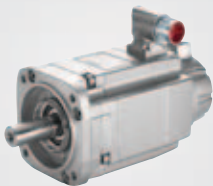


SINAMICS Inverters for Single-Axis Drives and SIMOTICS Motors

Catalog News D 31 N • January 2013















Motion Control Drives

Answers for industry.

SIEMENS

Related catalogs

<p>Motion Control SIMOTION, SINAMICS S120 & SIMOTICS Equipment for Production Machines</p> <p>E86060-K4921-A101-A3-7600</p>	PM 21 	<p>SITRAIN Training for Automation and Industrial Solutions</p> <p>Only available in German E86060-K6850-A101-C3</p>	
<p>SINAMICS Drives SINAMICS G130 Drive Converter Chassis Units SINAMICS G150 Drive Converter Cabinet Units E86060-K5511-A101-A5-7600</p>	D 11 	<p>Products for Automation and Drives Interactive Catalog</p> <p>DVD: E86060-D4001-A510-D2-7600</p>	
<p>SIMOTICS Low-Voltage Motors Frame sizes 63 to 450 Power 0.09 to 1250 kW</p> <p>E86060-K5581-A111-A4-7600</p>	D 81.1 	<p>Industry Mall Information and Ordering Platform in the Internet:</p> <p>www.siemens.com/industrymall</p>	
<p>MOTOX Geared Motors</p> <p>E86060-K5287-A111-A4-7600</p>	D 87.1 	<p>Further information</p> <p>Up-to-date information material, such as promotional literature, catalogs or brochures, is always available in the Internet at the following addresses:</p> <p>www.siemens.com/sinamics-g110 www.siemens.com/sinamics-g120c www.siemens.com/sinamics-g120p www.siemens.com/sinamics-g120 www.siemens.com/sinamics-g110d www.siemens.com/sinamics-g120d www.siemens.com/sinamics-s110 www.siemens.com/sinamics-s120 www.siemens.com/servomotors www.siemens.com/main-motors</p> <p>under "Marketing Materials (Brochures, Catalogs)".</p> <p>The offered documentation can be ordered or downloaded in common file formats (PDF, ZIP).</p> <p>new New products included in this Catalog News.</p>	
<p>SIMOGEAR Geared Motors</p> <p>E86060-K5250-A111-A1-7600</p>	MD 50.1 		
<p>FLENDER Couplings Standard Couplings</p> <p>E86060-K5710-A111-A4-7600</p>	MD 10.1 		
<p>SIMATIC Products for Totally Integrated Automation and Micro Automation</p> <p>E86060-K4670-A101-B3-7600</p>	ST 70 		
<p>SIMATIC HMI / PC-based Automation Human Machine Interface Systems PC-based Automation</p> <p>E86060-K4680-A101-B9-7600</p>	ST 80/ST PC 		
<p>Industrial Communication SIMATIC NET</p> <p>E86060-K6710-A101-B7-7600</p>	IK PI 		

Motion Control Drives SINAMICS Inverters for Single-Axis Drives and SIMOTICS Motors

Catalog News D 31 N · January 2013



The products and systems described in this catalog are distributed under application of a certified quality and environmental management system in accordance with ISO 9001:2008 (Certified Registration No. DE-001258 QM08) and ISO 14001:2004/Cor 1: 2009 (Certified Registration No. DE-001258 UM). The certificate is recognized by all IQNet countries.

Supersedes:

Catalog D 31 · 2012 chapters 4, 5, 6 and 8

Notes:

The Catalog News D 31 N · January 2013 complements Catalog D 31 · 2012. The Catalog News includes new products as well as updated technical specifications and selection and ordering data.

Refer to the Industry Mall for current updates of this catalog:

www.siemens.com/industrymall

The products contained in this catalog can also be found in the Interactive Catalog CA 01.

Order No.: E86060-D4001-A510-D2-7600

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SINAMICS G120C compact inverters 0.55 kW to 18.5 kW (0.75 hp to 25 hp)	4
SINAMICS G120P pump, fan, compressor inverters 0.37 kW to 90 kW (0.5 hp to 125 hp)	5
SINAMICS G120 standard inverters 0.37 kW to 250 kW (0.5 hp to 400 hp)	6
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Answers for industry.

Siemens Industry answers the challenges in the manufacturing and the process industry as well as in the building automation business. Our drive and automation solutions based on Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) are employed in all kinds of industry. In the manufacturing and the process industry. In industrial as well as in functional buildings.

Siemens offers automation, drive, and low-voltage switching technology as well as industrial software from standard products up to entire industry solutions. The industry software enables our industry customers to optimize the entire value chain – from product design and development through manufacture and sales up to after-sales service. Our electrical and mechanical components offer integrated technologies for the entire drive train – from couplings to gear units, from motors to control and drive solutions for all engineering industries. Our technology platform TIP offers robust solutions for power distribution.

Check out the opportunities our automation and drive solutions provide. And discover how you can sustainably enhance your competitive edge with us.

System overview



1/2	Converter/inverter selection
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1/3	Application examples
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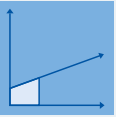
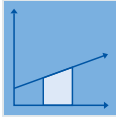
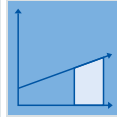
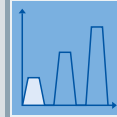
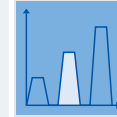

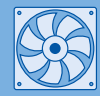
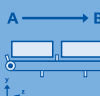
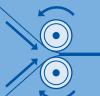

System overview

Converter/inverter selection

1

Overview

SINAMICS selection guide – typical applications

Application	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality			Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality		
						
Pumping, ventilating, compressing 	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	G110, G120C (G130, G150, GM150, GL150)	G120P, G120C, G120 (G130, G150, GM150, GL150)	S120	S110	S110, S120	S120 (GM150)
Moving 	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/disengagers
	G110, G110D, G120C (G130, G150, GM150)	G120D, G120C, G120, S120 (G130, G150, S150, GM150, GL150, SM150, DCM)	S120 (S150, SM150, SL150, GM150, DCM)	G120D new, S110	S110, S120 (DCM)	S120 (DCM)
Processing 	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders and unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	G120C (G130, G150, GM150)	G120C, G120 (G130, G150, S150, GM150, GL150, DCM)	S120 (S150, DCM)	S110	S110, S120	S120 (SM150, SL150, DCM)
Machining 	Main drives for • Turning • Drilling • Milling	Main drives for • Drilling • Sawing	Main drives for • Turning • Drilling • Milling • Gear cutting • Grinding	Axle drives for • Turning • Drilling • Milling	Axle drives for • Drilling • Sawing	Axle drives for • Turning • Drilling • Milling • Lasering • Gear cutting • Grinding • Nibbling and punching
	S110	S110, S120	S120	S110	S110, S120	S120

(Devices in brackets are not included in Catalog D 31)

Overview

Using the SINAMICS selection guide

The varying range of demands on modern variable frequency drives requires a large number of different types. This means that the individual types are highly efficient, but the selection of the right drive becomes significantly more complex. The application matrix shown simplifies this selection process considerably, by suggesting the ideal SINAMICS drive for examples of typical applications and requirements.

- The relevant type of use can be found on the vertical axis (supply, movement, processing or machining).
- What type of movement should be realized with what level of quality (basic, medium, high)? Find this using the relevant fields on the horizontal axis.

To make orientation easier, an example selection of typical applications is shown.

SINAMICS drives can be used to implement all types of applications. Just a part of the SINAMICS family is described here:

- SINAMICS G110
- SINAMICS G120C
- SINAMICS G120P
- SINAMICS G120
- SINAMICS G110D
- SINAMICS G120D
- SINAMICS S110
- SINAMICS S120 (single-axis AC drive)

The SINAMICS frequency converter family contains numerous other converters which can be found in the following catalogs if required:

- Motion Control low-voltage converters:
SINAMICS S120 and SIMOTION ⇒ Catalog PM 21
- Low-voltage converters with powers > 250 kW (400 hp):
SINAMICS G130, SINAMICS G150 ⇒ Catalog D 11
SINAMICS S150 ⇒ Catalog D 21.3
- Medium-voltage converters:
SINAMICS GM150, SINAMICS SM150 ⇒ Catalog D 12
- SINAMICS DC drives ⇒ Catalog D 23.1
- Solutions for machine tools:
SINUMERIK & SINAMICS ⇒ Catalogs NC 61, NC 62 and NC 82

Application examples

Moving

SINAMICS moves continuous or highly dynamic elevators, roll feeds, and many other applications from simple to high-performance versions, for conveyor technology, handling technology and many other areas. The solution suggested here for storage and retrieval machines is an example from the broad range of applications.

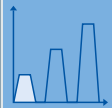
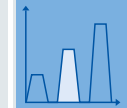
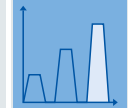
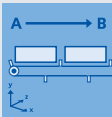
Storage and retrieval machines



SINAMICS G120D ^{new}, SINAMICS S110 and SINAMICS S120, with power ratings from 0.12 kW to 90 kW (0.16 hp to 125 hp), are ideally suited to motion control for synchronous and asynchronous (induction) motors in storage and retrieval machines. Depending on the application, there is a solution based on the drive-integrated positioning function Epos, a solution using the SIMOTION Motion Control System and a SIMATIC-based motion control solution.

Additional advantages:

- Precise positioning functions
- A high degree of flexibility, even for multi-axis groups and for three-dimensional movement sequences
- Energy-efficient thanks to regenerative feedback capability
- Can be controlled with SIMATIC or SIMOTION


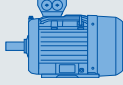
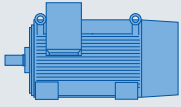
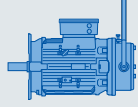
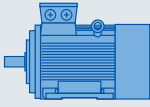
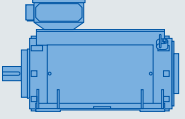
Application	Non-continuous motion		
	Requirements for torque accuracy/speed accuracy/position accuracy/coordination of axes/functionality		
	Basic	Medium	High
			
Moving 	Traction drive, lifting/lowering drive, telescopic conveyor		
Supply voltage	380 ... 480 V 3 AC		
Power	0.12 ... 90 kW (0.16 ... 125 hp)		
Degree of protection	IP65 for SINAMICS G120D, IP20		
SINAMICS platform	SINAMICS G120D SINAMICS S110	SINAMICS S110 SINAMICS S120	SINAMICS S120


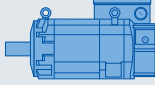

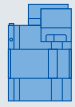
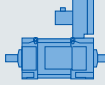
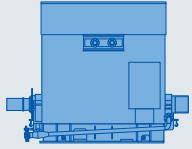
System overview

SIMOTICS motors for motion control applications

1

Overview

SIMOTICS						
Low-voltage motors for mains and converter operation						
	General purpose	Severe duty	Non-standard	Definite purpose	Explosion-protected	High torque
	GP	SD	TN	DP	XP	HT
						
Power	IEC: 0.09 ... 45 kW NEMA: 1 ... 200 hp	IEC: 0.75 ... 315 kW NEMA: 1 ... 400 hp	200 ... 1250 kW	0.09 ... 1250 kW	IEC: 0.12 ... 1000 kW NEMA: 1 ... 300 hp	150 ... 2100 kW
Torque	IEC: 0.61 ... 292 Nm NEMA: 2 ... 883 lb-ft	IEC: 5 ... 2022 Nm NEMA: 1.5 ... 1776 lb-ft	800 ... 8500 Nm	0.61 ... 8500 Nm	IEC: 0.61 ... 8090 Nm NEMA: 1.5 ... 1187 lb-ft	6000 ... 42000 Nm
Speed	750 ... 3600 rpm	750 ... 3600 rpm	750 ... 5000 rpm	750 ... 3600 rpm	750 ... 3600 rpm	0 ... 800 rpm
Applications	Pumps, fans, compressors with especially low weight and high efficiency requirements	Pumps, fans, compressors, marine and offshore applications, mixers, mills, extruders, rollers with special demands on ruggedness, particularly in the chem. and petrochem. industries	Pumps, fans, compressors, mixers, extruders in the chem. and petrochem. industries, paper-making machines, mining, cement, steel industry and marine applications	Special motors for e.g. work and transport roller tables, ventilation of tunnels, multi-storey car parks, shopping malls, dockside cranes, container terminals	For general industrial applications with special explosion protection requirements, e.g. in the process industry	High-torque gearless motors for paper-making machines, low-speed pumps, mills, steel shears, bow thrusters, winches or main drives on ships

SIMOTICS						
Motors for motion control					DC motors	High-voltage motors
	Servo	Main	Linear	Torque		
	S	M	L	T	DC	
						
Power	0.05 ... 34.2 kW (0.07 ... 45.9 hp)	2.8 ... 1340 kW (3.75 ... 1797 hp)	1.29 ... 81.9 kW (1.73 ... 110 hp)	1.7 ... 380 kW (2.28 ... 510 hp)	Up to 1610 kW (2159 hp)	200 ... 100000 kW (268 ... 134100 hp)
Torque	0.08 ... 125 Nm (0.06 ... 92.2 lb _f -ft)	13 ... 12435 Nm (9.59 ... 9172 lb _f -ft)	Feed force 66.3 ... 10375 N (14.9 ... 2332 lb _f)	22 ... 7000 Nm (16.2 ... 5163 lb _f -ft)	Up to 44500 Nm (32823 lb _f -ft)	1290 ... 25000000 Nm (952 ... 18440000 lb _f -ft)
Speed	Up to 10000 rpm	Up to 40000 rpm	Velocity up to 1280 m/min	Up to 1800 rpm	Up to 3600 rpm	9 ... 15000 rpm
Applications	Highly dynamic, high-precision applications, e.g. handling systems, wood, glass, ceramics and stone working, packaging, plastics and textile machines, machine tools	High-precision, highly dynamic rotary axes, e.g. main drives in presses, printing machines, roller drives and winders in foil machines and other converting applications, main spindle drives in machine tools	Applications with stringent requirements of dynamic response and precision for linear movements, e.g. machining centers, turning, grinding, laser machining, handling and machine tool applications	Rotary axis applications with stringent requirements of precision and force, e.g. extruders, winders, servo presses, roller drives, rotary axes in machine tools, rotary index tables, tool magazines	Motors for drive applications in all areas of industry and in infrastructure	Medium-voltage and high-voltage drive applications including pumps, fans, compressors, extruders, mills, crushers, conveyor belts, refiners, excavators for open-cast mining, main drives for marine applications, main drives for rolling mills

Further motors can be found in Catalogs D 81.1 and D 84.1.

Overview*SIMOTICS stands for*

- 125 years of experience in building electric motors
- The most comprehensive range of motors worldwide
- Optimum solutions in all industries, regions and power/performance classes
- Innovative motor technologies of the highest quality and reliability
- Outstanding dynamic response, precision and efficiency combined with the optimum degree of compactness
- Motor-end system integration into the drive train
- A global network of skill sets and worldwide service around-the-clock

A clearly structured portfolio

The entire SIMOTICS product portfolio is transparently organized according to application-specific criteria in order to help users select the optimum motor for their application.

The product range extends from standard motors for pumps, fans and compressors to highly dynamic, precise motion control motors for positioning tasks and motion control in handling applications, as well as production machinery and machine tools, to DC motors and powerful high-voltage motors. Whatever it is that you want to move – we can supply the right motor for the task.

An outstanding performance for any job

A key characteristic of all SIMOTICS motors is their quality. They are robust, reliable, dynamic and precise to assure the requisite performance level for any process and deliver exactly the capabilities demanded by the application in hand. Thanks to their compact design, they can be integrated as space-saving units into installations. Furthermore, their impressive energy efficiency makes them effective as a means of reducing operating costs and protecting the environment.

A dense network of skill sets and servicing expertise around the world

SIMOTICS offers not only a wealth of sound experience gleaned from a development history which stretches back over around 150 years, but also the know-how of hundreds of engineers. This knowledge and our worldwide presence form the basis for a unique proximity to industries, resulting in the specific motor configuration which is tailored to suit your application.

Our specialists are available to answer all your queries regarding any aspect of motor technology. At any time – wherever you are in the world. When you choose SIMOTICS, therefore, you reap the benefits of a global service network which is continuously accessible, thereby helping to optimize response times and minimize downtimes.

Perfection of the complete drive train

SIMOTICS is perfectly coordinated with other Siemens product families. In combination with the SINAMICS integrated converter family and the SIRIUS complete portfolio of industrial controls, SIMOTICS fits seamlessly as part of the complete drive train into automation solutions which are based on the SIMATIC, SIMOTION and SINUMERIK control systems.





System overview

SIMOTICS motors for motion control applications

1

Overview

Overview of motors for motion control applications

SIMOTICS – the largest motor portfolio worldwide			
Motors for motion control applications			
Servo S	Main M	Linear L	Torque T
1FK/1FT	1PH/1FE	1FN	1FW
			
<p>Rated power 0.05 ... 34.2 kW (0.05 ... 45.9 hp)</p> <p>Rated torque 0.08 ... 125 Nm (0.06 ... 92.2 lb_f-ft)</p> <p>Rated speed 1500 ... 6000 rpm</p>	<p>Rated power 2.8 ... 1340 kW (3.75 ... 1797 hp)</p> <p>Rated torque 13 ... 12435 Nm (9.59 ... 9172 lb_f-ft)</p> <p>Rated speed 400 ... 40000 rpm</p>	<p>Rated power 1.29 ... 81.9 kW (1.73 ... 110 hp)</p> <p>Rated force 66.3 ... 10375 Nm (14.9 ... 2332 lb_f) Maximum force 157 ... 20700 Nm (35.3 ... 4654 lb_f)</p> <p>Velocity 93.9 ... 1280 m/min</p>	<p>Rated power 1.7 ... 380 kW (2.28 ... 510 hp)</p> <p>Rated torque 22 ... 7000 Nm (16.2 ... 5163 lb_f-ft)</p> <p>Rated speed 38 ... 1200 rpm</p>
Application examples			
Handling systems, wood, glass, ceramics and stone working, packaging, plastics and textile machines, machine tool applications	Main drives in presses, printing machines, roller drives and winders in foil machines and other converting applications, main spindle drives in machine tools	Machining centers, turning, grinding and laser machining, handling and machine tool applications	Extruders, winders, servo presses, roller drives, rotary axes in machine tools, rotary index tables, tool magazines
Highlights			
Servomotors for highly dynamic, exact positioning and precise motion control – including motors with planetary and bevel gears	Main motors for precise concentricity in rotary axes and main drives	Linear motors for outstanding dynamic response and precision for linear traversing motions	Torque motors for the gearless direct drive of rotary axes
Degrees of protection			
IP64 ... IP67	IP23 ... IP65	IP65	IP23 ... IP55
Catalog			
PM 21, D 31, NC 61, NC 62, NC 82	PM 21, D 31, NC 61, NC 62, NC 82	PM 21, NC 61, NC 62	PM 21, NC 61, NC 62

Overview

Whether it is a servomotor, a main motor, a torque motor or a linear motor – no other manufacturer anywhere in the world offers such an extensive portfolio of motors for motion control applications. Perfectly coordinated for operation with SINAMICS converters, all products in the portfolio impress with their compact dimensions, precision and dynamic response.

SIMOTICS S servomotors *Highly dynamic and extremely compact*

Whether they are used for positioning in pick and place applications, as cyclic drives in packaging machines or for path control in handling systems and machine tools: Our permanent-magnet, highly energy efficient SIMOTICS servomotors are the first choice for any application which demands **highly dynamic and precise motional sequences**. Depending on the application, they are available with various different built-in encoders – from the simple resolver to the high-resolution absolute encoder. SIMOTICS S motors are also available optionally with gearing.

SIMOTICS M main motors *Exact rotation at up to 40000 rpm*

For applications where **continuous, precise rotation** of the axes is the primary concern. Thus they are ideally suited for the main drives for presses, as roller drives in printing and paper-making machines, textiles and plastics-processing machines. They can also be deployed as winder drives and in machine tool spindles and hoisting gear. With a power spectrum ranging from 2.8 kW to 1340 kW, they cover virtually every application.

SIMOTICS L linear motors *Improved dynamic response all along the line*

The ideal solution for any application which requires linear movements to be performed with **maximum dynamic response and precision**. The reason: The effects of elasticity, backlash and friction as well as natural oscillation in the drive train are largely eliminated because no mechanical transmission elements such as ball screw, coupling and belt are needed when linear motors are used. This simplifies the machine design and reduces wear.

SIMOTICS T torque motors *Outstanding precision for rotary axes*

Optimized **for high torques at low rated speeds**. With their excellent precision, dynamic response and low wear, these motors have all the right credentials for use as built-in motors in rotary indexing machines, rotary tables or swivel and rotary axes, e.g. on machine tools. The same also applies to complete torque motors which are typically used as a roller and winder drive in converting applications.

Optimally coordinated system solutions

SIMOTICS motors are perfectly coordinated with the drive systems of the SINAMICS family. They provide you with precisely tailored, state-of-the-art motion control solutions in all performance classes created using globally available standard components. Electronic rating plates and the ability to integrate the motors via the DRIVE-CLiQ system interface ensure quick commissioning as well as problem-free operation. Thanks to the integral encoders with redundant encoder tracks and safety functions which are integrated in the drive, modern safety concepts are easy to implement. As a result, external safety components are completely unnecessary. All components can be interconnected simply and reliably by means of pre-assembled MOTION-CONNECT signal and power cables.

Powerful tools and competent support

Siemens offers expert advice and efficient tools to help users select the right motor solution. Experienced specialists are always ready to lend a hand in designing mechanically integrated motor solutions.

- Engineering tool SIZER for Siemens Drives
 - User-friendly support when dimensioning the motor and gear unit
www.siemens.com/sizer
- CAD CREATOR
 - Dimension drawing and 2D/3D CAD generator
www.siemens.com/cadcreator

System overview

Notes

1

SINAMICS G120C compact inverters 0.55 kW to 18.5 kW (0.75 hp to 25 hp)

4



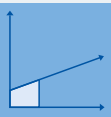
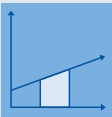
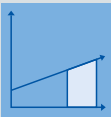
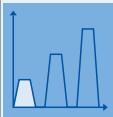
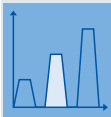
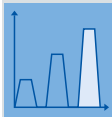

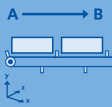
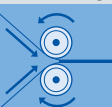

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SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Introduction

Application

Application	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality 	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality 	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality 	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality 	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality 	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality 
Pumping, ventilating, compressing 	Centrifugal pumps Radial / axial fans Compressors G110, G120C (G130, G150, GM150, GL150)	Centrifugal pumps Radial / axial fans Compressors G120P, G120C, G120 (G130, G150, GM150, GL150)	Eccentric screw pumps S120	Hydraulic pumps Metering pumps S110	Hydraulic pumps Metering pumps S110, S120	Descaling pumps Hydraulic pumps S120 (GM150)
Moving 	Conveyor belts Roller conveyors Chain conveyors G110, G110D, G120C (G130, G150, GM150)	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/moving walkways Indoor cranes Marine drives Cable railways G120D, G120C, G120, S120 (G130, G150, S150, GM150, GL150, SM150, DCM)	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays S120 (S150, SM150, SL150, GM150, DCM)	Acceleration conveyors Storage and retrieval machines G120D, S110	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers S110, S120 (DCM)	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/disengagers S120 (DCM)
Processing 	Mills Mixers Kneaders Crushers Agitators Centrifuges G120C (G130, G150, GM150)	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces G120C, G120 (G130, G150, S150, GM150, GL150, DCM)	Extruders Winders and unwinders Lead/follower drives Calenders Main press drives Printing machines S120 (S150, DCM)	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile S110	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile S110, S120	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations S120 (SM150, SL150, DCM)
Machining 	Main drives for • Turning • Drilling • Milling S110	Main drives for • Drilling • Sawing S110, S120	Main drives for • Turning • Drilling • Milling • Gear cutting • Grinding S120	Axle drives for • Turning • Drilling • Milling S110	Axle drives for • Drilling • Sawing S110, S120	Axle drives for • Turning • Drilling • Milling • Lasering • Gear cutting • Grinding • Nibbling and punching S120

(Devices in brackets are not included in Catalog D 31)

SINAMICS G120C compact inverters continuously control the speed of three-phase asynchronous (induction) motors and can be used in a wide range of industrial areas. They are generally

suitable for applications involving conveyor belts, mixers, extruders, pumps, fans, compressors and basic handling machines.

More information

You may also be interested in these inverters:

- More performance in the control cabinet in IP20 degree of protection ⇒ SINAMICS G120
- Higher degree of protection for power ratings up to 7.5 kW ⇒ SINAMICS G110D, SINAMICS G120D
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS S110
- With positioning function for distributed drive solutions in IP65 degree of protection ⇒ SINAMICS G120D

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Overview



SINAMICS G120C frame sizes FSA, FSB and FSC with mounted blanking cover

SINAMICS G120C compact inverters offer a well-balanced combination of features to address a wide range of applications. SINAMICS G120C inverters are compact, rugged devices that are easy to operate and can be optionally equipped with a basic or advanced operator panel.

SINAMICS G120C inverters are especially suitable when it comes to meeting the requirements of system integrators, OEMs and distributors regarding high productivity and tailored performance.

Benefits

- Compact design
- Side-by-side design
- High power density, low envelope dimensions
- Simple installation in the tightest space
- Low space requirement
- Use in small control cabinets, close to the machine
- Optimized parameter set
- Optimized commissioning
- Getting Started document
- BOP-2 or IOP operator panels can be used
- Integrated USB connection
- Simple and fast software parameter assignment
- Simple to use during commissioning and in operation
- Minimized training costs, existing SINAMICS know-how can be used
- High degree of service friendliness, simple maintenance
- Plug-in terminals
- Cloning function using BOP-2, IOP or memory card
- Operating hours counter for "drive on" and "motor on"
- Fast mechanical installation
- Intuitive standard commissioning
- Integrated component of Totally Integrated Automation
- Energy-efficient, sensorless vector control
- Automatic flux reduction with V/f ECO
- Integrated energy saving computer
- Safety Integrated (STO)
- Communications versions with PROFINET, PROFIBUS DP, CAN, USS/Modbus RTU
- Coated modules
- Operation up to an ambient temperature of 60 °C (140 °F)

Design

SINAMICS G120C is a compact inverter for control cabinet mounting in IP20 degree of protection where the Control Unit (CU) and Power Module (PM) function units are combined in one device.

The compact mechanical design and the high power density allow these devices to be installed in machine control enclosures and control cabinets for maximum space utilization. The SINAMICS G120C compact inverter can be butt-mounted directly, without derating; the PROFINET version can be butt-mounted up to 55 °C (131 °F).



SINAMICS G120C, frame size FSB, with BOP-2

SINAMICS G120C can be integrated into the widest range of applications, either using the integrated digital and analog inputs or via the integrated fieldbus interface (available in the USS/Modbus RTU, PROFIBUS DP, PROFINET, CANopen versions). Especially the product versions with integrated PROFIBUS DP or PROFINET interface make full integration into the Siemens TIA family possible, therefore allowing the advantages of the seamless TIA product family to be fully utilized. SINAMICS G120C devices are preset in the factory so that they can be immediately connected to PROFIBUS DP, PROFINET and CANopen fieldbuses and used without parameterization.

SINAMICS G120C is also equipped with the safety function STO (Safe Torque Off) as standard, which is used to safely stop drives. As a consequence, machine manufacturers can simply comply with current machinery directives with minimum associated costs.

SINAMICS G120C can control asynchronous (induction) motors in the power range from 0.37 kW up to 18.5 kW (0.5 hp up to 25 hp). Reliable and efficient motor operation is achieved by using state-of-the-art IGBT technology combined with vector control. The extensive range of functions integrated in the SINAMICS G120C also offers a high degree of protection for the inverter and motor.

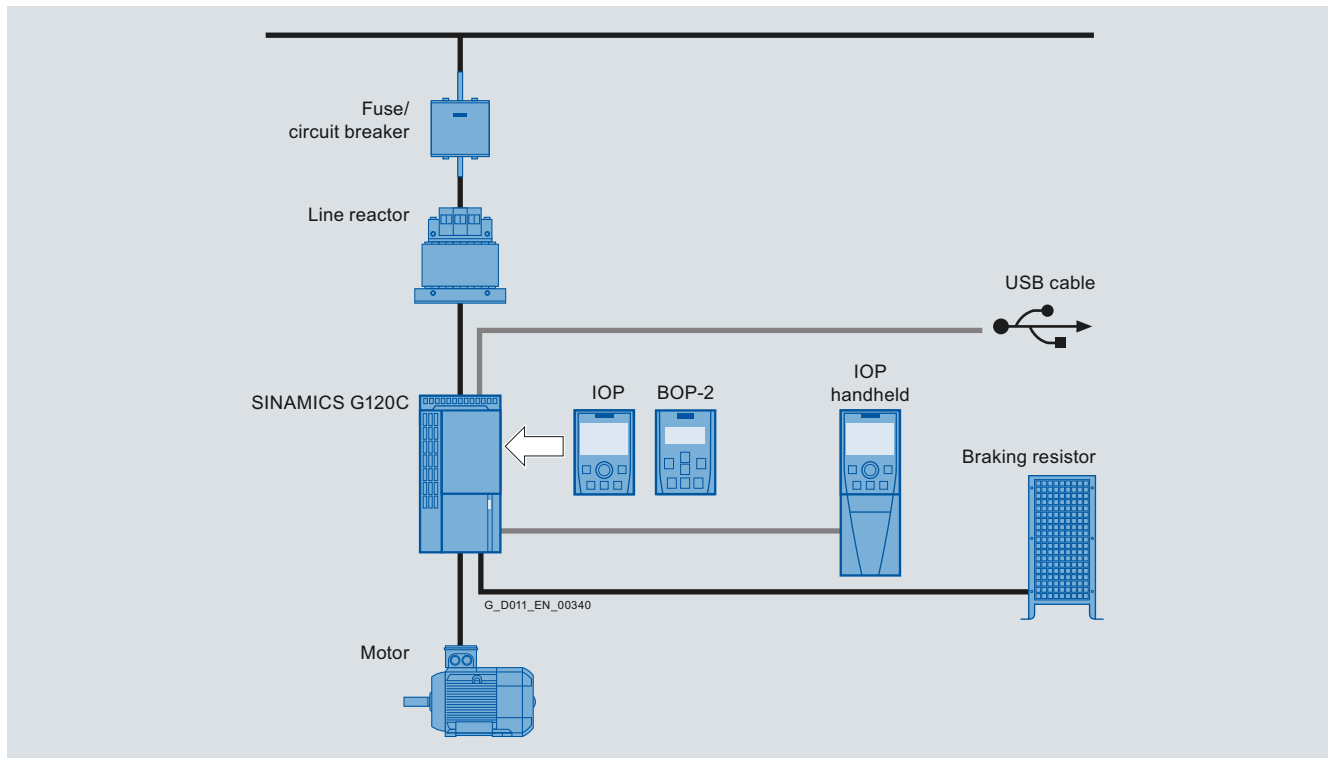
SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Design

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Line-side components

Line reactors

A line reactor is used to smooth voltage peaks (inverter protection) and to reduce commutating dips (line harmonic distortion).

Recommended line-side power components

Standard fuses can be used for the SINAMICS G120C. These must be dimensioned to comply with local regulations. In this chapter, you will find recommended components such as fuses and circuit breakers in compliance with IEC and UL regulations.

DC link components

Braking resistors

The excess energy of the DC link is dissipated using the braking resistor. The braking resistors are designed for use with the SINAMICS G120C. This has an integrated brake chopper (electronic switch).

Supplementary system components

Intelligent Operator Panel IOP

Graphics-based, user-friendly and powerful operator panel for commissioning and diagnostics as well as local operator control and monitoring of SINAMICS G120C.

Basic Operator Panel BOP-2

A 2-line display to provide support when commissioning and troubleshooting the drive. The drive can be locally controlled.

Memory cards

The parameter settings for an inverter can be stored on the SINAMICS micro memory card (MMC) or SINAMICS SD card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again. The associated memory card holder is integrated in the inverter.

PC inverter connection kit 2

For controlling and commissioning an inverter directly from a PC, if the STARTER commissioning tool V4.3 and higher has been installed on the PC.

Spare parts

Shield plates

A set of shield plates is included in the scope of delivery for the motor and signal cables corresponding to the frame size of the SINAMICS G120C, and can also be ordered as spare parts.

Spare parts kit

This kit comprises 5 sets of I/O terminals, 1 RS485 terminal, 2 pairs of Control Unit doors (1 × PN and 1 × other communication versions) and 1 blanking cover.

Set of connectors

A set of connectors for the line feeder cable, braking resistor and motor cable can be ordered corresponding to the frame size of the SINAMICS G120C inverter.

Roof-mounted fan

A roof-mounted fan (at the top of the device) comprising a pre-assembled unit with holder and fan can be ordered corresponding to the frame size of the SINAMICS G120C.

Fan unit

A replacement fan (at the rear of the device; heat sink) comprising a pre-assembled unit with holder and fan can be ordered corresponding to the frame size of the SINAMICS G120C.

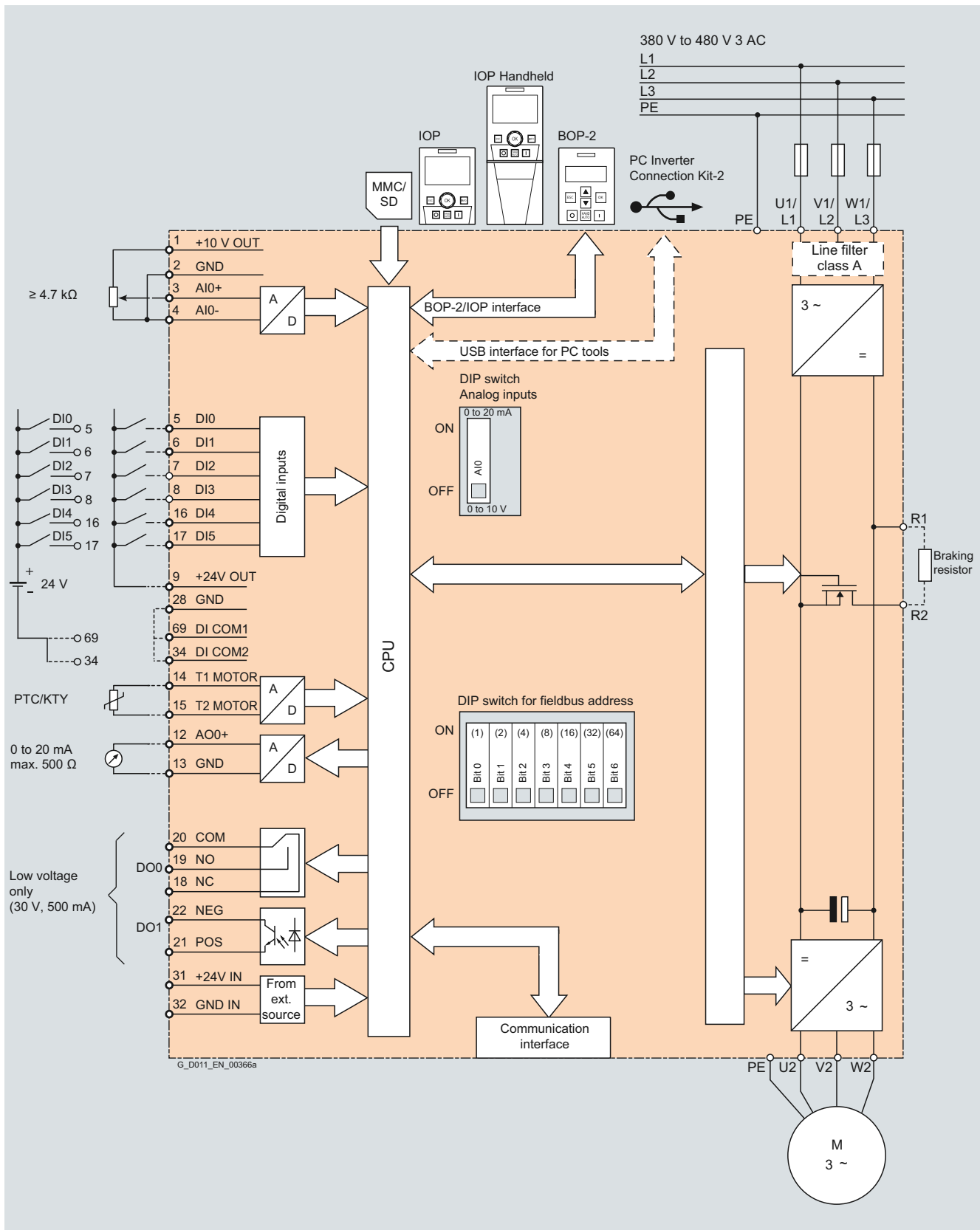
SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Integration

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Connection example for SINAMICS G120C

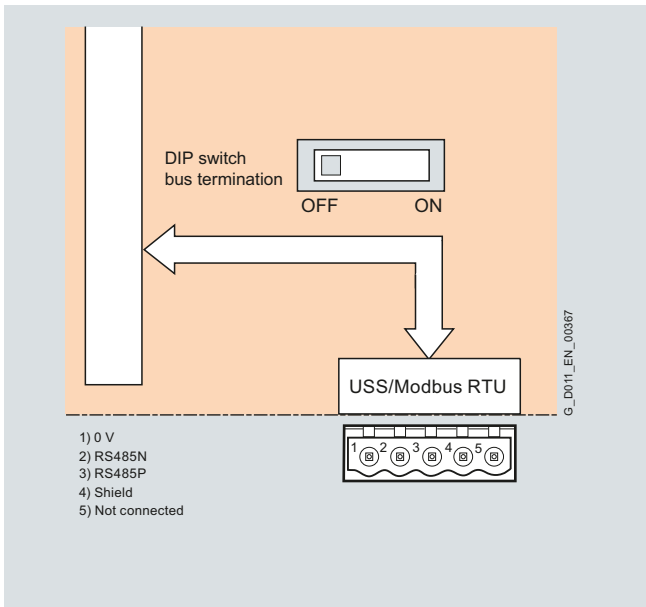
SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

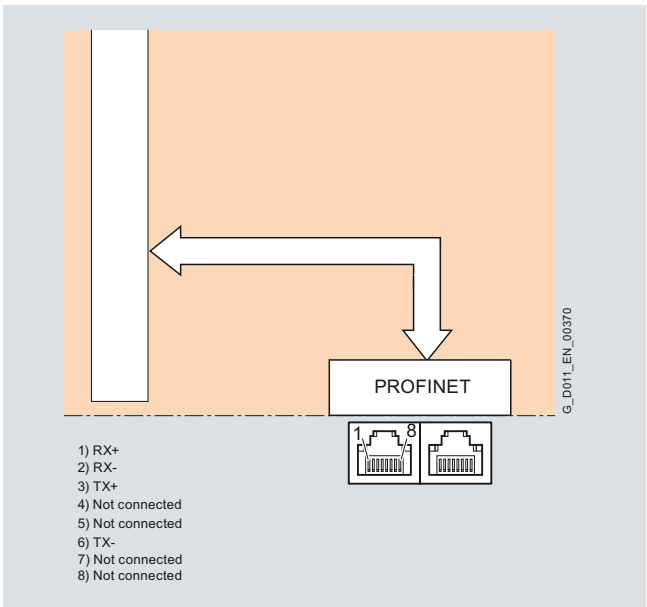
SINAMICS G120C compact inverters

Integration

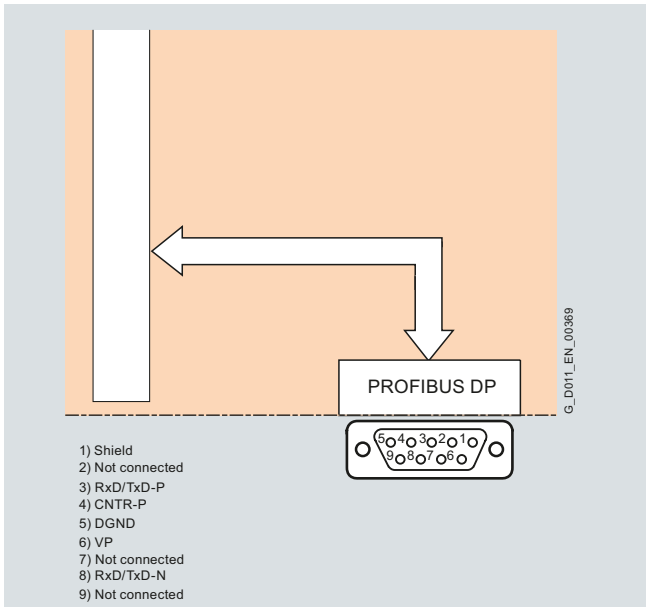
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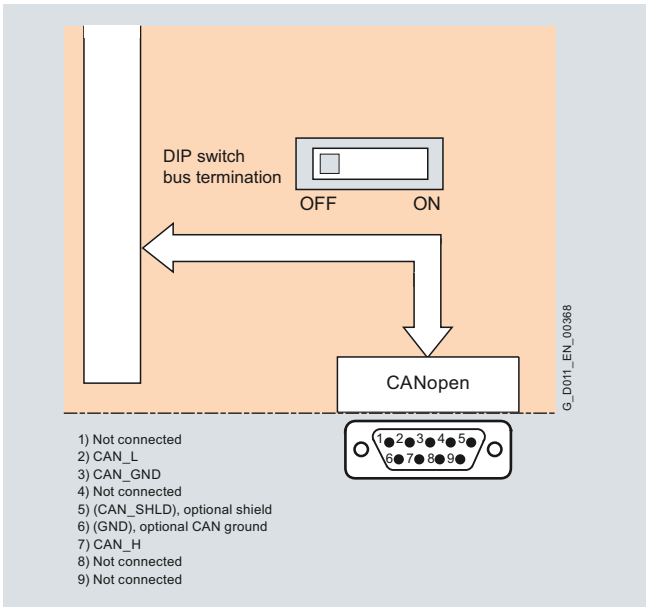
USS/Modbus RTU communication interface



PROFINET communication interface



PROFIBUS DP communication interface



CANopen communication interface

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Configuration

The following electronic configuring guides and engineering tools are available for the SINAMICS G120C compact inverters:

Selection guide DT Configurator within the CA 01

The interactive catalog CA 01 – the offline mall of Siemens Industry Automation & Drive Technologies – contains over 100000 products with approximately 5 million possible drive system product variants. The DT Configurator has been developed to facilitate selection of the optimum motor and/or inverter from the wide spectrum of drives. The configurator is integrated as a "selection guide" in this catalog on the DVD-ROM with the selection and configuration tools.

Online DT Configurator

In addition, the DT Configurator can be used in the Internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:
www.siemens.com/dt-configurator

SIZER for Siemens Drives engineering tool

The SIZER for Siemens Drives engineering tool makes it easy to engineer the SINAMICS and MICROMASTER 4 drive families. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER for Siemens Drives covers the full range of operations required to configure a complete drive system, from basic single drives to demanding multi-axis applications.

[Additional information on the SIZER for Siemens Drives engineering tool is provided in Catalog D 31, chapter Engineering tools.](#)

STARTER commissioning tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics. Apart from the SINAMICS drives, STARTER is also suitable for MICROMASTER 4 devices. For SINAMICS G120D, STARTER version 4.3 and higher.

[Additional information on the STARTER commissioning tool is provided in Catalog D 31, chapter Engineering tools.](#)

Drive ES engineering system

Drive ES is the engineering system used to integrate the communication, configuration and data management functions of Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively. The STEP 7 Manager user interface provides the ideal basis for this. A variety of software packages are available for SINAMICS – Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7.1.

[Additional information on the Drive ES engineering system is provided in Catalog D 31, chapter Engineering tools.](#)

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Selection and ordering data

The order number is selected corresponding to

- the required motor power or the motor current required and the overload requirements of the application,
- the necessary EMC classification and
- the required integrated fieldbus interface

Rated power ¹⁾		Base-load current I_L ²⁾	Base-load current I_H ³⁾	Frame size	Version	SINAMICS G120C without filter		SINAMICS G120C with integrated filter class A	
kW	hp					Order No.	Order No.		
Line voltage 380 ... 480 V 3 AC									
0.55	0.75	1.7	1.3	FSA	USS/Modbus RTU	new	6SL3210-1KE11-8UB1	new	6SL3210-1KE11-8AB1
					PROFIBUS DP	new	6SL3210-1KE11-8UP1	new	6SL3210-1KE11-8AP1
					PROFINET	new	6SL3210-1KE11-8UF1	new	6SL3210-1KE11-8AF1
					CANopen	new	6SL3210-1KE11-8UC1	new	6SL3210-1KE11-8AC1
0.75	1.0	2.2	1.7	FSA	USS/Modbus RTU	new	6SL3210-1KE12-3UB1	new	6SL3210-1KE12-3AB1
					PROFIBUS DP	new	6SL3210-1KE12-3UP1	new	6SL3210-1KE12-3AP1
					PROFINET	new	6SL3210-1KE12-3UF1	new	6SL3210-1KE12-3AF1
					CANopen	new	6SL3210-1KE12-3UC1	new	6SL3210-1KE12-3AC1
1.1	1.5	3.1	2.2	FSA	USS/Modbus RTU	new	6SL3210-1KE13-2UB1	new	6SL3210-1KE13-2AB1
					PROFIBUS DP	new	6SL3210-1KE13-2UP1	new	6SL3210-1KE13-2AP1
					PROFINET	new	6SL3210-1KE13-2UF1	new	6SL3210-1KE13-2AF1
					CANopen	new	6SL3210-1KE13-2UC1	new	6SL3210-1KE13-2AC1
1.5	2.0	4.1	3.1	FSA	USS/Modbus RTU	new	6SL3210-1KE14-3UB1	new	6SL3210-1KE14-3AB1
					PROFIBUS DP	new	6SL3210-1KE14-3UP1	new	6SL3210-1KE14-3AP1
					PROFINET	new	6SL3210-1KE14-3UF1	new	6SL3210-1KE14-3AF1
					CANopen	new	6SL3210-1KE14-3UC1	new	6SL3210-1KE14-3AC1
2.2	3.0	5.6	4.1	FSA	USS/Modbus RTU	new	6SL3210-1KE15-8UB1	new	6SL3210-1KE15-8AB1
					PROFIBUS DP	new	6SL3210-1KE15-8UP1	new	6SL3210-1KE15-8AP1
					PROFINET	new	6SL3210-1KE15-8UF1	new	6SL3210-1KE15-8AF1
					CANopen	new	6SL3210-1KE15-8UC1	new	6SL3210-1KE15-8AC1
3.0	4.0	7.3	5.6	FSA	USS/Modbus RTU	new	6SL3210-1KE17-5UB1	new	6SL3210-1KE17-5AB1
					PROFIBUS DP	new	6SL3210-1KE17-5UP1	new	6SL3210-1KE17-5AP1
					PROFINET	new	6SL3210-1KE17-5UF1	new	6SL3210-1KE17-5AF1
					CANopen	new	6SL3210-1KE17-5UC1	new	6SL3210-1KE17-5AC1
4.0	5.0	8.8	7.3	FSA	USS/Modbus RTU	new	6SL3210-1KE18-8UB1	new	6SL3210-1KE18-8AB1
					PROFIBUS DP	new	6SL3210-1KE18-8UP1	new	6SL3210-1KE18-8AP1
					PROFINET	new	6SL3210-1KE18-8UF1	new	6SL3210-1KE18-8AF1
					CANopen	new	6SL3210-1KE18-8UC1	new	6SL3210-1KE18-8AC1
5.5	7.5	12.5	8.8	FSB	USS/Modbus RTU	new	6SL3210-1KE21-3UB1	new	6SL3210-1KE21-3AB1
					PROFIBUS DP	new	6SL3210-1KE21-3UP1	new	6SL3210-1KE21-3AP1
					PROFINET	new	6SL3210-1KE21-3UF1	new	6SL3210-1KE21-3AF1
					CANopen	new	6SL3210-1KE21-3UC1	new	6SL3210-1KE21-3AC1
7.5	10	16.5	12.5	FSB	USS/Modbus RTU	new	6SL3210-1KE21-7UB1	new	6SL3210-1KE21-7AB1
					PROFIBUS DP	new	6SL3210-1KE21-7UP1	new	6SL3210-1KE21-7AP1
					PROFINET	new	6SL3210-1KE21-7UF1	new	6SL3210-1KE21-7AF1
					CANopen	new	6SL3210-1KE21-7UC1	new	6SL3210-1KE21-7AC1
11	15	25	16.5	FSC	USS/Modbus RTU	new	6SL3210-1KE22-6UB1	new	6SL3210-1KE22-6AB1
					PROFIBUS DP	new	6SL3210-1KE22-6UP1	new	6SL3210-1KE22-6AP1
					PROFINET	new	6SL3210-1KE22-6UF1	new	6SL3210-1KE22-6AF1
					CANopen	new	6SL3210-1KE22-6UC1	new	6SL3210-1KE22-6AC1
15	20	31	25	FSC	USS/Modbus RTU	new	6SL3210-1KE23-2UB1	new	6SL3210-1KE23-2AB1
					PROFIBUS DP	new	6SL3210-1KE23-2UP1	new	6SL3210-1KE23-2AP1
					PROFINET	new	6SL3210-1KE23-2UF1	new	6SL3210-1KE23-2AF1
					CANopen	new	6SL3210-1KE23-2UC1	new	6SL3210-1KE23-2AC1
18.5	25	37	31	FSC	USS/Modbus RTU	new	6SL3210-1KE23-8UB1	new	6SL3210-1KE23-8AB1
					PROFIBUS DP	new	6SL3210-1KE23-8UP1	new	6SL3210-1KE23-8AP1
					PROFINET	new	6SL3210-1KE23-8UF1	new	6SL3210-1KE23-8AF1
					CANopen	new	6SL3210-1KE23-8UC1	new	6SL3210-1KE23-8AC1

¹⁾ The rated power of the device based on the rated output current I_L and a rated input voltage of 400 V 3 AC. The rated power is specified on the device rating plate.

²⁾ The base-load current I_L is based on the duty cycle for low overload (LO). The current value is specified on the device rating plate.

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO). The current value is not specified on the device rating plate.

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all SINAMICS G120C compact inverters.

Mechanical specifications	
Vibratory load According to EN 60068-2-6	
• Transport in the transport packaging	5 ... 9 Hz: Constant deflection 3.1 mm 9 ... 200 Hz: Constant acceleration = 9.81 m/s ² (1 × g)
• Operation	2 ... 9 Hz: Constant deflection 7 mm 9 ... 200 Hz: Constant acceleration = 19.62 m/s ² (2 × g)
Shock load According to EN 60068-2-27	
• Transport in the transport packaging	147.15 m/s ² (15 × g)/11 ms 3 shocks in each axis and direction
• Operation	147.15 m/s ² (15 × g)/11 ms 3 shocks in each axis and direction
Degree of protection	IP20/ UL open type
Permissible mounting position	Horizontal panel mounting
Ambient conditions	
Protection class According to EN 61800-5-1	Class III (PELV1)
Touch protection According to EN 61800-5-1	Class I (with protective conductor system)
Humidity, max.	95 % at 40 °C (104 °F), condensation and icing not permissible
Ambient temperature	
• Storage ¹⁾ acc. to EN 60068-2-1	-40 ... +70 °C (-40 ... +158 °F)
• Transport ¹⁾ acc. to EN 60068-2-1	-40 ... +70 °C (-40 ... +158 °F)
• Operation acc. to EN 60068-2-2	-10 ... +40 °C (14 ... 104 °F) without derating >40 ... 60 °C (104 ... 140 °F) see derating characteristics
Environmental class in operation	
• Harmful chemical substances	Class 3C2 to EN 60721-3-3
• Organic/biological pollutants	Class 3B1 to EN 60721-3-3
• Degree of pollution	2 acc. to EN 61800
Standards	
Compliance with standards	CE, cULus, c-tick
Fail-safe certification	
• According to EN 60204 (2007)	Function: Safe Torque Off (STO) Category 3
• According to IEC 61508, Parts 1 to 7 (1998 ... 2001)	SIL 2
• According to EN ISO 13849 Part 1 (2008)	PL d
• PFH _D	5 × 10 ⁻⁸
• T1	20 years
CE marking, according to	EMC Directive 2004/108/EC Low-Voltage Directive 2006/95/EC
EMC behavior According to EN 61800-3	
• Frame sizes FSA to FSC with integrated line filter class A	The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter. Category C2 with max. 25 m (82 ft) shielded motor cable and conducted interference
• Frame size FSA with integrated line filter class A	Category C2 with max. 25 m (82 ft) shielded motor cable
• Frame size FSB with integrated line filter class A and non-PROFINET version	Category C2 with max. 25 m (82 ft) shielded motor cable
• Frame size FSB with integrated line filter class A and PROFINET version as well as mandatory use of a line reactor at the inverter	Category C2 with max. 25 m (82 ft) shielded motor cable
• Frame size FSB with integrated line filter class A and PROFINET version	Category C3 with max. 25 m (82 ft) shielded motor cable
• Frame size FSC with integrated line filter class A	Category C3 with max. 25 m (82 ft) shielded motor cable

¹⁾ In transport packaging.

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Technical specifications

SINAMICS G120C compact inverter	USS/Modbus RTU version	PROFIBUS DP version	PROFINET version	CANopen version
	6SL3210-1KE...B1	6SL3210-1KE...P1	6SL3210-1KE...F1	6SL3210-1KE...C1
Integrated bus interface				
Protocols	USS Modbus RTU (switchable using a parameter)	PROFIdrive Profile V4.1	PROFINET IO PROFIdrive profile V4.1 PROFIsave PROFIenergy	CANopen
Hardware	Plug-in terminal, insulated, USS: max. 187.5 kbaud Modbus RTU: 19.2 kbaud, Bus terminating resistors that can be switched in	9-pin SUB-D connector, insulated, Max. 12 Mbit/s Slave address can be set using DIP switches	2 × RJ45, max. 100 Mbit/s (full duplex), device name can be stored on the device	9-pin SUB-D socket, insulated, Max. 1 Mbit/s
I/O interfaces				
Signal cable cross-section	0.15 mm ² ... 1.5 mm ² (AWG28 ... AWG16)			
Digital inputs – Standard	6 isolated inputs Optically isolated; Free reference potential (own potential group) NPN/PNP logic can be selected using the wiring			
• Switching level: 0 → 1	11 V			
• Switching level: 1 → 0	5 V			
• Input current, max.	15 mA			
Fail-safe input	1 safety input When using the standard digital inputs (DI4+DI5) Safety function: Safe Torque OFF (STO)			
Digital outputs	1 relay changeover contact 30 V DC, 0.5 A (ohmic load) 1 transistor 30 V DC, 0.5 A (ohmic load)			
Analog inputs	1 analog input Differential input Switchable between voltage (-10 ... +10 V) and current (0/4 ... 20 mA) using a DIP switch 10-bit resolution Can be used as additional digital input Analog inputs are protected in a voltage range of ± 30 V and have a common-mode voltage in the ± 15 V range.			
• Switching threshold: 0 → 1	4 V			
• Switching threshold: 1 → 0	1.6 V			
Analog outputs	1 analog output Non-isolated output Switchable between voltage (0 ... 10 V) and current (0/4 ... 20 mA) using a parameter Voltage mode: 10 V, min. burden 10 kΩ Current mode: 20 mA, max. burden 500 Ω The analog outputs have short circuit protection			
PTC/KTY interface	1 motor temperature sensor input Sensors that can be connected: PTC, KTY and Thermo-Click, Accuracy ±5 °C			
Voltage supply for the integrated Control Unit	24 V DC via the Power Module or by connecting to an external 20.4 ... 28.8 V DC power supply			
Tool interfaces				
Memory cards	Optional 1 SINAMICS micro memory card (MMC) or 1 SINAMICS SD card			
Operator panels	Optional Basic Operator Panel BOP-2 or Intelligent Operator Panel IOP			
PC interface	USB			

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Technical specifications

SINAMICS G120C compact inverter	USS/Modbus RTU version	PROFIBUS DP version	PROFINET version	CANopen version
	6SL3210-1KE...B1	6SL3210-1KE...P1	6SL3210-1KE...F1	6SL3210-1KE...C1
Open-loop/closed-loop control techniques				
V/f linear/square/parameterizable	✓			
V/f with flux current control (FCC)	✓			
V/f ECO linear/square	✓			
Vector control, sensorless	✓			
Vector control, with sensor	–			
Torque control, sensorless	–			
Torque control, with sensor	–			
Software functions				
Setpoint input	✓			
Fixed frequencies	16, parameterizable			
JOG	✓			
Digital motorized potentiometer (MOP)	✓			
Ramp smoothing	✓			
Extended ramp-function generator (with ramp smoothing Off3)	✓			
Positioning down ramp	–			
Slip compensation	✓			
Signal interconnection with BICO technology	✓			
Free function blocks (FFB) for logical and arithmetic operations	–			
Switchable drive data sets (DDS)	–			
Switchable command data sets (CDS)	✓ (2)			
Flying restart	✓			
Automatic restart after line supply failure or operating fault (AR)	✓			
Technology controller (internal PID)	✓			
Energy consumption counter	✓			
Energy saving computer	✓			
Thermal motor protection	✓ (I^2t , sensor: PTC/KTY/Thermo-Click)			
Thermal inverter protection	✓			
Motor identification	✓			
Motor holding brake	✓			
Auto-ramping (V_{dcmax} controller)	✓			
Kinetic buffering (V_{dcmin} controller)	✓			
Braking functions				
• DC braking	✓			
• Compound braking	✓			
• Dynamic braking with integrated brake chopper	✓			

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Technical specifications

General technical specifications of the power electronics	
System operating voltage	380 ... 480 V 3 AC +10 % -20 %
Line supply requirements Line short circuit voltage u_K	No restriction
Input frequency	47 ... 63 Hz
Output frequency	
• Control type V/f	0 ... 650 Hz
• Control type Vector	0 ... 240 Hz
Pulse frequency	4 kHz for higher pulse frequencies up to 16 kHz, see derating data
Power factor λ	0.7 ... 0.85
Offset factor $\cos \varphi$	≥ 0.95
Output voltage, max. In % of input voltage	95 %
Overload capability	
• Low overload LO <u>Note:</u> No reduction in base-load current I_L for use of overload.	1.5 × base-load current I_L (i. e. 150 % overload) for 3 s plus 1.1 × base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s
• High overload HO <u>Note:</u> No reduction in base-load current I_H for use of overload.	2 × base-load current I_H (i. e. 200 % overload) for 3 s plus 1.5 × base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s
Electromagnetic compatibility	With integrated line filter Category C2/C3 according to EN 61800-3
Cooling	Air cooling using an integrated fan
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics
Standard SCCR (Short Circuit Current Rating) ¹⁾	65 kA
Protection functions	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature

¹⁾ Applies to industrial control cabinet installations to NEC article 409/UL 508A.

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Technical specifications

Line voltage 380 ... 480 V 3 AC		SINAMICS G120C power electronics			
		6SL3210-1KE11-8..1	6SL3210-1KE12-3..1	6SL3210-1KE13-2..1	6SL3210-1KE14-3..1
Output current at 400 V 3 AC					
• Rated current I_{rated} ¹⁾	A	1.8	2.3	3.2	4.3
• Base-load current I_L ²⁾	A	1.7	2.2	3.1	4.1
• Base-load current I_H ³⁾	A	1.3	1.7	2.2	3.1
• I_{max}	A	2.6	3.4	4.4	6.2
Rated power					
• Based on I_L	kW (hp)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• Based on I_H	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)
Rated pulse frequency		kHz	4	4	4
Efficiency η			0.97	0.97	0.97
Power loss at rated current		kW	0.04	0.05	0.05
Cooling air requirement		m ³ /s (ft ³ /s)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)
Sound pressure level L_{pA} (1 m)		dB	<52	<52	<52
Rated input current ⁴⁾					
• Based on I_L	A	2.3	2.9	4.1	5.5
• Based on I_H	A	1.9	2.5	3.2	4.5
Length of cable to braking resistor, max.		m (ft)	15 (49)	15 (49)	15 (49)
Line supply connection U1/L1, V1/L2, W1/L3			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)
Motor connection U2, V2, W2			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)
Connection for braking resistor R1, R2			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)
PE connection			On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Motor cable length, max. ⁵⁾					
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)
Dimensions					
• Width	mm (in)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)
• Height	mm (in)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)
• Depth					
- Without operator panel	mm (in)	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))
- With operator panel	mm (in)	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))
Frame size			FSA	FSA	FSA
Weight, approx.					
• Without filter	kg (lb)	1.7 (3.75)	1.7 (3.75)	1.7 (3.75)	1.7 (3.75)
• With integrated filter class A	kg (lb)	1.9 (4.19)	1.9 (4.19)	1.9 (4.19)	1.9 (4.19)

¹⁾ The rated output current I_{rated} can be used up to 100 %; however, without overload.

²⁾ The base-load current I_L is based on the duty cycle for low overload (LO).

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

⁴⁾ The rated input currents are valid for an input voltage of 400 V 3 AC and a line impedance corresponding to $u_K = 1\%$ (without line reactor). The rated input current based on I_L is stamped on the inverter rating plate. In the particular application, the input current depends on the motor load and line impedance. The input current is reduced when using a line reactor.

⁵⁾ The maximum motor cable lengths are valid for an input voltage of 400 V 3 AC and operation with a 4 kHz pulse frequency. When an inverter with an integrated line filter class A is used to comply with the limits of EN 61800-3 Category C2 for line conducted interference emission, the maximum permissible motor cable length is 25 m (82 ft) (shielded).

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Technical specifications

Line voltage 380 ... 480 V 3 AC		SINAMICS G120C power electronics			
		6SL3210-1KE15-8..1	6SL3210-1KE17-5..1	6SL3210-1KE18-8..1	6SL3210-1KE21-3..1
Output current at 400 V 3 AC					
• Rated current I_{rated} ¹⁾	A	5.8	7.5	9.0	13.0
• Base-load current I_L ²⁾	A	5.6	7.3	8.8	12.5
• Base-load current I_H ³⁾	A	4.1	5.6	7.3	8.8
• I_{max}	A	8.2	11.2	14.6	17.6
Rated power					
• Based on I_L	kW (hp)	2.2 (3.0)	3.0 (4.0)	4.0 (5.0)	5.5 (7.5)
• Based on I_H	kW (hp)	1.5 (2.0)	2.2 (3.0)	3.0 (4.0)	4.0 (5.0)
Rated pulse frequency		kHz	4	4	4
Efficiency η			0.97	0.97	0.97
Power loss at rated current		kW	0.09	0.14	0.15
Cooling air requirement		m ³ /s (ft ³ /s)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)
Sound pressure level L_{pA} (1 m)		dB	<52	<52	<63
Rated input current ⁴⁾					
• Based on I_L	A	7.4	9.5	11.4	16.5
• Based on I_H	A	6.0	8.2	10.6	12.8
Length of cable to braking resistor, max.		m (ft)	15 (49)	15 (49)	15 (49)
Line supply connection U1/L1, V1/L2, W1/L3			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	4 ... 6 (12 ... 10 AWG)
Motor connection U2, V2, W2			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	4 ... 6 (12 ... 10 AWG)
Connection for braking resistor R1, R2			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	1 ... 2.5 (16 ... 14 AWG)	4 ... 6 (12 ... 10 AWG)
PE connection			On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Motor cable length, max. ⁵⁾					
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)
Dimensions					
• Width	mm (in)	73 (2.87)	73 (2.87)	73 (2.87)	100 (3.94)
• Height	mm (in)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)
• Depth					
- Without operator panel	mm (in)	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))
- With operator panel	mm (in)	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))
Frame size			FSA	FSA	FSB
Weight, approx.					
• Without filter	kg (lb)	1.7 (3.75)	1.7 (3.75)	1.7 (3.75)	2.3 (5)
• With integrated filter class A	kg (lb)	1.9 (4.19)	1.9 (4.19)	1.9 (4.19)	2.5 (5.5)

¹⁾ The rated output current I_{rated} can be used up to 100 %; however, without overload.

²⁾ The base-load current I_L is based on the duty cycle for low overload (LO).

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

⁴⁾ The rated input currents are valid for an input voltage of 400 V 3 AC and a line impedance corresponding to $u_K = 1\%$ (without line reactor). The rated input current based on I_L is stamped on the inverter rating plate. In the particular application, the input current depends on the motor load and line impedance. The input current is reduced when using a line reactor.

⁵⁾ The maximum motor cable lengths are valid for an input voltage of 400 V 3 AC and operation with a 4 kHz pulse frequency. When an inverter with an integrated line filter class A is used to comply with the limits of EN 61800-3 Category C2 for line conducted interference emission, the maximum permissible motor cable length is 25 m (82 ft) (shielded).

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Technical specifications

Line voltage 380 ... 480 V 3 AC		SINAMICS G120C power electronics			
		6SL3210-1KE21-7..1	6SL3210-1KE22-6..1	6SL3210-1KE23-2..1	6SL3210-1KE23-8..1
Output current at 400 V 3 AC					
• Rated current I_{rated} ¹⁾	A	17.0	26.0	32.0	38.0
• Base-load current I_L ²⁾	A	16.5	25.0	31.0	37.0
• Base-load current I_H ³⁾	A	12.5	16.5	25.0	31.0
• I_{max}	A	25.0	33.0	50.0	62.0
Rated power					
• Based on I_L	kW (hp)	7.5 (10)	11.0 (15)	15.0 (20)	18.5 (25)
• Based on I_H	kW (hp)	5.5 (7.5)	7.5 (10)	11.0 (15)	15.0 (20)
Rated pulse frequency		kHz	4	4	4
Efficiency η			0.97	0.97	0.97
Power loss at rated current		kW	0.24	0.35	0.43
Cooling air requirement		m ³ /s (ft ³ /s)	0.009 (0.32)	0.018 (0.64)	0.018 (0.64)
Sound pressure level L_{pA} (1 m)		dB	<63	<66	<66
Rated input current⁴⁾					
• Based on I_L	A	21.5	33.0	40.6	48.2
• Based on I_H	A	18.2	24.1	36.4	45.2
Length of cable to braking resistor, max.		m (ft)	15 (49)	15 (49)	15 (49)
Line supply connection U1/L1, V1/L2, W1/L3			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	4 ... 6 (12 ... 10 AWG)	6 ... 16 (10 ... 5 AWG)	6 ... 16 (10 ... 5 AWG)	6 ... 16 (10 ... 5 AWG)
Motor connection U2, V2, W2			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	4 ... 6 (12 ... 10 AWG)	6 ... 16 (10 ... 5 AWG)	6 ... 16 (10 ... 5 AWG)	6 ... 16 (10 ... 5 AWG)
Connection for braking resistor R1, R2			Plug-in screw terminals	Plug-in screw terminals	Plug-in screw terminals
• Conductor cross-section	mm ²	4 ... 6 (12 ... 10 AWG)	6 ... 16 (10 ... 5 AWG)	6 ... 16 (10 ... 5 AWG)	6 ... 16 (10 ... 5 AWG)
PE connection			On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Motor cable length, max.⁵⁾					
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)
Dimensions					
• Width	mm (in)	100 (3.94)	140 (5.51)	140 (5.51)	140 (5.51)
• Height	mm (in)	196 (7.72)	295 (11.61)	295 (11.61)	295 (11.61)
• Depth					
- Without operator panel	mm (in)	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))	203 (7.99) (PN version: 225.4 (8.87))
- With operator panel	mm (in)	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))	224 (8.82) (PN version: 246.4 (9.70))
Frame size			FSB	FSC	FSC
Weight, approx.					
• Without filter	kg (lb)	2.3 (5)	4.4 (9.7)	4.4 (9.7)	4.4 (9.7)
• With integrated filter class A	kg (lb)	2.5 (5.5)	4.7 (10.4)	4.7 (10.4)	4.7 (10.4)

¹⁾ The rated output current I_{rated} can be used up to 100 %; however, without overload.

²⁾ The base-load current I_L is based on the duty cycle for low overload (LO).

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

⁴⁾ The rated input currents are valid for an input voltage of 400 V 3 AC and a line impedance corresponding to $u_K = 1\%$ (without line reactor). The rated input current based on I_L is stamped on the inverter rating plate. In the particular application, the input current depends on the motor load and line impedance. The input current is reduced when using a line reactor.

⁵⁾ The maximum motor cable lengths are valid for an input voltage of 400 V 3 AC and operation with a 4 kHz pulse frequency. When an inverter with an integrated line filter class A is used to comply with the limits of EN 61800-3 Category C2 for line conducted interference emission, the maximum permissible motor cable length is 25 m (82 ft) (shielded).

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

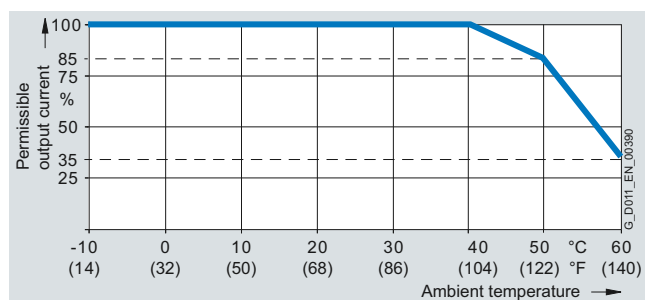
Characteristic curves

Derating data

Pulse frequency

Rated power based on low overload (LO)		Rated output current A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.55 ¹⁾	0.75	1.7	1.4	1.2	1.0	0.9	0.8	0.7
0.75 ¹⁾	1.0	2.2	1.9	1.5	1.3	1.1	1.0	0.9
1.1 ¹⁾	1.5	3.1	2.6	2.2	1.9	1.6	1.4	1.2
1.5 ¹⁾	2.0	4.1	3.5	2.9	2.5	2.1	1.8	1.6
2.2 ¹⁾	3.0	5.6	4.8	3.9	3.4	2.8	2.5	2.2
3.0 ¹⁾	4.0	7.3	6.2	5.1	4.4	3.7	3.3	2.9
4.0 ¹⁾	5.0	8.8	7.5	6.2	5.3	4.4	4.0	3.5
5.5	7.5	12.5	10.6	8.8	7.5	6.3	5.6	5.0
7.5	10	16.5	14.0	11.6	9.9	8.3	7.4	6.6
11.0	15	25.0	21.3	17.5	15.0	12.5	11.3	10.0
15.0	20	31.0	26.4	21.7	18.6	15.5	14.0	12.4
18.5	25	37.0	31.5	25.9	22.2	18.5	16.7	14.8

Ambient temperature

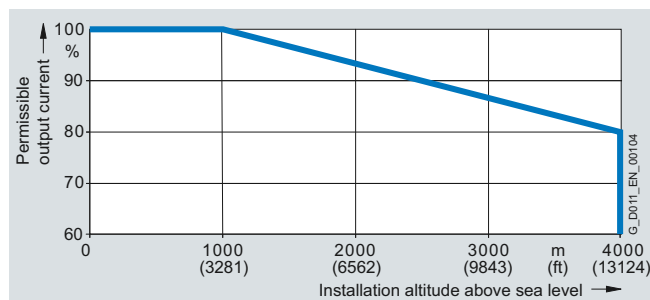


High overload (HO) and low overload (LO)

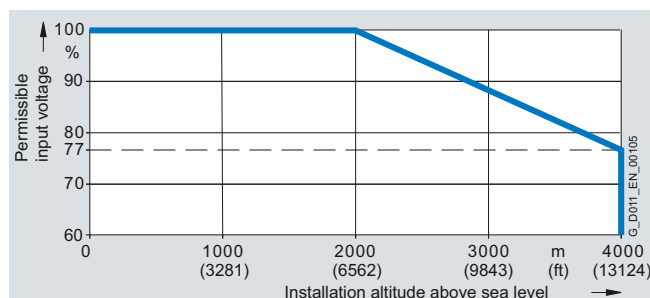
Note:

The PROFINET version can be butt-mounted at temperatures up to 55 °C (131 °F). At temperatures between 55 °C and 60 °C (131 °F and 140 °F), side-by-side mounting is not possible.

Installation altitude

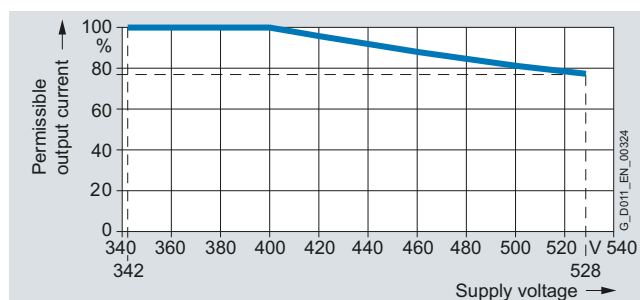


Permissible output current as a function of installation altitude

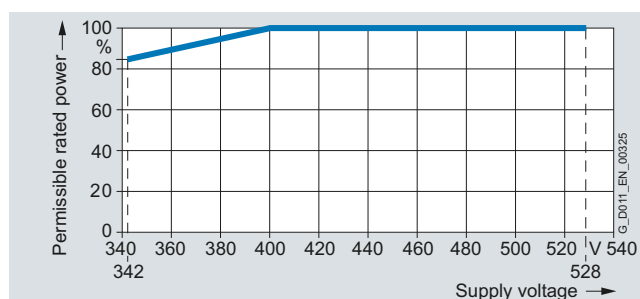


Permissible input voltage as a function of installation altitude

Line voltage



Permissible output current as a function of line voltage



Permissible rated power as a function of line voltage

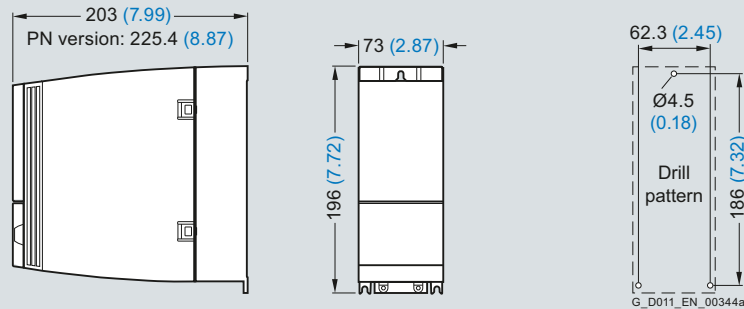
¹⁾ The permissible motor cable length depends on the cable type and the pulse frequency.

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Dimensional drawings



SINAMICS G120C, frame size FSA

Mounted with 3 M4 studs, 3 M4 nuts, 3 M4 washers.

Ventilation clearance required at the top: 80 mm (3.15 inches).

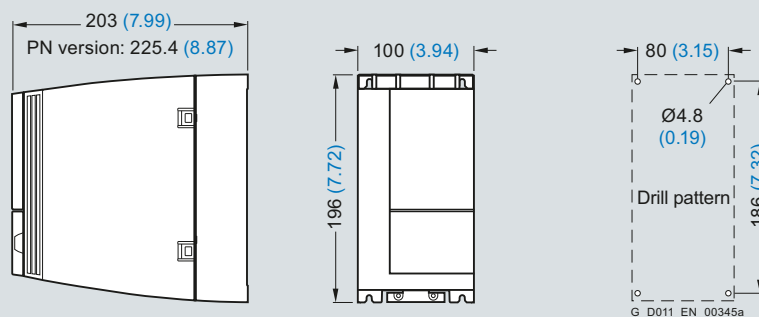
Ventilation clearance required at the bottom: 100 mm (3.94 inches).

Ventilation clearance required at the side: 0 mm (0 inches).

When the IOP is inserted, the mounting depth increases by 21 mm (0.83 inches).

When the BOP-2 is inserted, the mounting depth increases by 11 mm (0.43 inches).

All dimensions in mm (values in brackets are in inches).



SINAMICS G120C, frame size FSB

Mounted with 4 M4 studs, 4 M4 nuts, 4 M4 washers.

Ventilation clearance required at the top: 80 mm (3.15 inches).

Ventilation clearance required at the bottom: 100 mm (3.94 inches).

Ventilation clearance required at the side: 0 mm (0 inches).

When the IOP is inserted, the mounting depth increases by 21 mm (0.83 inches).

When the BOP-2 is inserted, the mounting depth increases by 11 mm (0.43 inches).

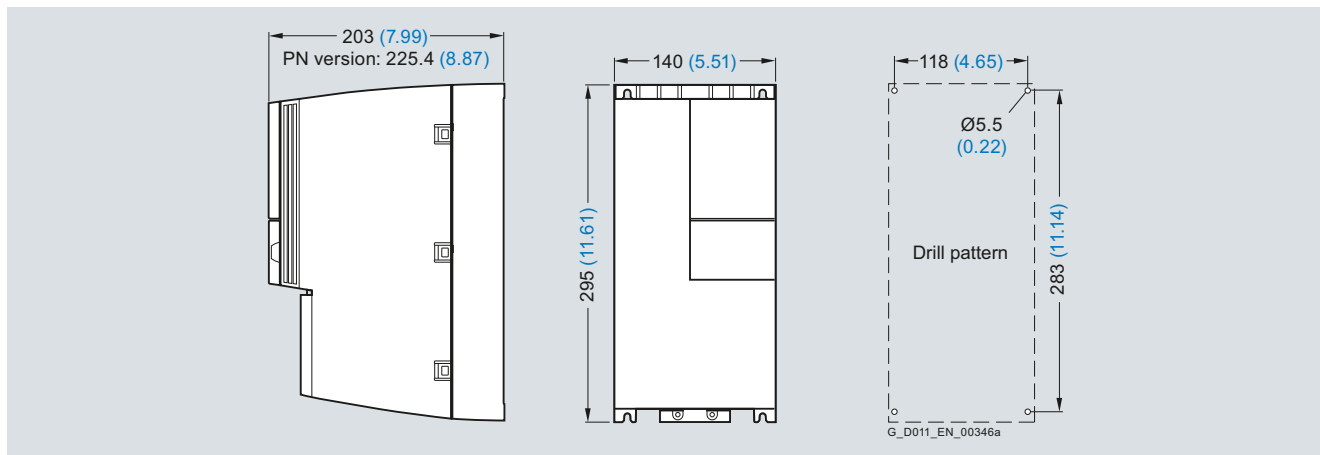
All dimensions in mm (values in brackets are in inches).

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

SINAMICS G120C compact inverters

Dimensional drawings



SINAMICS G120C, frame size FSC

Mounted with 4 M5 studs, 4 M5 nuts, 4 M5 washers.

Ventilation clearance required at the top: 80 mm (3.15 inches).

Ventilation clearance required at the bottom: 100 mm (3.94 inches).

Ventilation clearance required at the side: 0 mm (0 inches)

When the IOP is inserted, the mounting depth increases by 21 mm (0.83 inches).

When the BOP-2 is inserted, the mounting depth increases by 11 mm (0.43 inches).

All dimensions in mm (values in brackets are in inches).

More information

Detailed information on SINAMICS G120C, the latest technical documentation (catalogs, dimensional drawings, certificates, manuals and operating instructions), are available on the Internet at:

www.siemens.com/sinamics-g120c

You can find information offline about SINAMICS G120C on the DVD-ROM CA 01 in the DT Configurator.

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Line-side components
Line reactors

Overview



Line reactor for SINAMICS G120C, frame size FSB

Line reactors are used to smooth voltage peaks or to bridge commutating dips. Line reactors also reduce the effects of harmonics on the inverter and the line supply.

If the ratio of the rated inverter power to the line supply short-circuit power is less than 1 %, then it is recommended to use a line reactor to reduce the current peaks.

Selection and ordering data

Rated power		SINAMICS G120C		Line reactor
kW	hp	Type 6SL3210-...	Frame size	Order No.
Line voltage 380 ... 480 V 3 AC				
0.55	0.75	1KE11-8..1	FSA	6SL3203-OCE13-2AA0
0.75	1	1KE12-3..1		
1.1	1.5	1KE13-2..1		
1.5	2	1KE14-3..1	FSA	6SL3203-OCE21-0AA0
2.2	3	1KE15-8..1		
3	4	1KE17-5..1		
4	5	1KE18-8..1		
5.5	7.5	1KE21-3..1	FSB	6SL3203-OCE21-8AA0
7.5	10	1KE21-7..1		
11	15	1KE22-6..1	FSC	6SL3203-OCE23-8AA0
15	20	1KE23-2..1		
18.5	25	1KE23-8..1		

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Technical specifications

Line voltage 380 ... 480 V 3 AC		Line reactor			
		6SL3203-OCE13-2AA0	6SL3203-OCE21-0AA0	6SL3203-OCE21-8AA0	6SL3203-OCE23-8AA0
Rated current	A	4	11.3	22.3	47
Power loss at 50/60 Hz	W	23/26	36/40	53/59	88/97
Line supply/load connection 1L1, 1L2, 1L3 2L1, 2L2, 2L3		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm ²	4	4	10	16
PE connection		M4 × 8; U washer; spring lock washer	M4 × 8; U washer; spring lock washer	M5 × 10; U washer; spring lock washer	M5 × 10; U washer; spring lock washer
Degree of protection		Control cabinet built-in unit IP20	Control cabinet built-in unit IP20	Control cabinet built-in unit IP20	Control cabinet built-in unit IP20
Dimensions					
• Width	mm (in)	125 (4.92)	125 (4.92)	125 (4.92)	190 (7.48)
• Height	mm (in)	120 (4.72)	140 (5.51)	145 (5.71)	220 (8.66)
• Depth	mm (in)	71 (2.80)	71 (2.80)	91 (3.58)	91 (3.58)
Weight, approx.	kg (lb)	1.1 (2.4)	2.1 (4.6)	2.95 (6.5)	7.8 (17.2)
Suitable for SINAMICS G120C	Type	6SL3210-1KE11-8..1 6SL3210-1KE12-3..1 6SL3210-1KE13-2..1	6SL3210-1KE14-3..1 6SL3210-1KE15-8..1 6SL3210-1KE17-5..1 6SL3210-1KE18-8..1	6SL3210-1KE21-3..1 6SL3210-1KE21-7..1	6SL3210-1KE22-6..1 6SL3210-1KE23-2..1 6SL3210-1KE23-8..1
• Frame size		FSA	FSA	FSB	FSC

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Line-side components
Recommended line-side power components

Selection and ordering data

The following table lists recommendations for additional line-side components, such as fuses and circuit breakers.

Note for use in compliance with IEC standards:

3NA3 fuses are recommended for European countries. The values in the table take into account the overload capability of the inverter.

Note for use in compliance with UL regulations:

Fuses for use in North America must be UL-certified, such as the Class NON fuse series from Bussmann or approved circuit breakers from the SIRIUS 3RV circuit breakers and 3VL molded-case circuit breakers series according to UL 489 (category control number CCN: DIV Q). The specified circuit breakers are UL-certified.

An overvoltage protection device is required for installation in conformance with UL corresponding to the UL certification of SINAMICS G120C. The overvoltage protection device must be marked with the Listed test symbol and category code VZCA. The detailed UL installation guidelines are included in the equipment manual.

[Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 10.1, IC 10 and IC 10 AO.](#)

Rated power		SINAMICS G120C Type 6SL3210-...	Corresponding to the IEC standard			Corresponding to the UL/cUL standard		
kW	hp		Standard fuse Current in A	Order No.	Circuit breaker Order No.	Standard fuse Current in A	Class	Circuit breaker Order No.
Line voltage 380 ... 480 V 3 AC								
0.55	0.75	1KE11-8..1	6	3NA3801	3RV1021-1DA10	10	J	3RV1021-1DA10
0.75	1	1KE12-3..1	6	3NA3801	3RV1021-1EA10	10	J	3RV1021-1EA10
1.1	1.5	1KE13-2..1	6	3NA3801	3RV1021-1FA10	10	J	3RV1021-1FA10
1.5	2	1KE14-3..1	10	3NA3803	3RV1021-1HA10	10	J	3RV1021-1HA10
2.2	3	1KE15-8..1	10	3NA3803	3RV1021-1JA10	10	J	3RV1021-1JA10
3.0	4	1KE17-5..1	16	3NA3805	3RV1021-1KA10	15	J	3RV1021-1KA10
4.0	5	1KE18-8..1	16	3NA3805	3RV1021-4AA10	15	J	3RV1021-4AA10
5.5	7.5	1KE21-3..1	20	3NA3807	3RV1021-4BA10	20	J	3RV1021-4BA10
7.5	10	1KE21-7..1	25	3NA3810	3RV1021-4DA10	25	J	3RV1021-4DA10
11	15	1KE22-6..1	40	3NA3817	3RV1031-4FA10	40	J	3RV1031-4FA10
15	20	1KE23-2..1	50	3NA3820	3RV1031-4GA10	50	J	3RV1031-4GA10
18.5	25	1KE23-8..1	63	3NA3822	3RV1031-4HA10	60	J	3RV1031-4HA10

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

DC link components Braking resistors

Overview



Braking resistor for SINAMICS G120C, frame size FSB

The excess energy of the DC link is dissipated using the braking resistor. The braking resistors are designed for use with the SINAMICS G120C. SINAMICS G120C has an integrated brake chopper and cannot feed back regenerative energy to the line supply. For regenerative operation, e.g. the braking of a rotating mass with high moment of inertia, a braking resistor must be connected to convert the resulting energy into heat.

The braking resistors are designed for mounting horizontally or vertically onto a heat-resistant sheet steel panel. The resistors should be mounted such as to ensure that the air can flow in and out and heat cannot build up. The heat dissipated by the braking resistor must not diminish the inverter cooling.

Every braking resistor is equipped with a temperature switch. The temperature switch can be evaluated to prevent consequential damage if the braking resistor overheats.

Selection and ordering data

Rated power		SINAMICS G120C		Braking resistor
kW	hp	Type 6SL3210-...	Frame size	Order No.
Line voltage 380 ... 480 V 3 AC				
0.55	0.75	1KE11-8..1	FSA	6SL3201-0BE14-3AA0
0.75	1	1KE12-3..1		
1.1	1.5	1KE13-2..1		
1.5	2	1KE14-3..1		
2.2	3	1KE15-8..1	FSA	6SL3201-0BE21-0AA0
3	4	1KE17-5..1		
4	5	1KE18-8..1		
5.5	7.5	1KE21-3..1	FSB	6SL3201-0BE21-8AA0
7.5	10	1KE21-7..1		
11	15	1KE22-6..1	FSC	6SL3201-0BE23-8AA0
15	20	1KE23-2..1		
18.5	25	1KE23-8..1		

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Technical specifications


Line voltage 380 ... 480 V 3 AC		Braking resistor			
		6SL3201-0BE14-3AA0	6SL3201-0BE21-0AA0	6SL3201-0BE21-8AA0	6SL3201-0BE23-8AA0
Resistance	Ω	370	140	75	30
Rated power P_{DB}	kW	0.075	0.2	0.375	0.925
Peak power P_{max} (on-load factor 5 %)	kW	1.5	4	7.5	18.5
Power connection		Terminal block	Terminal block	Terminal block	Terminal block
• Conductor cross-section	mm ²	2.5	2.5	2.5	6
Thermostatic switch		NC contact	NC contact	NC contact	NC contact
• Contact load, max.		250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A
• Conductor cross-section	mm ²	2.5	2.5	2.5	2.5
PE connection					
• Via terminal block		Yes	Yes	Yes	Yes
• PE connection on housing		M4 screw	M4 screw	M4 screw	M4 screw
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	105 (4.13)	105 (4.13)	175 (6.89)	250 (9.84)
• Height	mm (in)	295 (11.61)	345 (13.58)	345 (13.58)	490 (19.29)
• Depth	mm (in)	100 (3.94)	100 (3.94)	100 (3.94)	140 (5.51)
Weight, approx.	kg (lb)	1.48 (3.26)	1.8 (3.97)	2.73 (6.02)	6.2 (13.7)
Suitable for SINAMICS G120C	Type	6SL3210-1KE11-8..1 6SL3210-1KE12-3..1 6SL3210-1KE13-2..1 6SL3210-1KE14-3..1	6SL3210-1KE15-8..1 6SL3210-1KE17-5..1 6SL3210-1KE18-8..1	6SL3210-1KE21-3..1 6SL3210-1KE21-7..1	6SL3210-1KE22-6..1 6SL3210-1KE23-2..1 6SL3210-1KE23-8..1
• Frame size		FSA	FSA	FSB	FSC

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Supplementary system components Operator panels

Overview

Operator panel	Intelligent Operator Panel IOP and IOP Handheld	Basic Operator Panel BOP-2
		
Description	<p>Thanks to the large plain text display, menu-based operation and the application wizards, commissioning of the standard drives is easy. Integrated application wizards guide the user interactively through the commissioning process for important applications such as pumps, fans, compressors and conveyor systems.</p>	<p>Commissioning of standard drives is easy with the menu-prompted dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.</p>
Possible applications	<ul style="list-style-type: none"> • Directly mounted on SINAMICS G120C • Can be mounted in the control cabinet door using a door mounting kit (achievable degree of protection is IP54/UL Type 12) • Available as handheld version • 5 languages available 	<ul style="list-style-type: none"> • Directly mounted on SINAMICS G120C • Can be mounted in the control cabinet door using a door mounting kit (achievable degree of protection is IP55/UL Type 12)
Quick commissioning without expert knowledge	<ul style="list-style-type: none"> • Standard commissioning using the clone function • User-defined parameter list with a reduced number of self-selected parameters • Simple commissioning of standard applications using application-specific wizards; it is not necessary to know the parameter structure • Simple local commissioning using the handheld version • Commissioning largely without documentation 	<ul style="list-style-type: none"> • Standard commissioning using the clone function
High degree of operator friendliness and intuitive operation	<ul style="list-style-type: none"> • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes • Intuitive navigation using a rotary knob – just like in everyday applications • Graphic display to show status values such as pressure or flow in bar-type diagrams • Status display with freely selectable units to specify physical values 	<ul style="list-style-type: none"> • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes – • 2-line display for showing up to 2 process values with text • Status display of predefined units
Minimization of maintenance times	<ul style="list-style-type: none"> • Diagnostics using plain text display, can be used locally on-site without documentation • Simple update of languages, wizards and firmware via USB 	<ul style="list-style-type: none"> • Diagnostics with menu prompting with 7-segment display

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Supplementary system components
Intelligent Operator Panel IOP

Overview

Intelligent Operator Panel IOP



Intelligent Operator Panel IOP

The Intelligent Operator Panel IOP is a very user-friendly and powerful operator panel for the SINAMICS G120, SINAMICS G120C, SINAMICS G120D and SINAMICS G120P standard drives.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu-based operation and the application wizards, it is easy to commission standard drives. A drive can be essentially commissioned without having to use a printed parameter list – as the parameters are displayed in plain text, and explanatory help texts and the parameter filtering function are provided.

Application wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There are quick commissioning wizards for general commissioning.

Up to 2 process values can be displayed graphically or numerically on the status screen/status display. Process values can also be displayed in technological units.

The IOP supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the IOP and downloaded into other drive units of the same type as required.

The IOP includes the following language packages: English, French, German, Italian and Spanish.

The IOP can be installed in control cabinet doors using the optionally available door mounting kit.

Updating the IOP

The IOP can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be transferred from the PC to the IOP via drag & drop. Further, the USB interface allows user languages and wizards that will become available in the future to be subsequently downloaded and the firmware to be updated for the IOP.

The IOP is supplied with power via the USB interface during an update.

IOP Handheld



IOP Handheld

A handheld version of the IOP can be ordered for mobile use. In addition to the IOP, this includes a housing with rechargeable batteries, charging unit and RS232 connecting cable. The charging unit is supplied with connector adapters for Europe, the US and UK. When the batteries are fully charged, the operating time is up to 8 hours.

To connect the IOP Handheld to SINAMICS G110D and SINAMICS G120D, the RS232 connecting cable with optical interface is required in addition.

Selection and ordering data

Description	Order No.
Intelligent Operator Panel IOP	6SL3255-0AA00-4JA0
IOP Handheld For use with SINAMICS G120, SINAMICS G120C, SINAMICS G110D or SINAMICS G120D Included in the scope of delivery:	6SL3255-0AA00-4HA0
<ul style="list-style-type: none"> • IOP • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable (3 m/9.84 ft long, can only be used for SINAMICS G120) • USB cable (1 m/3.28 ft long) 	
Accessories	
Door mounting kit For mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 ... 0.12 in) IP54 degree of protection for IOP IP55 degree of protection for BOP-2 Included in the scope of delivery:	6SL3256-0AP00-0JA0
<ul style="list-style-type: none"> • Seal • Mounting material • Connecting cable (5 m/16.4 ft long, also supplies voltage to the IOP directly via the SINAMICS G120C compact inverter) 	

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Supplementary system components

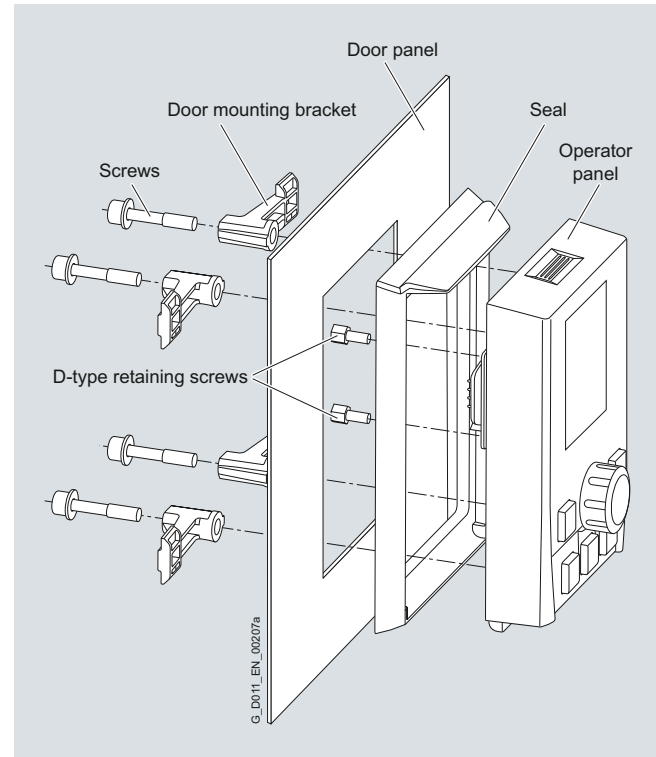
Intelligent Operator Panel IOP

Benefits

- Simple commissioning of standard applications using wizards, it is not necessary to know the parameter structure
- Diagnostics using plain text display; can be used locally on-site without documentation
- Direct manual operation of the drive; you can toggle between the automatic and manual modes
- Status display with freely selectable units; display of real physical values
- Intuitive navigation using a wheel – just like in everyday applications
- Graphic display with bar charts e.g. for status values such as pressure or flowrate
- Quickly and simply mounted in the door – mechanically and electrically
- Simple local commissioning on-site using the handheld version
- Commissioning without documentation using the integrated help function
- Standard commissioning using the clone function (parameter set data is saved for fast replacement)
- User-defined parameter list with a reduced number of self-selected parameters (to generate your own commissioning screens)
- 5 integrated languages
- Simple update of languages, wizards and firmware updates via USB

Integration

Using the optionally available door mounting kit, an operator panel can be simply mounted in a control cabinet door with just a few manual operations. For door mounting with an IOP, degree of protection IP54/UL Type 12 is achieved, and with BOP-2, degree of protection IP55.



Door mounting kit with plugged-on IOP

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Supplementary system components Basic Operator Panel BOP-2

Overview



Basic Operator Panel BOP-2

The Basic Operator Panel BOP-2 can be used to commission drives, monitor drives in operation and input individual parameter settings.

Commissioning of standard drives is easy with the menu-prompted dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.

The drives are easily controlled manually using directly assigned navigation buttons. The BOP-2 has a dedicated switchover button to switch from automatic to manual mode.

Diagnostics can easily be performed on the connected inverter by following the menus.

Up to two process values can be numerically visualized simultaneously.

BOP-2 supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the BOP-2 and when required, downloaded into other drive units of the same type.

Benefits

- Shorten commissioning times – Easy commissioning of standard drives using basic commissioning wizards (setup)
- Minimize standstill times – Fast detection and rectification of errors (Diagnostics)
- Greater transparency in the process – The status display of the BOP-2 makes process variable monitoring easy (Monitoring)
- Direct mounting on the inverter (also see IOP)
- User-friendly user interface:
 - Easy navigation using clear menu structure and clearly assigned control keys
 - Two-line display

Selection and ordering data

Description	Order No.
Basic Operator Panel BOP-2	6SL3255-0AA00-4CA1
Accessories	
Door mounting kit	6SL3256-0AP00-0JA0
For mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 ... 0.12 in) IP54 degree of protection for IOP IP55 degree of protection for BOP-2	
Included in the scope of delivery:	
<ul style="list-style-type: none"> • Seal • Mounting material • Connecting cable (5 m/16.4 ft long, also supplies voltage to the BOP-2 directly via the SINAMICS G120C compact inverter) 	

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Supplementary system components Memory cards

Overview



SINAMICS memory card

The parameter settings for an inverter can be stored on the SINAMICS micro memory card (MMC) or SINAMICS SD card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again.

- Parameter settings can be written from the memory card to the inverter or saved from the inverter to the memory card.
- Up to 100 parameter sets can be stored.
- The memory card supports standard commissioning without the use of an operator panel such as the BOP-2 or the STARTER commissioning tool.

Note:

The memory card is not required for operation and does not have to remain inserted.

Selection and ordering data

Description	Order No.
SINAMICS micro memory card (MMC) 64 MB	6SL3254-0AM00-0AA0
SINAMICS SD card 512 MB	new ¹⁾ 6SL3054-4AG00-2AA0

¹⁾ Available soon.

²⁾ The STARTER commissioning tool is also available on the Internet at <http://support.automation.siemens.com/WW/view/en/10804985/133100>

Supplementary system components PC inverter connection kit 2

Overview



PC inverter connection kit 2

For controlling and commissioning an inverter directly from a PC, if the STARTER commissioning tool has been installed on the PC. With this, the inverter can be

- parameterized (commissioned, optimized)
- monitored (diagnostics)
- controlled (master control via the STARTER commissioning tool for test purposes).

A USB cable (3 m/9.84 ft) and the STARTER commissioning tool on DVD-ROM are included in the scope of delivery.

Selection and ordering data

Description	Order No.
PC inverter connection kit 2 For SINAMICS G120C and SINAMICS G120 CU230P-2, CU240B-2 and CU240E-2 Control Units Including USB cable (length 3 m/9.84 ft) and STARTER commissioning tool ²⁾ on DVD-ROM	6SL3255-0AA00-2CA0

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Spare parts

Overview

The following spare parts are available for SINAMICS G120C for service and maintenance work.

SINAMICS G120C shield plates

A set of shield plates is included in the scope of delivery for the motor and signal cables corresponding to the frame size of the SINAMICS G120C compact inverter, and can also be ordered as spare parts.

SINAMICS G120C spare parts kit

This kit comprises 5 sets of I/O terminals, 1 RS485 terminal, 2 sets of Control Unit doors (1 × PN and 1 × other communication versions) and 1 blanking cover.

SINAMICS G120C connectors

A set of connectors for the line feeder cable, braking resistor and motor cable can be ordered corresponding to the frame size of the SINAMICS G120C compact inverter.

SINAMICS G120C roof-mounted fan

A roof-mounted fan (at the top of the device) comprising a pre-assembled unit with holder and fan can be ordered corresponding to the frame size of the SINAMICS G120C compact inverter.



SINAMICS G120C, frame size FSB, with integrated roof-mounted fan

SINAMICS G120C fan unit

A replacement fan (at the rear of the device; heat sink) comprising a pre-assembled unit with holder and fan can be ordered corresponding to the frame size of the SINAMICS G120C compact inverter.



SINAMICS G120C, frame size FSB, with fan unit (rear view of rotated inverter)

Selection and ordering data

Description	Order No.
SINAMICS G120C shield plate	
• Frame size FSA	6SL3266-1EA00-0KA0
• Frame size FSB	6SL3266-1EB00-0KA0
• Frame size FSC	6SL3266-1EC00-0KA0
SINAMICS G120C spare parts kit	new 6SL3200-0SK41-0AA0
SINAMICS G120C connection plug	
• Frame size FSA	6SL3200-0ST05-0AA0
• Frame size FSB	6SL3200-0ST06-0AA0
• Frame size FSC	6SL3200-0ST07-0AA0
SINAMICS G120C roof-mounted fan	
• Frame size FSA	6SL3200-0SF40-0AA0
• Frame size FSB	6SL3200-0SF41-0AA0
• Frame size FSC	6SL3200-0SF42-0AA0
SINAMICS G120C fan unit	
• Frame size FSA	6SL3200-0SF12-0AA0
• Frame size FSB	6SL3200-0SF13-0AA0
• Frame size FSC	6SL3200-0SF14-0AA0

SINAMICS G120C compact inverters

0.55 kW to 18.5 kW (0.75 hp to 25 hp)

Notes

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SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

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SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Introduction

Application

Application	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality			Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality		
Pumping, ventilating, compressing 	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	G110, G120C (G130, G150, GM150, GL150)	G120P, G120C, G120 (G130, G150, GM150, GL150)	S120	S110	S110, S120	S120 (GM150)
Moving 	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Escalators/moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/disengagers
	G110, G110D, G120C (G130, G150, GM150)	G120D, G120C, G120, S120 (G130, G150, S150, GM150, GL150, SM150, DCM)	S120 (S150, SM150, SL150, GM150, DCM)	G120D, S110	S110, S120 (DCM)	S120 (DCM)
Processing 	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders and unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	G120C (G130, G150, GM150)	G120C, G120 (G130, G150, S150, GM150, GL150, DCM)	S120 (S150, DCM)	S110	S110, S120	S120 (SM150, SL150, DCM)
Machining 	Main drives for • Turning • Drilling • Milling	Main drives for • Drilling • Sawing	Main drives for • Turning • Drilling • Milling • Gear cutting • Grinding	Axle drives for • Turning • Drilling • Milling	Axle drives for • Drilling • Sawing	Axle drives for • Turning • Drilling • Milling • Lasering • Gear cutting • Grinding • Nibbling and punching
	S110	S110, S120	S120	S110	S110, S120	S120

(Devices in brackets are not included in Catalog D 31)

The SINAMICS G120P inverter is a cost-effective, space-saving drive for pump and fan drives, which is easy to operate and has a wide range of functions. As a consequence, it is especially

well-suited for building automation, the process industry, the water industry as well as for heating, ventilation and air conditioning (HVAC).

More information

You may also be interested in these inverters/converters:

- More performance in the control cabinet in IP20 degree of protection ⇒ SINAMICS G120
- Higher degree of protection for power ratings up to 7.5 kW (10 hp) ⇒ SINAMICS G110D, SINAMICS G120D
- With positioning function for distributed drive solutions in IP65 degree of protection ⇒ SINAMICS G120D
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS S110

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

SINAMICS G120P
pump, fan, compressor inverters

Overview

Energy awareness, economy and energy efficiency – Siemens offers an answer to these trends with the new SINAMICS G120P inverter series. SINAMICS G120P is an innovative and user-friendly inverter series that has been specifically optimized for pump, fan and compressor applications in the industrial environment, but also for tasks in building automation.

SINAMICS G120P offers efficient drive solutions for a wide range of applications. With their easy handling, the drives support the user not only in optimizing existing frequency-controlled drives, but also in converting fixed-speed drives and in retrofitting.

The SINAMICS G120P inverter series features advanced hardware and software functions that make a substantial contribution towards saving energy and thus make more careful use of our natural resources. SINAMICS G120P is also particularly "line-friendly", i.e. the inverter topology keeps harmonic currents to a minimum. Additional components such as line reactors are not required and it is not permissible to use them. As a consequence, low envelope dimensions are obtained for space-saving designs.



SINAMICS G120P in degree of protection IP54/UL Type12, frame sizes FSA, FSB and FSC; comprising a PM230 Power Module and mounted IOP Intelligent Operator Panel



SINAMICS G120P in degree of protection IP54/UL Type12, frame sizes FSD, FSE and FSF; comprising a PM230 Power Module and mounted IOP Intelligent Operator Panel

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

SINAMICS G120P pump, fan, compressor inverters

Overview

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SINAMICS G120P in degree of protection IP20 standard variant, frame sizes FSA to FSC (example: frame size FSB comprising PM230 Power Module, CU230P-2 HVAC Control Unit and mounted Intelligent Operator Panel IOP)



SINAMICS G120P in degree of protection IP20 standard variant, frame sizes FSA to FSC comprising PM230 Power Module, CU230P-2 HVAC Control Unit and mounted Basic Operator Panel BOP-2



SINAMICS G120P in degree of protection IP20 standard variant, frame sizes FSD to FSF comprising PM230 Power Module, CU230P-2 HVAC Control Unit and mounted Intelligent Operator Panel IOP

SINAMICS G120P pump, fan, compressor inverters

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SINAMICS G120P
pump, fan, compressor inverters

Overview



SINAMICS G120P in degree of protection IP20 push-through variant, frame sizes FSA to FSC comprising PM230 Power Module, CU230P-2 HVAC Control Unit and mounted Basic Operator Panel BOP-2

SINAMICS G120P has the following connections and interfaces in order to address specific requirements:

- Fieldbus interface of the CU230P-2 Control Unit optionally with
 - RS485/USS, Modbus/RTU, BACnet MS/TP
 - PROFIBUS DP
 - PROFINET
 - CANopen
- Pt1000/LG-Ni1000 interface for direct connection of temperature sensors
- 230 V relay for direct connection of auxiliary equipment
- Isolated digital inputs with a separate potential group to prevent potential transfers
- Isolated analog inputs for EMC-compatible installation without the need for additional components

User-friendliness

A high degree of user-friendliness is one of the main characteristics of the SINAMICS G120P:

- Simple application-specific commissioning wizard "on board" the Intelligent Operator Panel (IOP)
- Plain text scripts for integration in the STARTER commissioning tool for more demanding applications
- Operator panel with plain text display and extensive diagnostics functions (IOP)
- SINAMICS micro memory card (MMC)/SINAMICS SD card for storing parameter settings, cloning and local commissioning
- Plug-in terminal blocks for supply cables and motor cables (for power outputs of up to 18.5 kW/25 hp)
- Fast replacement of drive components thanks to modular structure

Guided operation using wizards

SINAMICS G120P offers two basic options for guided parameterization/setting in a target application:

Commissioning of simple applications

using application wizards integrated in the IOP operator panel.

The following wizards are available:

- Quick commissioning
- Pump with/without PID control
- Fan with/without PID control
- Compressor with/without PID control
- PID setting
- Boost setting

An appropriate connection diagram for the standard wiring can be found in the documentation of the IOP operator panel.

Commissioning of more demanding applications

using plain text scripts through solution-based dialog prompting in the STARTER commissioning tool

The wizards support setpoint input for process values and setpoint exchange using timers. Not only this, they also allow technological functions such as motor staging or hibernation to be easily integrated. The connection diagrams for standard wiring that are required for the wizards are also supplied.

The following wizards are available:

- Fan for exhaust air with closed-loop control of pressure/air quality
- Fan for cooling tower with closed-loop control of cooling water temperature
- Fan for stairwell with closed-loop control of pressure and enhanced fire emergency operation
- Fan for tunnel/multi-storey car park with closed-loop control of air quality and enhanced fire emergency operation
- Fan for supply air with closed-loop control of pressure/temperature/air quality/flowrate
- Pumps with closed-loop control of pressure
- Pumps with closed-loop control of level
- Pumps for cooling circuits with closed-loop control of temperature
- Compressor with closed-loop control of pressure

Line supply conditions

The inverter topology implemented ensures minimal line harmonic distortion. This means that the harmonic currents are low and the THD value (Total Harmonic Distortion) are in compliance with EN 61000-3-12 and IEC 61000-3-12 standards.

SINAMICS G120P pump, fan, compressor inverters

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SINAMICS G120P pump, fan, compressor inverters

Benefits

Energy efficiency

SINAMICS G120P increases the efficiency and minimizes energy consumption in the complete process chain. The inverter has integrated hardware as well as software functions as standard. The main features are:

- Extremely high active power component of apparent power thanks to efficient inverter topology: For the same drive power, SINAMICS G120P requires a lower line current than comparable inverters.
- ECO mode through automatic adaptation of the motor current to the prevailing load conditions with the closed-loop control mode V/f ECO and vector control without encoder (SLVC), therefore achieving savings of up to 40 % under partial load conditions
- Hibernation as a function of setpoints in the process
- Automatic switchover to line operation at rated speed (bypass mode)
- Elimination of mechanical closed-loop control systems and the associated efficiency losses, by using 4 internal PID controllers

Optimum energy management through innovative technology

Optimized inverter topology

- THD according to IEC/EN 61000-3-12 is fulfilled without the need for additional measures ($R_{sc} \geq 120$)
- Reduced line harmonic distortions
- No reactors → Compact design
- Lower apparent power → Smaller cable cross-sections

ECO mode

- Energy-saving capability through automatic adaptation of the magnetic flux in the motor to prevailing load conditions (lower motor losses under partial load conditions)

Hibernation

- Energy-saving capability: The drive is started/stopped in line with the currently applicable setpoints, thereby avoiding excessive mechanical loads

Straightforward, application-specific commissioning and operation using operator panel

- Local commissioning without specialized knowledge of inverters using application-specific wizards
- Unique: SINAMICS micro memory card (MMC)/SINAMICS SD card for pre-parameterization and cloning inverter data sets
- Data backup for easy replacement
- USB port integrated on the CU230P-2 Control Unit for commissioning and easy diagnostics using the STARTER commissioning tool
- Commissioning/diagnostics and controlling of inverters

Flexible deployment of integrated functions

- PLC functions for local control tasks
 - Flexible use of integrated function blocks → No need for additional, external components
- 4 integrated PID controllers
 - Distributed closed-loop control for motor-independent process control without higher-level controller (PLC)
- 3 freely programmable digital timer switches
 - Control for freely selectable daily and weekly programs

Flexible deployment across a wide range of applications

- Isolated digital inputs with separate potential group
- Isolated analog inputs
 - Potential transfer avoided
 - EMC-compliant design without the need for additional components in line with process industry requirements
- Pt1000/LG-Ni1000 temperature sensor interface
 - Direct connection of temperature sensors without external interface unit
- 230 V relay
 - Direct control for auxiliary equipment, e.g. reactor or valve actuators

Flexible, modular system for challenging environmental conditions

- Operation at ambient temperatures of up to +60 °C (140 °F) (with CU230P-2 PN up to +55 °C/131 °F)
- Modular design of power and control electronics
 - Power range can be easily extended
 - Fast exchange of power units
- Removable operator panel
 - Protection against unauthorized access
 - Degree of protection IP54/UL Type 12 with IOP operator panel
 - Degree of protection IP55/UL Type 12 with BOP-2 operator panel or blanking cover
 - Degree of protection IP20 standard variant with IOP, BOP-2 operator panel or blanking cover
 - Degree of protection IP20 push-through variant with IOP, BOP-2 operator panel or blanking cover
- Replacement of individual components without the need for reinstallation

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

SINAMICS G120P
pump, fan, compressor inverters

Application

The specialist for pump, fan and compressor applications

SINAMICS G120P is ideally suited to pump, fan and compressor applications in the industrial environment, in the process industry, water industry, and in building automation.

SINAMICS G120P is ideally suited for the following applications:

- Circulating pumps for heating and cooling systems
- Pumps for pressure boosting stations
- Level control
- Fans in cooling towers
- Fans for air intake and discharge
- Fans for tunnels and multi-storey car parks
- Fans for stairwells
- Compressors for supplying compressed air

Reliable operation in harsh environments

SINAMICS G120P is suitable for use under harsh environmental conditions:

- High degree of protection IP55/UL Type 12 for use outside the control cabinet
It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12.
- Degree of protection IP20 standard variant for use in the control cabinet
- Degree of protection IP20 push-through variant for space-saving design when installed in the control cabinet
- Operation at ambient temperatures of up to 60 °C (140 °F) (with CU230P-2 PN up to 55 °C/131 °F)
- The power loss is dissipated using an external heat sink, separate internal air circulation
- Coated modules for increased resistance to humidity and dust

Design

Modular design

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

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

CU230P-2 Control Unit

The inverter communication interface is defined when selecting the Control Unit (FW V4.5 and higher).

- CU230P-2 HVAC → USS, Modbus RTU, BACnet MS/TP
- CU230P-2 DP → PROFIBUS
- CU230P-2 PN → PROFINET
- CU230P-2 CAN → CANopen

The CU230P-2 Control Unit controls and monitors the Power Module and the connected motor using several different closed-loop control modes that can be selected. It supports communication to a local or central controller as well as to the monitoring equipment, and allows all process-related auxiliary equipment and external components to be connected (sensors, valves, contactors, etc.).

PM230 Power Module

The power unit is selected depending on the power requirement and the application. The PM230 Power Modules in degree of protection IP20 are intended for installation in a control cabinet.

- PM230 with integrated filter class A, degree of protection IP55/UL Type 12, 0.37 kW up to 90 kW (0.5 hp up to 125 hp)
- PM230 with integrated filter class B, degree of protection IP55/UL Type 12, 0.37 kW up to 90 kW (0.5 hp up to 125 hp)
- PM230 with integrated filter class A, degree of protection IP20 standard variant, 0.37 kW to 75 kW (0.5 hp to 100 hp)
- PM230 without integrated line filter, degree of protection IP20 standard variant, 0.37 kW to 75 kW (0.5 hp to 100 hp)
- PM230 with integrated filter class A, degree of protection IP20 push-through variant, 3 kW to 18.5 kW (4 hp to 25 hp)
- PM230 without integrated line filter, degree of protection IP20 push-through variant, 3 kW to 18.5 kW (4 hp to 25 hp)

State-of-the-art IGBT technology with pulse-width modulation is used for reliable and flexible motor operation. Comprehensive protection functions provide a high degree of protection for the Power Module and the motor.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

SINAMICS G120P pump, fan, compressor inverters

Design

Operator panel or blanking cover

- Intelligent Operator Panel IOP, degree of protection IP54/UL Type 12
The IOP supports entry-level personnel and drive experts. Thanks to the large plain text display, the menu-based operation and the application wizards, it is easy to commission, diagnose and locally control standard drives. Integrated application wizards interactively guide users through the commissioning process.
- Basic Operator Panel BOP-2, degree of protection IP55/UL Type 12
The menu prompting and the 2-line display facilitate fast and user-friendly commissioning of the inverter. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can also be performed without a printed parameter list.
- Blanking cover, degree of protection IP55/UL Type 12
The blanking cover is mounted on the inverter in place of an operator panel, provided that an operator panel is not required.

The operator panel supports user-friendly local commissioning, control and diagnostics and enables complete inverter data sets to be pre-parameterized and cloned.

As an alternative, instead of the operator panel, a blanking cover can be used to cover the interface.

It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12.

Load-side power components

The following load-side power components are available for the SINAMICS G120P inverters. This means that during operation with output reactors or sine-wave filters, longer, shielded motor cables are possible and the motor service life can be extended:

- Output reactors
Output reactors reduce the voltage stress on the motor windings. At the same time, the capacitive charging/discharging currents, which place an additional load on the power unit when long motor cables are used, are reduced.
- Sine-wave filters
The sine-wave filter limits the rate of rise of voltage and the capacitive charging/discharging currents that usually occur with inverter operation. The use of an additional output reactor is not required.

Optional accessories

- Push-through mounting frame
- SINAMICS micro memory cards (MMC)/SINAMICS SD cards
- PC inverter connection kit 2
- Shield connection kits for CU230P-2 Control Units
- Shield plates for PM230 Power Modules

Spare parts

- Shield plate for PM230 Power Modules
- Mounting set
- Terminal cover kit
- Fan units

Function

Technology function

Functions specific to pumps, fans and compressors are already integrated, e.g.:

- **Automatic restart**
Application restart after a power failure or fault occurrence
- **Flying restart**
Connection of the inverter when the motor is running
- **ECO mode**
Automatic adaptation of the motor current to the prevailing load conditions, e.g. for applications with a low dynamic response and a constant speed setpoint
- **Motor staging**
For applications that require simultaneous operation of between 1 and 4 motors depending on load, e.g. closed-loop control of highly variable flow volumes
- **Hibernation**
Drive is started/stopped in line with the actual setpoints
- **4 integrated PID controllers**
For controlling the speed of the drive as a function of pressure, temperature, flowrate, level, air quality and other process variables
- **Extended emergency mode**
Special inverter operating mode that enhances the availability of the drive system in the event of a fire
- **Multi-zone controller**
 - Closed-loop control of a zone with up to 3 sensors for pressure or temperature, or
 - Closed-loop control of two independent zones, each with one sensor
- **Bypass mode**
When the setpoint is reached or a fault occurs, the system changes over to line operation
- **Programmable timer switches**
- **Real-time clock**
For time-dependent process controls, e.g. to reduce the temperature at night via heating control
- **Freely programmable logical function blocks**
For simulating simple PLC functions

SINAMICS G120P pump, fan, compressor inverters

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SINAMICS G120P
pump, fan, compressor inverters

Configuration

The following electronic configuring guides and engineering tools are available for SINAMICS G120P inverters:

Selection guide DT Configurator

The interactive catalog CA 01 – the offline mall of Siemens Industry Automation & Drive Technologies – contains over 100000 products with approximately 5 million possible drive system product variants. The DT Configurator has been developed to facilitate selection of the optimum motor and/or inverter from the wide spectrum of drives. It is provided on a DVD-ROM.

Online DT Configurator

In addition, the DT Configurator can be used in the Internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

SIZER for Siemens Drives engineering tool

The PC-based SIZER for Siemens Drives engineering tool makes it easy to engineer the SINAMICS and MICROMASTER 4 drive families. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER for Siemens Drives covers the full range of operations required to configure a complete drive system, from basic single drives to demanding multi-axis applications.

STARTER commissioning tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics. Apart from the SINAMICS drives, STARTER is also suitable for MICROMASTER 4 devices.

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Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all the following components of the SINAMICS G120P inverter series.

Mechanical specifications	
Vibratory load	
• Transport ¹⁾ acc. to EN 60721-3-2	Class 2M3
• Operation Test values acc. to EN 60068-2-6	Class 3M2
Shock load	
• Transport ¹⁾ acc. to EN 60721-3-2 - All units and components	Class 2M3
• Operation Test values acc. to EN 60068-2-27 - Frame sizes FSA to FSF	Class 3M2
Ambient conditions	
Protection class According to EN 61800-5-1	Class I (with protective conductor system) and Class III (PELV)
Touch protection According to EN 61800-5-1	For the intended purpose
Permissible ambient and coolant temperature (air) during operation for line-side power components and Power Modules	
• Low overload (LO)	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (104 ... 140 °F) see derating characteristics
• High overload (HO)	0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (122 ... 140 °F) see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units and supplementary system components	
	With CU230P-2 HVAC/DP/CAN with/without blanking cover: -10 ... 60 °C (14 ... 140 °F) With CU230P-2 PN with/without blanking cover: -10 ... 55 °C (14 ... 131 °F) With IOP/BOP-2: 0 ... 50 °C (32 ... 122 °F) Derating of 3 K/1000 m (3281 ft) applies to Control Units as of an installation altitude of 1000 m (3281 ft) above sea level.

Mechanical specifications

Climatic ambient conditions

- | | |
|--|---|
| • Storage ¹⁾ acc. to EN 60721-3-1 | Class 1K3
Temperature -25 ... +55 °C
(-13 ... +131 °F) |
| • Transport ¹⁾ acc. to EN 60721-3-2 | Class 2K4
Temperature -40 ... +70 °C
(-40 ... +158 °F)
Max. air humidity 95 %
at 40 °C (104 °F) |
| • Operation acc. to EN 60721-3-3 | Class 3K3
Condensation, splashwater,
and ice formation not permitted
(EN 60204, Part 1) |

Environmental class/harmful chemical substances

- | | |
|--|-----------|
| • Storage ¹⁾ acc. to EN 60721-3-1 | Class 1C2 |
| • Transport ¹⁾ acc. to EN 60721-3-2 | Class 2C2 |
| • Operation acc. to EN 60721-3-3 | Class 3C2 |

Organic/biological influences

- | | |
|--|-----------|
| • Storage ¹⁾ acc. to EN 60721-3-1 | Class 1B1 |
| • Transport ¹⁾ acc. to EN 60721-3-2 | Class 2B1 |
| • Operation acc. to EN 60721-3-3 | Class 3B1 |

Degree of pollution

According to EN 61800-5-1

2

Standards

Compliance with standards UL ²⁾, CE, c-tick ³⁾

CE marking

According to Low-Voltage Directive 2006/95/EC

EMC Directive

According to EN 61800-3

- | | |
|---|---|
| • Frame sizes FSA to FSF without integrated line filter, degree of protection IP20/UL Open Type | Category C3 ⁴⁾ |
| • Frame sizes FSA to FSF with integrated line filter class A, degree of protection IP20/UL Open Type and degree of protection IP55/UL Type 12 | Category C2 ⁵⁾
(corresponds to class A acc. to EN 55011) |
| • Frame sizes FSA to FSF with integrated line filter class B, degree of protection IP55/UL Type 12 | Category C1 Table 14 ⁵⁾
(corresponds to class B acc. to EN 55011 for conducted interference emission) |

Note:

The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the frequency inverter. The frequency inverters on their own do not generally require identification according to the EMC Directive.

¹⁾ In transport packaging.

²⁾ UL approval for frame sizes FSD to FSF will be available soon.

³⁾ The c-tick approval for PM230 Power Modules without integrated line filter is in preparation.

⁴⁾ Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side. As a consequence, a PDS (Power Drive System) can be installed according to category C3.

⁵⁾ With shielded motor cable up to 25 m (82 ft).

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Technical specifications

Compliance with standards

CE marking



The SINAMICS G120P inverters meet the requirements of the Low-Voltage Directive 2006/95/EC.

Low-Voltage Directive

The inverters comply with the following standards listed in the official journal of the EU:

- EN 60204-1
Safety of machinery, electrical equipment of machines
- EN 61800-5-1
Electrical power drive systems with variable speed – Part 5-1: Requirements regarding safety – electrical, thermal, and energy requirements

UL listing



Inverter devices in UL category NMMS certified to UL, in compliance with UL 508C. UL list numbers E121068 and E192450. UL approval for frame sizes FSD to FSF will be available soon.

For use in environments with pollution degree 2.

On the Internet at www.ul.com

Machinery Directive

The inverters are suitable for installation in machines. Compliance with the Machinery Directive 2006/42/EC requires a separate certificate of conformity. This must be provided by the plant construction company or the organization marketing the machine.

EMC Directive

- EN 61800-3
Variable-speed electric drives
Part 3: EMC product standard including specific test methods

The following information applies to the SINAMICS G120P inverters from Siemens:

- The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the frequency inverter.
- Frequency inverters are normally only supplied to experts for installation in machines or systems. A frequency inverter must, therefore, only be considered as a component which, on its own, is not subject to the EMC product standard EN 61800-3. The inverter's operating instructions, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to become a PDS. For a PDS, the EMC Directive in the EU is complied with by observing the product standard EN 61800-3 for variable-speed electric drive systems. The frequency inverters on their own do not generally require identification according to the EMC Directive.

- In the Standard EN 61800-3 of July 2005, a distinction is no longer made between "general availability" and "restricted availability". Instead, different categories C1 to C4 have been defined in accordance with the environment of the PDS at the operating location:
 - **Category C1:** Drive systems for rated voltages < 1000 V for use in the first environment
 - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in the first environment, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning note is required.
 - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use in the second environment. A warning note is required.
 - **Category C4:** Drive systems for rated voltages ≥ 1000 V or for rated currents ≥ 400 A or for use in complex systems in the second environment. An EMC plan must be created.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for the "second environment" (= industrial power supply systems that do not supply households). These limit values are below the limit values of filter class A to EN 55011. Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side.
- With SINAMICS G120P, Power Drive Systems (PDS) that fulfill the EMC product standard EN 61800-3 can be configured when observing the installation instructions in the product documentation.
- A differentiation must be made between the product standards for electrical drive systems (PDS) of the range of standards EN 61800 (of which Part 3 covers EMC topics) and the product standards for the devices/systems/machines, etc. This will probably not result in any changes in the practical use of frequency inverters. Since frequency inverters are always part of a PDS and these are part of a machine, the machine manufacturer must observe various standards depending on their type and environment (e.g. EN 61000-3-2 for line harmonics and EN 55011 for radio interference). The product standard for PDS on its own is, therefore, either insufficient or irrelevant.
- With respect to the compliance with limits for line supply harmonics, the EMC product standard EN 61800-3 for PDS refers to compliance with the EN 61000-3-2 and EN 61000-3-12 standards.
- Regardless of the configuration with SINAMICS G120P and its components, the machine construction company (OEM) can also apply other measures to ensure that the machine complies with the EU EMC Directive. The EU EMC Directive is generally fulfilled when the relevant EMC product standards are observed. If they are not available, the generic standards (e.g. DIN EN 61000-x-x) can be used instead. It is important that the conducted and emitted interference at the line connection point and outside the machine remain below the relevant limit values. Any suitable technical measures can be applied to ensure this.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

SINAMICS G120P pump, fan, compressor inverters

Accessories

Optional accessories

Shield connection kit 1 for CU230P-2 HVAC/DP/CAN Control Units

Shield connection kit 1 offers optimum shield connection and strain relief for all signal and communication cables. It includes a matching shield bonding plate and all of the necessary connecting and retaining elements for mounting.

Shield connection kit 3 for CU230P-2 PN, CU240E-2 PN and CU240E-2 PN-F Control Units

Shield connection kit 3 offers optimum shield connection and strain relief for all signal and communication cables. It includes a matching shield bonding plate and all of the necessary connecting and retaining elements for mounting.

SINAMICS micro memory cards (MMC)/SINAMICS SD cards

The parameter settings for an inverter can be stored on the SINAMICS micro memory card (MMC)/SINAMICS SD card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again. The associated slot is located on the top of the Control Unit.

PC inverter connection kit 2

For controlling and commissioning the inverter directly from a PC, if the STARTER commissioning tool has been installed on the PC. The STARTER commissioning tool on DVD-ROM is included in the scope of delivery of the PC inverter connection kit 2.

Spare parts

Mounting set

Depending on the frame size, different mounting sets are available for the PM230 Power Modules.

Fan units

The PM230 Power Module is equipped with an internal and an external fan unit. Both of these can be replaced if necessary.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

CU230P-2 Control Units

Overview



Example: CU230P-2 HVAC Control Unit in the PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC

The CU230P-2 Control Units are designed for drives with integrated technological functions for pump, fan and compressor applications. The I/O interface, the fieldbus interfaces and the additional software functions optimally support these applications.

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines.

For further information, see [Shield connection kits and Shield plates for Control Units and Power Modules in section Supplementary system components](#).

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Selection and ordering data

Technology functions (selection)	Inputs	Outputs	Integrated safety technology	Digital inputs, fail-safe	Communication	Designation	Control Unit Order No.
CU230P-2 series – the specialist for pumps, fans, compressors, water, buildings							
<ul style="list-style-type: none"> • Free function blocks (FFB) • 4 × PID controllers • Pump staging • Hibernation • Essential service mode • 2-zone control 	6 digital 4 analog	3 digital 2 analog	–	–	RS485/USS / Modbus RTU / BACnet MS/TP	CU230P-2 HVAC	6SL3243-0BB30-1HA2
					PROFIBUS DP	CU230P-2 DP	6SL3243-0BB30-1PA2
					PROFINET	CU230P-2 PN <small>new</small>	6SL3243-0BB30-1FA0
					CANopen	CU230P-2 CAN	6SL3243-0BB30-1CA2

Function

Control modes

- Linear and square torque characteristic for fluid flow and positive displacement machines
- ECO mode for additional energy saving
- Sensorless Vector control for sophisticated control tasks

Connections

- 2 analog inputs (current/voltage can be selected) to directly connect pressure/level sensors
- 2 additional analog inputs to connect Pt1000/LG-Ni1000 temperature sensors
- Direct control of valves and flaps using two 230 V relays

Interfaces

- PROFINET, PROFIBUS, USS, BACnet MS/TP, CANopen and Modbus-RTU communication

Software functions

- Automatic restart function after power failure
- Flying restart
- Skip frequencies
- 1 PID controller for the closed-loop control of the motor speed as process controller for temperature, pressure, air quality or levels
- 3 freely-programmable PID controllers
- Energy saving through hibernation
- Load check function to monitor belts and flow
- Motor staging
- Multi-zone controller
- Extended emergency mode
- Real time clock with three time generators

IOP wizards for special applications with and without PID controller, such as

- Pumps: Positive displacement (constant load torque) and centrifugal pumps (square load torque)
- Fans: Radial and axial fans (square load torque)
- Compressors: Positive displacement (constant load torque) and fluid flow machines (square load torque)

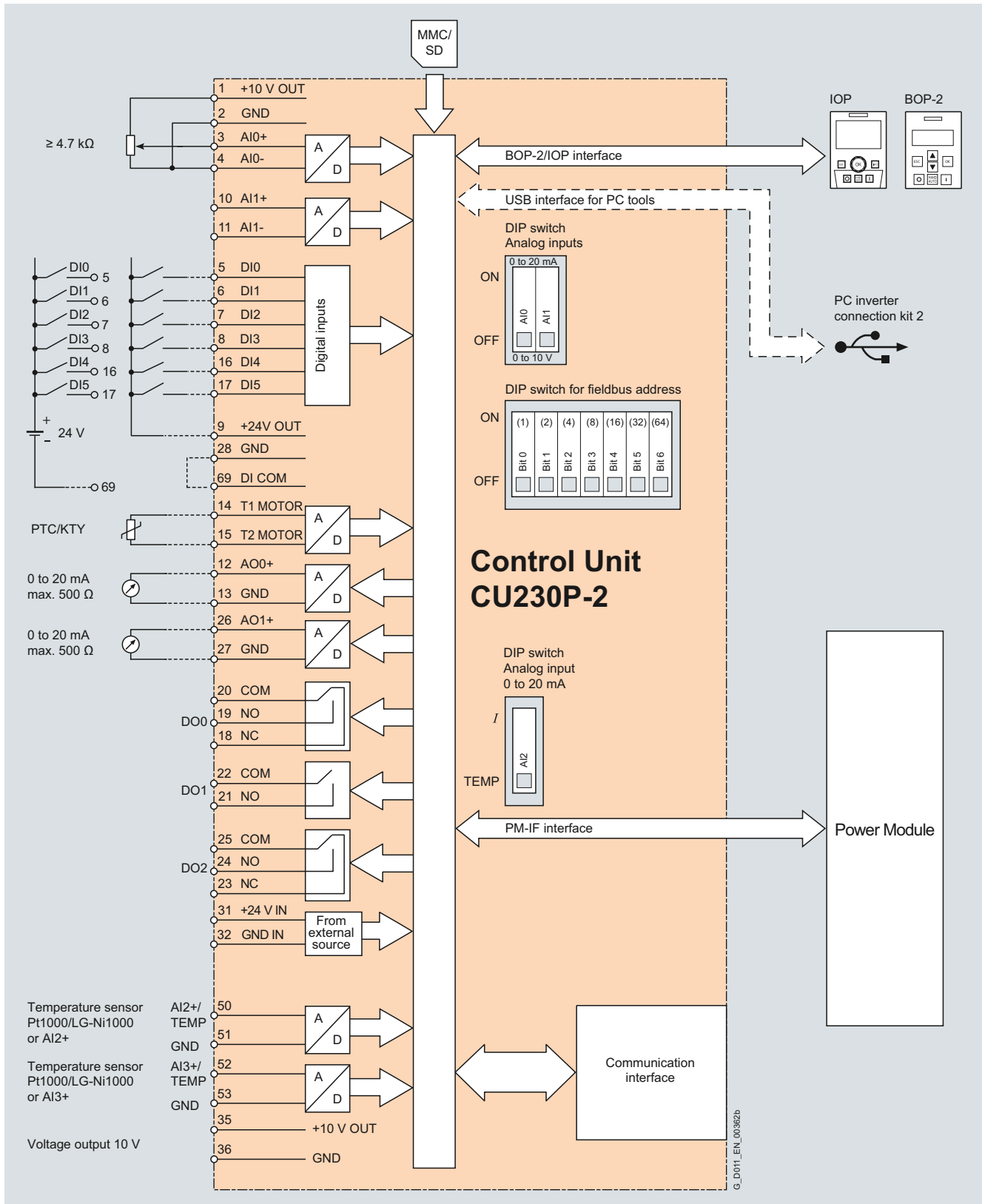
SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

CU230P-2 Control Units

Integration

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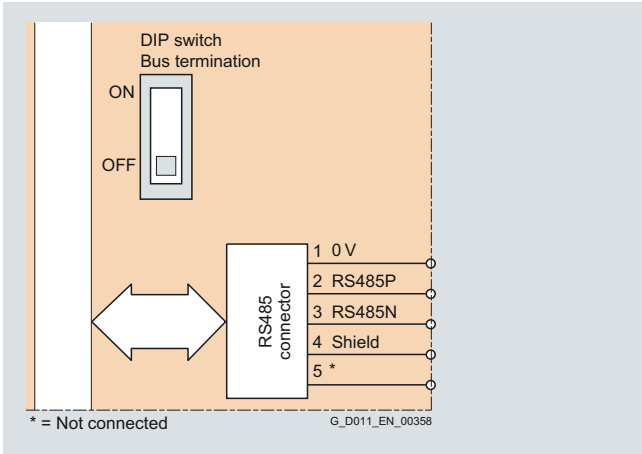
Connection diagram for the CU230P-2 Control Unit series

SINAMICS G120P pump, fan, compressor inverters

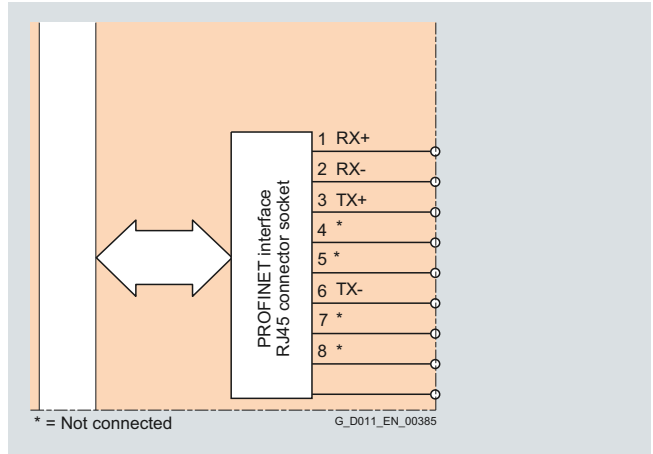
0.37 kW to 90 kW (0.5 hp to 125 hp)

CU230P-2 Control Units

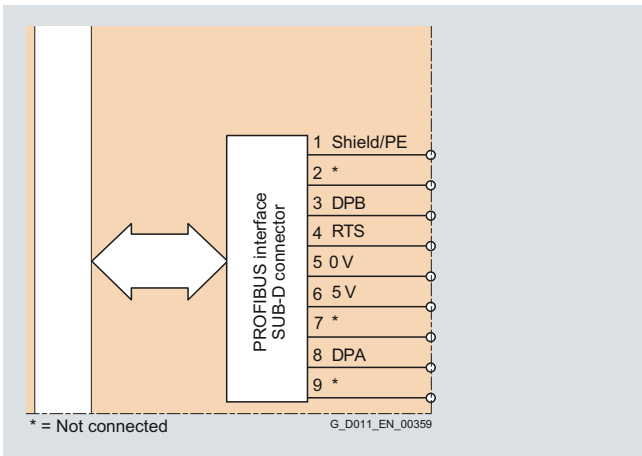
Integration



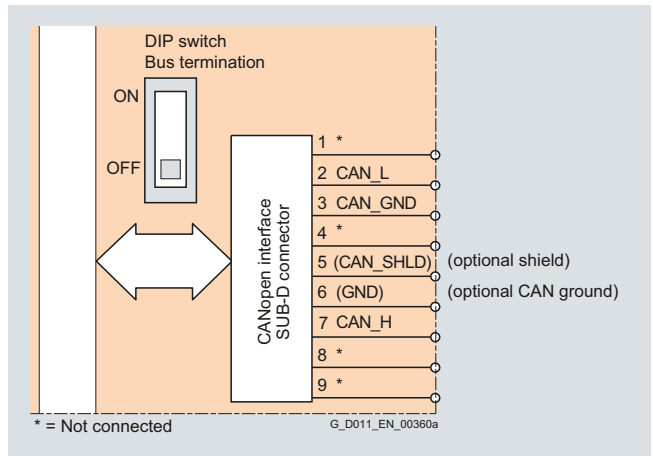
Communication interface RS485 USS/Modbus RTU/BACnet MS/TP



PROFINET communication interface



PROFIBUS DP communication interface



CANopen communication interface

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

CU230P-2 Control Units

Design

CU230P-2 HVAC, CU230P-2 DP, CU230P-2 PN and CU230P-2 CAN Control Units



Example: CU230P-2 Control Unit with open and closed terminal covers

Terminal No.	Signal	Features
Digital inputs (DI) – Standard		
69	DI COM	Reference potential for digital inputs
5 ... 8, 16, 17	DI0 ... DI5	Freely programmable isolated, inputs in compliance with IEC 61131-2
Digital outputs (DO)		
18	DO0, NC	Relay output 1 NC contact (5 A, 30 V DC or 2 A, 250 V AC) ¹⁾
19	DO0, NO	Relay output 1 NO contact (5 A, 30 V DC or 2 A, 250 V AC)
20	DO0, COM	Relay output 1 Common contact (5 A, 30 V DC or 2 A, 250 V AC) ¹⁾
21	DO1, NO	Relay output 2 NO contact (0.5 A, 30 V DC)
22	DO1, COM	Relay output 2 Common contact (0.5 A, 30 V DC)
23	DO2, NC	Relay output 3 NC contact (5 A, 30 V DC or 2 A, 250 V AC) ¹⁾
24	DO2, NO	Relay output 3 NO contact (5 A, 30 V DC or 2 A, 250 V AC)
25	DO2, COM	Relay output 3 Common contact (5 A, 30 V DC or 2 A, 250 V AC) ¹⁾

¹⁾ The following applies to UL-compliant installations: max. 3 A, 30 V DC or 2 A, 250 V AC may be switched over terminals 18/20 (DO0 NC) and 23/25 (DO2 NC).

Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current and voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current and voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
50	AI2+/TEMP	Non-isolated input, switchable between current and temperature sensors, type Pt1000/LG-Ni1000 Value range: 0/4 ... 20 mA, Pt1000: -50 ... +250 °C (-58 ... +482 °F) LG-Ni1000: -50 ... +150 °C (-58 ... +302 °F)
51	GND	Reference potential of the AI2/internal electronics ground
52	AI3+/TEMP	Non-isolated input for temperature sensors, type Pt1000/LG-Ni1000 Value range: Pt1000: -50 ... +250 °C (-58 ... +482 °F) LG-Ni1000: -50 ... +150 °C (-58 ... +302 °F)
53	GND	Reference potential of the AI3/internal electronics ground
Analog outputs (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
13	GND	Reference potential of the AO0/internal electronics ground
26	AO1+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
27	GND	Reference potential of the AO1/internal electronics ground
Motor temperature sensor interface		
14	T1 MOTOR	Positive input for motor temperature sensor Type: PTC, KTY sensor, Thermo-Click
15	T2 MOTOR	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 200 mA
28	GND	Reference potential of the power supply/internal electronics ground
1	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/internal electronics ground
31	+24 V IN	Power supply input 20.4 ... 28.8 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input
35	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
36	GND	Reference potential of the power supply/internal electronics ground

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

CU230P-2 Control Units

Technical specifications

Control Unit	CU230P-2 HVAC	CU230P-2 DP	CU230P-2 PN	CU230P-2 CAN
	6SL3243-0BB30-1HA2	6SL3243-0BB30-1PA2	6SL3243-0BB30-1FA0	6SL3243-0BB30-1CA2
Electrical specifications				
Operating voltage	24 V DC via the Power Module or by connecting to an external 20.4 ... 28.8 V DC power supply			
Current consumption, max.	0.5 A			
Protective insulation	PELV according to EN 50178 Protective separation from the line supply using double/reinforced insulation			
Power loss	<5.5 W			
Interfaces				
Digital inputs – Standard	6 isolated inputs optically isolated; free reference potential (own potential group) NPN/PNP logic can be selected using the wiring			
• Switching level: 0 → 1	11 V			
• Switching level: 1 → 0	5 V			
• Input current, max.	15 mA			
Digital outputs	3 relays			
• 2 relay changeover contacts	250 V AC, 2 A (inductive load) 30 V DC, 5 A (ohmic load) The following applies to UL-compliant installations: max. 3 A, 30 V DC or 2 A, 250 V AC may be switched over terminals 18/20 (DO0 NC) and 23/25 (DO2 NC).			
• 1 relay NO contact	30 V DC, 0.5 A (ohmic load)			
Analog inputs	Analog inputs are protected against inputs in a voltage range of ± 30 V and have a common-mode voltage in the ± 15 V range			
• 2 differential inputs	Switchable with DIP switch between voltage and current: -10 ... +10 V, 0/4 ... 20 mA, 10-bit resolution These differential inputs can be configured as additional digital inputs. Switching thresholds: 0 → 1: Rated voltage 4 V 1 → 0: Rated voltage 1.6 V			
• 1 non-isolated input	Switchable using DIP switch between current and temperature sensor type Pt1000/LG-Ni1000, 0/4 ... 20 mA; 10-bit resolution			
• 1 non-isolated input	Temperature sensor type Pt1000/LG-Ni1000, 10-bit resolution			
Analog outputs	The analog outputs have short circuit protection			
• 2 non-isolated outputs	Switchable between voltage and current using parameter setting: 0 ... 10 V, 0/4 ... 20 mA Voltage mode: 10 V, min. burden 10 kΩ Current mode: 20 mA, max. burden 500 Ω			
PTC/KTY interface	1 motor temperature sensor input, sensors that can be connected, PTC, KTY and Thermo-Click, accuracy ±5 °C			
Removable terminal connector for I/O interface	✓			
Bus interface				
Type	RS485	PROFIBUS DP	PROFINET	CANopen
Protocols	USS Modbus RTU BACnet MS/TP (switchable using software)	PROFIdrive profile V4.1	PROFINET	CANopen
Hardware	Terminal, insulated, USS: max. 187.5 kBaud Modbus RTU: 19.2 kBaud, Bus terminating resistors that can be switched in	9-pin SUB-D connector, insulated, Max. 12 Mbit/s Slave address can be set using DIP switches	2 × RJ45, PROFIdrive profile V4.1, device name can be stored on the device Max. 100 Mbit/s (full duplex)	9-pin SUB-D socket, insulated, Max. 1 Mbit/s

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

CU230P-2 Control Units

Technical specifications

Control Unit	CU230P-2 HVAC	CU230P-2 DP	CU230P-2 PN	CU230P-2 CAN
	6SL3243-0BB30-1HA2	6SL3243-0BB30-1PA2	6SL3243-0BB30-1FA0	6SL3243-0BB30-1CA2
Tool interfaces				
Memory card	1 SINAMICS micro memory card (MMC) or 1 SINAMICS SD card			
Operator panels	<ul style="list-style-type: none"> Intelligent Operator Panel IOP Basic Operator Panel BOP-2 Blanking cover 			
	Can be directly plugged on			
	Can be directly plugged on			
	Necessary if an operator panel is not inserted in order to achieve degree of protection IP55			
PC interface	USB			
Open-loop/closed-loop control techniques				
V/f linear/square/parameterizable	✓			
V/f with flux current control (FCC)	✓			
V/f ECO linear/square	✓			
Vector control, sensorless	✓			
Vector control, with sensor	–			
Torque control, sensorless	✓			
Torque control, with sensor	–			
Software functions				
Setpoint input	✓			
Fixed frequencies	16, parameterizable			
JOG	✓			
Digital motorized potentiometer (MOP)	✓			
Ramp smoothing	✓			
Extended ramp-function generator (with ramp smoothing Off3)	✓			
Positioning down ramp	–			
Slip compensation	✓			
Signal interconnection with BICO technology	✓			
Free function blocks (FFB) for logical and arithmetic operations	✓			
Switchable drive data sets (DDS)	✓ (4)			
Switchable command data sets (CDS)	✓ (4)			
Flying restart	✓			
Automatic restart after line supply failure or operational fault (AR)	✓			
Technology controller (internal PID)	✓			
Energy-saving function (hibernation) with internal PID controller	✓			
Energy-saving function (hibernation) with external PID controller	✓			
Belt monitoring with and without sensor (load torque monitoring)	✓			
Dry-running/overload protection monitoring (load torque monitoring)	✓			
Thermal motor protection	✓ (R_t , sensor: PTC/KTY/Thermo-Click)			
Thermal inverter protection	✓			
Motor identification	✓			
Motor holding brake	–			
Auto-ramping (V_{dcmax} controller)	✓			
Kinetic buffering (V_{dcmin} controller)	✓			
Braking functions for PM230				
• DC braking	✓			
• Compound braking	–			
• Dynamic braking with integrated brake chopper	–			

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

CU230P-2 Control Units

Technical specifications

Control Unit	CU230P-2 HVAC	CU230P-2 DP	CU230P-2 PN	CU230P-2 CAN
	6SL3243-0BB30-1HA2	6SL3243-0BB30-1PA2	6SL3243-0BB30-1FA0	6SL3243-0BB30-1CA2
Mechanical specifications and ambient conditions				
Degree of protection	IP20			
Signal cable cross-section	0.15 mm ² ... 1.5 mm ² (AWG28 ... AWG16)			
Operating temperature	For CU230P-2 HVAC/DP/CAN: -10 ... 60 °C (14 ... 140 °F) For CU230P-2 PN: -10 ... 55 °C (14 ... 131 °F) With IOP/BOP-2: 0 ... 50 °C (32 ... 122 °F) Derating of 3 K/1000 m (3281 ft) applies to Control Units as of an installation altitude of 1000 m (3281 ft) above sea level.			
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)			
Relative humidity	< 95 % RH, condensation not permissible			
Dimensions				
• Width	73 mm (2.87 in)			
• Height	199 mm (7.83 in)			
• Depth	65.5 mm (2.58 in)			
Weight, approx.	0.61 kg (1.35 lb)			

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Overview

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PM230 Power Modules, degree of protection IP55/UL Type 12, frame sizes FSA to FSF



PM230 Power Modules, degree of protection IP20, standard variant, frame sizes FSA to FSC (example: frame size FSB)



PM230 Power Modules, degree of protection IP20, push-through variant, frame sizes FSA to FSC (with Control Unit and operator panel)



PM230 Power Modules, degree of protection IP20, standard variant, frame sizes FSD to FSF

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Overview



PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC, rear view



PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC, internal view (without Control Unit)

PM230 Power Modules, degree of protection IP55/UL Type 12, are designed for applications involving pumps, fans and compressors with a square characteristic. They do not have an integrated braking chopper (single-quadrant applications).

The PM230 Power Module only generates low line harmonics and apparent power losses. In addition to the energy-related advantages, environmental stressing is also reduced.

- Line harmonics are reduced significantly.
 - The harmonics and the THD (Total Harmonic Distortion) are below the limits required by the EN 61000-3-12 or IEC 61000-3-12 standards.
 - Additional components such as line reactors are not required and it is not permissible to use them. As a consequence, low envelope dimensions are obtained for space-saving designs.
- The active power component is very high, i.e. the devices consume less current from the supply for the same drive power. As a consequence, smaller supply cables can be used.

Frame sizes FSA to FSF of the PM230 Power Module in the degree of protection IP55/UL Type 12 are available with integrated line filter class A for C2 installations or integrated line filter class B for C1 installations.

Frame sizes FSA to FSF of the PM230 Power Module in degree of protection IP20 standard variant are available with integrated line filter class A for C2 installations or without an integrated line filter.

Frame sizes FSA to FSC of the PM230 Power Module in degree of protection IP20 push-through variant are available with integrated line filter class A for C2 installations or without an integrated line filter.

In order to maintain EMC categories C2 (line filter A) or C1 table 14 (line filter B, conducted), the permissible shielded cable length between the inverter and motor is limited to max. 25 m (82 ft).

The permissible cable lengths between inverter and motor are limited. Longer cables can be used if output reactors are connected for PM230 Power Modules, frame sizes FSD to FSF ([see load-side power components](#)).

The line system configurations that are supported are symmetrical systems with grounded neutral point.

The PM230 Power Module is not approved for safety-oriented applications.

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines.

[For further information, see Shield connection kits and Shield plates for Control Units and Power Modules in section Supplementary system components.](#)

Design

PM230 Power Modules have the following connections and interfaces:

- PM-IF interface to connect the PM230 Power Module to the Control Unit. The PM230 Power Module also supplies power to the Control Unit using an integrated power supply.
- Motor connection using screw terminals or screw studs
- 2 PE/protective conductor connections

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Selection and ordering data

To ensure that a suitable Power Module is selected, the following currents should be used for applications:

- **Rated output current for applications with low overload (LO)**
- **Base-load current for applications with high overload (HO)**

The G120P drive supports most 2-pole, 4-pole and 6-pole motors rated up to 3.0 kW (4.0 hp). The drive should be selected by matching the output current to the motor FLA. For a description of the overload performance, please refer to the general technical specifications of the Power Modules.

PM230 Power Modules degree of protection IP55/UL Type 12

Rated power ¹⁾		Rated output current I_{rated} ²⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	Frame size	PM230 Power Module degree of protection IP55/UL Type 12 with integrated line filter class A Order No.	PM230 Power Module degree of protection IP55/UL Type 12 with integrated line filter class B Order No.
kW	hp		kW	hp				
380 ... 480 V 3 AC								
0.37	0.50	1.3	0.25	0.33	0.9	FSA	6SL3223-0DE13-7AA0	6SL3223-0DE13-7BA0
0.55	0.75	1.7	0.37	0.5	1.3	FSA	6SL3223-0DE15-5AA0	6SL3223-0DE15-5BA0
0.75	1.0	2.2	0.55	0.75	1.7	FSA	6SL3223-0DE17-5AA0	6SL3223-0DE17-5BA0
1.1	1.5	3.1	0.75	1.0	2.2	FSA	6SL3223-0DE21-1AA0	6SL3223-0DE21-1BA0
1.5	2.0	4.1	1.1	1.5	3.1	FSA	6SL3223-0DE21-5AA0	6SL3223-0DE21-5BA0
2.2	3.0	5.9	1.5	2.0	4.1	FSA	6SL3223-0DE22-2AA0	6SL3223-0DE22-2BA0
3.0	4.0	7.7	2.2	3.0	5.9	FSA	6SL3223-0DE23-0AA0	6SL3223-0DE23-0BA0
4.0	5.0	10.2	3.0	4.0	7.7	FSB	6SL3223-0DE24-0AA0	6SL3223-0DE24-0BA0
5.5	7.5	13.2	4.0	5.0	10.2	FSB	6SL3223-0DE25-5AA0	6SL3223-0DE25-5BA0
7.5	10	18	5.5	7.5	13.2	FSB	6SL3223-0DE27-5AA0	6SL3223-0DE27-5BA0
11.0	15	26	7.5	10	18	FSC	6SL3223-0DE31-1AA0	6SL3223-0DE31-1BA0
15.0	20	32	11.0	15	26	FSC	6SL3223-0DE31-5AA0	6SL3223-0DE31-5BA0
18.5	25	38	15.0	20	32	FSC	6SL3223-0DE31-8AA0	–
						FSD	–	6SL3223-0DE31-8BA0
22	30	45	18.5	25	38	FSD	6SL3223-0DE32-2AA0	6SL3223-0DE32-2BA0
30	40	60	22	30	45	FSD	6SL3223-0DE33-0AA0	6SL3223-0DE33-0BA0
37	50	75	30	40	60	FSE	6SL3223-0DE33-7AA0	6SL3223-0DE33-7BA0
45	60	90	37	50	75	FSE	6SL3223-0DE34-5AA0	6SL3223-0DE34-5BA0
55	75	110	45	60	90	FSF	6SL3223-0DE35-5AA0	6SL3223-0DE35-5BA0
75	100	145	55	75	110	FSF	6SL3223-0DE37-5AA0	6SL3223-0DE37-5BA0
90	125	178	75	100	145	FSF	6SL3223-0DE38-8AA0	6SL3223-0DE38-8BA0

It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12.

For further information, see [Operator panels and Blanking cover for PM230 Power Modules](#) in section [Supplementary system components](#).

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

²⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Selection and ordering data

PM230 Power Modules degree of protection IP20 standard variant

Rated power ¹⁾		Rated output current I_{rated} ²⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	Frame size		PM230 Power Module degree of protection IP20 standard variant without integrated line filter	PM230 Power Module degree of protection IP20 standard variant with integrated line filter class <u>A</u>
kW	hp		kW	hp					
380 ... 480 V 3 AC									
0.37	0.50	1.3	0.25	0.33	0.9	FSA	6SL3210-1NE11-3UL0	6SL3210-1NE11-3AL0	
0.55	0.75	1.7	0.37	0.5	1.3	FSA	6SL3210-1NE11-7UL0	6SL3210-1NE11-7AL0	
0.75	1.0	2.2	0.55	0.75	1.7	FSA	6SL3210-1NE12-2UL0	6SL3210-1NE12-2AL0	
1.1	1.5	3.1	0.75	1.0	2.2	FSA	6SL3210-1NE13-1UL0	6SL3210-1NE13-1AL0	
1.5	2.0	4.1	1.1	1.5	3.1	FSA	6SL3210-1NE14-1UL0	6SL3210-1NE14-1AL0	
2.2	3.0	5.9	1.5	2.0	4.1	FSA	6SL3210-1NE15-8UL0	6SL3210-1NE15-8AL0	
3.0	4.0	7.7	2.2	3.0	5.9	FSA	6SL3210-1NE17-7UL0	6SL3210-1NE17-7AL0	
4.0	5.0	10.2	3.0	4.0	7.7	FSB	6SL3210-1NE21-0UL0	6SL3210-1NE21-0AL0	
5.5	7.5	13.2	4.0	5.0	10.2	FSB	6SL3210-1NE21-3UL0	6SL3210-1NE21-3AL0	
7.5	10	18	5.5	7.5	13.2	FSB	6SL3210-1NE21-8UL0	6SL3210-1NE21-8AL0	
11.0	15	26	7.5	10	18	FSC	6SL3210-1NE22-6UL0	6SL3210-1NE22-6AL0	
15.0	20	32	11.0	15	26	FSC	6SL3210-1NE23-2UL0	6SL3210-1NE23-2AL0	
18.5	25	38	15.0	20	32	FSC	6SL3210-1NE23-8UL0	6SL3210-1NE23-8AL0	
22	30	45	18.5	25	38	FSD	6SL3210-1NE24-5UL0	6SL3210-1NE24-5AL0	
30	40	60	22	30	45	FSD	6SL3210-1NE26-0UL0	6SL3210-1NE26-0AL0	
37	50	75	30	40	60	FSE	6SL3210-1NE27-5UL0	6SL3210-1NE27-5AL0	
45	60	90	37	50	75	FSE	6SL3210-1NE28-8UL0	6SL3210-1NE28-8AL0	
55	75	110	45	60	90	FSF	6SL3210-1NE31-1UL0	6SL3210-1NE31-1AL0	
75	100	145	55	75	110	FSF	6SL3210-1NE31-5UL0	6SL3210-1NE31-5AL0	

PM230 Power Modules degree of protection IP20 push-through variant

Rated power ¹⁾		Rated output current I_{rated} ²⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	Frame size		PM230 Power Module degree of protection IP20 push-through variant without integrated line filter	PM230 Power Module degree of protection IP20 push-through variant with integrated line filter class <u>A</u>
kW	hp		kW	hp					
380 ... 480 V 3 AC									
3.0	4.0	7.7	2.2	3.0	5.9	FSA	6SL3211-1NE17-7UL0	6SL3211-1NE17-7AL0	
7.5	10	18	5.5	7.5	13.2	FSB	6SL3211-1NE21-8UL0	6SL3211-1NE21-8AL0	
18.5	25	38	15.0	20	32	FSC	6SL3211-1NE23-8UL0	6SL3211-1NE23-8AL0	

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).
²⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

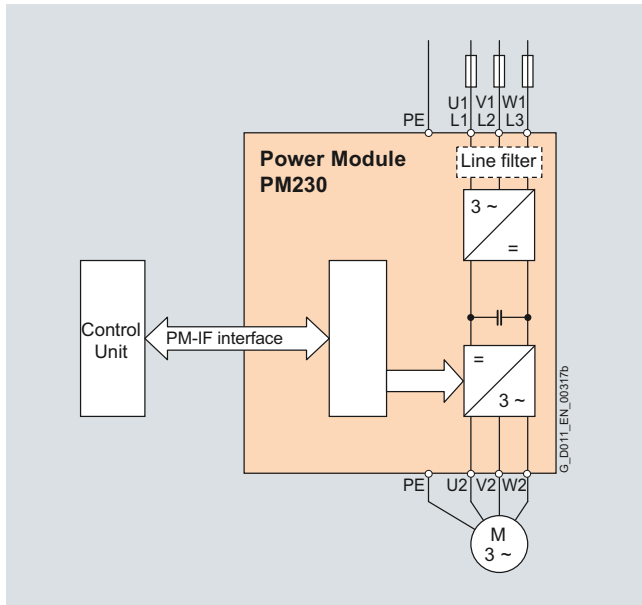
SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Integration

PM230 Power Modules communicate with the Control Unit via the PM-IF interface.



Connection diagram for PM230 Power Module with or without integrated line filter class A or B

Power components that are optionally available depending on the Power Module used

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

	Frame size							
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX	
PM230 Power Module (IP54/IP55)								
Available frame sizes	✓	✓	✓	✓	✓	✓	–	
Line-side power components								
Line filter class A							–	
Line filter class B							–	
Line reactor ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	–	
Load-side power components								
Output reactor	–	–	–	S	S	S	–	
Sine-wave filter	–	–	–	S	S	S	–	
PM230 Power Module (IP20)								
Available frame sizes	✓	✓	✓	✓	✓	✓	–	
Line-side power components								
Line filter class A							–	
Line reactor ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	–	
Load-side power components								
Output reactor	–	–	–	S	S	S	–	
Sine-wave filter	–	–	–	S	S	S	–	

S = Lateral mounting
 | = Integrated
 – = Not possible

¹⁾ A line reactor is not required and must not be used in conjunction with a PM230 Power Module.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

General technical specifications

	PM230 Power Modules	
Degree of protection	IP55/UL Type 12 (with BOP-2 or blanking cover) IP54/UL Type 12 with IOP	IP20/UL Open Type (standard or push-through variants)
Power (low overload LO)	0.37 ... 90 kW	0.37 ... 75 kW
Rated output current (low overload LO)	1.3 ... 178 A	1.3 ... 145 A
Power (high overload HO)	0.25 ... 75 kW	0.25 ... 55 kW
Rated output current (high overload HO)	0.9 ... 145 A	0.9 ... 110 A
System operating voltage	380 ... 480 V 3 AC ± 10 %	
Line supply requirements Line short circuit voltage u_K	$R_{sc} > 100$ or $u_K < 1\%$	
Input frequency	47 ... 63 Hz	
Output frequency	<ul style="list-style-type: none"> Control type V/f: 0 ... 650 Hz Control type Vector: 0 ... 200 Hz 	
Pulse frequency	4 kHz for higher pulse frequencies up to 16 kHz, see derating data	
Power factor λ	0.9	
Output voltage, max. In % of input voltage	95 %	
Overload capability	<ul style="list-style-type: none"> Low overload (LO) <ul style="list-style-type: none"> - Frame sizes FSA to FSC: Note: When the overload capability is used, the base-load current I_L is not reduced. 1.5 × base-load current I_L (i. e. 150 % overload) for 3 s plus 1.1 × base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s - Frame sizes FSD to FSF: 1.1 × base-load current I_L (i.e. 110 % overload) for 60 s within a cycle time of 300 s High overload (HO) <ul style="list-style-type: none"> - Frame sizes FSA to FSC: Note: When the overload capability is used, the base-load current I_H is not reduced. 2 × base-load current I_H (i. e. 200 % overload) for 3 s plus 1.5 × base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s - Frame sizes FSD to FSF: 1.5 × base-load current I_H (i.e. 150 % overload) for 60 s within a cycle time of 300 s 	
Electromagnetic compatibility	Integrated line filter according to EN 61800-3 C2 and EN 61800-3 C1 Table 14 or without integrated line filter according to EN 61800-3 C3 (with IP20 variants only)	
Possible braking methods	DC braking	
Operating temperature	<ul style="list-style-type: none"> Low overload (LO): 0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (104 ... 140 °F) see derating characteristics High overload (HO): 0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (122 ... 140 °F) see derating characteristics 	
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)	
Relative humidity	< 95 % RH, condensation not permissible	
Cooling	Power units with increased air cooling using integrated fans	
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, >1000 m (3281 ft) see derating characteristics	
Protection functions	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking 	
Compliance with standards	UL ¹⁾ , CE, c-tick ²⁾	
Standard SCCR (Short Circuit Current Rating) ³⁾	Frame sizes FSA to FSC: 40 kA Frame sizes FSD to FSF: 65 kA	65 kA
CE marking	According to Low-Voltage Directive 2006/95/EC	

¹⁾ UL approval for frame sizes FSD to FSF will be available soon.

²⁾ The c-tick approval for PM230 Power Modules without integrated line filter is in preparation.

³⁾ Applies to industrial control cabinet installations to NEC article 409/UL 508A.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

PM230 Power Modules degree of protection IP55/UL Type 12

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules, degree of protection IP55/UL Type 12				
With integrated line filter class A		6SL3223-ODE13-7AA0	6SL3223-ODE15-5AA0	6SL3223-ODE17-5AA0	6SL3223-ODE21-1AA0	6SL3223-ODE21-5AA0
With integrated line filter class B		6SL3223-ODE13-7BA0	6SL3223-ODE15-5BA0	6SL3223-ODE17-5BA0	6SL3223-ODE21-1BA0	6SL3223-ODE21-5BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_L^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_H^{2)}$	A	0.9	1.3	1.7	2.2	3.1
• I_{max}	A	2	2.6	3.4	4.7	6.2
Rated power						
• Based on I_L	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• Based on I_H	kW (hp)	0.25 (0.33)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.86	0.9	0.92	0.94	0.95
Power loss at rated current	kW	0.06	0.06	0.06	0.07	0.08
Cooling air requirement	m ³ /s (ft ³ /s)	0.007 (0.25)	0.007 (0.25)	0.007 (0.25)	0.007 (0.25)	0.007 (0.25)
Sound pressure level L_{pA} (1 m)	dB	61.9	61.9	61.9	61.9	61.9
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	1.3	1.8	2.3	3.2	4.2
• Based on I_H	A	0.9	1.3	1.8	2.3	3.2
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor connection U2, V2, W2		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection ⁵⁾		IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12
Dimensions						
• Width	mm (in)	154 (6.06)	154 (6.06)	154 (6.06)	154 (6.06)	154 (6.06)
• Height	mm (in)	460 (18.11)	460 (18.11)	460 (18.11)	460 (18.11)	460 (18.11)
• Depth						
- Without operator panel	mm (in)	249 (9.80)	249 (9.80)	249 (9.80)	249 (9.80)	249 (9.80)
- With operator panel, max.	mm (in)	264 (10.39)	264 (10.39)	264 (10.39)	264 (10.39)	264 (10.39)
Frame size		FSA	FSA	FSA	FSA	FSA
Weight, approx.	kg (lb)	4.3 (9.5)	4.3 (9.5)	4.3 (9.5)	4.3 (9.5)	4.3 (9.5)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 table 14 (filter B). With unshielded cables, Categories C2 and C1 are not achieved.

⁵⁾ It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12. For further information, see [Operator panels and Blanking cover for PM230 Power Modules](#) in section [Supplementary system components](#).

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules, degree of protection IP55/UL Type 12					
		6SL3223-0DE22-2AA0	6SL3223-0DE23-0AA0	6SL3223-0DE24-0AA0	6SL3223-0DE25-5AA0	6SL3223-0DE27-5AA0	
With integrated line filter class A							
With integrated line filter class B							
Output current at 50 Hz 400 V 3 AC							
• Rated current I_{rated} ¹⁾	A	5.9	7.7	10.2	13.2	18	
• Base-load current I_L ¹⁾	A	5.9	7.7	10.2	13.2	18	
• Base-load current I_H ²⁾	A	4.1	5.9	7.7	10.2	13.2	
• I_{max}	A	8.9	11.8	15.4	20.4	27	
Rated power							
• Based on I_L	kW (hp)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)	7.5 (10)	
• Based on I_H	kW (hp)	1.5 (2.0)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)	
Rated pulse frequency		kHz	4	4	4	4	
Efficiency η			0.96	0.96	0.97	0.97	
Power loss at rated current		kW	0.1	0.12	0.14	0.18	
Cooling air requirement		m ³ /s (ft ³ /s)	0.007 (0.25)	0.007 (0.25)	0.009 (0.32)	0.009 (0.32)	
Sound pressure level L_{pA} (1 m)		dB	61.9	61.9	62.8	62.8	
24 V DC power supply for the Control Unit		A	1	1	1	1	
Input current ³⁾							
• Rated current	A	6.1	8	11	14	19	
• Based on I_H	A	4.2	6.1	8	11	14	
Line supply connection U1/L1, V1/L2, W1/L3							
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	2.5 ... 6	4 ... 6	4 ... 6	
Motor connection U2, V2, W2							
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	2.5 ... 6	4 ... 6	4 ... 6	
Motor cable length, max. ⁴⁾							
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)	
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)	
Degree of protection ⁵⁾			IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	
Dimensions							
• Width	mm (in)	154 (6.06)	154 (6.06)	180 (7.09)	180 (7.09)	180 (7.09)	
• Height	mm (in)	460 (18.11)	460 (18.11)	540 (21.26)	540 (21.26)	540 (21.26)	
• Depth							
- Without operator panel	mm (in)	249 (9.80)	249 (9.80)	249 (9.80)	249 (9.80)	249 (9.80)	
- With operator panel, max.	mm (in)	264 (10.39)	264 (10.39)	264 (10.39)	264 (10.39)	264 (10.39)	
Frame size			FSA	FSA	FSB	FSB	
Weight, approx.		kg (lb)	4.3 (9.5)	4.3 (9.5)	6.3 (13.9)	6.3 (13.9)	

1) The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

2) The base-load current I_H is based on the duty cycle for high overload (HO).

3) The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

4) Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 table 14 (filter B). With unshielded cables, Categories C2 and C1 are not achieved.

5) It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12. For further information, see Operator panels and Blanking cover for PM230 Power Modules in section Supplementary system components.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules, degree of protection IP55/UL Type 12					
With integrated line filter class A		6SL3223-0DE31-1AA0	6SL3223-0DE31-5AA0	6SL3223-0DE31-8AA0	–	6SL3223-0DE32-2AA0	6SL3223-0DE33-0AA0
With integrated line filter class B		6SL3223-0DE31-1BA0	6SL3223-0DE31-5BA0	–	6SL3223-0DE31-8BA0	6SL3223-0DE32-2BA0	6SL3223-0DE33-0BA0
Output current at 50 Hz 400 V 3 AC							
• Rated current I_{rated} ¹⁾	A	26	32	38	38	45	60
• Base-load current I_L ¹⁾	A	26	32	38	38	45	60
• Base-load current I_H ²⁾	A	18	26	32	32	38	45
• I_{max}	A	39	52	64	64	76	90
Rated power							
• Based on I_L	kW (hp)	11 (15)	15 (20)	18.5 (25)	18.5 (25)	22 (30)	30 (40)
• Based on I_H	kW (hp)	7.5 (10)	11 (15)	15 (20)	15 (20)	18.5 (25)	22 (30)
Rated pulse frequency	kHz	4	4	4	4	4	4
Efficiency η		0.97	0.97	0.98	0.97	0.97	0.97
Power loss at rated current	kW	0.32	0.39	0.46	0.52	0.52	0.68
Cooling air requirement	m ³ /s (ft ³ /s)	0.02 (0.71)	0.02 (0.71)	0.02 (0.71)	0.039 (1.38)	0.039 (1.38)	0.039 (1.38)
Sound pressure level L_{pA} (1 m)	dB	66.1	66.1	66.1	56	56	56
24 V DC power supply for the Control Unit	A	1	1	1	1	1	1
Input current ³⁾							
• Rated current	A	27	33	39	39	42	56
• Based on I_H	A	19	27	33	33	36	42
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm ²	6 ... 16	10 ... 16	10 ... 16	16 ... 35	16 ... 35	16 ... 35
Motor connection U2, V2, W2		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm ²	6 ... 16	10 ... 16	10 ... 16	16 ... 35	16 ... 35	16 ... 35
Motor cable length, max. ⁴⁾							
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection ⁵⁾		IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12
Dimensions							
• Width	mm (in)	230 (9.06)	230 (9.06)	230 (9.06)	320 (12.60)	320 (12.60)	320 (12.60)
• Height	mm (in)	620 (24.41)	620 (24.41)	620 (24.41)	640 (25.20)	640 (25.20)	640 (25.20)
• Depth							
- Without operator panel	mm (in)	249 (9.80)	249 (9.80)	249 (9.80)	329 (12.95)	329 (12.95)	329 (12.95)
- With operator panel, max.	mm (in)	264 (10.39)	264 (10.39)	264 (10.39)	344 (13.54)	344 (13.54)	344 (13.54)
Frame size		FSC	FSC	FSC	FSD	FSD	FSD
Weight, approx.	kg (lb)	9.5 (21)	9.5 (21)	9.5 (21)	31 (68)	31 (68)	31 (68)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 table 14 (filter B). With unshielded cables, Categories C2 and C1 are not achieved.

⁵⁾ It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12. For further information, see Operator panels and Blanking cover for PM230 Power Modules in section Supplementary system components.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules, degree of protection IP55/UL Type 12				
		6SL3223-ODE33-7AA0	6SL3223-ODE34-5AA0	6SL3223-ODE35-5AA0	6SL3223-ODE37-5AA0	6SL3223-ODE38-8AA0
With integrated line filter class A						
With integrated line filter class B		6SL3223-ODE33-7BA0	6SL3223-ODE34-5BA0	6SL3223-ODE35-5BA0	6SL3223-ODE37-5BA0	6SL3223-ODE38-8BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	75	90	110	145	178
• Base-load current $I_L^{1)}$	A	75	90	110	145	178
• Base-load current $I_H^{2)}$	A	60	75	90	110	145
• I_{max}	A	120	150	180	220	290
Rated power						
• Based on I_L	kW (hp)	37 (50)	45 (60)	55 (75)	75 (100)	90 (125)
• Based on I_H	kW (hp)	30 (40)	37 (50)	45 (60)	55 (75)	75 (100)
Rated pulse frequency						
	kHz	4	4	4	4	4
Efficiency η						
		0.97	0.97	0.97	0.97	0.97
Power loss at rated current						
	kW	0.99	1.2	1.4	1.9	2.3
Cooling air requirement						
	m ³ /s (ft ³ /s)	0.039 (1.38)	0.039 (1.38)	0.117 (4.13)	0.117 (4.13)	0.117 (4.13)
Sound pressure level L_{pA} (1 m)						
	dB	56	56	61	61	61
24 V DC power supply for the Control Unit						
	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	70	84	102	135	166
• Based on I_H	A	56	70	84	102	135
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	25 ... 50	25 ... 50	35 ... 120	35 ... 120	35 ... 120
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	25 ... 50	25 ... 50	35 ... 120	35 ... 120	35 ... 120
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection ⁵⁾						
		IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12
Dimensions						
• Width	mm (in)	320 (12.60)	320 (12.60)	410 (16.14)	410 (16.14)	410 (16.14)
• Height	mm (in)	751 (29.57)	751 (29.57)	915 (36.02)	915 (36.02)	915 (36.02)
• Depth						
- Without operator panel	mm (in)	329 (12.95)	329 (12.95)	416 (16.38)	416 (16.38)	416 (16.38)
- With operator panel, max.	mm (in)	344 (13.54)	344 (13.54)	431 (16.97)	431 (16.97)	431 (16.97)
Frame size						
		FSE	FSE	FSF	FSF	FSF
Weight, approx.						
	kg (lb)	37 (82) (with filter class A) 38 (84) (with filter class B)	37 (82) (with filter class A) 38 (84) (with filter class B)	70 (154)	70 (154)	70 (154)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 table 14 (filter B). With unshielded cables, Categories C2 and C1 are not achieved.

⁵⁾ It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12. For further information, see Operator panels and Blanking cover for PM230 Power Modules in section Supplementary system components.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

PM230 Power Modules degree of protection IP20 standard variant

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant				
Without integrated line filter		6SL3210-1NE11-3U0L0	6SL3210-1NE11-7U0L0	6SL3210-1NE12-2U0L0	6SL3210-1NE13-1U0L0	6SL3210-1NE14-1U0L0
With integrated line filter class A		6SL3210-1NE11-3AL0	6SL3210-1NE11-7AL0	6SL3210-1NE12-2AL0	6SL3210-1NE13-1AL0	6SL3210-1NE14-1AL0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_L^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_H^{2)}$	A	0.9	1.3	1.7	2.2	3.1
• I_{max}	A	2	2.6	3.4	4.7	6.2
Rated power						
• Based on I_L	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• Based on I_H	kW (hp)	0.25 (0.33)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.89	0.93	0.93	0.94	0.95
Power loss at rated current	kW	0.04	0.04	0.05	0.06	0.07
Cooling air requirement	m ³ /s (ft ³ /s)	0.002 (0.07)	0.002 (0.07)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)
Sound pressure level L_{pA} (1 m)	dB	<45	<45	<45	<45	<45
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	1.3	1.8	2.3	3.2	4.2
• Based on I_H	A	0.9	1.3	1.8	2.3	3.2
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor connection U2, V2, W2		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)
• Height	mm (in)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)
- With operator panel, max.	mm (in)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)
Frame size		FSA	FSA	FSA	FSA	FSA
Weight, approx.						
• Without integrated line filter	kg (lb)	1.4 (3.1)	1.4 (3.1)	1.4 (3.1)	1.4 (3.1)	1.4 (3.1)
• With integrated line filter	kg (lb)	1.6 (3.5)	1.6 (3.5)	1.6 (3.5)	1.6 (3.5)	1.6 (3.5)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$.
The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values acc. to EN 61800-3 Category C2. With unshielded cables, Category C2 is not achieved.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant				
Without integrated line filter		6SL3210-1NE15-8U0	6SL3210-1NE17-7U0	6SL3210-1NE21-0U0	6SL3210-1NE21-3U0	6SL3210-1NE21-8U0
With integrated line filter class A		6SL3210-1NE15-8AL0	6SL3210-1NE17-7AL0	6SL3210-1NE21-0AL0	6SL3210-1NE21-3AL0	6SL3210-1NE21-8AL0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} ¹⁾	A	5.9	7.7	10.2	13.2	18
• Base-load current I_L ¹⁾	A	5.9	7.7	10.2	13.2	18
• Base-load current I_H ²⁾	A	4.1	5.9	7.7	10.2	13.2
• I_{max}	A	8.9	11.8	15.4	20.4	27
Rated power						
• Based on I_L	kW (hp)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)	7.5 (10)
• Based on I_H	kW (hp)	1.5 (2.0)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.96	0.96	0.97	0.97	0.97
Power loss at rated current	kW	0.08	0.11	0.12	0.15	0.24
Cooling air requirement	m ³ /s (ft ³ /s)	0.005 (0.18)	0.005 (0.18)	0.009 (0.32)	0.009 (0.32)	0.009 (0.32)
Sound pressure level L_{pA} (1 m)	dB	61.9	61.9	62.8	62.8	62.8
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	6.1	8	11	14	19
• Based on I_H	A	4.2	6.1	8	11	14
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 6	1.5 ... 6	1.5 ... 6
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 6	1.5 ... 6	1.5 ... 6
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection						
		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	73 (2.87)	73 (2.87)	100 (3.94)	100 (3.94)	100 (3.94)
• Height	mm (in)	196 (7.72)	196 (7.72)	292 (11.50)	292 (11.50)	292 (11.50)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)
- With operator panel, max.	mm (in)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)
Frame size						
		FSA	FSA	FSB	FSB	FSB
Weight, approx.						
• Without integrated line filter	kg (lb)	1.4 (3.1)	1.4 (3.1)	2.8 (6.2)	2.8 (6.2)	2.8 (6.2)
• With integrated line filter	kg (lb)	1.6 (3.5)	1.6 (3.5)	3.0 (6.6)	3.0 (6.6)	3.0 (6.6)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values acc. to EN 61800-3 Category C2. With unshielded cables, Category C2 is not achieved.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant				
Without integrated line filter		6SL3210-1NE22-6ULO	6SL3210-1NE23-2ULO	6SL3210-1NE23-8ULO	6SL3210-1NE24-5ULO	6SL3210-1NE26-0ULO
With integrated line filter class A		6SL3210-1NE22-6ALO	6SL3210-1NE23-2ALO	6SL3210-1NE23-8ALO	6SL3210-1NE24-5ALO	6SL3210-1NE26-0ALO
Output current						
at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	26	32	38	45	60
• Base-load current $I_L^{1)}$	A	26	32	38	45	60
• Base-load current $I_H^{2)}$	A	18	26	32	38	45
• I_{max}	A	39	52	64	57	67
Rated power						
• Based on I_L	kW (hp)	11 (15)	15 (20)	18.5 (25)	22 (30)	30 (40)
• Based on I_H	kW (hp)	7.5 (10)	11 (15)	15 (20)	18.5 (25)	22 (30)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.97	0.97	0.98	0.98	0.97
Power loss at rated current	kW	0.3	0.35	0.45	0.52	0.68
Cooling air requirement	m ³ /s (ft ³ /s)	0.019 (0.67)	0.019 (0.67)	0.019 (0.67)	0.08 (2.83)	0.08 (2.83)
Sound pressure level L_{pA} (1 m)	dB	<60	<60	<60	<60	<60
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	27	33	39	42	56
• Based on I_H	A	19	27	33	36	42
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	6 ... 16	6 ... 16	6 ... 16	16 ... 35	16 ... 35
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	6 ... 16	6 ... 16	6 ... 16	16 ... 35	16 ... 35
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection						
		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	140 (5.51)	140 (5.51)	140 (5.51)	275 (10.83)	275 (10.83)
• Height						
- Without integrated line filter	mm (in)	355 (13.98)	355 (13.98)	355 (13.98)	419 (16.50)	419 (16.50)
- With integrated line filter	mm (in)	355 (13.98)	355 (13.98)	355 (13.98)	512 (20.16)	512 (20.16)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	204 (8.03)	204 (8.03)
- With operator panel, max.	mm (in)	248 (9.76)	248 (9.76)	248 (9.76)	287 (11.30)	287 (11.30)
Frame size						
		FSC	FSC	FSC	FSD	FSD
Weight, approx.						
• Without integrated line filter	kg (lb)	4.5 (9.9)	4.5 (9.9)	4.5 (9.9)	11 (24.3)	11 (24.3)
• With integrated line filter	kg (lb)	5.1 (11.2)	5.1 (11.2)	5.1 (11.2)	14 (30.9)	14 (30.9)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values acc. to EN 61800-3 Category C2. With unshielded cables, Category C2 is not achieved.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant			
Without integrated line filter		6SL3210-1NE27-5UL0	6SL3210-1NE28-8UL0	6SL3210-1NE31-1UL0	6SL3210-1NE31-5UL0
With integrated line filter class A		6SL3210-1NE27-5AL0	6SL3210-1NE28-8AL0	6SL3210-1NE31-1AL0	6SL3210-1NE31-5AL0
Output current					
at 50 Hz 400 V 3 AC					
• Rated current I_{rated} ¹⁾	A	75	90	110	145
• Base-load current I_L ¹⁾	A	75	90	110	145
• Base-load current I_H ²⁾	A	60	75	90	110
• I_{max}	A	90	112	135	165
Rated power					
• Based on I_L	kW (hp)	37 (50)	45 (60)	55 (75)	75 (100)
• Based on I_H	kW (hp)	30 (40)	37 (50)	45 (60)	55 (75)
Rated pulse frequency					
	kHz	4	4	4	4
Efficiency η					
		0.97	0.97	0.97	0.97
Power loss					
at rated current					
	kW	0.99	1.2	1.4	2
Cooling air requirement					
	m ³ /s (ft ³ /s)	0.08 (2.83)	0.08 (2.83)	0.15 (5.30)	0.15 (5.30)
Sound pressure level					
L_{pA} (1 m)					
	dB	<60	<60	<60	<60
24 V DC power supply					
for the Control Unit					
	A	1	1	1	1
Input current ³⁾					
• Rated current	A	70	84	102	135
• Based on I_H	A	56	70	84	102
Line supply connection					
U1/L1, V1/L2, W1/L3					
• Conductor cross-section	mm ²	25 ... 50	25 ... 50	35 ... 120	35 ... 120
Motor connection					
U2, V2, W2					
• Conductor cross-section	mm ²	25 ... 50	25 ... 50	35 ... 120	35 ... 120
Motor cable length, max. ⁴⁾					
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection					
		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	275 (10.83)	275 (10.83)	350 (13.78)	350 (13.78)
• Height					
- Without integrated line filter	mm (in)	499 (19.65)	499 (19.65)	634 (24.96)	634 (24.96)
- With integrated line filter	mm (in)	635 (25.00)	635 (25.00)	934 (36.77)	934 (36.77)
• Depth					
- Without operator panel	mm (in)	204 (8.03)	204 (8.03)	316 (12.44)	316 (12.44)
- With operator panel, max.	mm (in)	287 (11.30)	287 (11.30)	399 (15.71)	399 (15.71)
Frame size					
		FSE	FSE	FSF	FSF
Weight, approx.					
• Without integrated line filter	kg (lb)	15 (33.1)	15 (33.1)	34 (75)	34 (75)
• With integrated line filter	kg (lb)	22 (48.5)	22 (48.5)	46 (101)	46 (101)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values acc. to EN 61800-3 Category C2. With unshielded cables, Category C2 is not achieved.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Technical specifications

PM230 Power Modules degree of protection IP20 push-through variant

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 push-through variant		
Without integrated line filter		6SL3211-1NE17-7UL0	6SL3211-1NE21-8UL0	6SL3211-1NE23-8UL0
With integrated line filter class A		6SL3211-1NE17-7AL0	6SL3211-1NE21-8AL0	6SL3211-1NE23-8AL0
Output current				
at 50 Hz 400 V 3 AC				
• Rated current I_{rated} ¹⁾	A	7.7	18	38
• Base-load current I_L ¹⁾	A	7.7	18	38
• Base-load current I_H ²⁾	A	5.9	13.2	32
• I_{max}	A	11.8	27	64
Rated power				
• Based on I_L	kW (hp)	3 (4.0)	7.5 (10)	18.5 (25)
• Based on I_H	kW (hp)	2.2 (3.0)	5.5 (7.5)	15 (20)
Rated pulse frequency		kHz	4	4
Efficiency η			0.96	0.97
Power loss at rated current		kW	0.11	0.24
Cooling air requirement		m ³ /s (ft ³ /s)	0.005 (0.18)	0.009 (0.32)
Sound pressure level L_{pA} (1 m)		dB	<45	<50
24 V DC power supply for the Control Unit		A	1	1
Input current ³⁾				
• Rated current	A	8	19	39
• Based on I_H	A	6.1	14	33
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in		
• Conductor cross-section	mm ²	1.5 ... 2.5	4 ... 6	6 ... 16
Motor connection U2, V2, W2		Screw terminals, plug-in		
• Conductor cross-section	mm ²	1 ... 2.5	4 ... 6	10 ... 16
Motor cable length, max. ⁴⁾				
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	126 (4.96)	154 (6.06)	200 (7.87)
• Height	mm (in)	238 (9.37)	345 (13.58)	411 (16.18)
• Depth				
- Without operator panel	mm (in)	171 (6.73)	171 (6.73)	171 (6.73)
- With operator panel, max.	mm (in)	254 (10.00)	254 (10.00)	254 (10.00)
Frame size		FSA	FSB	FSC
Weight, approx.				
• Without integrated line filter	kg (lb)	1.7 (3.75)	3.4 (7.5)	5.4 (11.9)
• With integrated line filter	kg (lb)	1.9 (4.2)	3.6 (7.9)	6 (13.2)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values acc. to EN 61800-3 Category C2. With unshielded cables, Category C2 is not achieved.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Characteristic curves

Derating data

Pulse frequency

Rated power ¹⁾ at 50 Hz 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.37	0.5	1.3	1.11	0.91	0.78	0.65	0.59	0.52
0.55	0.75	1.7	1.45	1.19	1.02	0.85	0.77	0.68
0.75	1.0	2.2	1.87	1.54	1.32	1.10	0.99	0.88
1.1	1.5	3.1	2.64	2.17	1.86	1.55	1.40	1.24
1.5	2.0	4.1	3.49	2.87	2.46	2.05	1.85	1.64
2.2	3.0	5.9	5.02	4.13	3.54	2.95	2.66	2.36
3.0	4.0	7.7	6.55	5.39	4.62	3.85	3.47	3.08
4.0	5.0	10.2	8.67	7.14	6.12	5.1	4.59	4.08
5.5	7.5	13.2	11.22	9.24	7.92	6.6	5.94	5.28
7.5	10	18.0	15.3	12.6	10.8	9.0	8.1	7.2
11.0	15	26.0	22.1	18.2	15.6	13.0	11.7	10.4
15.0	20	32.0	27.2	22.4	19.2	16.0	14.4	12.8
18.5	25	38.0	32.3	26.6	22.8	19.0	17.1	15.2
22	30	45.0	38.25	31.5	27.0	22.5	20.25	18.0
30	40	60.0	51.0	42.0	36.0	30.0	27.0	24.0
37	50	75.0	63.75	52.5	45.0	37.5	33.75	30.0
45	60	90.0	76.5	63.0	54.0	45.0	40.5	36.0
55	75	110	93.5	77.0	66.0 ²⁾	55.0 ²⁾	49.5 ²⁾	44.0 ²⁾
75	100	145	123.3	101.5	–	–	–	–
90	125	178	151.3	124.6	–	–	–	–

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

²⁾ Values apply only to IP20 variants.

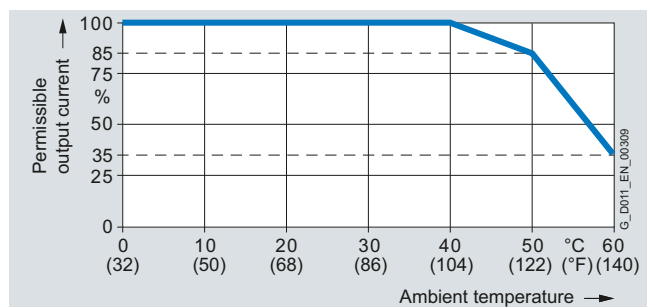
SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

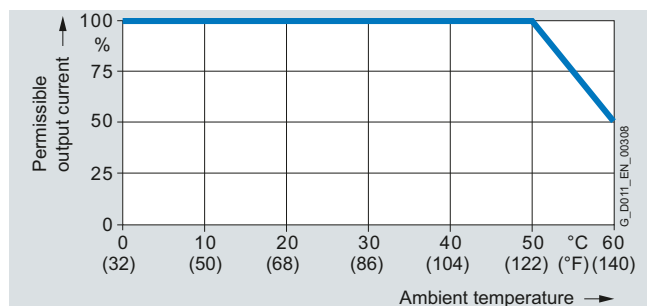
PM230 Power Modules

Characteristic curves

Ambient temperature



Low overload (LO) for PM230 Power Modules, frame sizes FSA to FSF



High overload (HO) for PM230 Power Modules, frame sizes FSA to FSF

Note:

The operating temperature ranges of the Control Units should be taken into account. [The temperature ranges are specified in the section Technical specifications under Control Units.](#)

Installation altitude

The clearance inside the inverter can isolate surge voltages in accordance with overvoltage category III as defined by EN 60664-1 up to an installation altitude of up to 2000 m (6562 ft).

At least one of the following conditions must be fulfilled for altitudes above 2000 m (6562 ft) and below 4000 m (13124 ft) above sea level:

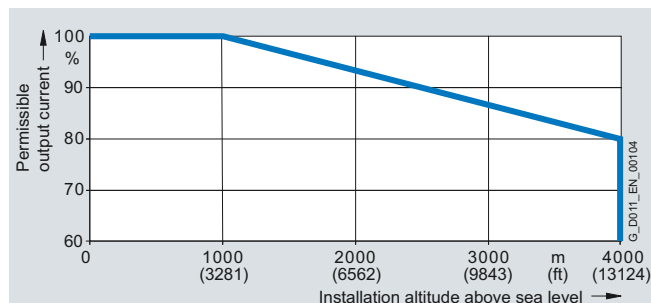
The inverter is connected to:

- a TN system with isolated neutral (not an externally grounded connector) or
- via an isolation transformer which provides a TN system with a grounded neutral.

There is no need to reduce the line voltage.

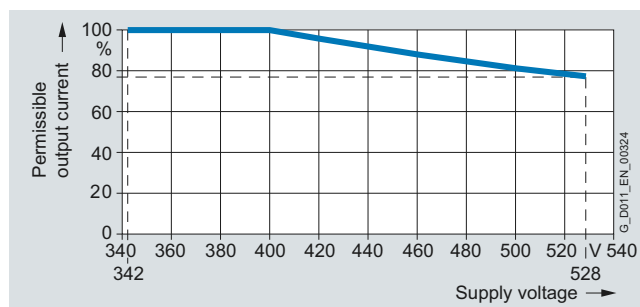
Note:

The connected motors and power elements must be considered separately.

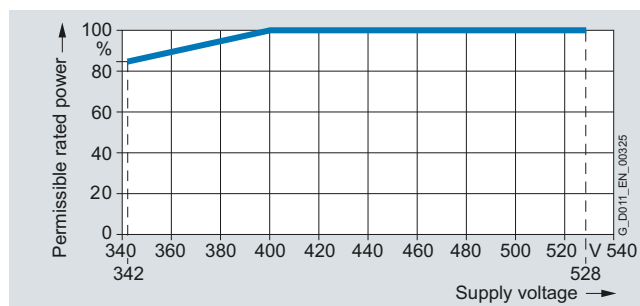


Permissible output current as a function of installation altitude

System operating voltage



Permissible output current as a function of the line voltage



Permissible rated power as a function of the line voltage

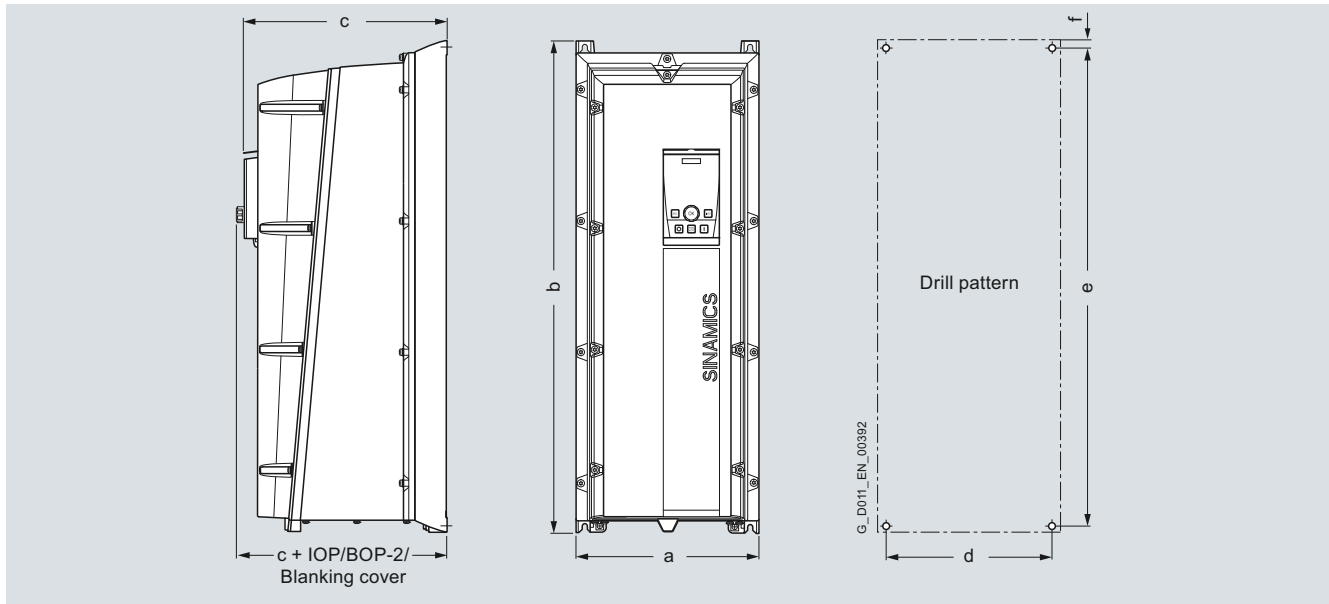
SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Dimensional drawings

PM230 Power Modules, degree of protection IP55/UL Type 12



Principle dimension drawing and drill pattern for PM230 Power Modules, degree of protection IP55/UL Type 12 with integrated line filter class A/B

Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)			Cooling clearance in mm (inches)			Mounting With bolts, nuts and washers
	a (width)	b (height)	c (depth) ¹⁾	d	e	f	top	bottom	side	
PM230 Power Modules, degree of protection IP55/UL Type 12 with integrated line filter class A/B										
FSA	154 (6.06)	460 (18.11)	249 (9.8)	132 (5.19)	445 (17.51)	11 (0.43)	100 (3.94)	0 (0)	0 (0)	4 × M4
FSB	180 (7.08)	540 (21.25)	249 (9.8)	158 (5.9)	524 (20.62)	11 (0.43)	100 (3.94)	0 (0)	0 (0)	4 × M4
FSC	230 (9.05)	620 (24.4)	249 (9.8)	208 (8.18)	604 (23.77)	11 (0.43)	125 (4.92)	0 (0)	0 (0)	4 × M5
FSD	320 (12.59)	640 (25.19)	329 (12.95)	285 (11.22)	600 (23.62)	17.5 (0.69)	300 (11.81)	0 (0)	50 (1.97) ²⁾	4 × M8
FSE	320 (12.59)	751 (29.56)	329 (12.95)	285 (11.22)	710 (27.95)	17.5 (0.69)	300 (11.81)	0 (0)	50 (1.97) ²⁾	4 × M8
FSF	410 (16.14)	915 (36.02)	416 (16.38)	370 (14.56)	870 (34.25)	20 (0.79)	350 (13.78)	0 (0)	50 (1.97) ²⁾	4 × M8

¹⁾ Increased depth:
 • When the IOP is plugged on, the depth increases by 15 mm (0.59 in)
 • When the BOP-2/blanking cover is plugged on, the depth increases by 5 mm (0.2 in)

²⁾ Up to 40 °C (104 °F) without any lateral clearance.

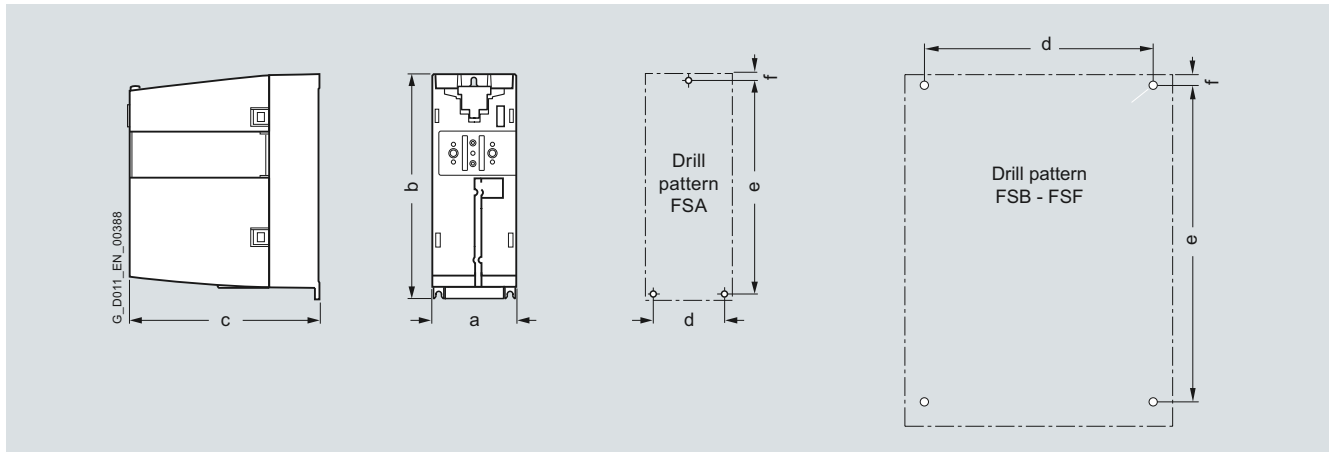
SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules

Dimensional drawings

PM230 Power Modules, degree of protection IP20, standard variant



Principle dimension drawing and drill pattern for PM230 Power Modules, degree of protection IP20, standard variant, with/without integrated line filter class A

Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)			Cooling clearance in mm (inches)			Mounting With bolts
	a (width)	b (height)	c (depth) ¹⁾	d	e	f	top	bottom	side ²⁾	
PM230 Power Modules, degree of protection IP20, standard variant, with/without integrated line filter class A										
FSA	73 (2.87)	196 (7.72)	165 (6.5)	62.3 (2.45)	186 (7.32)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	3 × M4
FSB	100 (3.94)	292 (11.5)	165 (6.5)	80 (3.15)	281 (11.06)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	4 × M4
FSC	140 (5.51)	355 (13.98)	165 (6.5)	120 (4.72)	343 (13.5)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	4 × M5
FSD	275 (10.83)	419/512 (16.50/20.16)	204 (8.03)	235 (9.25)	325/419 (12.8/16.5)	11 (0.43)	300 (11.81)	300 (11.81)	0 (0)	4 × M6
FSE	275 (10.83)	499/635 (19.65/25)	204 (8.03)	235 (9.25)	405/541 (15.94/21.3)	11 (0.43)	300 (11.81)	300 (11.81)	0 (0)	4 × M6
FSF	350 (13.78)	634/934 (24.96/36.77)	316 (12.44)	300 (11.81)	598/899 (23.54/35.39)	11 (0.43)	350 (13.78)	350 (13.78)	0 (0)	4 × M8

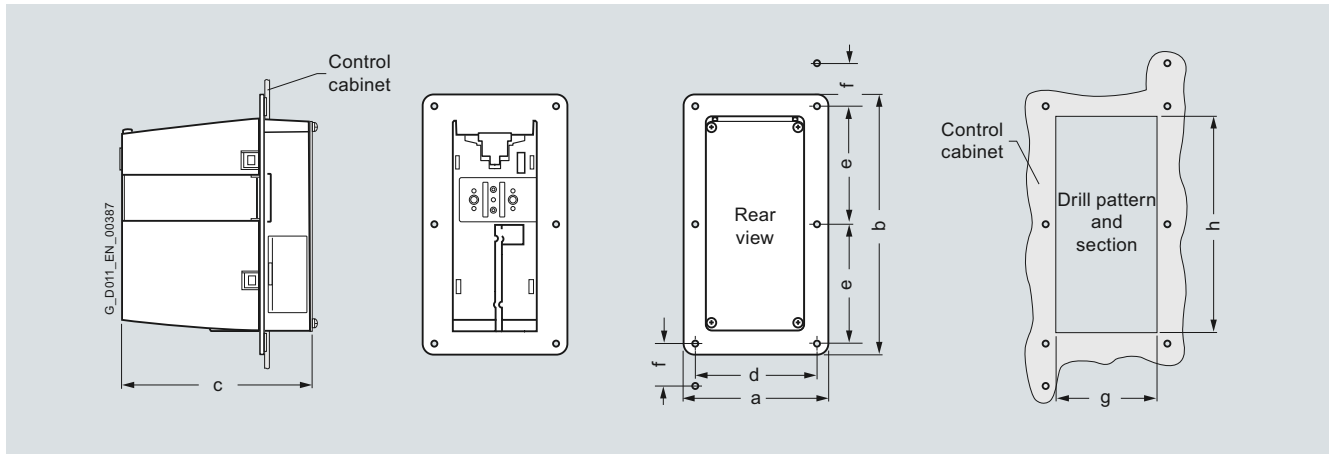
¹⁾ Increased depth:

- When the CU230P-2 Control Unit is plugged on, the depth increases by 58 mm (2.28 in)
- When the IOP is plugged on, the depth increases by a further 25 mm (0.98 in)
- When the BOP-2 is plugged on, the depth increases by a further 15 mm (0.59 in)

²⁾ The Power Modules can be mounted side by side. A side clearance of 1 mm (0.04 in) is recommended for tolerance-related reasons.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

PM230 Power Modules
Dimensional drawings
PM230 Power Modules, degree of protection IP20, push-through variant


Principle dimension drawing and drill pattern for PM230 Power Modules, degree of protection IP20, push-through variant, with/without integrated line filter class A

Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)			Section of cabinet in mm (inches)		Cooling clearance in mm (inches)			Mounting With bolts
	a (width)	b (height)	c (depth) ¹⁾	d	e	f	g (width)	h (height)	top	bottom	side ²⁾	
PM230 Power Modules, degree of protection IP20, push-through variant, with/without integrated line filter class A												
FSA	125.9 (4.96)	238 (9.37)	171 (6.73)	106 (4.17)	103 (4.06)	27 (1.06)	88 (3.46)	198 (7.8)	80 (3.15)	100 (3.94)	0 (0)	M5
FSB	153.9 (6.06)	345 (13.58)	171 (6.73)	134 (5.28)	147.5 (5.81)	34.5 (1.36)	116 (4.57)	304 (11.97)	80 (3.15)	100 (3.94)	0 (0)	M5
FSC	200 (7.87)	410.5 (16.16)	171 (6.73)	174 (6.85)	123 (4.84)	30.5 (1.2)	156 (6.14)	365 (14.37)	80 (3.15)	100 (3.94)	0 (0)	M5

¹⁾ Overall depth, of which 117.7 mm (4.63 in) is inside and 53.1 mm (2.09 in) is outside the control cabinet.

Increased depth:

- When the CU230P-2 Control Unit is plugged on, the depth increases by 58 mm (2.28 in).
- When the IOP is plugged on, the depth increases by a further 25 mm (0.98 in).
- When the BOP-2 is plugged on, the depth increases by a further 15 mm (0.59 in).

²⁾ The Power Modules can be mounted side by side (mounting frame to mounting frame).
A side clearance of 1 mm (0.04 in) is recommended for tolerance-related reasons.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Recommended line-side power components

Selection and ordering data


The following table lists recommendations for additional line-side components, such as fuses and circuit breakers. The values in the table take into account the overload capability of the inverter.

Notes for use in compliance with IEC standards:

3NA3 or 3NE1 fuses and 3RV10 or 3VL circuit breakers are recommended for European countries.


Notes for use in compliance with UL regulations:

UL-approved fuses and circuit breakers must be used in North America.

- Examples of fuses:
 - Type 3NE1 fuses are UL-compliant (corresponds to .
 - Class J fuses, fuse series Class NOS supplied by Bussmann
- Examples of circuit breakers:
 - Approved SIRIUS 3RV circuit breakers and 3VL molded-case circuit breakers in accordance with UL 489 (category control number CCN: DiV Q).

An overvoltage protection device is required for installation in conformance with UL corresponding to the UL certification of SINAMICS G120P PM230 Power Modules. The overvoltage protection device must be marked with the Listed test symbol and category code VZCA. The detailed UL installation guidelines are included in the equipment manual.

Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 10.1, IC 10 and IC 10 AO.

Rated power ¹⁾		SINAMICS G120P PM230 Power Modules Degree of protection IP55/ UL Type 12		Fuse		Circuit breaker
kW	hp	Type 6SL3223-...	Frame size	Type 3NA3 Order No.	Type 3NE1 () Order No.	Order No.
380 ... 480 V 3 AC						
0.37	0.50	0DE13-7 . A0	FSA	3NA3803	3NE1813-0	3RV1021-1CA10
0.55	0.75	0DE15-5 . A0	FSA			3RV1021-1DA10
0.75	1.0	0DE17-5 . A0	FSA			3RV1021-1FA10
1.1	1.5	0DE21-1 . A0	FSA			3RV1021-1GA10
1.5	2	0DE21-5 . A0	FSA			3RV1021-1JA10
2.2	3	0DE22-2 . A0	FSA			3RV1021-1KA10
3.0	4	0DE23-0 . A0	FSA			3RV1021-4AA10
4.0	5	0DE24-0 . A0	FSB	3NA3805	3NE1814-0	3RV1021-4BA10
5.5	7.5	0DE25-5 . A0	FSB	3NA3807		3RV1031-4EA10
7.5	10	0DE27-5 . A0	FSB	3NA3810	3NE1815-0	3RV1031-4FA10
11.0	15	0DE31-1 . A0	FSC	3NA3814	3NE1803-0	3RV1031-4HA10
15.0	20	0DE31-5 . A0	FSC	3NA3820	3NE1817-0	3RV1042-4KA10
18.5	25	0DE31-8 . A0	FSC/FSD			
22	30	0DE32-2 . A0	FSD	3NA3822	3NE1818-0	
30	40	0DE33-0 . A0	FSD	3NA3824	3NE1820-0	3RV1042-4MA10
37	50	0DE33-7 . A0	FSE	3NA3830	3NE1021-0	3VL1712-.DD33-....^{*)}
45	60	0DE34-5 . A0	FSE	3NA3832	3NE1022-0	3VL1716-.DD33-....^{*)}
55	75	0DE35-5 . A0	FSF	3NA3836	3NE1224-0	3VL3720-.DC36-....^{*)}
75	100	0DE37-5 . A0	FSF	3NA3140	3NE1225-0	3VL3725-.DC36-....^{*)}
90	125	0DE38-8 . A0	FSF	3NA3144	3NE1227-0	3VL4731-.DC36-....^{*)}


¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).


^{*)} See Catalog LV 10.1 for Order No. supplements.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Recommended line-side power components
Selection and ordering data

Rated power ¹⁾		SINAMICS G120P PM230 Power Modules Degree of protection IP20 standard variant		Fuse Corresponding to the UL/cUL standard Type 3NE1 () and Class J		
kW	hp	Type 6SL3210-...	Frame size	Order No.	Type	
380 ... 480 V 3 AC						
0.37	0.50	1NE11-3 . LO	FSA	3NE1813-0	AJT2	
0.55	0.75	1NE11-7 . LO	FSA		AJT4	
0.75	1.0	1NE12-2 . LO	FSA		AJT4	
1.1	1.5	1NE13-1 . LO	FSA		AJT6	
1.5	2	1NE14-1 . LO	FSA		AJT6	
2.2	3	1NE15-8 . LO	FSA		AJT10	
3.0	4	1NE17-7 . LO	FSA		AJT10	
4.0	5	1NE21-0 . LO	FSB		AJT15	
5.5	7.5	1NE21-3 . LO	FSB		3NE1814-0	AJT20
7.5	10	1NE21-8 . LO	FSB		3NE1815-0	AJT25
11.0	15	1NE22-6 . LO	FSC	3NE1803-0	AJT35	
15.0	20	1NE23-2 . LO	FSC	3NE1817-0	AJT45	
18.5	25	1NE23-8 . LO	FSC		AJT50	
22	30	1NE24-5 . LO	FSD	3NE1818-0	-	
30	40	1NE26-0 . LO	FSD	3NE1820-0	-	
37	50	1NE27-5 . LO	FSE	3NE1021-0	-	
45	60	1NE28-8 . LO	FSE	3NE1022-0	-	
55	75	1NE31-1 . LO	FSF	3NE1224-0	-	
75	100	1NE31-5 . LO	FSF	3NE1225-0	-	

Rated power ¹⁾		SINAMICS G120P PM230 Power Modules Degree of protection IP20 push-through variant		Fuse Corresponding to the UL/cUL standard Type 3NE1 () and Class J	
kW	hp	Type 6SL3211-...	Frame size	Order No.	Type
380 ... 480 V 3 AC					
3.0	4	1NE17-7 . LO	FSA	3NE1813-0	AJT10
7.5	10	1NE21-8 . LO	FSB	3NE1815-0	AJT25
18.5	25	1NE23-8 . LO	FSC	3NE1817-0	AJT50

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

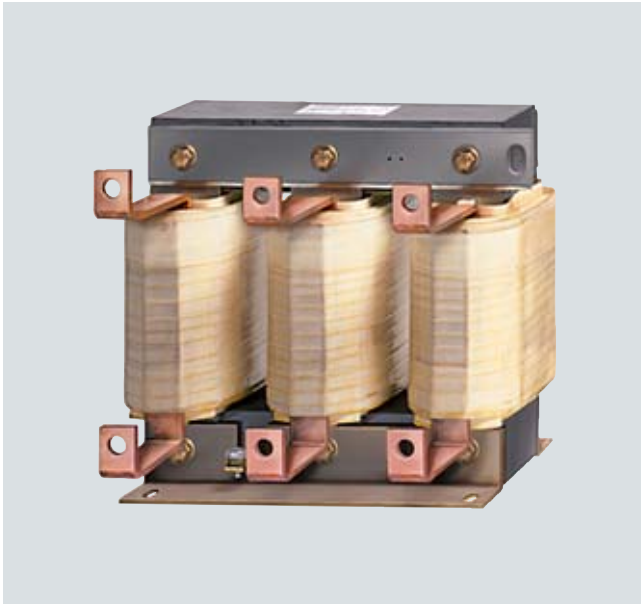
SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Load-side power components

Output reactors

Overview



Output reactor

Output reactors reduce the voltage stress on the motor windings. At the same time, the capacitive charging/discharging currents, which place an additional load on the power unit when long motor cables are used, are reduced.

The maximum permissible output frequency is 150 Hz when an output reactor is used – the pulse frequency must not exceed 4 kHz.

The output reactor must be installed as close as possible to the Power Module.

Output reactors are approved for use only in conjunction with Vector and *V/f* control modes.

Selection and ordering data

Rated power		SINAMICS G120P PM230 Power Modules degree of protection <u>IP20</u>	SINAMICS G120P PM230 Power Modules degree of protection <u>IP55/UL Type 12</u>	Output reactor	
kW	hp	Type 6SL3210-...	Type 6SL3223-...	Frame size	Order No.
380 ... 480 V 3 AC					
22	30	1NE24-5 . LO	ODE32-2 . A0	FSD	6SE6400-3TC03-8DD0
30	40	1NE26-0 . LO	ODE33-0 . A0	FSD	6SE6400-3TC05-4DD0
37	50	1NE27-5 . LO	ODE33-7 . A0	FSE	6SE6400-3TC08-0ED0
45	60	1NE28-8 . LO	ODE34-5 . A0	FSE	6SE6400-3TC07-5ED0
55	75	1NE31-1 . LO	ODE35-5 . A0	FSF	6SE6400-3TC14-5FD0
75	100	1NE31-5 . LO	ODE37-5 . A0	FSF	6SE6400-3TC15-4FD0
90	125	–	ODE38-8 . A0	FSF	6SE6400-3TC14-5FD0

Integration

Output reactors that are optionally available depending on the Power Module used

The following load-side power components are optionally available in the appropriate frames sizes for the Power Modules:

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM230 Power Module degree of protection IP20 or IP55/UL Type 12							
Available frame sizes	–	–	–	✓	✓	✓	–
Load-side power components							
Output reactor	–	–	–	S	S	S	–

S = Lateral mounting
– = Not possible

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Load-side power components
Output reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)			
		6SE6400-3TC03-8DD0	6SE6400-3TC05-4DD0	6SE6400-3TC08-0ED0	6SE6400-3TC07-5ED0
Rated current	A	45 ¹⁾	68 ¹⁾	104 ¹⁾	90 ¹⁾
Power loss	kW	0.2	0.2	0.17	0.27
Connection to the Power Module		Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug
Motor connection		Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between output reactor and motor					
• 380 -10 % ... 400 V 3 AC					
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)
• 401 ... 480 V 3 AC +10 %					
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions					
• Width	mm (in)	225 (8.86)	225 (8.86)	225 (8.86)	270 (10.63)
• Height	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)	248 (9.76)
• Depth	mm (in)	179 (7.05)	150 (5.91)	150 (5.91)	209 (8.23)
Possible as base component		No	No	No	No
Degree of protection		IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	16.1 (35.5)	10.7 (23.6)	10.4 (22.9)	24.9 (54.9)
Suitable for PM230 Power Module degree of protection IP20	Type	6SL3210-1NE24-5UL0 6SL3210-1NE24-5AL0	6SL3210-1NE26-0UL0 6SL3210-1NE26-0AL0	6SL3210-1NE27-5UL0 6SL3210-1NE27-5AL0	6SL3210-1NE28-8UL0 6SL3210-1NE28-8AL0
Suitable for PM230 Power Module degree of protection IP55/UL Type 12	Type	6SL3223-0DE32-2UA0 6SL3223-0DE32-2AA0	6SL3223-0DE33-0UA0 6SL3223-0DE33-0AA0	6SL3223-0DE33-7UA0 6SL3223-0DE33-7AA0	6SL3223-0DE34-5UA0 6SL3223-0DE34-5AA0
• Rated power of the Power Module	kW (hp)	22 (30)	30 (40)	37 (50)	45 (60)
• Rated current I_{rated} of the Power Module	A	45	60	75	90
• Frame size		FSD	FSD	FSE	FSE

¹⁾ On the rating plate of the reactor the current is specified according to high overload HO, which is lower than the indicated value for the low overload current of the Power Module.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Load-side power components

Output reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)		
		6SE6400-3TC14-5FD0	6SE6400-3TC15-4FD0	6SE6400-3TC14-5FD0
Rated current	A	178 ¹⁾	178 ¹⁾	178 ¹⁾
Power loss	kW	0.47	0.25	0.47
Connection to the Power Module		Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M8 cable lug
Motor connection		Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M8 cable lug
PE connection		M8 screw	M6 screw	M8 screw
Cable length, max. between output reactor and motor				
• 380 -10 % ... 400 V 3 AC				
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)
• 401 ... 480 V 3 AC +10 %				
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)
Dimensions				
• Width	mm (in)	350 (13.78)	270 (10.63)	350 (13.78)
• Height	mm (in)	321 (12.64)	248 (9.76)	321 (12.64)
• Depth	mm (in)	288 (11.34)	209 (8.23)	288 (11.34)
Possible as base component		No	No	No
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg (lb)	51.5 (114)	24 (52.9)	51.5 (114)
Suitable for PM230 Power Module degree of protection IP20	Type	6SL3210-1NE31-1UL0 6SL3210-1NE31-1AL0	6SL3210-1NE31-5UL0 6SL3210-1NE31-5AL0	–
Suitable for PM230 Power Module degree of protection IP55/UL Type 12	Type	6SL3223-ODE35-5UA0 6SL3223-ODE35-5AA0	6SL3223-ODE37-5UA0 6SL3223-ODE37-5AA0	6SL3223-ODE38-8UA0 6SL3223-ODE38-8AA0
• Rated power of the Power Module	kW (hp)	55 (75)	75 (100)	90 (125)
• Rated current I_{rated} of the Power Module	A	110	145	178
• Frame size		FSF	FSF	FSF

¹⁾ On the rating plate of the reactor the current is specified according to high overload HO, which is lower than the indicated value for the low overload current of the Power Module.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Load-side power components
Sine-wave filters

Overview



Sine-wave filter

A sine-wave filter limits the rate of rise of voltage and the capacitive charging/discharging currents that usually occur with inverter operation. An output reactor is not required.

The sine-wave filter at the inverter output supplies almost perfect sinusoidal voltages at the motor so that standard motors can be used without special cables. Standard cables can be used. The maximum permissible motor feeder cable length is 300 m (984 ft). The maximum output frequency is 150 Hz at 380 V to 480 V.

When using sine-wave filters, the following should be observed:

- May be used for rated outputs up to and including 90 kW (125 hp) operation at pulse frequencies of between 4 kHz and 8 kHz.
- It must be ensured that the automatic pulse frequency reduction functions are also deactivated
- 80 % of the line input voltage is available as an output voltage for PM230 Power Modules.
- The output frequency is limited to 150 Hz.
- Operation and commissioning may only be performed with the motor connected as the sine-wave filter is not no-load proof

5

Selection and ordering data

Rated power		SINAMICS G120P PM230 Power Modules degree of protection <u>IP20</u>	SINAMICS G120P PM230 Power Modules degree of protection <u>IP55/UL Type 12</u>	Sine-wave filter	
kW	hp	Type 6SL3210-...	Type 6SL3223-...	Frame size	Order No.
380 ... 480 V 3 AC					
22	30	1NE24-5 . L0	ODE32-2 . A0	FSD	6SL3202-0AE24-6SA0
30	40	1NE26-0 . L0	ODE33-0 . A0	FSD	6SL3202-0AE26-2SA0
37	50	1NE27-5 . L0	ODE33-7 . A0	FSE	6SL3202-0AE28-8SA0
45	60	1NE28-8 . L0	ODE34-5 . A0	FSE	
55	75	1NE31-1 . L0	ODE35-5 . A0	FSF	6SL3202-0AE31-5SA0
75	100	1NE31-5 . L0	ODE37-5 . A0	FSF	
90	125	–	ODE38-8 . A0	FSF	6SL3202-0AE31-8SA0

Integration

Sine-wave filters that are optionally available depending on the Power Module used

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM230 Power Module degree of protection IP20 or IP55/UL Type 12							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Load-side power components							
Sine-wave filter	–	–	–	S	S	S	–

S = Lateral mounting

– = Not possible

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Load-side power components

Sine-wave filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Sine-wave filter (for pulse frequencies 4 ... 8 kHz)			
		6SL3202-0AE24-6SA0	6SL3202-0AE26-2SA0	6SL3202-0AE28-8SA0	
Rated current	A	47	61.8	92	92
Power loss	kW	0.185	0.152	0.251	0.251
Connection to the Power Module		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	50	50	95	95
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	50	50	95	95
PE connection		M6 screw	M6 screw	M8 screw	M8 screw
Cable length, max. between sine-wave filter and motor					
• 380 ... 480 V ±10 % 3 AC					
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions					
• Width	mm (in)	250 (9.84)	250 (9.84)	275 (10.83)	275 (10.83)
• Height	mm (in)	315 (12.40)	305 (12.01)	368 (14.49)	368 (14.49)
• Depth	mm (in)	262 (10.31)	262 (10.31)	275 (10.83)	275 (10.83)
Possible as base component		No	No	No	No
Degree of protection		IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	24.0 (52.9)	34.0 (75)	45.0 (99.2)	45.0 (99.2)
Suitable for PM230 Power Module degree of protection IP20	Type	6SL3210-1NE24-5UL0 6SL3210-1NE24-5ALO	6SL3210-1NE26-0UL0 6SL3210-1NE26-0ALO	6SL3210-1NE27-5UL0 6SL3210-1NE27-5ALO	6SL3210-1NE28-8UL0 6SL3210-1NE28-8ALO
Suitable for PM230 Power Module degree of protection IP55/UL Type 12	Type	6SL3223-0DE32-2UA0 6SL3223-0DE32-2AA0	6SL3223-0DE33-0UA0 6SL3223-0DE33-0AA0	6SL3223-0DE33-7UA0 6SL3223-0DE33-7AA0	6SL3223-0DE34-5UA0 6SL3223-0DE34-5AA0
• Rated power of the Power Module	kW (hp)	22 (30)	30 (40)	37 (50)	45 (50)
• Rated current I_{rated} of the Power Module	A	45	60	75	90
• Frame size		FSD	FSD	FSE	FSE

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Load-side power components
Sine-wave filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Sine-wave filter (for pulse frequencies 4 ... 8 kHz)		
		6SL3202-0AE31-5SA0		6SL3202-0AE31-8SA0
Rated current	A	150	150	182
Power loss	kW	0.43	0.43	0.47
Connection to the Power Module		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	150	150	150
Motor connection		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	150	150	150
PE connection		M8 screw	M6 screw	M8 screw
Cable length, max. between sine-wave filter and motor				
• 380 ... 480 V ±10 % 3 AC				
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)
Dimensions				
• Width	mm (in)	350 (13.78)	350 (13.78)	350 (13.78)
• Height	mm (in)	440 (17.32)	440 (17.32)	468 (18.43)
• Depth	mm (in)	305 (12.01)	305 (12.01)	305 (12.01)
Possible as base component		No	No	No
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg (lb)	63.0 (139)	63.0 (139)	80.0 (176)
Suitable for PM230 Power Module degree of protection IP20	Type	6SL3210-1NE31-1UL0 6SL3210-1NE31-1AL0	6SL3210-1NE31-5UL0 6SL3210-1NE31-5AL0	–
Suitable for PM230 Power Module degree of protection IP55/UL Type 12	Type	6SL3223-0DE35-5UA0 6SL3223-0DE35-5AA0	6SL3223-0DE37-5UA0 6SL3223-0DE37-5AA0	6SL3223-0DE38-8UA0 6SL3223-0DE38-8AA0
• Rated power of the Power Module	kW (hp)	55 (75)	75 (100)	90 (125)
• Rated current I_{rated} of the Power Module	A	110	145	178
• Frame size		FSF	FSF	FSF

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Supplementary system components

Operator panels

Overview

Operator panel	Intelligent Operator Panel IOP and IOP Handheld	Basic Operator Panel BOP-2
		
Description	<p>Thanks to the large plain text display, menu-based operation and the application wizards, commissioning of the standard drives is easy. Integrated application wizards guide the user interactively through the commissioning process for important applications such as pumps, fans, compressors and conveyor systems.</p>	<p>Commissioning of standard drives is easy with the menu-prompted dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.</p>
Possible applications	<ul style="list-style-type: none"> • Directly mounted on SINAMICS G120P • Can be mounted in the control cabinet door using a door mounting kit (achievable degree of protection is IP54/UL Type 12) • Available as a handheld version (with PM230 in degree of protection IP55, degree of protection IP55/UL Type 12 is no longer provided at the connection point) • 5 languages available 	<ul style="list-style-type: none"> • Directly mounted on SINAMICS G120P • Can be mounted in the control cabinet door using a door mounting kit (achievable degree of protection is IP54/UL Type 12)
Quick commissioning without expert knowledge	<ul style="list-style-type: none"> • Standard commissioning using the clone function • User-defined parameter list with a reduced number of self-selected parameters • Simple commissioning of standard applications using application-specific wizards, it is not necessary to know the parameter structure • Simple local commissioning using the handheld version • Commissioning largely without documentation 	<ul style="list-style-type: none"> • Standard commissioning using the clone function
High degree of operator friendliness and intuitive operation	<ul style="list-style-type: none"> • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes • Intuitive navigation using a rotary knob – just like in everyday applications • Graphic display to show status values such as pressure or flow in bar-type diagrams • Status display with freely selectable units to specify physical values 	<ul style="list-style-type: none"> • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes – • 2-line display for showing up to 2 process values with text • Status display of predefined units
Minimization of maintenance times	<ul style="list-style-type: none"> • Diagnostics using plain text display, can be used locally on-site without documentation • Simple update of languages, wizards and firmware via USB 	<ul style="list-style-type: none"> • Diagnostics with menu prompting with 7-segment display

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Supplementary system components
Intelligent Operator Panel IOP

Overview

Intelligent Operator Panel IOP



Intelligent Operator Panel IOP

The Intelligent Operator Panel IOP is a very user-friendly and powerful operator panel for the SINAMICS G120, SINAMICS G120C, SINAMICS G120D and SINAMICS G120P standard drives.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu-based operation and the application wizards, it is easy to commission standard drives. A drive can be essentially commissioned without having to use a printed parameter list – as the parameters are displayed in plain text, and explanatory help texts and the parameter filtering function are provided.

Application wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There are quick commissioning wizards for general commissioning.

The drives are easily controlled manually using directly assigned buttons and the navigation wheel. The IOP has a dedicated switchover button to switch from automatic to manual mode.

The inverter can be diagnosed in a user-friendly fashion using the plain text display of faults and alarms. Help texts can be obtained by pressing the INFO button.

Up to 2 process values can be displayed graphically or numerically on the status screen/status display. Process values can also be displayed in technological units.

The IOP supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the IOP and downloaded into other drive units of the same type as required.

The IOP includes the following language packages: English, French, German, Italian and Spanish.

The IOP can be installed in control cabinet doors using the optionally available door mounting kit (not possible in conjunction with the PM230 Power Module in degree of protection IP55).

The operating temperature of the IOP is 0 ... 50 °C (32 ... 122 °F).

IOP Handheld



IOP Handheld

A handheld version of the IOP can be ordered for mobile use. In addition to the IOP, this includes a housing with rechargeable batteries, charging unit and RS232 connecting cable. The charging unit is supplied with connector adapters for Europe, the US and the UK. When the batteries are fully charged, the operating time is up to 8 hours.

To connect the IOP Handheld to SINAMICS G110D and SINAMICS G120D, the RS232 connecting cable with optical interface is required in addition.

The IOP Handheld can be used in conjunction with SINAMICS G120P. In this case, the degree of protection IP55/UL Type 12 is no longer provided at the connection point.

Updating the IOP

The IOP can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be transferred from the PC to the IOP via drag & drop. Further, the USB interface allows user languages and wizards that will become available in the future to be subsequently downloaded and the firmware to be updated for the IOP.

The IOP is supplied with power via the USB interface during an update.

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Supplementary system components

Intelligent Operator Panel IOP

Selection and ordering data

Description	Order No.
Intelligent Operator Panel IOP	6SL3255-0AA00-4JA0
IOP Handheld For use with SINAMICS G120, SINAMICS G110D or SINAMICS G120D Included in the scope of delivery: • IOP • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable (3 m/9.84 ft long, can only be used for SINAMICS G120) • USB cable (1 m/3.28 ft long)	6SL3255-0AA00-4HA0

Accessories

Door mounting kit IP54 degree of protection for mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 ... 0.12 in) IP54 degree of protection for IOP IP55 degree of protection for BOP-2 Included in the scope of delivery: • Seal • Mounting material • Connecting cable (5 m/16.41 ft long, also supplies voltage to the IOP directly via the Control Unit)	6SL3256-0AP00-0JA0
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Benefits

- Simple commissioning of standard applications using wizards, it is not necessary to know the parameter structure
- Diagnostics using plain text display; can be used locally on-site without documentation
- Direct manual operation of the drive – you can toggle between automatic and manual modes
- Status display with freely selectable units; display of real physical values
- Intuitive navigation using a wheel – just like in everyday applications
- Graphic display with bar charts, e.g. for status values such as pressure or flowrate
- Commissioning without documentation using the integrated help function
- Standard commissioning using the clone function (parameter set data is saved for fast replacement)
- User-defined parameter list with a reduced number of self-selected parameters (to generate your own commissioning screens)
- 5 integrated languages
- Simple update of languages, wizards and firmware via USB

Integration

Mounting the IOP on a Control Unit

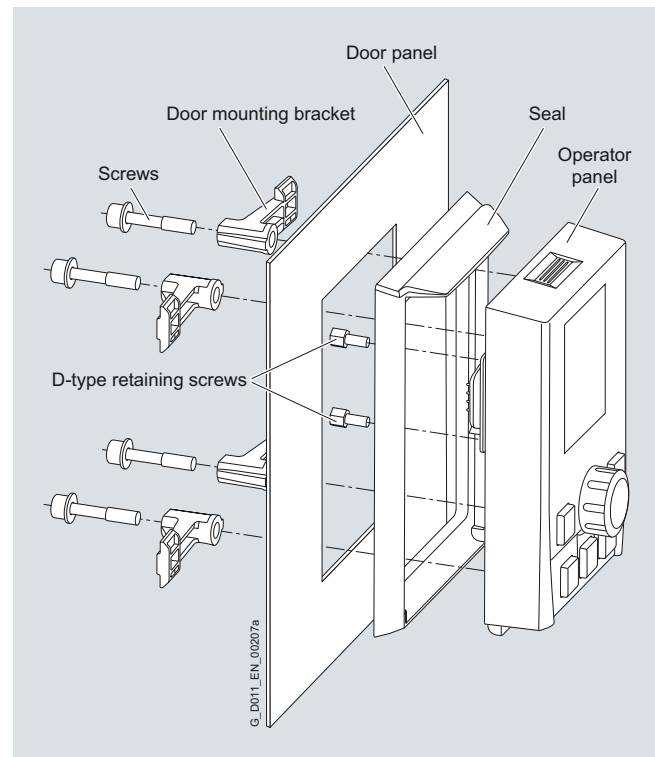
The IOP can be directly plugged onto the Control Unit.



CU230P-2 Control Unit with plugged-on IOP

Door mounting

An IOP can be installed in a control cabinet door in a few simple steps using the optionally available door mounting kit (not possible in conjunction with the PM230 Power Module in degree of protection IP55). Degree of protection IP54/UL Type 12 is achieved with door mounting.



Door mounting kit with plugged-on IOP

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Supplementary system components Basic Operator Panel BOP-2

Overview



Basic Operator Panel BOP-2

The Basic Operator Panel BOP-2 can be used to commission drives, monitor drives in operation and input individual parameter settings.

Commissioning of standard drives is easy with the menu-prompted dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.

The drives are easily controlled manually using directly assigned navigation buttons. The BOP-2 has a dedicated switchover key to switch over from automatic to manual mode.

Diagnostics can easily be performed on the connected inverter by following the menus.

Up to two process values can be numerically visualized simultaneously.

BOP-2 supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the BOP-2 and when required, downloaded into other drive units of the same type.

The operating temperature of the BOP-2 is 0 ... 50 °C (32 ... 122 °F).

Selection and ordering data

Description	Order No.
Basic Operator Panel BOP-2	6SL3255-0AA00-4CA1

Accessories

<p>Door mounting kit</p> <p>For mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 ... 0.12 in) IP54 degree of protection for IOP IP55 degree of protection for BOP-2</p> <p>Included in the scope of delivery:</p> <ul style="list-style-type: none"> • Seal • Mounting material • Connecting cable (5 m/16.41 ft long, also supplies voltage to the BOP-2 directly via the Control Unit) 	6SL3256-0AP00-0JA0
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Benefits

- Shorten commissioning times – Easy commissioning of standard drives using basic commissioning wizards (setup)
- Minimize standstill times – Fast detection and rectification of errors (Diagnostics)
- Greater transparency in the process – The status display of the BOP-2 makes process variable monitoring easy (Monitoring)
- Direct mounting on the inverter (also see IOP)
- User-friendly user interface:
 - Easy navigation using clear menu structure and clearly assigned control keys
 - Two-line display

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Supplementary system components

Basic Operator Panel BOP-2

Integration

Mounting the BOP-2 on a CU230P-2 Control Unit

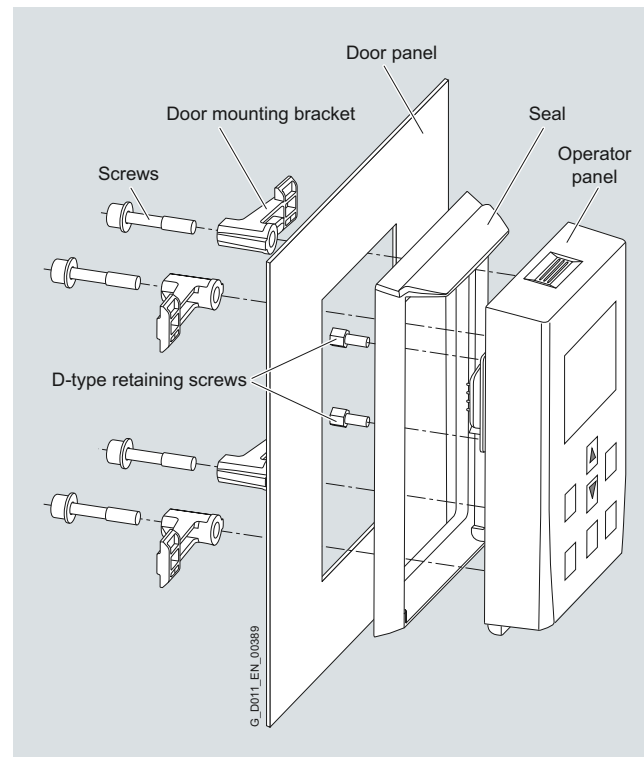
The BOP-2 can be directly plugged onto a CU230P-2 Control Unit.



PM230 Power Module and CU230P-2 Control Unit with plugged-on BOP-2

Door mounting

A BOP-2 can be installed in a control cabinet door in a few simple steps using the optionally available door mounting kit (not possible in conjunction with the PM230 Power Module in degree of protection IP55). Degree of protection IP55 is achieved for door mounting.



Door mounting kit with plugged-on BOP-2

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Supplementary system components Blanking cover for PM230 Power Modules

Supplementary system components Push-through mounting frame

Overview



PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC, with blanking cover

The blanking cover is mounted on the inverter in place of an operator panel, if an operator panel is not required. When the blanking cover is plugged onto the PM230 Power Module, degree of protection IP55/UL Type 12 is achieved.

Selection and ordering data

Description	Order No.
Blanking cover For PM230 Power Module degree of protection IP55/UL Type 12	6SL3256-1BA00-0AA0

Overview

It is advisable to use an optionally available mounting frame to install the push-through unit in a control cabinet. This mounting frame includes the necessary seals and frame to ensure compliance with degree of protection IP54.

If the Power Module is installed without use of the optional mounting frame, the user is responsible for ensuring that the requisite degree of protection is provided.

Tightening torque for fixing the mounting frame and the inverter: 3 ... 3.5 Nm.

Selection and ordering data

Description	Order No.
Push-through mounting frame	
• For PM230 Power Modules degree of protection IP20 push-through variants	
- Frame size FSA	new 6SL3260-6AA00-0DA0
- Frame size FSB	new 6SL3260-6AB00-0DA0
- Frame size FSC	new 6SL3260-6AC00-0DA0

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Supplementary system components

Memory cards

Overview



SINAMICS micro memory cards (MMC), SINAMICS SD cards

The parameter settings for an inverter can be stored on the SINAMICS micro memory card (MMC) or the SINAMICS SD card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again.

- Parameter settings can be written from the memory card to the inverter or saved from the inverter to the memory card.
- Up to 100 parameter sets can be stored.
- The memory card supports standard commissioning without the use of an operator panel such as the BOP-2 or the STARTER commissioning tool.

Note:

The memory card is not required for operation and does not have to remain inserted.

Selection and ordering data

Description	Order No.
SINAMICS micro memory card (MMC) 64 MB	6SL3254-0AM00-0AA0
SINAMICS SD card 512 MB	new¹⁾ 6SL3054-4AG00-2AA0

Supplementary system components

PC inverter connection kit 2

Overview



PC inverter connection kit 2

For controlling and commissioning an inverter directly from a PC, if the STARTER commissioning tool has been installed on the PC. With this, the inverter can be

- parameterized (commissioning, optimization)
- monitored (diagnostics)
- controlled (master control via the STARTER commissioning tool for test purposes).

A USB cable (3 m/9.84 ft) and the STARTER commissioning tool²⁾ on DVD-ROM are included in the scope of delivery.

The PC inverter connection kit 2 is suitable for the following SINAMICS G120 Control Units:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 PN
- CU230P-2 CAN
- CU240B-2
- CU240B-2 DP
- CU240E-2
- CU240E-2 DP
- CU240E-2 PN
- CU240E-2 F
- CU240E-2 DP-F
- CU240E-2 PN-F

Selection and ordering data

Description	Order No.
PC inverter connection kit 2 For CU230P-2, CU240B-2 and CU240E-2 Control Units Including USB cable (length 3 m/9.84 ft) and STARTER commissioning tool ²⁾ on DVD-ROM	6SL3255-0AA00-2CA0

¹⁾ Available soon.

²⁾ The STARTER commissioning tool is also available on the Internet at <http://support.automation.siemens.com/WW/view/en/10804985/133100>

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Supplementary system components – Shield connection kits for CU230P-2 Control Units

Overview

The shield connection kit offers for all signal and communication cables

- Optimum shield connection
- Strain relief

A shield connection kit contains the following:

- A matching shield bonding plate
- All of the necessary connecting and retaining elements for mounting

The shield connection kits are suitable for the following SINAMICS G120 Control Units:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 PN
- CU230P-2 CAN

Selection and ordering data

Description	Order No.
Shield connection kit 1 For CU230P-2 HVAC/DP/CAN Control Units	6SL3264-1EA00-0FA0
Shield connection kit 3 For CU230P-2 PN Control Units	new 6SL3264-1EA00-0HB0

Supplementary system components – Shield connection kits and shield plates for Power Modules

Overview

A shield plate for motor and signal cables is supplied with PM230 Power Modules, frame sizes FSA to FSC, in degree of protection IP20 standard variants.

Shield connection kits are available for PM230 Power Modules, frame sizes FSD to FSF, in degree of protection IP20 standard variants, and shield plates for PM230 Power Modules, frame sizes FSA to FSC, in degree of protection IP20 push-through variants.

Selection and ordering data

Description	Order No.
Shield plate for PM230 Power Module degree of protection IP20 standard variants • Frame sizes FSA to FSC	Supplied with the Power Modules, available as a spare part
Shield connection kit For PM230 Power Module degree of protection IP20 standard variants • Frame sizes FSD and FSE • Frame size FSF	6SL3262-1AD00-0DA0 6SL3262-1AF00-0DA0
Shield plate For PM230 Power Module degree of protection IP20 push-through variants • Frame size FSA • Frame size FSB • Frame size FSC	new 6SL3266-1EA00-0DA0 new 6SL3266-1EB00-0DA0 new 6SL3266-1EC00-0DA0

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Spare parts Spare parts kit for Control Units

Overview

The spare parts kit comprises small parts for all variants of the following SINAMICS G120 Control Units:

- CU230P-2
- CU240B-2
- CU240E-2
- CU240E-2 F

The delivery includes

- Label set for all variants of CU230P-2, CU240B-2, CU240E-2 and CU240E-2 F Control Units
- 2 replacement doors (top/bottom)
- 2 labeling strips for the doors
- Terminal blocks 6-pole, 7-pole, 9-pole, 10-pole and 5-pole (1 unit each)
- 1 protective element for SD/MMC card slot

Selection and ordering data

Description	Order No.
Spare parts kit for Control Units	
CU230P-2, CU240B-2, CU240E-2 and CU240E-2 F	6SL3200-0SK01-0AA0

Spare parts Shield plate for PM230 Power Modules

Overview

A shield plate for motor and signal cables is supplied with PM230 Power Modules, frame sizes FSA to FSC, in degree of protection IP20 standard variants. This shield plate is also available as a spare part.

Selection and ordering data

Description	Order No.
Shield plate For PM230 Power Module degree of protection IP20 standard variants (and SINAMICS G120C)	
• Frame size FSA	6SL3266-1EA00-0KA0
• Frame size FSB	6SL3266-1EB00-0KA0
• Frame size FSC	6SL3266-1EC00-0KA0

Spare parts Mounting set

Overview

The following parts are supplied from the factory for each PM230 Power Module in degree of protection IP55/UL Type 12 or IP20:

Frame sizes FSA to FSC	Frame sizes FSD to FSF (only for Power Modules in degree of protection IP55/UL Type 12)
<ul style="list-style-type: none"> • 1 SUB-D connector with mounting material for connecting the CU230P-2 HVAC/DP/PN/CAN Control Units to the operator panel (e.g. IOP) • 1 motor connector and 1 power supply connector • 2 serrated strips including mounting material for connecting the shield • 3 sleeves for inserting in the cutouts for the signal cables of the cable bonding plate • Ferrite cores (only necessary for devices with integrated line filter class B) • 2-page Quick Start Guide with mounting instructions 	<ul style="list-style-type: none"> • 1 adapter cable for connecting the CU230P-2 HVAC/DP/PN/CAN Control Units to the operator panel (e.g. IOP) • 4 clips to connect the shields of signal cables • 6 serrated strips including mounting material for the motor and supply cables • 4 sleeves (pre-installed in the cutouts for the signal cables of the cable bonding plate) • 1 cable bonding plate without cutouts for customers to configure their own connection system • 1 cabinet key • 2-page Quick Start Guide with mounting instructions

A **mounting set** can be ordered for every frame size in degree of protection IP55/UL Type 12 or IP20. It contains the following parts:

Frame sizes FSA to FSC	Frame sizes FSD to FSF (only for Power Modules in degree of protection IP55/UL Type 12)
<ul style="list-style-type: none"> • 1 SUB-D connector with mounting material • 1 motor connector and 1 power supply connector • 2 serrated strips including mounting material for connecting the shield • 3 sleeves for inserting in the cutouts for the signal cables of the cable bonding plate • Ferrite cores (only necessary for devices with integrated line filter class B) • Screws for fixing the cable bonding plate and the cover 	<ul style="list-style-type: none"> • 1 adapter cable including mounting material • 6 serrated strips including mounting material for the motor and supply cables • 1 cabinet key

Selection and ordering data

Description	Order No.
Mounting set For PM230 Power Modules degree of protection IP55/UL Type 12 or IP20	
• Frame size FSA	6SL3200-0SK02-0AA0
• Frame size FSB	6SL3200-0SK03-0AA0
• Frame size FSC	6SL3200-0SK04-0AA0
Mounting set For PM230 Power Modules degree of protection IP55/UL Type 12	
• Frame size FSD	6SL3200-0SK05-0AA0
• Frame size FSE	6SL3200-0SK06-0AA0
• Frame size FSF	6SL3200-0SK07-0AA0

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Spare parts Terminal cover kit for frame sizes FSD and FSE

Overview

The terminal cover kit includes a replacement cover for the connecting terminals.

The terminal cover kit is suitable for the following SINAMICS G120 Power Modules in frame sizes FSD and FSE:

- PM230 degree of protection IP20 standard variant
- PM240
- PM250

Selection and ordering data

Description	Order No.
Terminal cover kit for frame sizes FSD and FSE	6SL3200-0SM11-0AA0

Spare parts Terminal cover kit for frame size FSF

Overview

The terminal cover kit includes a replacement cover for the connecting terminals.

The terminal cover kit is suitable for the following SINAMICS G120 Power Modules in frame size FSF:

- PM230 degree of protection IP20 standard variant
- PM240
- PM250
- PM260

Selection and ordering data

Description	Order No.
Terminal cover kit for frame size FSF	6SL3200-0SM12-0AA0

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Spare parts

Fan units

Overview

The Power Module fans are designed for extra long service life. For special requirements, replacement fans are available that can be exchanged quickly and easily. The following pictures show the mounting location of the internal or external fan units as an example:



PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC, with external fan unit in heat sink



PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC, with internal fan unit above CU230P-2 Control Unit

Selection and ordering data

Rated power (LO)		PM230 Power Module degree of protection IP55/UL Type 12		External fan unit	Internal fan unit
kW	hp	Type 6SL3223-...	Frame size	Order No.	Order No.
380 ... 480 V 3 AC ± 10 %					
0.37	0.50	0DE13-7 . A0	FSA	6SL3200-0SF21-0AA0	6SL3200-0SF31-0AA0
0.55	0.75	0DE15-5 . A0			
0.75	1.0	0DE17-5 . A0			
1.1	1.5	0DE21-1 . A0			
1.5	2.0	0DE21-5 . A0			
2.2	3.0	0DE22-2 . A0			
3.0	4.0	0DE23-0 . A0			
4.0	5.0	0DE24-0 . A0	FSB	6SL3200-0SF22-0AA0	
5.5	7.5	0DE25-5 . A0			
7.5	10	0DE27-5 . A0			
11.0	15	0DE31-1 . A0	FSC	6SL3200-0SF23-0AA0	
15.0	20	0DE31-5 . A0			
18.5	25	0DE31-8AA0			
18.5	25	0DE31-8BA0	FSD	6SL3200-0SF24-0AA0	6SL3200-0SF32-0AA0
22	30	0DE32-2 . A0			
30	40	0DE33-0 . A0			
37	50	0DE33-7 . A0	FSE		
45	60	0DE34-5 . A0		6SL3200-0SF26-0AA0	
55	75	0DE35-5 . A0	FSF		
75	100	0DE37-5 . A0			
90	125	0DE38-8UA0			

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Spare parts
Fan units

Selection and ordering data

Rated power (LO)		PM230 Power Module degree of protection IP20 standard variant	Frame size	External fan unit
kW	hp			Type 6SL3210-...
380 ... 480 V 3 AC ± 10 %				
0.37	0.50	1NE11-3 . LO	FSA	6SL3200-0SF12-0AA0
0.55	0.75	1NE11-7 . LO		
0.75	1.0	1NE12-2 . LO		
1.1	1.5	1NE13-1 . LO		
1.5	2.0	1NE14-1 . LO		
2.2	3.0	1NE15-8 . LO		
3.0	4.0	1NE17-7 . LO		
4.0	5.0	1NE21-0 . LO	FSB	6SL3200-0SF13-0AA0
5.5	7.5	1NE21-3 . LO		
7.5	10	1NE21-8 . LO		
11.0	15	1NE22-6 . LO	FSC	6SL3200-0SF14-0AA0
15.0	20	1NE23-2 . LO		
18.5	25	1NE23-8 . LO		
22	30	1NE24-5 . LO	FSD	6SL3200-0SF05-0AA0
30	40	1NE26-0 . LO		
37	50	1NE27-5 . LO	FSE	
45	60	1NE28-8 . LO		
55	75	1NE31-1 . LO	FSF	6SL3200-0SF08-0AA0
75	100	1NE31-5 . LO		
Rated power (LO)		PM230 Power Module degree of protection IP20 push-through variant	Frame size	External fan unit
kW	hp			Type 6SL3211-...
380 ... 480 V 3 AC ± 10 %				
3.0	4.0	1NE17-7 . LO	FSA	6SL3200-0SF21-0AA0
7.5	10	1NE21-8 . LO	FSB	6SL3200-0SF22-0AA0
18.5	25	1NE23-8 . LO	FSC	6SL3200-0SF23-0AA0

SINAMICS G120P pump, fan, compressor inverters

0.37 kW to 90 kW (0.5 hp to 125 hp)

Notes

5

SINAMICS G120

standard inverters

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

6



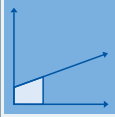
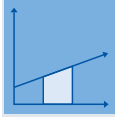
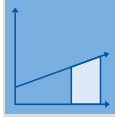
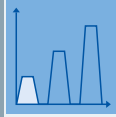
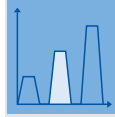
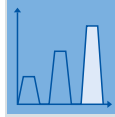

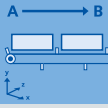
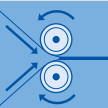
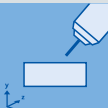
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		6/134	Replacement fans

SINAMICS G120 standard inverters

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

Introduction

Application

Application	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality			Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality		
						
Pumping, ventilating, compressing 	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	G110, G120C (G130, G150, GM150, GL150)	G120P, G120C, G120 (G130, G150, GM150, GL150)	S120	S110	S110, S120	S120 (GM150)
Moving 	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/disengagers
	G110, G110D, G120C (G130, G150, GM150)	G120D, G120C, G120, S120 (G130, G150, S150, GM150, GL150, SM150, DCM)	S120 (S150, SM150, SL150, GM150, DCM)	G120D, S110	S110, S120 (DCM)	S120 (DCM)
Processing 	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders and unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	G120C (G130, G150, GM150)	G120C, G120 (G130, G150, S150, GM150, GL150, DCM)	S120 (S150, DCM)	S110	S110, S120	S120 (SM150, SL150, DCM)
Machining 	Main drives for • Turning • Drilling • Milling	Main drives for • Drilling • Sawing	Main drives for • Turning • Drilling • Milling • Gear cutting • Grinding	Axle drives for • Turning • Drilling • Milling	Axle drives for • Drilling • Sawing	Axle drives for • Turning • Drilling • Milling • Laser cutting • Gear cutting • Grinding • Nibbling and punching
	S110	S110, S120	S120	S110	S110, S120	S120

(Devices in brackets are not included in Catalog D 31)

The standard SINAMICS G120 inverter is especially well-suited

- as a universal drive in all industrial and commercial applications
- e.g. in the automotive, textile, printing and chemical industries
- for higher-level applications, e.g. in conveyor systems

More information

You may also be interested in these inverters:

- Higher degree of protection for power ratings up to 7.5 kW (10 hp) ⇒ SINAMICS G110D, SINAMICS G120D
- With positioning function for distributed drive solutions in IP65 degree of protection ⇒ SINAMICS G120D
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS S110
- Special functions for pumps, fans, and compressors ⇒ SINAMICS G120P

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Overview

The SINAMICS G120 inverter is designed to provide precise and cost-effective speed/torque control of three-phase motors.

With different device versions (frame sizes FSA to FSGX) in an output range of 0.37 kW to 250 kW (0.5 hp to 400 hp), it is suitable for a wide variety of drive solutions.



Example: SINAMICS G120, frame sizes FSA, FSB and FSC; each with Power Module, CU240E-2 F Control Unit and Basic Operator Panel BOP-2



Example: SINAMICS G120, frame sizes FSD, FSE and FSF; each with Power Module, CU240E-2 F Control Unit and Basic Operator Panel BOP-2

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Overview



Example: SINAMICS G120, frame size FSGX; with Power Module, CU240E-2 F Control Unit and Basic Operator Panel BOP-2

Operator-friendly design

SINAMICS G120 is a modular inverter system that essentially comprises two function units:

- Control Unit (CU)
- Power Module (PM)

The Control Unit controls and monitors the Power Module and the connected motor using several different closed-loop control types that can be selected. It supports communication with a local or central controller and monitoring devices.

The Power Module supplies the motor in the power range 0.37 kW to 250 kW (0.5 hp to 400 hp). It features state-of-the-art IGBT technology with pulse-width-modulated motor voltage and selectable pulse frequency. It also features a range of functions offering a high degree of protection for the Power Module and motor.

Safety Integrated

SINAMICS G120 standard inverters are available in different versions for safety-related applications. The PM240-2, PM240, PM250 and PM260 Power Modules are prepared for Safety Integrated. In conjunction with a fail-safe Control Unit, the drive can be turned into a Safety Integrated Drive. PM240 Power Modules in frame size FSGX (i.e. 160 kW/250 hp and higher) are currently approved only for the Safe Torque Off (STO) function.

The safety function "Safe Torque Off" (STO) (certified according to EN 954-1, Category 3 and IEC 61508 SIL 2 – as well as ISO 13849-1 PL d) is already integrated into the basic versions of the CU240E-2 series (CU240E-2, CU240E-2 DP, CU240E-2 PN)

With the fail-safe variants of the CU240E-2 series (CU240E-2 F, CU240E-2 DP-F, CU240E-2 PN-F), the fail-safe SINAMICS G120 inverter provides five safety functions which are certified according to EN 954-1 Category 3 and IEC 61508 SIL 2 as well as ISO 13849-1 PL d:

- Safe Torque Off (STO)
to protect against active movement of the drive
- Safe Stop 1 (SS1)
for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS)
for protection against dangerous movements on exceeding a speed limit
- Safe direction (SDI)
This function ensures that the drive can only rotate in the selected direction.
- Safe speed monitoring (SSM)
This function signals if a drive operates below a specific speed/feed velocity.

These functions can be activated by means of PROFIsafe or via the safety inputs.

None of the safety functions require a motor encoder and they are thus much cheaper and easier to implement. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SSM and SDI functions are only permissible for applications where the load can never accelerate when the inverter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

[Additional information is provided in Catalog D 31, chapter Highlights, section Safety Integrated.](#)

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Overview

Efficient Infeed Technology

The advanced Efficient Infeed Technology is employed in PM250 and PM260 Power Modules. This technology allows the energy produced by motors operating in generator mode connected to standard inverters to be fed back into the supply system. For control cabinets, an additional temperature rise can be avoided and the amount of space required can be reduced due to the fact that components such as braking resistors, braking choppers and line reactors can be eliminated. Further, wiring and engineering costs are significantly reduced. At the same time, energy consumption can be reduced and ongoing operating costs noticeably reduced.

Additional information is provided in [Catalog D 31, chapter Highlights, section Efficient Infeed Technology](#).

Innovative cooling concept and varnishing of electronic modules

The new cooling system and varnishing of the electronic modules significantly increases the service life or useful life of the device.

- Disposal of all heat losses via an external heat sink
- Consequential convection cooling of the Control Unit, electronic modules are not located in the air duct
- All cooling air from the fan is directed through the heat sink

Energy efficiency

Integrated technologies help when optimizing the energy usage of the plant or system referred to the particular application:

- Energy-efficient, sensorless vector control
- Automatic flux reduction with V/f ECO mode
- Integrated energy saving computer

Benefits

- Modularity ensures flexibility for a drive concept that is fit for the future
 - Module replacement under voltage (hot swapping)
 - Pluggable terminals
 - The modules can be easily replaced, which makes the system extremely service friendly
- The integrated safety functions significantly reduce the costs when integrating drives into safety-oriented machines or systems
- Communications-capable via PROFINET or PROFIBUS with PROFIdrive Profile 4.0
 - Reduced number of interfaces
 - Plant-wide engineering
 - Easy to handle
- The innovative circuit design (bidirectional input rectifier with "pared-down" DC link) allows the kinetic energy of a load to be fed back into the supply system when PM250 and PM260 Power Modules are used. This feedback capability provides enormous potential for savings because generated energy no longer has to be converted into heat in a braking resistor
- Integrated USB interface for simplified, local commissioning and diagnostics
- Application-specific modules for pumps, fans and compressors are integrated, e.g.:
 - 4 freely-programmable PID controllers
 - Application-specific wizards
 - Pt1000/LG-Ni1000 temperature sensor interface
 - 230 V relay
 - 3 freely-programmable digital time switches
- Integrated control functionality by using BICO technology
- Innovative SiC semiconductor technology ensures that when a PM260 Power Module is used, the inverter is more compact than a comparable standard inverter with an optional sine-wave filter for the same power rating
- An innovative cooling concept and coated electronic modules increase robustness and service life
 - External heat sink
 - Electronic components are not located in air duct
 - Control Unit that is completely cooled by convection
 - Additional coating of the most important components
- Simple unit replacement and quick copying of parameters using the optional Basic Operator Panel or the optional memory cards
- Quiet motor operation as a result of the high pulse frequency
- Compact, space-saving design
- Software parameters for simple adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- 2/3-wire control for static/pulsed signals for universal control via digital inputs
- Fast engineering and commissioning by using standard engineering tools such as SIZER for Siemens Drives, STARTER and Drive ES – STARTER is integrated into STEP 7 using Drive ES Basic, with all of the benefits of central data management and totally integrated communication
- Certified worldwide for compliance with CE, UL, cUL, c-tick and Safety Integrated IEC 61508 SIL 2

SINAMICS G120 standard inverters

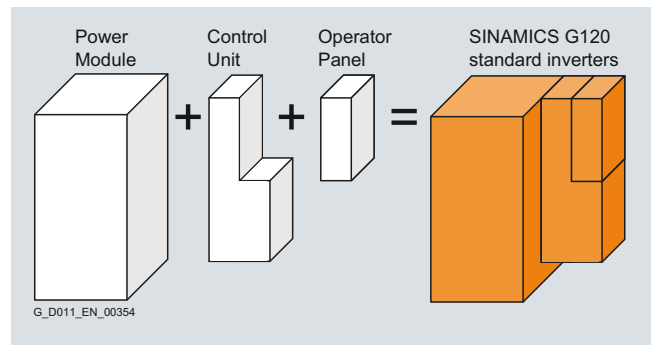
0.37 kW to 250 kW (0.5 hp to 400 hp)

SINAMICS G120 standard inverters

Design

Application-orientated design of SINAMICS G120

SINAMICS G120 standard inverters are modular inverters for standard drives. Selection of the SINAMICS G120 is reduced to two or three steps thanks to the modular system used.



Selecting the Control Unit

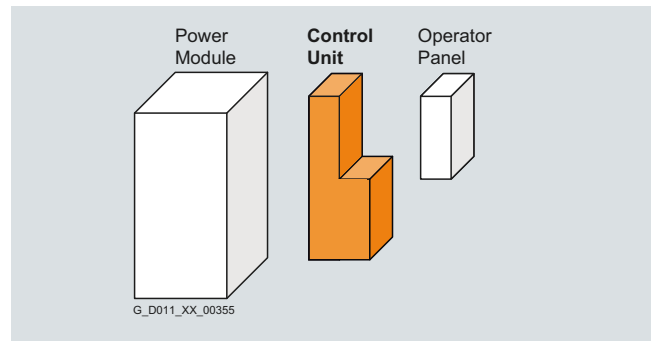
The optimum Control Unit is selected first, based on the number of I/Os and any additional functions required such as Safety Integrated or HVAC. The communication options are already integrated and do not have to be additionally ordered or plugged in. Two product series are available corresponding to the particular application.

CU230P-2 Control Units

The CU230P-2 Control Units have been specifically designed for pump, fan and compressor applications.

CU240B-2 and CU240E-2 Control Units

The CU240B-2 and CU240E-2 Control Units are suitable for a wide range of applications in general machine construction, such as conveyor belts, mixers and extruders.



Technology functions (selection)	Inputs	Outputs	Integrated safety technology	Digital inputs, fail-safe	Communication	Designation	Control Unit Order No.
CU230P-2 series – the specialist for pumps, fans, compressors, water, buildings							
<ul style="list-style-type: none"> Free function blocks (FFB) 4 × PID controllers Pump staging Hibernation Essential service mode 2-zone control 	6 digital 4 analog	3 digital 2 analog	–	–	RS485/USS / Modbus RTU / BACnet MS/TP	CU230P-2 HVAC	6SL3243-0BB30-1HA2
					PROFIBUS DP	CU230P-2 DP	6SL3243-0BB30-1PA2
					PROFINET	CU230P-2 PN new	6SL3243-0BB30-1FA0
					CANopen	CU230P-2 CAN	6SL3243-0BB30-1CA2
CU240B-2 series – for basic applications with variable-speed drives							
<ul style="list-style-type: none"> Free function blocks (FFB) 1 × PID controller Motor holding brake 	4 digital 1 analog	1 digital 1 analog	–	–	RS485/USS / Modbus RTU	CU240B-2	6SL3244-0BB00-1BA1
					PROFIBUS DP	CU240B-2 DP	6SL3244-0BB00-1PA1
CU240E-2 series – for standard applications in general machinery construction, such as conveyor belts, mixers and extruders							
<ul style="list-style-type: none"> Free function blocks (FFB) 1 × PID controller Motor holding brake 	6 digital 2 analog	3 digital 2 analog	STO	1 F-DI (opt. for each 2 DI)	RS485/USS / Modbus RTU	CU240E-2	6SL3244-0BB12-1BA1
					PROFIBUS DP PROFIsafe	CU240E-2 DP	6SL3244-0BB12-1PA1
					PROFINET	CU240E-2 PN new	6SL3244-0BB12-1FA0
			STO, SS1, SLS, SSM, SDI	3 F-DI (opt. for each 2 DI)	RS485/USS / Modbus RTU	CU240E-2 F	6SL3244-0BB13-1BA1
					PROFIBUS DP PROFIsafe	CU240E-2 DP-F	6SL3244-0BB13-1PA1
					PROFINET	CU240E-2 PN-F new	6SL3244-0BB13-1FA0

SINAMICS G120 standard inverters

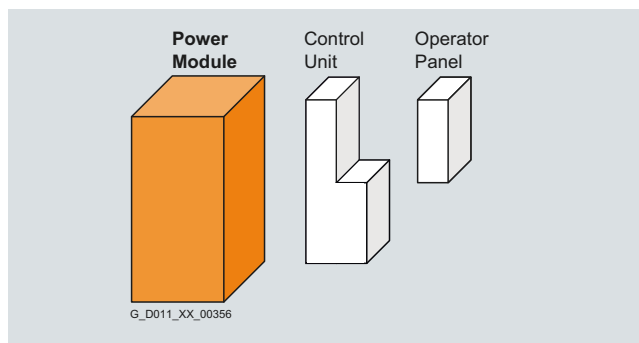
0.37 kW to 250 kW (0.5 hp to 400 hp)

SINAMICS G120 standard inverters

Design

Selecting the Power Module

The optimum power unit can be quickly selected based on the required motor power, the supply voltage and the braking cycles to be expected. Power Modules in degree of protection IP20 are intended for installation in a control cabinet.



PM230, PM240-2 and PM240 Power Modules

Rated power ¹⁾			Rated output current I_{rated} ²⁾	PM230 Power Module	PM230 Power Module	PM240-2 Power Module	PM240 Power Module
kW	hp	A		degree of protection IP55	degree of protection IP20	degree of protection IP20	degree of protection IP20
			Only CU230P-2 pluggable	The following Control Units are supported: CU230P-2 ..., CU240B-2 ..., CU240E-2 ...	The following Control Units are supported: CU230P-2 ..., CU240B-2 ..., CU240E-2 ...	All CUs pluggable	
			Order No.	Order No.	Order No.	Order No.	
380 ... 480 V 3 AC							
0.37	0.50	1.3	6SL3223-0DE13-7 A0	new	6SL3210-1NE11-3 L0	–	6SL3224-0BE13-7UA0
0.55	0.75	1.7	6SL3223-0DE15-5 A0	new	6SL3210-1NE11-7 L0	new	6SL3224-0BE15-5UA0
0.75	1.0	2.2	6SL3223-0DE17-5 A0	new	6SL3210-1NE12-2 L0	new	6SL3224-0BE17-5UA0
1.1	1.5	3.1	6SL3223-0DE21-1 A0	new	6SL3210-1NE13-1 L0	new	6SL3224-0BE21-1UA0
1.5	2.0	4.1	6SL3223-0DE21-5 A0	new	6SL3210-1NE14-1 L0	new	6SL3224-0BE21-5UA0
2.2	3.0	5.9	6SL3223-0DE22-2 A0	new	6SL3210-1NE15-8 L0	new ³⁾	6SL3224-0BE22-2 A0
3.0	4.0	7.7	6SL3223-0DE23-0 A0	new	6SL321-1-1NE17-7 L0	new	6SL3224-0BE23-0 A0
4.0	5.0	10.2	6SL3223-0DE24-0 A0	new	6SL3210-1NE21-0 L0	–	6SL3224-0BE24-0 A0
5.5	7.5	13.2	6SL3223-0DE25-5 A0	new	6SL3210-1NE21-3 L0	–	–
7.5	10	18	6SL3223-0DE27-5 A0	new	6SL321-1-1NE21-8 L0	–	6SL3224-0BE25-5 A0
11.0	15	25 (PM230:26)	6SL3223-0DE31-1 A0	new	6SL3210-1NE22-6 L0	–	6SL3224-0BE27-5 A0
15.0	20	32	6SL3223-0DE31-5 A0	new	6SL3210-1NE23-2 L0	–	6SL3224-0BE31-1 A0
18.5	25	38	6SL3223-0DE31-8 A0	new	6SL321-1-1NE23-8 L0	–	6SL3224-0BE31-5 A0
22	30	45	6SL3223-0DE32-2 A0	new	6SL3210-1NE24-5 L0	–	6SL3224-0BE31-8 A0
30	40	60	6SL3223-0DE33-0 A0	new	6SL3210-1NE26-0 L0	–	6SL3224-0BE32-2 A0
37	50	75	6SL3223-0DE33-7 A0	new	6SL3210-1NE27-5 L0	–	6SL3224-0BE33-0 A0
45	60	90	6SL3223-0DE34-5 A0	new	6SL3210-1NE28-8 L0	–	6SL3224-0BE33-7 A0
55	75	110	6SL3223-0DE35-5 A0	new	6SL3210-1NE31-1 L0	–	6SL3224-0BE34-5 A0
75	100	145	6SL3223-0DE37-5 A0	new	6SL3210-1NE31-5 L0	–	6SL3224-0BE35-5 A0
90	125	178	6SL3223-0DE38-8 A0	–	–	–	6SL3224-0BE37-5 A0
110	150	205	–	–	–	–	6SL3224-0BE38-8UA0
132	200	250	–	–	–	–	6SL3224-0BE41-1UA0
160	250	302	–	–	–	–	6SL3224-0XE41-3UA0
200	300	370	–	–	–	–	6SL3224-0XE41-6UA0
250	400	477	–	–	–	–	6SL3224-0XE42-0UA0
Heat sink variant					↑		↑
Standard					0		0
Push-through					1		1
Integrated line filter				↑		↑	
Without	(for IT systems)	Not supported			U		U
Class A	(for TN systems)	A			A		A
Class B	(for TN systems)	B		Are not available integrated		Are not available integrated	Are not available integrated

Data based on a duty cycle with low overload (LO). High overload (HO) see section Power Modules.

¹⁾ The LO duty cycle is generally used for applications with square torque characteristic such as for pumps, fans and compressors; the HO duty cycle for constant torque characteristics, for example conveyor belts.

²⁾ These current values are applicable for 400 V.

³⁾ Push-through variant only available in filtered form.

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Design

PM230 Power Modules – degree of protection IP55 and IP20

PM230 Power Modules are designed for applications involving pumps, fans and compressors with a square characteristic. They do not have an integrated braking chopper (single-quadrant applications).

PM240 and PM240-2 Power Modules – degree of protection IP20

PM240 and PM240-2 Power Modules have a braking chopper (four-quadrant applications) and are suitable for a large number of applications in general machinery construction.

PM250 and PM260 Power Modules

PM250 Power Modules – degree of protection IP20

PM250 Power Modules are suitable for the same applications as the PM240. Any braking energy is directly fed back into the line supply (four-quadrant applications – a braking chopper is not required).

PM260 Power Modules – degree of protection IP20

PM260 Power Modules are designed for applications from 500 V to 690 V, are capable of energy recovery and include a sine-wave filter to reduce the stress on the motor and for long cable lengths.

Rated power ¹⁾		Rated output current I_{rated} ²⁾	PM250 Power Module degree of protection IP20 All CUs pluggable	Rated output current I_{rated} ²⁾	PM260 Power Module degree of protection IP20 All CUs pluggable
kW	hp				
380 ... 480 V 3 AC		A		A	
500 ... 690 V 3 AC					
7.5	10	18	6SL3225-0BE25-5AA1	–	–
11.0	15	25	6SL3225-0BE27-5AA1	14	6SL3225-0BH27-5AA1
15.0	20	32	6SL3225-0BE31-1AA1	19	6SL3225-0BH31-1AA1
18.5	25	38	6SL3225-0BE31-5AA0	23	6SL3225-0BH31-5AA1
22	30	45	6SL3225-0BE31-8AA0	–	–
30	40	60	6SL3225-0BE32-2AA0	35	6SL3225-0BH32-2AA1
37	50	75	6SL3225-0BE33-0AA0	42	6SL3225-0BH33-0AA1
45	60	90	6SL3225-0BE33-7AA0	–	–
55	75	110	6SL3225-0BE34-5AA0	62	6SL3225-0BH33-7AA1
75	100	145	6SL3225-0BE35-5AA0	–	–
90	125	178	6SL3225-0BE37-5AA0	–	–
Integrated line filter			↑		↑
Without	(for IT systems)		U		U
Class A	(for TN systems)		A		A
Class B	(for TN systems)		Are not available integrated		Not supported

Data based on a duty cycle with low overload (LO). High overload (HO) see section Power Modules.

Selecting optional system components

Intelligent Operator Panel IOP

Graphic display with bar-type diagrams, e.g. for status values such as pressure or flowrate.

User-friendly commissioning, diagnostics and local operator control using a large plain text display, clear menu navigation and integrated application wizards.

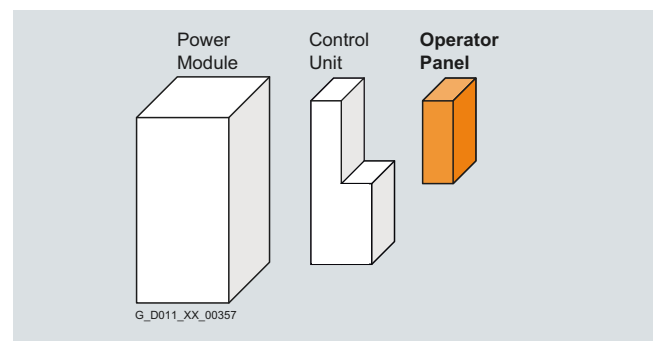
Intelligent Operator Panel IOP Handheld

A handheld version of the IOP can be ordered for mobile use. In addition to the IOP, this includes a housing with rechargeable batteries, charging unit and RS232 connecting cable.

Basic Operator Panel BOP-2

Menu navigation and 2-line display permit fast and user-friendly commissioning of the inverter.

Simple basic commissioning by simultaneously displaying parameter and parameter value, as well as the option of filtering parameters.



¹⁾ The LO duty cycle is generally used for applications with square torque characteristic such as for pumps, fans and compressors; the HO duty cycle for constant torque characteristics, for example conveyor belts.

²⁾ These current values are applicable for 400 V for PM250 Power Modules and 690 V for PM260 Power Modules.

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Design

Door mounting kit for IOP/BOP-2

Using the optionally available door mounting kit, the IOP/BOP-2 can be mounted in a control cabinet door with just a few manual operations (IP54/UL Type 12 degree of protection is achieved).

Blanking cover for PM230 Power Modules

The blanking cover is mounted on the inverter in place of an operator panel, if an operator panel is not required. When the blanking cover is plugged onto the PM230 Power Module, degree of protection IP55/UL Type 12 is achieved.

Push-through mounting frame for push-through variants of the PM230 and PM240-2 Power Modules

It is advisable to use an optionally available mounting frame to install the push-through unit in a control cabinet. This mounting frame includes the necessary seals and frame to ensure compliance with degree of protection IP54. If the Power Module is installed without use of the optional mounting frame, the user is responsible for ensuring that the requisite degree of protection is provided. The kit contains all the necessary nuts and seals.

Memory cards

The parameter settings for an inverter can be stored on the SINAMICS micro memory card (MMC) or the SINAMICS SD card. When service is required, e.g. after the inverter has been replaced, the drive system is immediately ready for use again.

Brake Relay

The Brake Relay allows the Power Module to be connected to an electromechanical motor brake, thereby allowing the motor brake to be driven directly by the Control Unit.

Adapter for mounting on DIN rails

The adapter for DIN rail mounting can be used to mount inverters, frame sizes FSA and FSB, on DIN mounting rails (2 units with a center-to-center distance of 100 mm/3.94 in).

PC inverter connection kit 2

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool) has been installed.

The STARTER commissioning tool on DVD-ROM is included in the scope of delivery of the PC inverter connection kit 2.

Shield connection kit for Power Modules

The shield connection kit makes it easier to connect the shields of supply and control cables, provides mechanical strain relief and thus ensures optimum EMC performance.

Shield connection kit for Control Units

The shield connection kit offers optimum shield connection and strain relief for all signal and communication cables. It includes a matching shield bonding plate and all of the necessary connecting and retaining elements for mounting.

Description	Order No.
Operator Panel IOP	6SL3255-0AA00-4JA0
Operator Panel IOP Handheld ¹⁾	6SL3255-0AA00-4HA0
Operator Panel BOP-2	6SL3255-0AA00-4CA1
Door mounting kit ²⁾ For IOP/BOP-2	6SL3256-0AP00-0JA0
Blanking cover For PM230 Power Modules degree of protection IP55/ UL Type 12	6SL3256-1BA00-0AA0
Push-through mounting frame	
• For PM230 and PM240-2 Power Modules degree of protection IP20 – Push-through variants	
- Frame size FSA	new 6SL3260-6AA00-0DA0
- Frame size FSB	new 6SL3260-6AB00-0DA0
- Frame size FSC	new 6SL3260-6AC00-0DA0
Memory card ³⁾	
• SINAMICS micro memory card (MMC) 64 MB	6SL3254-0AM00-0AA0
• SINAMICS SD card	new ⁴⁾ 6SL3054-4AG00-2AA0
Brake Relay ²⁾	6SL3252-0BB00-0AA0
Adapter for mounting on DIN rails	
• For Power Modules, frame size FSA	6SL3262-1BA00-0BA0
• For Power Modules, frame size FSB	6SL3262-1BB00-0BA0
PC inverter connection kit 2	6SL3255-0AA00-2CA0
Shield connection kits	
• For PM240 and PM250 Power Modules	
- Frame size FSA	6SL3262-1AA00-0BA0
- Frame size FSB	6SL3262-1AB00-0DA0
- Frame size FSC	6SL3262-1AC00-0DA0
- Frame sizes FSD and FSE	6SL3262-1AD00-0DA0
- Frame size FSF	6SL3262-1AF00-0DA0
• For PM260 Power Modules	
- Frame size FSD	6SL3262-1FD00-0CA0
- Frame size FSF	6SL3262-1FF00-0CA0
• For Control Units	
- For CU230P-2	6SL3264-1EA00-0FA0
- For CU240B-2 and CU240E-2	6SL3264-1EA00-0HA0
- For CU230P-2 PN, CU240E-2 PN and CU240E-2 PN-F	new 6SL3264-1EA00-0HB0
STARTER commissioning tool on DVD-ROM	6SL3072-0AA00-0AG0

¹⁾ Use of the IOP Handheld in conjunction with the PM230 Power Module in degree of protection IP55 is restricted since degree of protection IP55 is no longer assured when the IOP Handheld is connected.

²⁾ Not possible in conjunction with the PM230 Power Module in degree of protection IP55.

³⁾ Alternatively, an MMC or an SD card can be used.

⁴⁾ Available soon. Approved only for Control Units CU230P-2 HVAC, CU230P-2 CAN and CU230P-2 DP with firmware version V4.6 and higher.

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Design

Line-side power components

The following line-side power components are available for SINAMICS G120 standard inverters:

Line filters

With one of the additional line filters, the Power Module reaches a higher radio interference class.

Line reactors (for PM240 and PM240-2 Power Modules only)

Line reactors are used to smooth voltage peaks or to bridge commutating dips.

Line reactors also reduce the effects of harmonics on the inverter and the line supply.

If the ratio of the rated inverter power to the line supply short-circuit power is less than 1 %, then it is recommended to use a line reactor to reduce the current peaks.

Recommended line-side power components

This is a recommendation for additional line-side components, such as fuses and circuit breakers (line-side components must be dimensioned in accordance with IEC standards).

[Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 10.1, IC 10 and IC 10 AO.](#)

DC link components

The following DC link components are available for the SINAMICS G120 standard inverters:

Braking Modules (only for PM240 Power Modules, frame size FSGX)

A Braking Module and the matching external braking resistor are required to bring drives with a PM240 Power Module, frame size FSGX, to a controlled standstill in the event of a power failure (e.g. emergency retraction or EMERGENCY STOP Category 1) or to limit the DC link voltage during a short period of generator operation. The Braking Module includes the power electronics and the associated control circuit.

Braking resistors (for PM240 and PM240-2 Power Modules only)

Excess energy in the DC link is dissipated in the braking resistor. The braking resistors are designed for use with PM240 and PM240-2 Power Modules. They are equipped with an integrated braking chopper (electronic switch). There is an optional plug-in Braking Module for frame size FSGX.

Load-side power components

The following load-side power components are available for the SINAMICS G120 standard inverters. This means that during operation with output reactors or sine-wave filters, longer, shielded motor cables are possible and the motor service life can be extended:

Output reactors (for PM230, PM240 and PM250 Power Modules only)

Output reactors reduce the voltage stress on the motor windings. At the same time, the capacitive charging/discharging currents, which place an additional load on the power unit when long motor cables are used, are reduced.

Sine-wave filters (not for PM260 Power Modules)

The sine-wave filter limits the rate of rise of voltage and the capacitive charging/discharging currents that usually occur with inverter operation. An output reactor is not required.

Spare parts

Spare parts kit for Control Units

The spare parts kit comprises small parts for all variants of the following SINAMICS G120 Control Units:

- CU230P-2
- CU240B-2
- CU240E-2
- CU240E-2 F

Shield plates for PM230 and PM240-2 Power Modules

A shield plate for motor and signal cables is supplied with PM230 Power Modules, frame sizes FSA to FSC, in degree of protection IP20 standard variants and for PM240-2 Power Modules. The shield plate is available as a spare part for frame sizes FSA to FSC depending on the frame size of the SINAMICS G120C compact inverter. Shield plates are also available for the push-through variants of the PM230 and PM240-2 Power Modules.

The shield connection kits for PM240 and PM250 Power Modules are available for the PM230 Power Modules in degree of protection IP20 in frame sizes FSD to FSF.

Terminal cover kit

The kit includes a replacement cover for the terminals. The kit can be ordered for PM250, PM240 and PM230 Power Modules in degree of protection IP20 (standard variants) in frame sizes FSD, FSE and FSF, as well as for the PM260 in frame size FSF.

Replacement connectors for PM240-2 Power Modules

A set of connectors for the line feeder cable, braking resistor and motor cable can be ordered corresponding to the frame size of the PM240-2 Power Module.

Replacement connectors for PM260 Power Modules

This spare part includes a connector for the input and output sides of the PM260 Power Module, frame size FSD.

Replacement door for PM240 Power Modules, frame size FSGX

A complete replacement door can be ordered for the PM240 Power Module, frame size FSGX.

Fan units for PM230 and PM240-2 Power Modules

The fans of PM230 and PM240-2 Power Modules are designed for extra long service life. Replacement fans (at rear of device, heat sink) comprising a pre-assembled unit with holder and fan can be ordered to meet special requirements.

Replacement fans for PM240, PM250 and PM260 Power Modules

The fans of PM240, PM250 and PM260 Power Modules are designed for extra long service life. Replacement fans can be ordered for special applications.

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Configuration

The following electronic configuring aids and engineering tools are available for the SINAMICS G120 standard inverters:

Selection guide DT Configurator

The interactive catalog CA 01 – the offline mall of Siemens Industry Automation & Drive Technologies – contains over 100000 products with approximately 5 million possible drive system product variants. The DT Configurator has been developed to facilitate selection of the optimum motor and/or inverter from the wide spectrum of drives. It is provided on a DVD-ROM.

Online DT Configurator

In addition, the DT Configurator can be used in the Internet without requiring any installation
www.siemens.com/dt-configurator

SIZER for Siemens Drives engineering tool

The PC-based SIZER for Siemens Drives engineering tool makes it easy to engineer the SINAMICS and MICROMASTER 4 drive families. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER for Siemens Drives covers the full range of operations required to configure a complete drive system, from basic single drives to demanding multi-axis applications.

STARTER commissioning tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics. In addition to SINAMICS drives, STARTER is also suitable for MICROMASTER 4 units.

SINAMICS StartDrive commissioning tool

SINAMICS StartDrive is a tool for configuring, commissioning, and diagnosing the SINAMICS family of drives and is integrated into the TIA Portal. The engineering tool has been optimized with regard to user friendliness and consistent use of the TIA Portal technologies. The two Control Units CU240B-2 DP and CU240E-2 DP of the SINAMICS G120 standard inverter are supported in the SINAMICS StartDrive V11 version.

Drive ES engineering system

Drive ES is the engineering system that can be used to integrate the communication, configuration and data management functions of Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively. The STEP 7 Manager user interface provides the ideal basis for this. A variety of software packages are available for SINAMICS – Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7.1.

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all the following components of the SINAMICS G120 standard inverters.

Mechanical specifications	
Vibratory load	
<ul style="list-style-type: none"> Transport ¹⁾ acc. to EN 60721-3-2 <ul style="list-style-type: none"> All units and components with the exception of frame size FSGX Units, frame size FSGX Operation <ul style="list-style-type: none"> Test values acc. to EN 60068-2-6 	Class 2M3 Class 2M2 Test Fc: 10 ... 58 Hz: Constant deflection 0.075 mm 58 ... 200 Hz: Constant acceleration = 9.81 m/s ² (1 × g)
Shock load	
<ul style="list-style-type: none"> Transport ¹⁾ acc. to EN 60721-3-2 <ul style="list-style-type: none"> All units and components with the exception of frame size FSGX Units, frame size FSGX Operation <ul style="list-style-type: none"> Test values acc. to EN 60068-2-27 <ul style="list-style-type: none"> Frame sizes FSA to FSC Frame sizes FSD to FSF Frame size FSGX 	Class 2M3 Class 2M2 Test Ea: 147 m/s ² (15 × g)/11 ms 49 m/s ² (5 × g)/30 ms 98 m/s ² (10 × g)/20 ms
Ambient conditions	
Protection class acc. to EN 61800-5-1	Class I (with protective conductor system) and class III (PELV)
Touch protection acc. to EN 61800-5-1	For the intended purpose
Permissible ambient and coolant temperature (air) during operation for line-side power components and Power Modules	
<ul style="list-style-type: none"> Low overload (LO) High overload (HO) 	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics 0 ... 50 °C (32 ... 122 °F) without derating (for PM240 frame size FSGX: 0 ... 40 °C, 32 ... 104 °F), >50 ... 60 °C (>104 ... 140 °F) see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units and supplementary system components	With CU230P-2 HVAC/DP/CAN with/without blanking cover: -10 ... 60 °C (14 ... 140 °F) With CU230P-2 PN with/without blanking cover: -10 ... 55 °C (14 ... 131 °F) With CU240B-2 and CU240E-2 (without PN): -10 ... 55 °C (14 ... 131 °F) With CU240E-2 PN and CU240E-2 PN-F: -10 ... 53 °C (14 ... 127.4 °F) With IOP/BOP-2: 0 ... 50 °C (32 ... 122 °F) Derating of 3 K/1000 m (3281 ft) applies to Control Units as of an installation altitude of 1000 m (3281 ft) above sea level.
Climatic ambient conditions	
<ul style="list-style-type: none"> Storage ¹⁾ acc. to EN 60721-3-1 Transport ¹⁾ acc. to EN 60721-3-2 Operation acc. to EN 60721-3-3 	Class 1K3 Temperature -25 ... +55 °C (-13 ... +131 °F) Class 2K4 Temperature -40 ... +70 °C (-40 ... +158 °F) Max. air humidity 95 % at 40 °C (104 °F) Class 3K3 Condensation, splashwater, and ice formation not permitted (EN 60204, Part 1)

¹⁾ In transport packaging.

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Technical specifications

Ambient conditions	
Environmental class/harmful chemical substances	
• Storage ¹⁾ acc. to EN 60721-3-1	Class 1C2
• Transport ¹⁾ acc. to EN 60721-3-2	Class 2C2
• Operation acc. to EN 60721-3-3	Class 3C2
Organic/biological influences	
• Storage ¹⁾ acc. to EN 60721-3-1	Class 1B1
• Transport ¹⁾ acc. to EN 60721-3-2	Class 2B1
• Operation acc. to EN 60721-3-3	Class 3B1
Degree of pollution acc. to EN 61800-5-1	2
Certification for fail-safe versions	
Applies to Control Units CU240E-2, CU240E-2 DP, CU240E-2 PN, CU240E-2 F, CU240E-2 DP-F and CU240E-2 PN-F. The values comprise the Control Unit and Power Module.	
• According to EN 954-1	Category 3
• According to IEC 61508	SIL 2
• According to ISO 13849-1	PL d
• PFH _D	5×10^{-8}
• PFH	5×10^{-3}
• T1	20 years
Standards	
Compliance with standards	UL ²⁾ , cUL ³⁾ , CE, c-tick ⁴⁾
CE marking	According to Low-Voltage Directive 2006/95/EG
EMC Directive acc. to EN 61800-3	
• Frame sizes FSA to FSGX without integrated line filter class A	Category C3 ⁵⁾
• Frame sizes FSB to FSF with integrated line filter class A	Category C2 ⁶⁾ (corresponds to class A acc. to EN 55011 for conducted interference emission)
• Frame size FSA without integrated line filter and with additional line filter class A	Category C2 ⁶⁾ (corresponds to class A acc. to EN 55011 for conducted interference emission)
• Frame size FSA with additional line filter class A and with additional line filter class B	Category C2 ⁶⁾ (corresponds to class B acc. to EN 55011 for conducted interference emission)
• Frame sizes FSB and FSC with additional line filter class A and with additional line filter class B	Category C2 ⁶⁾ (corresponds to class B acc. to EN 55011 for conducted interference emission)
• PM230: Frame sizes FSA to FSF without integrated line filter, degree of protection IP20/UL Open Type	Category C3 ⁵⁾
• PM230: Frame sizes FSA to FSF with integrated line filter class A, degree of protection IP20/UL Open Type and degree of protection IP55/UL Type 12	Category C2 ⁶⁾ (corresponds to class A acc. to EN 55011)
• PM230: Frame sizes FSA to FSF with integrated line filter class B, degree of protection IP55/UL Type 12	Category C1 ⁶⁾ (corresponds to class B acc. to EN 55011 for conducted interference emission)

Note:

The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter. The frequency inverters on their own do not generally require identification according to the EMC Directive.

¹⁾ In transport packaging.

²⁾ UL approval for frame sizes FSD to FSF will be available soon.

³⁾ Applies to all PM240 Power Modules and PM250 Power Modules with integrated line filter class A.

⁴⁾ The c-tick approval for PM230 Power Modules without integrated line filter is in preparation.

⁵⁾ Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side. As a consequence, a PDS (Power Drive System) can be installed according to category C3.

⁶⁾ With shielded motor cable up to 25 m (82 ft).

SINAMICS G120 standard inverters

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

SINAMICS G120 standard inverters

Technical specifications

Compliance with standards

CE marking



The SINAMICS G120 inverters meet the requirements of the Low-Voltage Directive 2006/95/EC.

Low-Voltage Directive

The inverters comply with the following standards listed in the official journal of the EU:

- EN 60204
Safety of machinery, electrical equipment of machines
- EN 61800-5-1
Electrical power drive systems with variable speed – Part 5-1: Requirements regarding safety – electrical, thermal, and energy requirements

UL listing



Inverter devices in UL category NMMS certified to UL and cUL, in compliance with UL508C. UL list numbers E121068 and E192450. This applies to all PM240 Power Modules and PM250 Power Modules with integrated line filter class A.

For use in environments with pollution degree 2.

On the Internet at www.ul.com

Machinery Directive

The inverters are suitable for installation in machines. Compliance with the Machinery Directive 2006/42/EC requires a separate certificate of conformity. This must be provided by the plant construction company or the organization marketing the machine.

EMC Directive

- EN 61800-3
Variable-speed electric drives
Part 3: EMC product standard including specific test methods

The EMC product standard EN 61800-3 for electric drive systems has been valid since July 1, 2005. The transition period for the predecessor standard EN 61800-3/A11 dated February 2001 ended on October 1, 2007. The following information applies to the Siemens SINAMICS G120 inverters:

- The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter.
- Frequency inverters are normally only supplied to experts for installation in machines or systems. A frequency inverter must, therefore, only be considered as a component which, on its own, is not subject to the EMC product standard EN 61800-3. The inverter's operating instructions, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to become a PDS. For a PDS, the EMC Directive in the EU is complied with by observing the product standard EN 61800-3 for variable-speed electric drive systems. The frequency inverters on their own do not generally require identification according to the EMC Directive.

- In the Standard EN 61800-3 of July 2005, a distinction is no longer made between "general availability" and "restricted availability". Instead, different categories C1 to C4 have been defined in accordance with the environment of the PDS at the operating location:
 - **Category C1:** Drive systems for rated voltages < 1000 V for use in the first environment
 - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in the first environment, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning note is required.
 - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use in the second environment. A warning note is required.
 - **Category C4:** Drive systems for rated voltages \geq 1000 V or for rated currents \geq 400 A or for use in complex systems in the second environment. An EMC plan must be created.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for the "second environment" (= industrial power supply systems that do not supply households). These limit values are below the limit values of filter class A to EN 55011. Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side.
- With SINAMICS G120, Power Drive Systems (PDS) that fulfill the EMC product standard EN 61800-3 can be configured when observing the installation instructions in the product documentation.
- A differentiation must be made between the product standards for electrical drive systems (PDS) of the range of standards EN 61800 (of which Part 3 covers EMC topics) and the product standards for the devices/systems/machines, etc. This will probably not result in any changes in the practical use of frequency inverters. Since frequency inverters are always part of a PDS and these are part of a machine, the machine manufacturer must observe various standards depending on their type and environment (e.g. EN 61000-3-2 for line harmonics and EN 55011 for radio interference). The product standard for PDS on its own is, therefore, either insufficient or irrelevant.
- With respect to the compliance with limits for line supply harmonics, the EMC product standard EN 61800-3 for PDS refers to compliance with the EN 61000-3-2 and EN 61000-3-12 standards.
- Regardless of the configuration with SINAMICS G120 and its components, the machine construction company (OEM) can also apply other measures to ensure that the machine complies with the EU EMC Directive. The EU EMC Directive is generally fulfilled when the relevant EMC product standards are observed. If they are not available, the generic standards (e.g. DIN EN 61000-x-x) can be used instead. It is important that the conducted and emitted interference at the line supply connection point and outside the machine remain below the relevant limit values. Any suitable technical measures can be applied to ensure this.

SEMI F47

SEMI F47 is an industry standard relating to the immunity to voltage dips. This includes the requirement that industrial equipment must be able to tolerate defined dips or drops of the line supply voltage. As a result, industrial equipment that fulfills this standard is more reliable and productive. In the SINAMICS G120 product family, the PM240 and PM250 Power Modules fulfill the latest SEMI F47-0706 standard. In the case of a voltage dip defined in accordance with SEMI F47-0607, these drives either continue to supply a defined output current, or automatically restart and continue to operate as expected.

SINAMICS G120 standard inverters

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

Control Units

Overview

CU230P-2 Control Units



CU230P-2 PN Control Unit

The Control Unit performs closed-loop control functions for the inverter.

The CU230P-2 Control Units are designed for drives with integrated technological functions for pump, fan and compressor applications.

The I/O interface, the fieldbus interfaces and the additional software functions optimally support these applications. The integration of technological functions is a significant differentiating feature to the other Control Units of the SINAMICS G120 drive family.

The CU230P-2 Control Units can be operated with the following Power Modules:

- PM230
- PM240-2
- PM240
- PM250
- PM260

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines.

For further information, see [Shield connection kits and Shield plates for Control Units and Power Modules](#) in section [Supplementary system components](#).

Typical, integrated HVAC/HLK functions

- Linear and square torque characteristic for fluid flow and positive displacement machines
- ECO mode for additional energy saving
- 2 analog inputs (current/voltage can be selected) to directly connect pressure/level sensors
- 2 additional analog inputs to connect Pt1000/LG-Ni1000 temperature sensors
- Direct control of valves and flaps using two 230 V relays
- Automatic restart function after power failure
- Flying restart
- Skippable frequencies
- Energy saving through "hibernation"
- Load check function to monitor belts and flow
- Motor staging
- 4 integrated PID controllers (e.g. for temperature, pressure, air quality, level)
- Multi-zone controller
- Extended emergency mode
- Real time clock with three time generators

IOP wizards for special applications

- Pumps: Positive displacement (constant load torque) and centrifugal pumps (square load torque) with and without PID controller
- Fans: Radial and axial fans (square load torque) with and without PID controller
- Compressors: Positive displacement (constant load torque) and fluid flow machines (square load torque) with and without PID controller

SINAMICS G120 standard inverters

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

Control Units

Overview

CU240B-2 and CU240E-2 Control Units



CU240B-2 DP Control Unit



CU240E-2 DP-F Control Unit

The Control Unit performs closed-loop control functions for the inverter.

The CU240B-2 and CU240E-2 Control Units are designed as standard Control Units for all of the usual applications involving V/f or vector control.

- CU240B-2 series with basic I/O quantity structure, ideal for a large number of applications
- CU240E-2 series with standard I/O quantity structure and integrated safety technology

The CU240B-2 and CU240E-2 Control Units can be operated with the following Power Modules:

- PM230 degree of protection IP20
- PM240-2
- PM240
- PM250
- PM260

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines.

For further information, see [Shield connection kits and Shield plates for Control Units and Power Modules](#) in section [Supplementary system components](#).

Safety Integrated functions

The safety function "Safe Torque Off" (STO) (certified according to EN 954-1, Category 3 and IEC 61508 SIL 2 – as well as ISO 13849-1 PL d) is already integrated into the basic versions of the CU240E-2 series (CU240E-2, CU240E-2 DP, CU240E-2 PN)

With the fail-safe variants of the CU240E-2 series (CU240E-2 F, CU240E-2 DP-F, CU240E-2 PN-F), the fail-safe SINAMICS G120 inverter provides five safety functions which are certified according to EN 954-1 Category 3 and IEC 61508 SIL 2 as well as ISO 13849-1 PL d:

- Safe Torque Off (STO)
to protect against active movement of the drive
- Safe Stop 1 (SS1)
for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS)
for protection against dangerous movements when a speed limit is exceeded (CU240E-2 DP-F Control Unit has up to 4 selectable SLS limit values)
- Safe direction (SDI)
This function ensures that the drive can only rotate in the selected direction.
- Safe speed monitoring (SSM)
This function signals if a drive operates below a specific speed/feed velocity (only CU240E-2 DP-F with PROFIsafe).

These functions can be activated by means of PROFIsafe or via the safety inputs.

None of the safety functions require a motor encoder and they are thus much cheaper and easier to implement. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SDI and SSM functions are only permissible for applications where the load can never accelerate when the inverter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

Additional information is provided in [Catalog D 31, chapter Highlights, section Safety Integrated](#).

SINAMICS G120 standard inverters

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

Control Units

Selection and ordering data

Technology functions (selection)	Inputs	Outputs	Integrated safety technology	Digital inputs, fail-safe	Communication	Designation	Control Unit Order No.
CU230P-2 series – the specialist for pumps, fans, compressors, water, buildings							
<ul style="list-style-type: none"> Free function blocks (FFB) 4 × PID controllers Pump staging Hibernation Essential service mode 2-zone control 	6 digital 4 analog	3 digital 2 analog	–	–	RS485/USS / Modbus RTU / BACnet MS/TP	CU230P-2 HVAC	6SL3243-0BB30-1HA2
					PROFIBUS DP	CU230P-2 DP	6SL3243-0BB30-1PA2
					PROFINET	CU230P-2 PN <small>new</small>	6SL3243-0BB30-1FA0
					CANopen	CU230P-2 CAN	6SL3243-0BB30-1CA2
CU240B-2 series – for basic applications with variable-speed drives							
<ul style="list-style-type: none"> Free function blocks (FFB) 1 × PID controller Motor holding brake 	4 digital 1 analog	1 digital 1 analog	–	–	RS485/USS / Modbus RTU	CU240B-2	6SL3244-0BB00-1BA1
					PROFIBUS DP	CU240B-2 DP	6SL3244-0BB00-1PA1
CU240E-2 series – for standard applications in general machinery construction, such as conveyor belts, mixers and extruders							
<ul style="list-style-type: none"> Free function blocks (FFB) 1 × PID controller Motor holding brake 	6 digital 2 analog	3 digital 2 analog	STO	1 F-DI (opt. for each 2 DI)	RS485/USS / Modbus RTU	CU240E-2	6SL3244-0BB12-1BA1
					PROFIBUS DP PROFIsafe	CU240E-2 DP	6SL3244-0BB12-1PA1
					PROFINET	CU240E-2 PN <small>new</small>	6SL3244-0BB12-1FA0
			STO, SS1, SLS, SSM, SDI	3 F-DI (opt. for each 2 DI)	RS485/USS / Modbus RTU	CU240E-2 F	6SL3244-0BB13-1BA1
					PROFIBUS DP PROFIsafe	CU240E-2 DP-F	6SL3244-0BB13-1PA1
					PROFINET	CU240E-2 PN-F <small>new</small>	6SL3244-0BB13-1FA0

SINAMICS G120 standard inverters

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

Control Units

Design

CU230P-2 HVAC, CU230P-2 DP, CU230P-2 PN and CU230P-2 CAN Control Units



CU230P-2 Control Unit with open and closed terminal covers

Terminal No.	Signal	Features
Digital inputs (DI) – Standard		
69	DI COM	Reference potential for digital inputs
5 ... 8, 16, 17	DI0 ... DI5	Freely programmable isolated, inputs in compliance with IEC 61131-2
Digital outputs (DO)		
18	DO0, NC	Relay output 1 NC contact (5 A, 30 V DC or 2 A, 250 V AC) ¹⁾
19	DO0, NO	Relay output 1 NO contact (5 A, 30 V DC or 2 A, 250 V AC)
20	DO0, COM	Relay output 1 Common contact (5 A, 30 V DC or 2 A, 250 V AC) ¹⁾
21	DO1, NO	Relay output 2 NO contact (0.5 A, 30 V DC)
22	DO1, COM	Relay output 2 Common contact (0.5 A, 30 V DC)
23	DO2, NC	Relay output 3 NC contact (5 A, 30 V DC or 2 A, 250 V AC) ¹⁾
24	DO2, NO	Relay output 3 NO contact (5 A, 30 V DC or 2 A, 250 V AC)
25	DO2, COM	Relay output 3 Common contact (5 A, 30 V DC or 2 A, 250 V AC) ¹⁾

¹⁾ The following applies to UL-compliant installations: max. 3 A, 30 V DC or 2 A, 250 V AC may be switched over terminals 18/20 (DO0 NC) and 23/25 (DO2 NC).

Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
50	AI2+/TEMP	Non-isolated input, switchable between current and temperature sensors, type Pt1000/LG-Ni1000 Value range: 0/4 ... 20 mA, Pt1000 -50 ... +250 °C (-58 ... +482 °F); LG-Ni1000 -50 ... +150 °C (-58 ... +302 °F)
51	GND	Reference potential of the AI2/internal electronics ground
52	AI3+/TEMP	Non-isolated input for temperature sensors, type Pt1000/LG-Ni1000 Value range: Pt1000 -50 ... +250 °C (-58 ... +482 °F); LG-Ni1000 -50 ... +150 °C (-58 ... +302 °F)
53	GND	Reference potential of the AI3/internal electronics ground
Analog outputs (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
13	GND	Reference potential of the AO0/internal electronics ground
26	AO1+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
27	GND	Reference potential of the AO1/internal electronics ground
Motor temperature sensor interface		
14	T1 MOTOR	Positive input for motor temperature sensor Type: PTC, KTY sensor, Thermo-Click
15	T2 MOTOR	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 200 mA
28	GND	Reference potential of the power supply/internal electronics ground
1	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/internal electronics ground
31	+24 V IN	Power supply input 20.4 ... 28.8 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input
35	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
36	GND	Reference potential of the power supply/internal electronics ground

SINAMICS G120 standard inverters

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

Control Units

Design

CU240B-2 and CU240B-2 DP Control Units



CU240B-2 Control Unit with open and closed terminal covers

Terminal No.	Signal	Features
Digital inputs (DI)		
5 ... 8	DI0 ... DI3	Freely programmable (isolated) 5.5 mA/24 V
69	DI COM	Reference potential for digital inputs
Digital output (DO)		
18	DO0, NC	Relay output DO0 NC contact (0.5 A, 30 V DC)
19	DO0, NO	Relay output DO0 NO contact (0.5 A, 30 V DC)
20	DO0, COM	Relay output DO0 Common contact (0.5 A, 30 V DC)
Analog input (AI)		
3	AI0+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
Analog output (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
13	GND	Reference potential of the AO0/internal electronics ground
Motor temperature sensor interface		
14	T1 MOTOR	Positive input for motor temperature sensor Type: PTC, KTY sensor, Thermo-Click
15	T2 MOTOR	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 200 mA
28	GND	Reference potential of the power supply/internal electronics ground
1	+10 V OUT	Power supply output 10 V DC \pm 0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/internal electronics ground
31	+24 V IN	Power supply input 20.4 ... 28.8 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input

SINAMICS G120 standard inverters

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

Control Units

Design

CU240E-2, CU240E-2 DP, CU240E-2 PN, CU240E-2 F, CU240E-2 DP-F and CU240E-2 PN-F Control Units



CU240E-2 Control Unit with open and closed terminal covers

Terminal No.	Signal	Features
Digital inputs (DI) – Standard		
5 ... 8, 16, 17	DI0 ... DI5	Freely programmable (isolated) 5.5 mA/24 V
69	DI COM1	Reference potential for digital inputs 0, 2, 4, 6
34	DI COM2	Reference potential for digital inputs 1, 3, 5, 7
Digital inputs (DI) – Fail-safe (formed from two standard inputs using the appropriate parameter setting)		
16, 17	F-DI0	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
The following are only available for CU240E-2 F, CU240E-2 DP-F and CU240E-2 PN-F		
5, 6	F-DI0	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
7, 8	F-DI1	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
16, 17	F-DI2	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V

Terminal No.	Signal	Features
Digital outputs (DO)		
18	DO0, NC	Relay output DO0 NC contact (0.5 A, 30 V DC)
19	DO0, NO	Relay output DO0 NO contact (0.5 A, 30 V DC)
20	DO0, COM	Relay output DO0 Common contact (0.5 A, 30 V DC)
21	DO1+	Transistor output DO1 Positive (0.5 A, 30 V DC)
22	DO1-	Transistor output DO1 Negative (0.5 A, 30 V DC)
23	DO2, NC	Relay output DO2 NC contact (0.5 A, 30 V DC)
24	DO2, NO	Relay output DO2 NO contact (0.5 A, 30 V DC)
25	DO2, COM	Relay output DO2 Common contact (0.5 A, 30 V DC)

Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	

Terminal No.	Signal	Features
Analog outputs (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
13	GND	Reference potential of the AO0/internal electronics ground
26	AO1+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
27	GND	Reference potential of the AO1/internal electronics ground

Terminal No.	Signal	Features
Motor temperature sensor interface		
14	T1 MOTOR	Positive input for motor temperature sensor Type: PTC, KTY sensor, Thermo-Click
15	T2 MOTOR	Negative input for motor temperature sensor

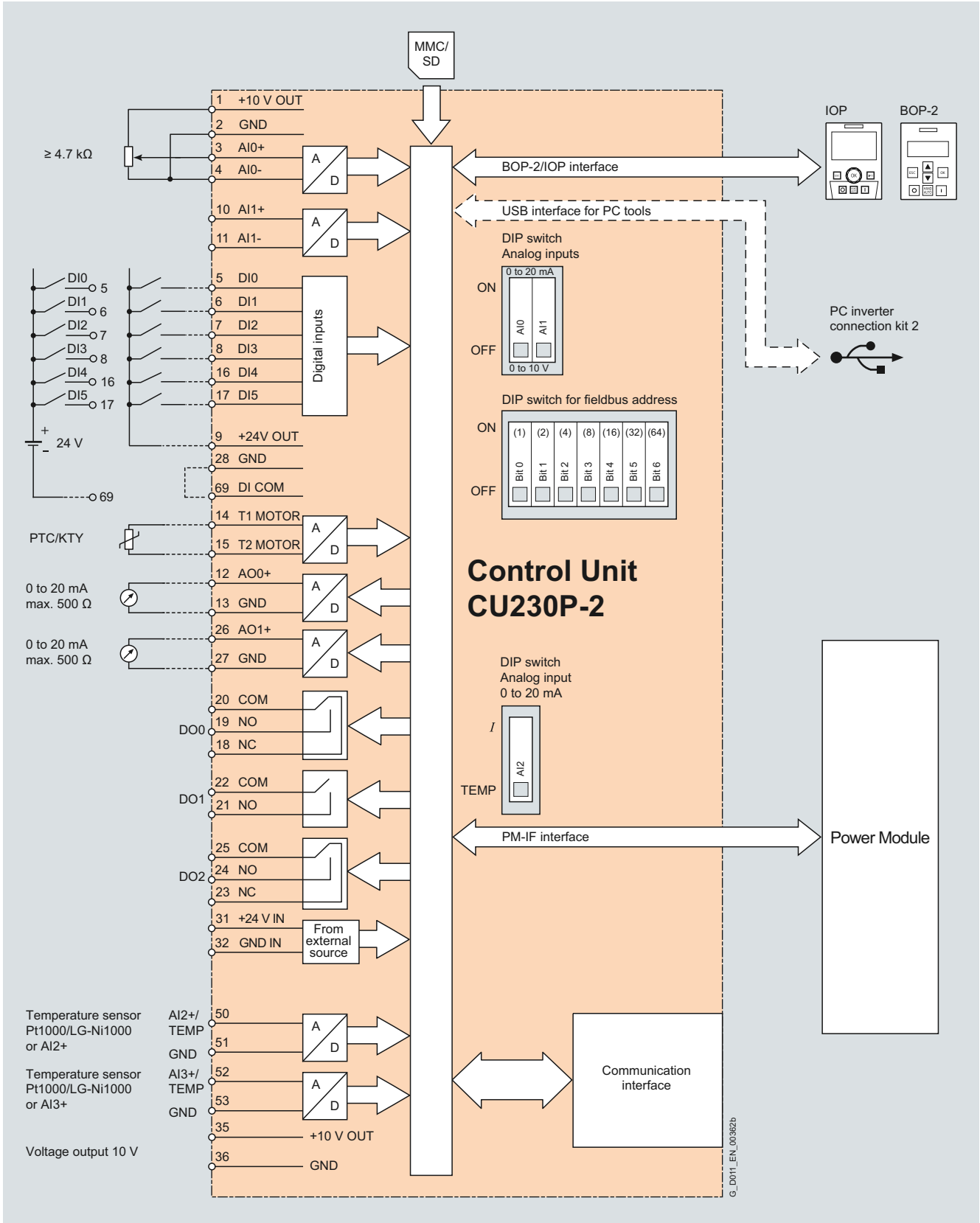
Terminal No.	Signal	Features
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 200 mA
28	GND	Reference potential of the power supply/internal electronics ground
1	+10 V OUT	Power supply output 10 V DC ± 0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/internal electronics ground
31	+24 V IN	Power supply input 20.4 ... 28.8 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input

SINAMICS G120 standard inverters

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

Control Units

Integration



Connection diagram for the CU230P-2 Control Unit series

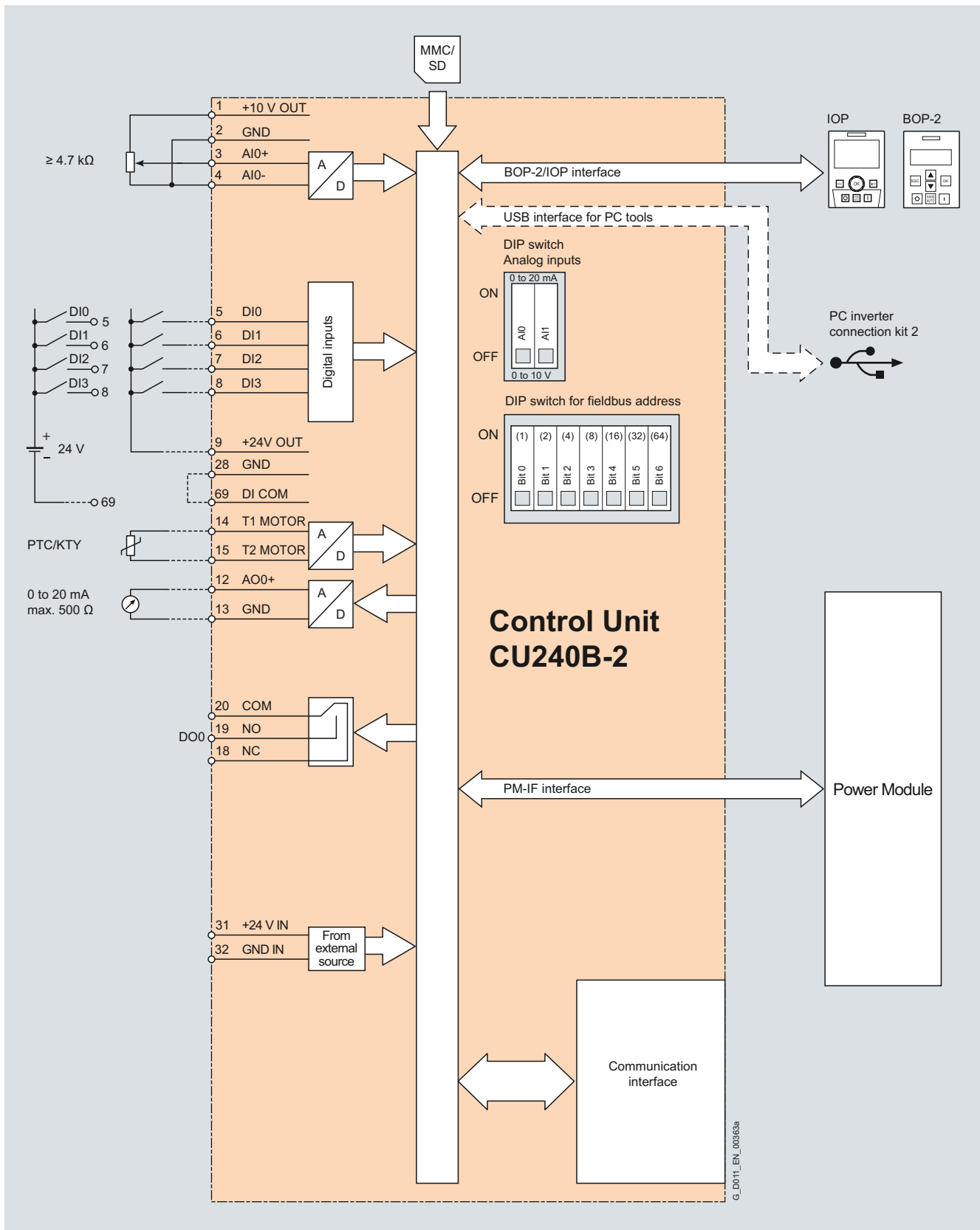
SINAMICS G120 standard inverters

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

Control Units

Integration

6



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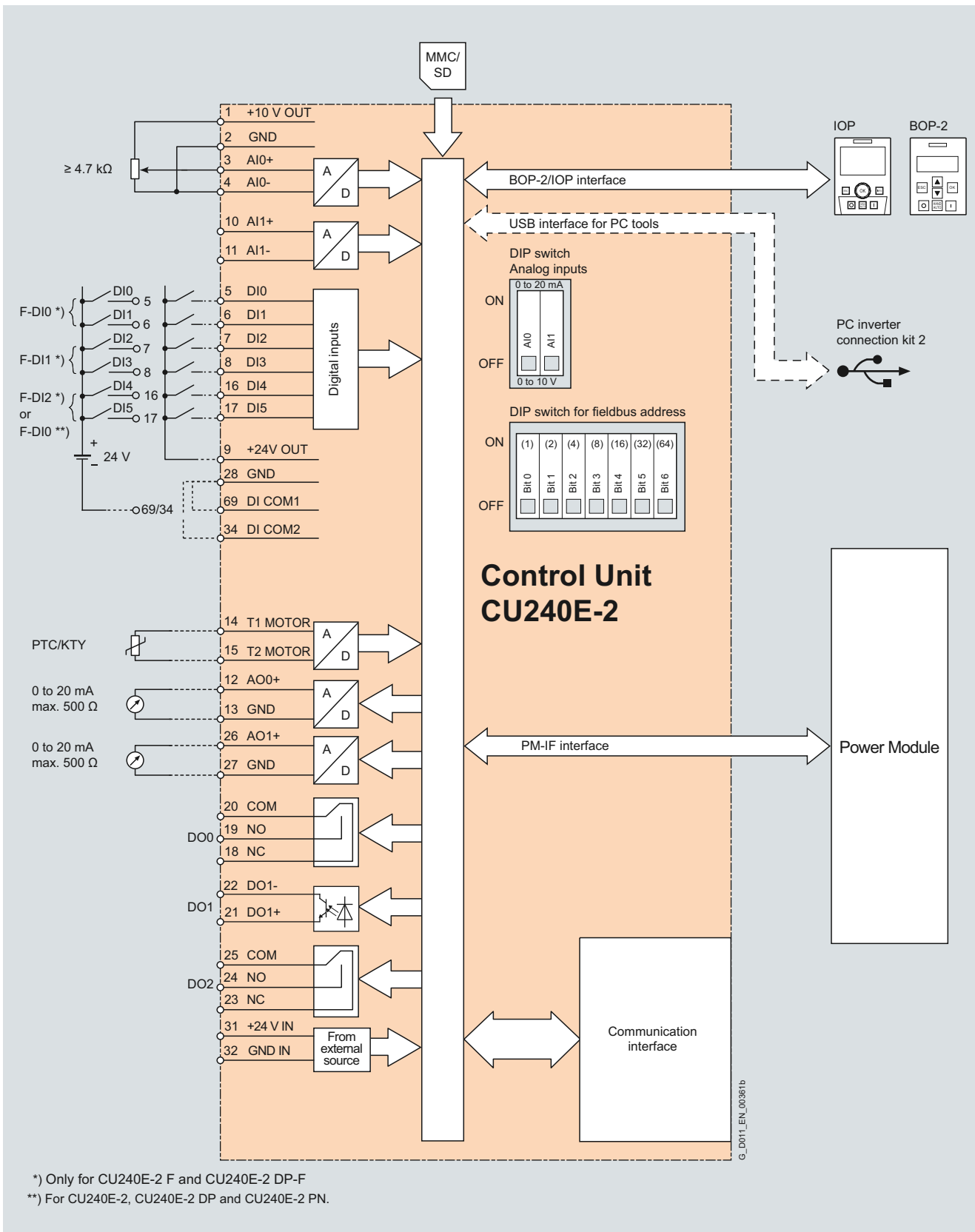
Connection diagram for the CU240B-2 Control Unit series

SINAMICS G120 standard inverters

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

Control Units

Integration



6

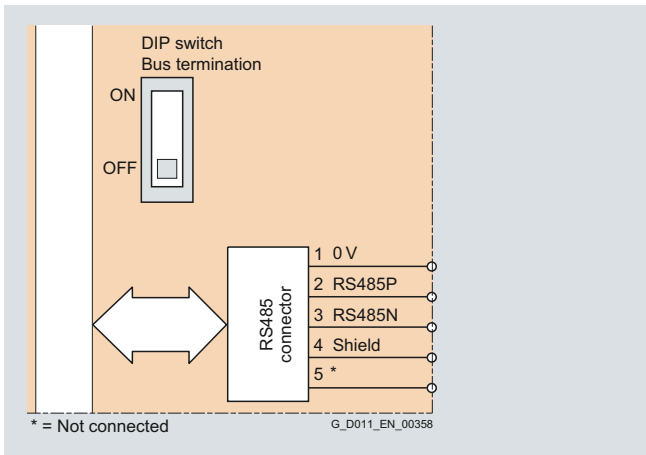
Connection diagram for the CU240E-2 Control Unit series

SINAMICS G120 standard inverters

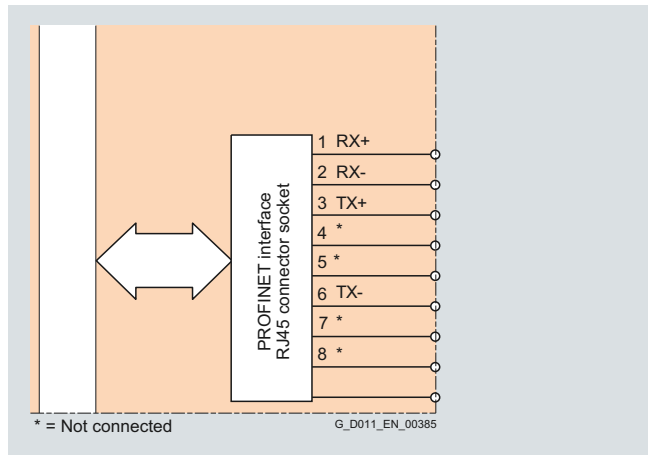
0.37 kW to 250 kW (0.5 hp to 400 hp)

Control Units

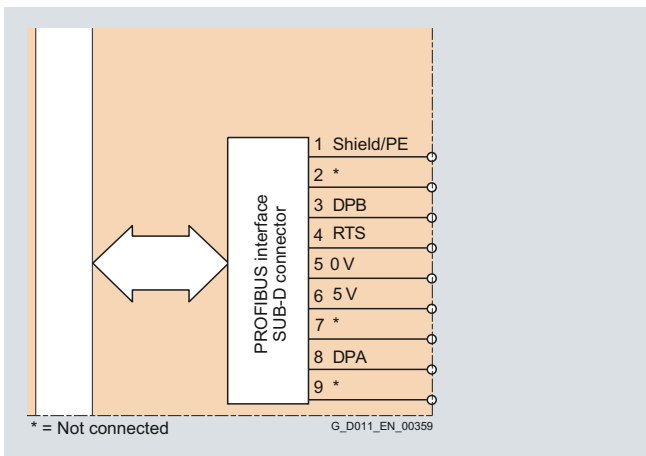
Integration



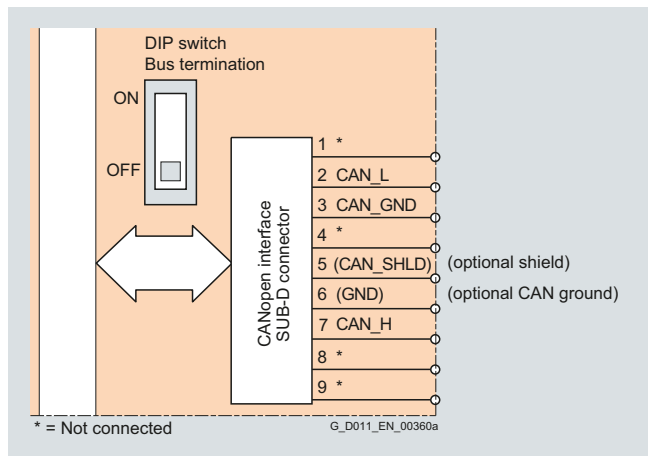
RS485 USS/Modbus RTU/BACnet MS/TP communication interface



PROFINET communication interface



PROFIBUS DP communication interface



CANopen communication interface

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SINAMICS G120 standard inverters

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

Control Units

Technical specifications

Control Unit	CU230P-2 series 6SL3243-0BB30-1 . A2 6SL3243-0BB30-1FA0	CU240B-2 series 6SL3244-0BB00-1 . A1	CU240E-2 series 6SL3244-0BB1 . -1 . A1 6SL3244-0BB1 . -1FA0
Electrical specifications			
Operating voltage	24 V DC via the Power Module or by connecting to an external 20.4 ... 28.8 V DC power supply		
Current consumption, max.	0.5 A		
Protective insulation	PELV according to EN 50178 Protective separation from the line supply using double/reinforced insulation		
Power loss	<5.5 W		
Interfaces			
Digital inputs – Standard	6 isolated inputs Optically isolated, free reference potential (own potential group), max. input current 15 mA NPN/PNP logic can be selected using the wiring Switching level: 0 → 1: 11 V Switching level: 1 → 0: 5 V	4 isolated inputs	6 isolated inputs
Digital inputs – Fail-safe	–	–	1 (use of 2 × DI standard) Max. 3 (use of 6 × DI standard) for CU240E-2 F and CU240E-2 DP-F
Digital outputs	2 relay changeover contacts 250 V AC, 2 A (inductive load), 30 V DC, 5 A (ohmic load) The following applies to UL-compliant installations: max. 3 A, 30 V DC or 2 A, 250 V AC may be switched over terminals 18/20 (DO0 NC) and 23/25 (DO2 NC). 1 relay NO contact 30 V DC, 0.5 A (ohmic load)	1 relay changeover contact 30 V DC, 0.5 A (ohmic load)	1 transistor 30 V DC, 0.5 A (ohmic load) 2 relay changeover contacts 30 V DC, 0.5 A (ohmic load)
Analog inputs – Standard	2 differential inputs Switchable using DIP switch between voltage and current: -10 ... +10 V, 0/4 ... 20 mA, 10-bit resolution The differential analog inputs can be configured as additional digital inputs. Switching thresholds: 0 → 1: Rated voltage 4 V 1 → 0: Rated voltage 1.6 V Analog inputs are protected against inputs in a voltage range of ± 30 V and have a common-mode voltage in the ± 15 V range	1 differential input	2 differential inputs
Analog inputs – Expanded	1 non-isolated input, switchable using DIP switch between current and temperature sensor, type Pt1000/LG-Ni1000, 0/4 ... 20 mA; 10-bit resolution 1 non-isolated input, temperature sensor, type Pt1000/LG-Ni1000, 10-bit resolution	–	–
Analog outputs	2 non-isolated outputs Switchable between voltage and current using parameter setting: 0 ... 10 V, 0/4 ... 20 mA Voltage mode: 10 V, min. burden 10 kΩ Current mode: 20 mA, max. burden 500 Ω The analog outputs have short circuit protection	1 non-isolated output	2 non-isolated outputs
Motor temperature sensor interface	1 motor temperature sensor input, sensors that can be connected: PTC, KTY and Thermo-Click, accuracy ±5 °C		
Removable terminal connector for I/O interface	✓	✓	✓

SINAMICS G120 standard inverters

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

Control Units

Technical specifications

Control Unit	CU230P-2 series 6SL3243-0BB30-1 . A2 6SL3243-0BB30-1FA0	CU240B-2 series 6SL3244-0BB00-1 . A1	CU240E-2 series 6SL3244-0BB1 . -1 . A1 6SL3244-0BB1 . -1FA0
Integrated bus interface			
USS/Modbus RTU RS485 connected at a terminal, isolated, bus terminating resistors can be switched in, slave address can be set using DIP switches USS: max. 187.5 kBaud Modbus RTU: 19.2 kBaud	CU230P-2 HVAC 6SL3243-0BB30-1HA2	CU240B-2 6SL3244-0BB00-1BA1	CU240E-2 6SL3244-0BB12-1BA1 CU240E-2 F 6SL3244-0BB13-1BA1
BACnet MS/TP RS485 connected to a terminal, isolated, bus terminating resistors can be switched in Max. 187.5 kBaud	CU230P-2 HVAC 6SL3243-0BB30-1HA2	–	–
PROFIBUS DP 9-pin SUB-D connector, isolated, PROFIdrive profile V4.1, slave address can be set using DIP switches Max. 12 Mbit/s	CU230P-2 DP 6SL3243-0BB30-1PA2	CU240B-2 DP 6SL3244-0BB00-1PA1	CU240E-2 DP 6SL3244-0BB12-1PA1 CU240E-2 DP-F 6SL3244-0BB13-1PA1
PROFINET 2 × RJ45, PROFIdrive profile V4.1, device name can be stored on the device Max. 100 Mbit/s (full duplex)	CU230P-2 PN 6SL3243-0BB30-1FA0	–	CU240E-2 PN 6SL3244-0BB12-1FA0 CU240E-2 PN-F 6SL3244-0BB13-1FA0
CANopen 9-pin SUB-D socket, isolated, slave address can be set using DIP switches Max. 1 Mbit/s	CU230P-2 CAN 6SL3243-0BB30-1CA2	–	–
Tool interfaces			
Memory card	1 SINAMICS micro memory card (MMC) or 1 SINAMICS SD card		
Operator panels	<ul style="list-style-type: none"> • IOP Supported connection options between CU230P-2 and IOP: can be directly plugged on, door mounting (not possible in conjunction with PM230 IP55) or handheld (use of the IOP Handheld in conjunction with the PM230 Power Module in degree of protection IP55 is restricted since degree of protection IP55 is no longer assured when the IOP Handheld is connected.) • BOP-2 Supported connection options between CU230P-2 and BOP-2: can be directly plugged on or door-mounted • Blanking cover Necessary in combination with the PM230 Power Module degree of protection IP55/UL Type 12 if an operator panel is not inserted in order to achieve degree of protection IP55 		
PC interface	USB (connection via PC inverter connection kit 2)		
Open-loop/closed-loop control techniques			
V/f linear/square/parameterizable	✓		
V/f with flux current control (FCC)	✓		
V/f ECO linear/square	✓		
Vector control, sensorless	✓		
Vector control, with sensor	–		
Torque control, sensorless	✓		
Torque control, with sensor	–		

SINAMICS G120 standard inverters

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

Control Units

Technical specifications

Control Unit	CU230P-2 series 6SL3243-0BB30-1 . A2 6SL3243-0BB30-1FA0	CU240B-2 series 6SL3244-0BB00-1 . A1	CU240E-2 series 6SL3244-0BB1 . -1 . A1 6SL3244-0BB1 . -1FA0
Software functions			
Application macro	✓		
Setpoint input, can be parameterized	✓		
Fixed frequencies	16, parameterizable		
JOG	✓		
Digital motorized potentiometer (MOP)	✓		
Ramp smoothing	✓		
Extended ramp-function generator (with ramp smoothing Off3)	✓		
Slip compensation	✓		
Signal interconnection with BICO technology	✓		
Trace	✓		
Energy saving display	✓		
Switchable drive data sets (DDS)	✓ (4)		
Switchable command data sets (CDS)	✓ (4)		
Free function blocks (FFB) for logical and arithmetic operations	✓		
Technology controller (internal PID)	✓		
3 additional, free PID controllers	✓	–	–
2-zone controller	✓	–	–
Flying restart	✓		
Automatic restart after line supply failure or operating fault (AR)	✓		
Energy-saving function (hibernation) with internal PID controller	✓	–	–
Energy-saving function (hibernation) with external PID controller	✓	–	–
Belt monitoring with and without sensor (load torque monitoring)	✓	–	–
Dry-running/overload protection monitoring (load torque monitoring)	✓	–	–
Thermal motor protection	✓ (I^2t , sensor: PTC/KTY/Thermo-Click)		
Thermal inverter protection	✓		
Motor identification	✓		
Motor holding brake	–	✓	✓
Auto-ramping (V_{dcmax} controller)	✓		
Kinetic buffering (V_{dcmin} controller)	✓		
Braking functions for PM230			
• DC braking	✓		
• Compound braking	–		
• Dynamic braking with integrated braking chopper	–		
Braking functions for PM240			
• DC braking	✓		
• Compound braking	✓		
• Dynamic braking with integrated braking chopper	✓		
Braking functions for PM250			
Regenerative feedback	✓		

SINAMICS G120 standard inverters

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

Control Units

Technical specifications

Control Unit	CU230P-2 series 6SL3243-0BB30-1 . A2 6SL3243-0BB30-1FA0	CU240B-2 series 6SL3244-0BB00-1 . A1	CU240E-2 series 6SL3244-0BB1 . -1 . A1 6SL3244-0BB1 . -1FA0
Mechanical specifications and ambient conditions			
Degree of protection	IP20		
Signal cable cross-section			
• Min.	0.15 mm ² (AWG28)	0.05 mm ² (AWG30)	0.05 mm ² (AWG30)
• Max.	1.5 mm ² (AWG16)	1.5 mm ² (AWG16)	1.5 mm ² (AWG16)
Operating temperature	-10 ... 60 °C (14 ... 140 °F)	-10 ... 55 °C (14 ... 131 °F)	-10 ... 55 °C (14 ... 131 °F)
Derating of 3 K/1000 m (3281 ft) applies to Control Units as of an installation altitude of 1000 m above sea level.	For CU230P-2 PN: -10 ... 55 °C (14 ... 131 °F) With IOP/BOP-2: 0 ... 50 °C (32 ... 122 °F)	With IOP/BOP-2: 0 ... 50 °C (32 ... 122 °F)	For CU240E-2 PN and CU240E-2 PN-F: -10 ... 53 °C (14 ... 127.4 °F) With IOP/BOP-2: 0 ... 50 °C (32 ... 122 °F)
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)		
Relative humidity	<95 % RH, condensation not permissible		
Dimensions			
• Width	73 mm (2.87 in)	73 mm (2.87 in)	73 mm (2.87 in)
• Height	199 mm (7.83 in)	199 mm (7.83 in)	199 mm (7.83 in)
• Depth	65.5 mm (2.58 in)	46 mm (1.81 in)	46 mm (1.81 in)
Weight, approx.	0.61 kg (1.35 lb)	0.49 kg (1.08 lb)	0.49 kg (1.08 lb)

SINAMICS G120 standard inverters

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

Power Modules

Overview

PM230 Power Modules – 0.37 kW to 90 kW (0.5 hp to 125 hp), degree of protection IP54/IP55 and IP20



PM230 Power Modules, degree of protection IP55/UL Type 12, frame sizes FSA to FSF



PM230 Power Modules, degree of protection IP20, standard variant, frame sizes FSA to FSC (example: frame size FSB)



PM230 Power Modules, degree of protection IP20, standard variant, frame sizes FSD to FSF

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SINAMICS G120 standard inverters

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

Power Modules

Overview



PM230 Power Modules, degree of protection IP20, push-through variant, frame sizes FSA to FSC (with Control Unit and operator panel)

PM230 Power Modules are designed for applications involving pumps, fans and compressors with a square characteristic. They do not have an integrated braking chopper (single-quadrant applications).

The PM230 Power Module only generates low line harmonics and apparent power losses. In addition to the energy-related advantages, environmental stressing is also reduced.

- Line harmonics are reduced significantly.
 - The THD (Total Harmonic Distortion) is below the limit required by the standard EN 61000-3-12 or IEC 61000-3-12.
 - Additional components such as line reactors are not required and it is not permissible to use them. As a consequence, low envelope dimensions are obtained for space-saving designs.
- The active power component is very high, i.e. the devices draw less current from the supply for the same drive power. As a consequence, smaller supply cables can be used.

Frame sizes FSA to FSF of the PM230 Power Module in the degree of protection IP55/UL Type 12 are available with integrated line filter class A for C2 installations or integrated line filter class B for C1 installations.

Frame sizes FSA to FSF of the PM230 Power Module in degree of protection IP20 standard variant are available with integrated line filter class A for C2 installations or without an integrated line filter.

Frame sizes FSA to FSC of the PM230 Power Module in degree of protection IP20 push-through variant are available with integrated line filter class A for C2 installations or without an integrated line filter.

In order to maintain EMC categories C2 (line filter A) or C1 table 14 (line filter B, conducted), the permissible shielded cable lengths between the inverter and motor are limited to max. 25 m (82 ft).

The permissible cable lengths between inverter and motor are limited. Longer cables can be used if output reactors are connected for PM230 Power Modules, frame sizes FSD to FSF (see [Load-side power components](#)).

The line system configurations that are supported are symmetrical systems with grounded neutral point.

The PM230 Power Module is not approved for safety-oriented applications.

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines. [For further information, see Shield connection kits and Shield plates for Control Units and Power Modules in section Supplementary system components.](#)

SINAMICS G120 standard inverters

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

Power Modules

Overview

PM240-2 Power Modules – 0.55 kW to 3 kW (0.75 hp to 4 hp), degree of protection IP20



PM240-2 Power Modules, degree of protection IP20, standard variant, frame size FSA



PM240-2 Power Modules, degree of protection IP20, push-through variant, frame size FSA

The new PM240-2 Power Modules are based on a new hardware platform. This permits an increase in power density as well as the application of innovative cooling concepts (push-through technology) with especially high requirements in terms of control cabinet cooling.

Furthermore, the PM240-2 Power Module is also suitable for use in safety-oriented applications. In conjunction with a fail-safe Control Unit, the drive can be transformed into a Safety Integrated drive (see [Control Units](#)).

Frame size FSA of the PM240-2 Power Module is available both with and without an integrated line filter class A of compact design.

The PM240-2 Power Modules with integrated line filter class A are suitable for connection to TN supply systems. Power Modules without integrated line filter can be connected to grounded TN/TT systems and non-grounded IT systems.

Push-through variant

The push-through variant allows the cooling fins of the Power Module to be pushed through the rear panel of the control cabinet. Push-through variants should be used in applications in which the amount of waste heat generated inside the control cabinet itself must be minimized.

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines. For further information, see [Shield connection kits and Shield plates for Control Units and Power Modules in section Supplementary system components](#).

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SINAMICS G120 standard inverters

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

Power Modules

Overview

PM240 Power Modules – 0.37 kW to 250 kW (0.5 hp to 400 hp), IP20 degree of protection



PM240 Power Modules, frame sizes FSA to FSGX

PM240 Power Modules have a braking chopper (four-quadrant applications) and are suitable for a large number of applications in general machinery construction.

The braking chopper is already integrated in frame sizes FSA up to FSF. For frame size FSGX, an optional pluggable Braking Module can be ordered ([see DC link components](#)).

The permissible cable lengths between inverter and motor are limited. Longer cables can be used if output reactors are connected ([see Load-side power components](#)).

Line reactors are available to minimize line harmonics as well as voltage and current peaks ([see Line-side components](#)).

Frame size FSA of the PM240 Power Module is available only without integrated line filter class A. A base filter is therefore available so that class A can be achieved. A base filter class B is also available so that class B can be achieved ([see Line-side components](#)).

Frame sizes FSB and FSC of the PM240 Power Module are available both with and without integrated line filter class A. To achieve class B, PM240 Power Modules with integrated line filter class A must be additionally equipped with a base filter class B ([see Line-side components](#)).

The PM240 Power Module is suitable for safety-oriented applications. In conjunction with a fail-safe Control Unit, the drive can be transformed into a Safety Integrated drive ([see Control Units](#)).

PM240 Power Modules in frame size FSGX (i.e. 160 kW/250 hp and higher) are currently approved only for the Safe Torque Off (STO) function.

Power Modules with integrated line filter class A are suitable for connection to TN systems. Power Modules without integrated line filter can be connected to grounded TN/TT systems and non-grounded IT systems.

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines.

[For further information, see Shield connection kits and Shield plates for Control Units and Power Modules in section Supplementary system components.](#)

SINAMICS G120 standard inverters

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

Power Modules

Overview

PM250 Power Modules – 7.5 kW to 75 kW (10 hp to 100 hp), IP20 degree of protection



PM250 Power Modules, frame sizes FSC to FSF

PM250 Power Modules are suitable for many applications in general machinery construction, the same as for the PM240. Any braking energy is directly fed back into the line supply (four quadrant applications – a braking chopper is not required).

The PM250 Power Module features an absolutely unique technology – Efficient Infeed Technology. This feature provides the ability to feed energy back into the supply system in the generator mode (electronic braking) so that the energy is not wasted in a braking resistor. This saves space in the control cabinet. The time-consuming process of dimensioning the braking resistor and the expense of the extra wiring are eliminated. Furthermore, heat losses in the control cabinet are reduced.

Additional information is provided in [Catalog D 31, chapter Highlights, section Efficient Infeed Technology](#).

Further, the innovative circuit design reduces the line harmonics. There is no need to use an optional line reactor at the supply infeed. This saves space and costs for engineering and procurement.

The permissible cable lengths between inverter and motor are limited. Longer cables can be used if output reactors are connected ([see Load-side power components](#)).

Frame sizes FSD to FSF of the PM250 Power Modules are available both with as well as without integrated line filter class A.

For frame size FSC of the PM250 Power Module with an integrated line filter class A an additional base filter class B is available for achieving class B ([see Line-side components](#)).

The PM250 Power Module is also designed for safety-oriented applications. In conjunction with a fail-safe Control Unit, the drive can be transformed into a Safety Integrated drive ([see Control Units](#)).

The PM250 Power Modules with integrated line filter class A are suitable for connection to TN supply systems. Power Modules without integrated line filter can be connected to grounded TN/TT systems and non-grounded IT systems.

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines. [For further information, see Shield connection kits and Shield plates for Control Units and Power Modules in section Supplementary system components.](#)

SINAMICS G120 standard inverters

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

Power Modules

Overview

PM260 Power Modules – 11 kW to 55 kW (15 hp to 75 hp), IP20 degree of protection



PM260 Power Module, frame size FSD

PM260 Power Modules have been designed for applications from 500 V to 690 V. They are capable of energy recovery and include a sine-wave filter to reduce the stress on the motor and for long cable lengths.

The PM260 Power Module features an absolutely unique technology – Efficient Infeed Technology. This feature provides the ability to feed energy back into the supply system in the generator mode (electronic braking) so that the energy is not wasted in a braking resistor. This saves space in the control cabinet. The time-consuming process of dimensioning the braking resistor and the expense of the extra wiring are eliminated. Furthermore, heat losses in the control cabinet are reduced.

[Additional information is provided in Catalog D 31, chapter Highlights, section Efficient Infeed Technology.](#)

The innovative circuit design used in Efficient Infeed Technology reduces the line harmonics. There is no need to use an optional line reactor at the supply infeed. This saves space and costs for engineering and procurement.

The PM260 Power Modules are also characterized by a higher rated pulse frequency combined with a high efficiency and an integrated sine-wave filter. The integrated sine-wave filter ensures that the inverter output current is sinusoidal and supports cable lengths of up to 200 m (656 ft) shielded and 300 m (984 ft) unshielded. An output reactor is therefore not required. Furthermore, lower bearing currents flow and there is a lower voltage stress that reduces the overall stress on the motor.

The use of SiC free-wheeling diodes – an absolutely unique innovation – makes the PM260 Power Module extremely compact. It is also highly resistant to thermal loading and operates very quietly as a result of the high clock frequencies.

Standard motors can be used in conjunction with the PM260 Power Module. The winding system insulation strength does not have to be increased.

The PM260 Power Module is suitable for safety-oriented applications. In conjunction with a fail-safe Control Unit, the drive can be transformed into a Safety Integrated drive ([see Control Units](#)).

The PM260 Power Modules with integrated line filter class A are suitable for connection to TN supply systems. Power Modules without integrated line filter can be connected to grounded TN/TT systems and non-grounded IT systems.

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines. [For further information, see Shield connection kits and Shield plates for Control Units and Power Modules in section Supplementary system components.](#)

Customer benefits

- Low switching losses at high fundamental frequency
- High speeds possible
- Quiet operation thanks to the 16 kHz pulse frequency
- High thermal load capacity (small heat sinks)
- Very compact units
- Increased ruggedness
- High efficiency
- Low forward losses
- Integrated sine-wave filter, so that long unshielded cables can be used
- Can be used with motors without a special insulation
- Very low bearing currents, no bearing insulation required

SINAMICS G120 standard inverters

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

Power Modules

Selection and ordering data

To ensure that a suitable Power Module is selected, the following currents should be used for applications:

- **Rated output current for applications with low overload (LO)**
- **Base-load current for applications with high overload (HO)**

With reference to the rated output current, the modules support at least 2-pole to 6-pole low-voltage motors, e.g. the new 1LE1 motor series. The rated power is merely a guide value. For a description of the overload performance, please refer to the general technical specifications of the Power Modules.

PM230 Power Modules degree of protection IP55/UL Type 12

Rated power ¹⁾		Rated output current I_{rated} ²⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	Frame size	PM230 Power Module degree of protection IP55/UL Type 12 with integrated line filter class <u>A</u>	PM230 Power Module degree of protection IP55/UL Type 12 with integrated line filter class <u>B</u>
kW	hp		kW	hp			Order No.	Order No.
380 ... 480 V 3 AC								
0.37	0.50	1.3	0.25	0.33	0.9	FSA	6SL3223-0DE13-7AA0	6SL3223-0DE13-7BA0
0.55	0.75	1.7	0.37	0.5	1.3	FSA	6SL3223-0DE15-5AA0	6SL3223-0DE15-5BA0
0.75	1.0	2.2	0.55	0.75	1.7	FSA	6SL3223-0DE17-5AA0	6SL3223-0DE17-5BA0
1.1	1.5	3.1	0.75	1.0	2.2	FSA	6SL3223-0DE21-1AA0	6SL3223-0DE21-1BA0
1.5	2.0	4.1	1.1	1.5	3.1	FSA	6SL3223-0DE21-5AA0	6SL3223-0DE21-5BA0
2.2	3.0	5.9	1.5	2.0	4.1	FSA	6SL3223-0DE22-2AA0	6SL3223-0DE22-2BA0
3.0	4.0	7.7	2.2	3.0	5.9	FSA	6SL3223-0DE23-0AA0	6SL3223-0DE23-0BA0
4.0	5.0	10.2	3.0	4.0	7.7	FSB	6SL3223-0DE24-0AA0	6SL3223-0DE24-0BA0
5.5	7.5	13.2	4.0	5.0	10.2	FSB	6SL3223-0DE25-5AA0	6SL3223-0DE25-5BA0
7.5	10	18	5.5	7.5	13.2	FSB	6SL3223-0DE27-5AA0	6SL3223-0DE27-5BA0
11.0	15	26	7.5	10	18	FSC	6SL3223-0DE31-1AA0	6SL3223-0DE31-1BA0
15.0	20	32	11.0	15	26	FSC	6SL3223-0DE31-5AA0	6SL3223-0DE31-5BA0
18.5	25	38	15.0	20	32	FSC	6SL3223-0DE31-8AA0	–
						FSD	–	6SL3223-0DE31-8BA0
22	30	45	18.5	25	38	FSD	6SL3223-0DE32-2AA0	6SL3223-0DE32-2BA0
30	40	60	22	30	45	FSD	6SL3223-0DE33-0AA0	6SL3223-0DE33-0BA0
37	50	75	30	40	60	FSE	6SL3223-0DE33-7AA0	6SL3223-0DE33-7BA0
45	60	90	37	50	75	FSE	6SL3223-0DE34-5AA0	6SL3223-0DE34-5BA0
55	75	110	45	60	90	FSF	6SL3223-0DE35-5AA0	6SL3223-0DE35-5BA0
75	100	145	55	75	110	FSF	6SL3223-0DE37-5AA0	6SL3223-0DE37-5BA0
90	125	178	75	100	145	FSF	6SL3223-0DE38-8AA0	6SL3223-0DE38-8BA0

It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12.

For further information, see [Operator panels and Blanking cover for PM230 Power Modules](#) in section [Supplementary system components](#).

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

²⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).





































SINAMICS G120 standard inverters

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







Power Modules

Selection and ordering data

PM230 Power Modules degree of protection IP20 standard variant

Rated power ¹⁾		Rated output current I_{rated} ²⁾	Power based on the base-load current ³⁾		Base-load current I_H ³⁾	Frame size		PM230 Power Module degree of protection IP20 standard variant without integrated line filter	PM230 Power Module degree of protection IP20 standard variant with integrated line filter class A	
kW	hp	A	kW	hp	A			Order No.	Order No.	
380 ... 480 V 3 AC										
0.37	0.50	1.3	0.25	0.33	0.9	FSA		6SL3210-1NE11-3UL0		6SL3210-1NE11-3AL0
0.55	0.75	1.7	0.37	0.5	1.3	FSA		6SL3210-1NE11-7UL0		6SL3210-1NE11-7AL0
0.75	1.0	2.2	0.55	0.75	1.7	FSA		6SL3210-1NE12-2UL0		6SL3210-1NE12-2AL0
1.1	1.5	3.1	0.75	1.0	2.2	FSA		6SL3210-1NE13-1UL0		6SL3210-1NE13-1AL0
1.5	2.0	4.1	1.1	1.5	3.1	FSA		6SL3210-1NE14-1UL0		6SL3210-1NE14-1AL0
2.2	3.0	5.9	1.5	2.0	4.1	FSA		6SL3210-1NE15-8UL0		6SL3210-1NE15-8AL0
3.0	4.0	7.7	2.2	3.0	5.9	FSA		6SL3210-1NE17-7UL0		6SL3210-1NE17-7AL0
4.0	5.0	10.2	3.0	4.0	7.7	FSB		6SL3210-1NE21-0UL0		6SL3210-1NE21-0AL0
5.5	7.5	13.2	4.0	5.0	10.2	FSB		6SL3210-1NE21-3UL0		6SL3210-1NE21-3AL0
7.5	10	18	5.5	7.5	13.2	FSB		6SL3210-1NE21-8UL0		6SL3210-1NE21-8AL0
11.0	15	26	7.5	10	18	FSC		6SL3210-1NE22-6UL0		6SL3210-1NE22-6AL0
15.0	20	32	11.0	15	26	FSC		6SL3210-1NE23-2UL0		6SL3210-1NE23-2AL0
18.5	25	38	15.0	20	32	FSC		6SL3210-1NE23-8UL0		6SL3210-1NE23-8AL0
22	30	45	18.5	25	38	FSD		6SL3210-1NE24-5UL0		6SL3210-1NE24-5AL0
30	40	60	22	30	45	FSD		6SL3210-1NE26-0UL0		6SL3210-1NE26-0AL0
37	50	75	30	40	60	FSE		6SL3210-1NE27-5UL0		6SL3210-1NE27-5AL0
45	60	90	37	50	75	FSE		6SL3210-1NE28-8UL0		6SL3210-1NE28-8AL0
55	75	110	45	60	90	FSF		6SL3210-1NE31-1UL0		6SL3210-1NE31-1AL0
75	100	145	55	75	110	FSF		6SL3210-1NE31-5UL0		6SL3210-1NE31-5AL0

PM230 Power Modules degree of protection IP20 push-through variant

Rated power ¹⁾		Rated output current I_{rated} ²⁾	Power based on the base-load current ³⁾		Base-load current I_H ³⁾	Frame size		PM230 Power Module degree of protection IP20 push-through variant without integrated line filter	PM230 Power Module degree of protection IP20 push-through variant with integrated line filter class A	
kW	hp	A	kW	hp	A			Order No.	Order No.	
380 ... 480 V 3 AC										
3.0	4.0	7.7	2.2	3.0	5.9	FSA		6SL3211-1NE17-7UL0		6SL3211-1NE17-7AL0
7.5	10	18	5.5	7.5	13.2	FSB		6SL3211-1NE21-8UL0		6SL3211-1NE21-8AL0
18.5	25	38	15.0	20	32	FSC		6SL3211-1NE23-8UL0		6SL3211-1NE23-8AL0

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

²⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).












SINAMICS G120 standard inverters

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



Power Modules

Selection and ordering data

PM240-2 Power Modules standard variant

Rated power ¹⁾		Rated output current I_{rated} ²⁾	Power based on the base-load current ³⁾		Base-load current I_H ³⁾	Frame size		PM240-2 Power Module standard variant without integrated line filter		PM240-2 Power Module standard variant with integrated line filter class A	
kW	hp		kW	hp				A	Order No.	Order No.	
380 ... 480 V 3 AC											
0.55	0.75	1.7	0.37	0.50	1.3	FSA		6SL3210-1PE11-8UL0		6SL3210-1PE11-8AL0	
0.75	1.0	2.2	0.55	0.75	1.7	FSA		6SL3210-1PE12-3UL0		6SL3210-1PE12-3AL0	
1.1	1.5	3.1	0.75	1.0	2.2	FSA		6SL3210-1PE13-2UL0		6SL3210-1PE13-2AL0	
1.5	2.0	4.1	1.1	1.5	3.1	FSA		6SL3210-1PE14-3UL0		6SL3210-1PE14-3AL0	
2.2	3.0	5.9	1.5	2.0	4.1	FSA		6SL3210-1PE16-1UL0		6SL3210-1PE16-1AL0	
3.0	4.0	7.7	2.2	3.0	5.9	FSA		6SL3210-1PE18-0UL0		–	

PM240-2 Power Modules push-through variant

Rated power ¹⁾		Rated output current I_{rated} ²⁾	Power based on the base-load current ³⁾		Base-load current I_H ³⁾	Frame size		PM240-2 Power Module push-through variant without integrated line filter		PM240-2 Power Module push-through variant with integrated line filter class A	
kW	hp		kW	hp				A	Order No.	Order No.	
380 ... 480 V 3 AC											
2.2	3.0	5.9	1.5	3.0	4.1	FSA		–		6SL3211-1PE16-1AL0	
3.0	4.0	7.7	2.2	3.0	5.9	FSA		6SL3211-1PE18-0UL0		–	

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

²⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

SINAMICS G120 standard inverters

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

Power Modules

Selection and ordering data

PM240 Power Modules

Rated power ¹⁾		Rated output current I_{rated} ²⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	Frame size	PM240 Power Module without integrated line filter	PM240 Power Module with integrated line filter class A
kW	hp		kW	hp			Order No.	Order No.
380 ... 480 V 3 AC								
0.37	0.50	1.3	0.37	0.50	1.3	FSA	6SL3224-0BE13-7UA0	–
0.55	0.75	1.7	0.55	0.75	1.7	FSA	6SL3224-0BE15-5UA0	–
0.75	1.0	2.2	0.75	1.0	2.2	FSA	6SL3224-0BE17-5UA0	–
1.1	1.5	3.1	1.1	1.5	3.1	FSA	6SL3224-0BE21-1UA0	–
1.5	2.0	4.1	1.5	2.0	4.1	FSA	6SL3224-0BE21-5UA0	–
2.2	3.0	5.9	2.2	3.0	5.9	FSB	6SL3224-0BE22-2UA0	6SL3224-0BE22-2AA0
3.0	4.0	7.7	3.0	4.0	7.7	FSB	6SL3224-0BE23-0UA0	6SL3224-0BE23-0AA0
4.0	5.0	10.2	4.0	5.0	10.2	FSB	6SL3224-0BE24-0UA0	6SL3224-0BE24-0AA0
7.5	10	18	5.5	7.5	13.2	FSC	6SL3224-0BE25-5UA0	6SL3224-0BE25-5AA0
11.0	15	25	7.5	10	19	FSC	6SL3224-0BE27-5UA0	6SL3224-0BE27-5AA0
15.0	20	32	11.0	15	26	FSC	6SL3224-0BE31-1UA0	6SL3224-0BE31-1AA0
18.5	25	38	15.0	20	32	FSD	6SL3224-0BE31-5UA0	6SL3224-0BE31-5AA0
22	30	45	18.5	25	38	FSD	6SL3224-0BE31-8UA0	6SL3224-0BE31-8AA0
30	40	60	22	30	45	FSD	6SL3224-0BE32-2UA0	6SL3224-0BE32-2AA0
37	50	75	30	40	60	FSE	6SL3224-0BE33-0UA0	6SL3224-0BE33-0AA0
45	60	90	37	50	75	FSE	6SL3224-0BE33-7UA0	6SL3224-0BE33-7AA0
55	75	110	45	60	90	FSF	6SL3224-0BE34-5UA0	6SL3224-0BE34-5AA0
75	100	145	55	75	110	FSF	6SL3224-0BE35-5UA0	6SL3224-0BE35-5AA0
90	125	178	75	100	145	FSF	6SL3224-0BE37-5UA0	6SL3224-0BE37-5AA0
110	150	205	90	125	178	FSF	6SL3224-0BE38-8UA0	–
132	200	250	110	150	205	FSF	6SL3224-0BE41-1UA0	–
160	250	302	132	200	250	FSGX	6SL3224-0XE41-3UA0	–
200	300	370	160	250	302	FSGX	6SL3224-0XE41-6UA0	–
250	400	477	200	300	370	FSGX	6SL3224-0XE42-0UA0	–

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

²⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

SINAMICS G120 standard inverters

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

Power Modules

Selection and ordering data

PM250 Power Modules

Rated power ¹⁾		Rated output current I_{rated} ²⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	Frame size	PM250 Power Module without integrated line filter Order No.	PM250 Power Module with integrated line filter class A Order No.
kW	hp		kW	hp				
380 ... 480 V 3 AC								
7.5	10	18	5.5	7.5	13.2	FSC	–	6SL3225-0BE25-5AA1
11.0	15	25	7.5	10	19	FSC	–	6SL3225-0BE27-5AA1
15.0	20	32	11.0	15	26	FSC	–	6SL3225-0BE31-1AA1
18.5	25	38	15.0	20	32	FSD	6SL3225-0BE31-5UA0	6SL3225-0BE31-5AA0
22	30	45	18.5	25	38	FSD	6SL3225-0BE31-8UA0	6SL3225-0BE31-8AA0
30	40	60	22	30	45	FSD	6SL3225-0BE32-2UA0	6SL3225-0BE32-2AA0
37	50	75	30	40	60	FSE	6SL3225-0BE33-0UA0	6SL3225-0BE33-0AA0
45	60	90	37	50	75	FSE	6SL3225-0BE33-7UA0	6SL3225-0BE33-7AA0
55	75	110	45	60	90	FSF	6SL3225-0BE34-5UA0	6SL3225-0BE34-5AA0
75	100	145	55	75	110	FSF	6SL3225-0BE35-5UA0	6SL3225-0BE35-5AA0
90	125	178	75	100	145	FSF	6SL3225-0BE37-5UA0	6SL3225-0BE37-5AA0

PM260 Power Modules

Rated power ¹⁾		Rated output current I_{rated} ⁴⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	Frame size	PM260 Power Module without integrated line filter Order No.	PM260 Power Module with integrated line filter class A Order No.
kW	hp		kW	hp				
500 ... 690 V 3 AC								
11.0	15	14	7.5	10	10	FSD	6SL3225-0BH27-5UA1	6SL3225-0BH27-5AA1
15.0	20	19	11	15	14	FSD	6SL3225-0BH31-1UA1	6SL3225-0BH31-1AA1
18.5	25	23	15	20	19	FSD	6SL3225-0BH31-5UA1	6SL3225-0BH31-5AA1
30	40	35	22	30	26	FSF	6SL3225-0BH32-2UA1	6SL3225-0BH32-2AA1
37	50	42	30	40	35	FSF	6SL3225-0BH33-0UA1	6SL3225-0BH33-0AA1
55	75	62	37	50	42	FSF	6SL3225-0BH33-7UA1	6SL3225-0BH33-7AA1

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).
²⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

³⁾ The base-load current I_H is based on the duty cycle for high overload (HO).
⁴⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 690 V and are specified on the rating plate of the Power Module.

SINAMICS G120 standard inverters

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

Power Modules

Integration

All Power Modules have the following connections and interfaces:

- PM-IF interface to connect the Power Module to the Control Unit. The Power Module also supplies power to the Control Unit using an integrated power supply
- Motor connection using screw terminals or screw studs
- 2 PE/protective conductor connections

Interfaces specific to the PM230 Power Module are as follows:

- Shield connection plate for FSA to FSC
- PM230 Power Modules communicate with the Control Unit via the PM-IF interface. The following Control Units are supported:
 - CU230P-2 HVAC, CU230P-2 DP, CU230P-2 PN, CU230P-2 CAN
 - For PM230 in degree of protection IP20 only: CU240B-2, CU240B-2 DP, CU240E-2, CU240E-2 DP, CU240E-2 PN, CU240E-2 F, CU240E-2 DP-F, CU240E-2 PN-F

Interfaces specific to the PM240-2 Power Module are as follows:

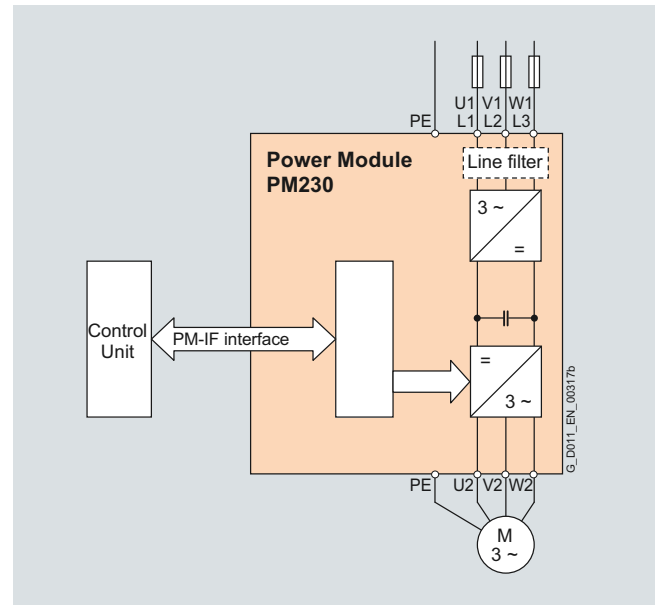
- Terminals R1 and R2 to connect an external braking resistor, applicable to frame size FSA
- Control for the Brake Relay for controlling a motor brake
- Shield connection plate
- PM240-2 Power Modules communicate with the Control Unit via the PM-IF interface. The following Control Units are supported:
 - CU230P-2 HVAC, CU230P-2 DP, CU230P-2 PN, CU230P-2 CAN
 - CU240B-2, CU240B-2 DP
 - CU240E-2, CU240E-2 DP, CU240E-2 PN, CU240E-2 F, CU240E-2 DP-F, CU240E-2 PN-F

Specific PM240 Power Module interfaces are as follows:

- Terminals DCP/R1 and R2 to connect an external braking resistor, applicable for frame sizes FSA to FSF. For frame size FSGX, an external plug-in braking unit (Braking Module) is required to connect a braking resistor
- Control for the Brake Relay for controlling a motor brake

Specific PM250 and PM260 Power Module interface is:

- Control for the Brake Relay for controlling a motor brake



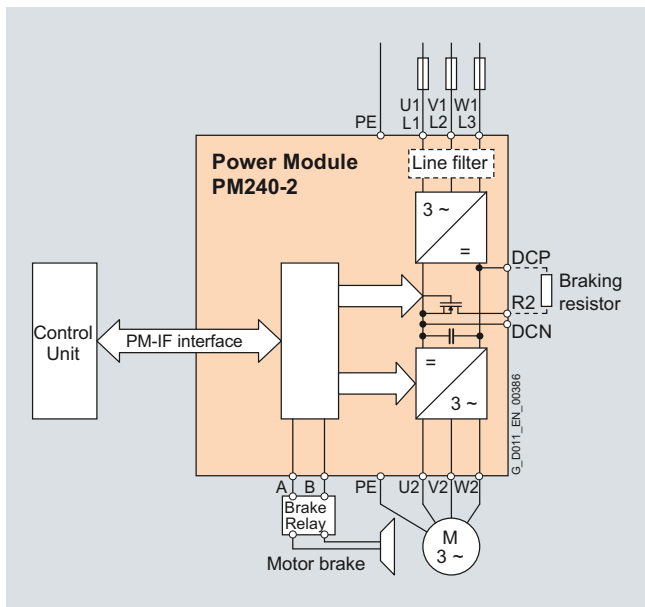
Connection diagram for PM230 Power Module with or without integrated line filter class A or B

SINAMICS G120 standard inverters

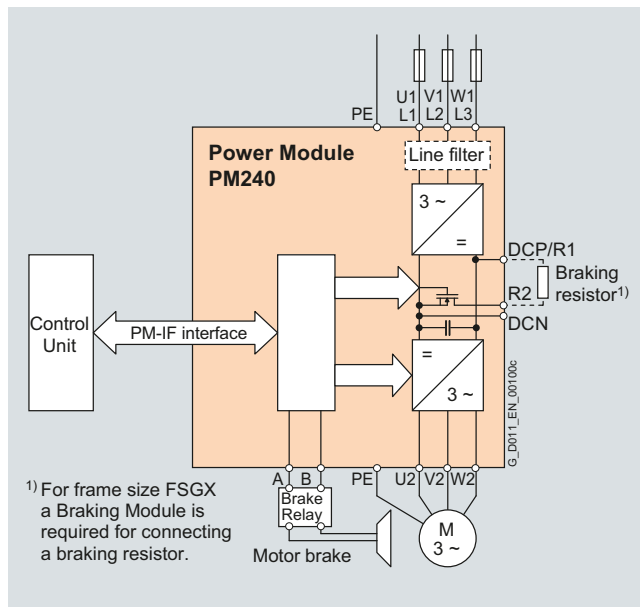
0.37 kW to 250 kW (0.5 hp to 400 hp)

Power Modules

Integration

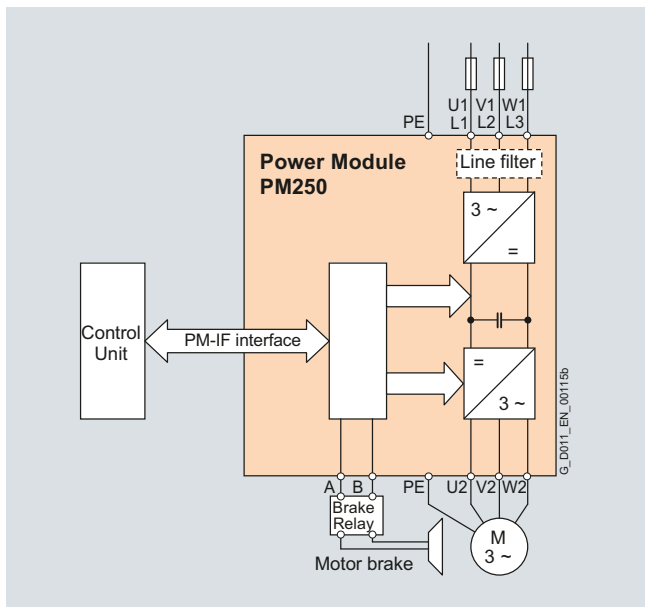


Connection diagram for PM240-2 Power Module with or without integrated line filter class A

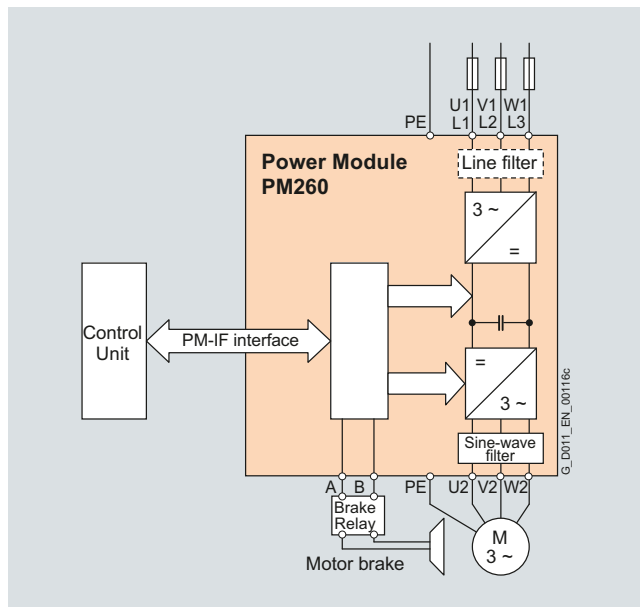


Connection diagram for PM240 Power Module with or without integrated line filter class A

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Connection diagram for PM250 Power Module with or without integrated line filter class A



Connection diagram for PM260 Power Module with or without integrated line filter class A

SINAMICS G120 standard inverters

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

Power Modules

Integration

Power and DC link components that are optionally available depending on the Power Module used

The following line-side power components, DC link components and load-side power components are optionally available in the appropriate frames sizes for the Power Modules:

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM230 Power Module (IP54/IP55)							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Line-side power components							
Line filter class A	I	I	I	I	I	I	–
Line filter class B	I	I	I	I	I	I	–
Line reactor ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	–
Load-side power components							
Output reactor	–	–	–	S	S	S	–
Sine-wave filter	–	–	–	S	S	S	–
PM230 Power Module (IP20)							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Line-side power components							
Line filter class A	I	I	I	I	I	I	–
Line reactor ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	–
Load-side power components							
Output reactor	–	–	–	S	S	S	–
Sine-wave filter	–	–	–	S	S	S	–
PM240-2 Power Module with integrated braking chopper							
Available frame sizes	✓	–	–	–	–	–	–
Line-side power components							
Line filter class A	I	–	–	–	–	–	–
Line reactor	S	–	–	–	–	–	–
DC link components							
Braking resistor	S	–	–	–	–	–	–
Braking Module	–	–	–	–	–	–	–
Load-side power components							
Output reactor	–	–	–	–	–	–	–
Sine-wave filter	–	–	–	–	–	–	–
PM240 Power Module with integrated braking chopper							
Available frame sizes	✓	✓	✓	✓	✓	✓	Without integrated braking chopper
Line-side power components							
Line filter class A	U	F	F	F	F	F/S ²⁾	S ²⁾
Line filter class B	U	U	U	–	–	–	–
Line reactor	U	U	U	U	U	S	S
DC link components							
Braking resistor	U	U	S	S	S	S	S
Braking Module	–	–	–	–	–	–	I (option)
Load-side power components							
Output reactor	U	U	U	S	S	S	S
Sine-wave filter	U	U	U	S	S	S	S

U = Base component

S = Lateral mounting

I = Integrated

F = Power Modules available with and without integrated filter class A

– = Not possible

¹⁾ A line reactor is not required and must not be used in conjunction with a PM230, PM250 or PM260 Power Module.

²⁾ PM240 Power Modules in frame size FSF from 110 kW and higher and frame size FSGX are available only without an integrated filter class A. An optional line filter class A for lateral mounting is available instead.

SINAMICS G120 standard inverters

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

Power Modules

Integration

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side power components							
Line filter class A	–	–	I	F	F	F	–
Line filter class B	–	–	U	–	–	–	–
Line reactor ¹⁾	–	–	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	–
DC link components							
Braking resistor ²⁾	–	–	– ²⁾	– ²⁾	– ²⁾	– ²⁾	–
Load-side power components							
Output reactor	–	–	U	S	S	S	–
Sine-wave filter	–	–	U	S	S	S	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Line-side power components							
Line filter class A	–	–	–	F	–	F	–
Line filter class B	–	–	–	–	–	–	–
Line reactor ¹⁾	–	–	–	– ¹⁾	–	– ¹⁾	–
DC link components							
Braking resistor ²⁾	–	–	–	– ²⁾	–	– ²⁾	–
Load-side power components							
Output reactor	–	–	–	–	–	–	–
Sine-wave filter	–	–	–	I	–	I	–

U = Base component

S = Lateral mounting

I = Integrated

F = Power Modules available with and without integrated filter class A

– = Not possible

¹⁾ A line reactor is not required and must not be used in conjunction with a PM230, PM250 or PM260 Power Module.

²⁾ PM250 and PM260 Power Modules are capable of line-commutated energy feedback. A braking resistor cannot be connected and is not necessary.

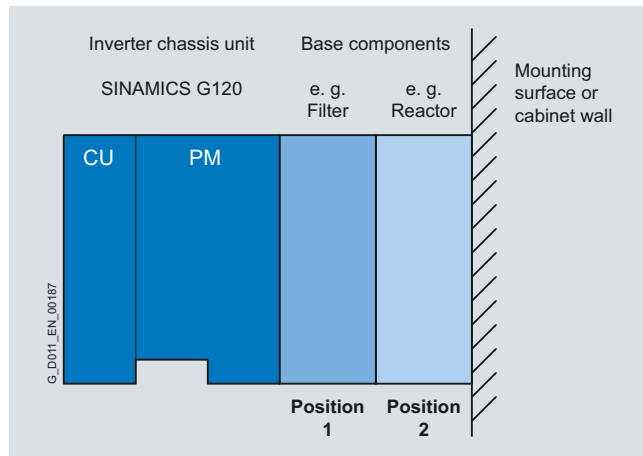
SINAMICS G120 standard inverters

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

Power Modules

Integration

General design information



- A maximum of two base components plus inverter are possible.
- If at all possible, the line filter should be mounted directly below the inverter (position 1).
- With lateral mounting, the line-side components have to be mounted on the left side of the inverter, and the load-side components on the right side.
- Braking resistors have to be mounted directly on the control cabinet wall due to heating issues.
- This mounting type is always used for the PM240 and PM250 built-in units.

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Inverter comprising a Power Module (PM) and a Control Unit (CU) and two base components at position 1 and position 2 (side view)

Recommended installation combinations of the inverter and optional power and DC link components

Power Module Frame size	Base		Lateral mounting	
	Position 1	Position 2	Left of the inverter (for line-side power components)	Right of the inverter (for load-side power components and DC link components)
FSA and FSB	Line filter	Line reactor	–	Output reactor or sine-wave filter and/or braking resistor
	Line filter or line reactor	Output reactor or sine-wave filter	–	Braking resistor
	Line filter or line reactor	Braking resistor	–	–
	Line filter or line reactor or braking resistor or sine-wave filter	–	–	–
FSC	Line filter	Line reactor	–	Output reactor or sine-wave filter and/or braking resistor
	Line filter or line reactor	Output reactor or sine-wave filter	–	Braking resistor
	Line filter or line reactor or sine-wave filter	–	–	Braking resistor
FSD and FSE	Line reactor	–	Line filter	Output reactor or sine-wave filter and/or braking resistor
FSF	–	–	Line filter and/or line reactor	Output reactor or sine-wave filter and/or braking resistor
FSGX	–	–	Line filter and/or line reactor	Output reactor or sine-wave filter and/or braking resistor

SINAMICS G120 standard inverters

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

Power Modules

Integration

Maximum permissible cable lengths from the motor to the inverter when using output reactors or sine-wave filters depending on the voltage range and the Power Module being used

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

Frame size	Maximum permissible motor cable lengths (shielded/unshielded) in m (ft)						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM230 Power Module degrees of protection IP20 and IP55/UL Type 12							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Without output reactor/sine-wave filter	25/100 (82/328)	25/100 (82/328)	25/100 (82/328)	25/100 (82/328)	25/100 (82/328)	25/100 (82/328)	–
With optional output reactor							
• At 380 -10 % ... 400 V 3 AC	–	–	–	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
• At 401 ... 480 V 3 AC +10 %	–	–	–	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
With optional sine-wave filter							
• At 380 -10 % ... 400 V 3 AC	–	–	–	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
• At 401 ... 480 V 3 AC +10 %	–	–	–	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
PM240-2 Power Module with integrated braking chopper							
Available frame sizes	✓	–	–	–	–	–	–
Without output reactor/sine-wave filter	50/100 (164/328)	–	–	–	–	–	–
With optional output reactor							
• At 380 -10 % ... 400 V 3 AC	–	–	–	–	–	–	–
• At 401 ... 480 V 3 AC +10 %	–	–	–	–	–	–	–
With optional sine-wave filter							
• At 380 -10 % ... 400 V 3 AC	–	–	–	–	–	–	–
• At 401 ... 480 V 3 AC +10 %	–	–	–	–	–	–	–
PM240 Power Module with integrated braking chopper							Without integrated braking chopper
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Without output reactor/sine-wave filter	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	200/300 (656/984)
With optional output reactor							
• At 380 -10 % ... 400 V 3 AC	150/225 (492/738)	150/225 (492/738)	150/225 (492/738)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	300/450 (984/1476)
• At 401 ... 480 V 3 AC +10 %	100/150 (328/492)	100/150 (328/492)	100/150 (328/492)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	300/450 (984/1476)
With optional sine-wave filter							
• At 380 -10 % ... 400 V 3 AC	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	300/450 (984/1476)
• At 401 ... 480 V 3 AC +10 %	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	300/450 (984/1476)
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Without output reactor/sine-wave filter	–	–	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	–
With optional output reactor							
• At 380 -10 % ... 400 V 3 AC	–	–	150/225 (492/738)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
• At 401 ... 480 V 3 AC +10 %	–	–	100/150 (328/492)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
With optional sine-wave filter							
• At 380 -10 % ... 400 V 3 AC	–	–	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
• At 401 ... 480 V 3 AC +10 %	–	–	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
With integrated sine-wave filter							
• At 500 ... 690 V 3 AC ±10 %	–	–	–	200/300 (656/984)	–	200/300 (656/984)	–

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SINAMICS G120 standard inverters

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

Power Modules

Integration

Derating data

The following inverter output currents can still be achieved with long motor cables without output reactor and sine-wave filter.

Derating for PM240 Power Modules, frame sizes FSA to FSF for shielded motor cables. From frame size FSD and higher, only the particular main Power Module types were tested. The values also apply to the other Power Modules of the particular frame size.

Rated power ¹⁾		Frame size	Rated output current I_{rated} ²⁾ A	Base-load current I_H A	Motor connection cross-section mm ²	Current derating of the output current as a % of the base-load current for the cable lengths (MOTION-CONNECT)			
kW	hp					50 m (82 ft)	100 m (328 ft)	150 m (492 ft)	200 m (656 ft)
0.37	0.50	FSA	1.3	1.3	2.5	100 %	–	–	–
0.55	0.75	FSA	1.7	1.7	2.5	100 %	–	–	–
0.75	1.0	FSA	2.2	2.2	2.5	100 %	–	–	–
1.1	1.5	FSA	3.1	3.1	2.5	100 %	–	–	–
1.5	2	FSA	4.1	4.1	2.5	100 %	–	–	–
2.2	3	FSB	5.9	5.9	6	100 %	60 %	–	–
3.0	4	FSB	7.7	7.7	6	100 %	60 %	–	–
4.0	5	FSB	10.2	10.2	6	100 %	70 %	–	–
7.5	10	FSC	18	13.2	10	100 %	70 %	45 %	–
11	15	FSC	25	19	10	100 %	90 %	80 %	–
22	30	FSC	32	26	10	100 %	90 %	80 %	–
30	40	FSD	60	45	35	100 %	95 %	90 %	85 %
45	60	FSE	90	75	35	100 %	100 %	95 %	90 %
90	125	FSF	178	145	95	100 %	100 %	100 %	95 %

– Not possible

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

²⁾ The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

General technical specifications

Power Modules	PM230	PM240-2	PM240	PM250	PM260
System operating voltage	380 ... 480 V 3 AC ±10 %	380 ... 480 V 3 AC ±10 %	380 ... 480 V 3 AC ±10 %	380 ... 480 V 3 AC ±10 %	500 ... 690 V 3 AC ±10 % For operation with 500 V -10 % linearly reduced – see derating characteristics
Line supply requirements Line short circuit voltage u_K	$u_K < 1 %$ or $R_{sc} > 100$	For $u_K < 1 %$, a line reactor is recommended	For $u_K < 1 %$ a line reactor is recommended	$u_K < 1 %$ or $R_{sc} > 100$	$u_K < 1 %$
Input frequency	47 ... 63 Hz	47 ... 63 Hz	47 ... 63 Hz	47 ... 63 Hz	47 ... 63 Hz
Output frequency • Control type V/f • Control type Vector	0 ... 650 Hz 0 ... 200 Hz	0 ... 650 Hz 0 ... 200 Hz	0 ... 650 Hz 0 ... 200 Hz	0 ... 650 Hz 0 ... 200 Hz	0 ... 200 Hz 0 ... 200 Hz
Pulse frequency	4 kHz Higher pulse frequen- cies up to 16 kHz, see derating data	4 kHz Higher pulse frequen- cies up to 16 kHz, see derating data	Up to 75 kW HO: 4 kHz From 90 kW HO: 2 kHz Higher pulse frequen- cies up to 16 kHz, see derating data	4 kHz (standard) Higher pulse frequen- cies up to 16 kHz, see derating data	16 kHz (standard)
Power factor λ	0.9	0.7	0.7 ... 0.85	0.9	0.95
Offset factor $\cos \varphi$	0.95	0.95	0.95	0.95 capacitive	0.95 capacitive
Inverter efficiency	86 ... 98 %	92 ... 95 %	95 ... 98 %	95 ... 97 %	95 ... 97 %
Output voltage, max. In % of input voltage	95 %	95 %	95 %	87 %	87 %
Overload capability • Low overload (LO) <u>Note:</u> When the overload capability is used, the base-load current I_L is not reduced.	FSA to FSC: 1.5 × base-load current I_L (i. e. 150 % overload) for 3 s plus 1.1 × base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s FSD to FSF: 1.1 × base-load current I_L (i. e. 110 % overload) for 60 s within a cycle time of 300 s	1.5 × base-load current I_L (i. e. 150 % overload) for 3 s plus 1.1 × base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s	Up to 75 kW (LO): 1.5 × base-load current I_L (i. e. 150 % overload) for 3 s plus 1.1 × base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s From 90 kW (LO): 1.5 × base-load current I_L (i. e. 150 % overload) for 1 s plus 1.1 × base-load current I_L (i. e. 110 % overload) for 59 s within a cycle time of 300 s	1.5 × base-load current I_L (i. e. 150 % overload) for 3 s plus 1.1 × base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s	1.4 × base-load current I_L (i. e. 140 % overload) for 3 s plus 1.1 × base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s
• High overload (HO) <u>Note:</u> When the overload capability is used, the base-load current I_H is not reduced.	FSA to FSC: 2 × base-load current I_H (i. e. 200 % overload) for 3 s plus 1.5 × base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s FSD to FSF: 1.5 × base-load current I_H (i. e. 150 % overload) for 60 s within a cycle time of 300 s	2 × base-load current I_H (i. e. 200 % overload) for 3 s plus 1.5 × base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s	Up to 75 kW (HO): 2 × base-load current I_H (i. e. 200 % overload) for 3 s plus 1.5 × base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s From 90 kW (HO): 1.6 × base-load current I_H (i. e. 160 % overload) for 3 s plus 1.36 × base-load current I_H (i. e. 136 % overload) for 57 s within a cycle time of 300 s	2 × base-load current I_H (i. e. 200 % overload) for 3 s plus 1.5 × base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s	2 × base-load current I_H (i. e. 200 % overload) for 3 s plus 1.5 × base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s

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SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Power Modules	PM230	PM240-2	PM240	PM250	PM260
Electromagnetic compatibility	Integrated line filter class A or B according to EN 61800-3 C2 and EN 61800-3 C1 Table 14 and without integrated line filter according to EN 61800-3 C3 (with IP20 variants only)	Variants with integrated line filter class A are available. Line filters class B will be available soon.	Optional line filter class A or B acc. to EN 55011 is available	Optional line filter class A or B acc. to EN 55011 is available	Optional line filter class A acc. to EN 55011 is available
Possible braking methods	IP55/UL Type 12: DC braking IP20 standard and IP20 push-through: DC braking Compound braking	DC braking Compound braking Dynamic braking with integrated braking chopper	DC braking Compound braking Dynamic braking with integrated braking chopper (optional for frame size FSGX)	Regenerative feedback in generator mode	Regenerative feedback in generator mode
Degree of protection	IP55/UL Type 12 (with BOP-2 or blanking cover) IP54/UL Type 12 (with IOP) IP20 (standard or push-through)	IP20 (standard or push-through)	IP20	IP20	IP20
Operating temperature					
• Low overload (LO)	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics	Frame sizes FSA to FSF: 0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics Frame size FSGX: 0 ... 40 °C (32 ... 104 °F) without derating >40 ... 55 °C (>104 ... 131 °F) see derating characteristics	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics
• High overload (HO)	0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics	0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics	Frame sizes FSA to FSF: 0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics Frame size FSGX: 0 ... 40 °C (32 ... 104 °F) without derating >40 ... 55 °C (>104 ... 131 °F) see derating characteristics	0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics	0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Power Modules	PM230	PM240-2	PM240	PM250	PM260
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible
Cooling	Power units with increased air cooling using integrated fans	Internal ventilation, power units with increased air cooling by built-in fans	Internal ventilation, power units with increased air cooling by built-in fans	Internal ventilation, power units with increased air cooling by built-in fans	Internal ventilation, power units with increased air cooling by built-in fans
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics
Protection functions	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking 				
Standard short-circuit breaking current SCCR (Short-Circuit Current Rating) ¹⁾	Degree of protection IP55 frame sizes FSA to FSC: 40 kA Degree of protection IP55 frame sizes FSD to FSF and degree of protection IP20: 65 kA	65 kA	65 kA	42 kA	42 kA
Compliance with standards	UL ²⁾ , CE, c-tick ³⁾	UL, cUL, CE, c-tick, SEMI F47	UL, cUL, CE, c-tick, SEMI F47	UL ²⁾ , cUL ²⁾ , CE, c-tick	CE
CE marking	According to Low-Voltage Directive 2006/95/EC	According to Low-Voltage Directive 2006/95/EC	According to Low-Voltage Directive 2006/95/EC	According to Low-Voltage Directive 2006/95/EC	According to Low-Voltage Directive 2006/95/EC

¹⁾ Applies to industrial control cabinet installations to NEC article 409/UL 508A.

²⁾ UL approval for frame sizes FSD to FSF will be available soon.

³⁾ The c-tick approval for PM230 Power Modules without integrated line filter is in preparation.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

PM230 Power Modules degree of protection IP55/UL Type 12

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP55/UL Type 12				
With integrated line filter class A		6SL3223-ODE13-7AA0	6SL3223-ODE15-5AA0	6SL3223-ODE17-5AA0	6SL3223-ODE21-1AA0	6SL3223-ODE21-5AA0
With integrated line filter class B		6SL3223-ODE13-7BA0	6SL3223-ODE15-5BA0	6SL3223-ODE17-5BA0	6SL3223-ODE21-1BA0	6SL3223-ODE21-5BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_L^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_H^{2)}$	A	0.9	1.3	1.7	2.2	3.1
• I_{max}	A	2.0	2.6	3.4	4.7	6.2
Rated power						
• Based on I_L	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• Based on I_H	kW (hp)	0.25 (0.33)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.86	0.90	0.92	0.94	0.95
Power loss at rated current	kW	0.06	0.06	0.06	0.07	0.08
Cooling air requirement	m ³ /s (ft ³ /s)	0.007 (0.25)	0.007 (0.25)	0.007 (0.25)	0.007 (0.25)	0.007 (0.25)
Sound pressure level L_{pA} (1 m)	dB	61.9	61.9	61.9	61.9	61.9
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	1.3	1.8	2.3	3.2	4.2
• Based on I_H	A	0.9	1.3	1.8	2.3	3.2
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection ⁵⁾						
		IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12
Dimensions						
• Width	mm (in)	154 (6.06)	154 (6.06)	154 (6.06)	154 (6.06)	154 (6.06)
• Height	mm (in)	460 (18.11)	460 (18.11)	460 (18.11)	460 (18.11)	460 (18.11)
• Depth						
- Without operator panel	mm (in)	249 (9.80)	249 (9.80)	249 (9.80)	249 (9.80)	249 (9.80)
- With operator panel, max.	mm (in)	264 (10.39)	264 (10.39)	264 (10.39)	264 (10.39)	264 (10.39)
Frame size						
		FSA	FSA	FSA	FSA	FSA
Weight, approx. With integrated line filter						
	kg (lb)	4.3 (9.48)	4.3 (9.48)	4.3 (9.48)	4.3 (9.48)	4.3 (9.48)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 table 14 (filter B). With unshielded cables, Categories C2 and C1 are not maintained.

⁵⁾ It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12.
For further information, see [Operator panels and Blanking cover for PM230 Power Modules](#) in section [Supplementary system components](#).

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP55/UL Type 12				
With integrated line filter class A		6SL3223-ODE22-2AA0	6SL3223-ODE23-0AA0	6SL3223-ODE24-0AA0	6SL3223-ODE25-5AA0	6SL3223-ODE27-5AA0
With integrated line filter class B		6SL3223-ODE22-2BA0	6SL3223-ODE23-0BA0	6SL3223-ODE24-0BA0	6SL3223-ODE25-5BA0	6SL3223-ODE27-5BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	5.9	7.7	10.2	13.2	18
• Base-load current $I_L^{1)}$	A	5.9	7.7	10.2	13.2	18
• Base-load current $I_H^{2)}$	A	4.1	5.9	7.7	10.2	13.2
• I_{max}	A	8.9	11.8	15.4	20.4	27
Rated power						
• Based on I_L	kW (hp)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)	7.5 (10)
• Based on I_H	kW (hp)	1.5 (2.0)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.96	0.96	0.97	0.97	0.97
Power loss at rated current	kW	0.1	0.12	0.14	0.18	0.24
Cooling air requirement	m ³ /s (ft ³ /s)	0.007 (0.25)	0.007 (0.25)	0.009 (0.32)	0.009 (0.32)	0.009 (0.32)
Sound pressure level L_{pA} (1 m)	dB	61.9	61.9	62.8	62.8	62.8
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	6.1	8.0	11	14	19
• Based on I_H	A	4.2	6.1	8.0	11	14
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	2.5 ... 6	4 ... 6	4 ... 6
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	2.5 ... 6	4 ... 6	4 ... 6
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection ⁵⁾						
		IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12
Dimensions						
• Width	mm (in)	154 (6.06)	154 (6.06)	180 (7.09)	180 (7.09)	180 (7.09)
• Height	mm (in)	460 (18.11)	460 (18.11)	540 (21.26)	540 (21.26)	540 (21.26)
• Depth						
- Without operator panel	mm (in)	249 (9.80)	249 (9.80)	249 (9.80)	249 (9.80)	249 (9.80)
- With operator panel, max.	mm (in)	264 (10.39)	264 (10.39)	264 (10.39)	264 (10.39)	264 (10.39)
Frame size						
		FSA	FSA	FSB	FSB	FSB
Weight, approx. With integrated line filter						
	kg (lb)	4.3 (9.48)	4.3 (9.48)	6.3 (13.9)	6.3 (13.9)	6.3 (13.9)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 table 14 (filter B). With unshielded cables, Categories C2 and C1 are not maintained.

⁵⁾ It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12. For further information, see [Operator panels and Blanking cover for PM230 Power Modules](#) in section [Supplementary system components](#).

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP55/UL Type 12					
With integrated line filter class A		6SL3223-ODE31-1AA0	6SL3223-ODE31-5AA0	6SL3223-ODE31-8AA0	–	6SL3223-ODE32-2AA0	6SL3223-ODE33-0AA0
With integrated line filter class B		6SL3223-ODE31-1BA0	6SL3223-ODE31-5BA0	–	6SL3223-ODE31-8BA0	6SL3223-ODE32-2BA0	6SL3223-ODE33-0BA0
Output current at 50 Hz 400 V 3 AC							
• Rated current I_{rated} ¹⁾	A	26	32	38	38	45	60
• Base-load current I_L ¹⁾	A	26	32	38	38	45	60
• Base-load current I_H ²⁾	A	18	26	32	32	38	45
• I_{max}	A	39	52	64	64	76	90
Rated power							
• Based on I_L	kW (hp)	11 (15)	15 (20)	18.5 (25)	18.5 (25)	22 (30)	30 (40)
• Based on I_H	kW (hp)	7.5 (10)	11 (15)	15 (20)	15 (20)	18.5 (25)	22 (30)
Rated pulse frequency		kHz	4	4	4	4	4
Efficiency η			0.97	0.97	0.98	0.97	0.97
Power loss at rated current		kW	0.32	0.39	0.46	0.52	0.68
Cooling air requirement		m ³ /s (ft ³ /s)	0.020 (0.71)	0.020 (0.71)	0.020 (0.71)	0.039 (1.38)	0.039 (1.38)
Sound pressure level L_{pA} (1 m)		dB	66.1	66.1	66.1	56	56
24 V DC power supply for the Control Unit		A	1	1	1	1	1
Input current ³⁾							
• Rated current	A	27	33	39	39	42	56
• Based on I_H	A	19	27	33	33	36	42
Line supply connection U1/L1, V1/L2, W1/L3			Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	M6 screw studs	M6 screw studs
• Conductor cross-section	mm ²	6 ... 16	10 ... 16	10 ... 16	16 ... 35	16 ... 35	16 ... 35
Motor connection U2, V2, W2			Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	M6 screw studs	M6 screw studs
• Conductor cross-section	mm ²	6 ... 16	10 ... 16	10 ... 16	16 ... 35	16 ... 35	16 ... 35
Motor cable length, max. ⁴⁾							
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection ⁵⁾			IP55/ UL Type 12	IP55/ UL Type 12	IP55/ UL Type 12	IP55/ UL Type 12	IP55/ UL Type 12
Dimensions							
• Width	mm (in)	230 (9.06)	230 (9.06)	230 (9.06)	320 (12.60)	320 (12.60)	320 (12.60)
• Height	mm (in)	620 (24.41)	620 (24.41)	620 (24.41)	640 (25.20)	640 (25.20)	640 (25.20)
• Depth							
- Without operator panel	mm (in)	249 (9.80)	249 (9.80)	249 (9.80)	329 (12.95)	329 (12.95)	329 (12.95)
- With operator panel, max.	mm (in)	264 (10.39)	264 (10.39)	264 (10.39)	344 (13.54)	344 (13.54)	344 (13.54)
Frame size			FSC	FSC	FSC	FSD	FSD
Weight, approx. With integrated line filter		kg (lb)	9.5 (20.9)	9.5 (20.9)	9.5 (20.9)	31 (68.4)	31 (68.4)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 table 14 (filter B). With unshielded cables, Categories C2 and C1 are not maintained.

⁵⁾ It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12.
For further information, see [Operator panels and Blanking cover for PM230 Power Modules](#) in section [Supplementary system components](#).

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP55/UL Type 12				
With integrated line filter class A		6SL3223-ODE33-7AA0	6SL3223-ODE34-5AA0	6SL3223-ODE35-5AA0	6SL3223-ODE37-5AA0	6SL3223-ODE38-8AA0
With integrated line filter class B		6SL3223-ODE33-7BA0	6SL3223-ODE34-5BA0	6SL3223-ODE35-5BA0	6SL3223-ODE37-5BA0	6SL3223-ODE38-8BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	75	90	110	145	178
• Base-load current $I_L^{1)}$	A	75	90	110	145	178
• Base-load current $I_H^{2)}$	A	60	75	90	110	145
• I_{max}	A	120	150	180	220	290
Rated power						
• Based on I_L	kW (hp)	37 (50)	45 (60)	55 (75)	75 (100)	90 (125)
• Based on I_H	kW (hp)	30 (40)	37 (50)	45 (60)	55 (75)	75 (100)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.97	0.97	0.97	0.97	0.97
Power loss at rated current	kW	0.99	1.2	1.4	1.9	2.3
Cooling air requirement	m ³ /s (ft ³ /s)	0.039 (1.38)	0.039 (1.38)	0.117 (4.13)	0.117 (4.13)	0.117 (4.13)
Sound pressure level L_{pA} (1 m)	dB	56	56	61	61	61
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	70	84	102	135	166
• Based on I_H	A	56	70	84	102	135
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	25 ... 50	25 ... 50	35 ... 120	35 ... 120	35 ... 120
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	25 ... 50	25 ... 50	35 ... 120	35 ... 120	35 ... 120
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection ⁵⁾						
		IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12	IP55/UL Type 12
Dimensions						
• Width	mm (in)	320 (12.60)	320 (12.60)	410 (16.14)	410 (16.14)	410 (16.14)
• Height	mm (in)	751 (29.57)	751 (29.57)	915 (36.02)	915 (36.02)	915 (36.02)
• Depth						
- Without operator panel	mm (in)	329 (12.95)	329 (12.95)	416 (16.38)	416 (16.38)	416 (16.38)
- With operator panel, max.	mm (in)	344 (13.54)	344 (13.54)	431 (16.97)	431 (16.97)	431 (16.97)
Frame size						
		FSE	FSE	FSF	FSF	FSF
Weight, approx. With integrated line filter	kg (lb)	37 (81.6) (with filter class A) 38 (83.8) (with filter class B)	37 (81.6) (with filter class A) 38 (83.8) (with filter class B)	70 (154)	70 (154)	70 (154)

¹⁾ The rated output current I_{rated} and the base-load current I_L is based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 table 14 (filter B). With unshielded cables, Categories C2 and C1 are not maintained.

⁵⁾ It is essential to plug on an operator panel or the blanking cover in order to achieve degree of protection IP54/IP55/UL Type 12.
For further information, see Operator panels and Blanking cover for PM230 Power Modules in section Supplementary system components.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

PM230 Power Modules degree of protection IP20 standard variant

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant				
Without integrated line filter		6SL3210-1NE11-3ULO	6SL3210-1NE11-7ULO	6SL3210-1NE12-2ULO	6SL3210-1NE13-1ULO	6SL3210-1NE14-1ULO
With integrated line filter class A		6SL3210-1NE11-3ALO	6SL3210-1NE11-7ALO	6SL3210-1NE12-2ALO	6SL3210-1NE13-1ALO	6SL3210-1NE14-1ALO
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_L^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_H^{2)}$	A	0.9	1.3	1.7	2.2	3.1
• I_{max}	A	2.0	2.6	3.4	4.7	6.2
Rated power						
• Based on I_L	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• Based on I_H	kW (hp)	0.25 (0.33)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)
Rated pulse frequency		kHz	4	4	4	4
Efficiency η			0.89	0.93	0.93	0.94
Power loss at rated current		kW	0.04	0.04	0.05	0.06
Cooling air requirement		m ³ /s (ft ³ /s)	0.002 (0.07)	0.002 (0.07)	0.005 (0.18)	0.005 (0.18)
Sound pressure level L_{pA} (1 m)		dB	<45	<45	<45	<45
24 V DC power supply for the Control Unit		A	1	1	1	1
Input current ³⁾						
• Rated current	A	1.3	1.8	2.3	3.2	4.2
• Based on I_H	A	0.9	1.3	1.8	2.3	3.2
Line supply connection U1/L1, V1/L2, W1/L3			Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor connection U2, V2, W2			Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection			IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)
• Height	mm (in)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)
- With operator panel, max.	mm (in)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)
Frame size			FSA	FSA	FSA	FSA
Weight, approx.						
• Without integrated line filter	kg (lb)	1.4 (3.09)	1.4 (3.09)	1.4 (3.09)	1.4 (3.09)	1.4 (3.09)
• With integrated line filter	kg (lb)	1.6 (3.53)	1.6 (3.53)	1.6 (3.53)	1.6 (3.53)	1.6 (3.53)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2. With unshielded cables, Category C2 is not maintained.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant				
Without integrated line filter		6SL3210-1NE15-8ULO	6SL3210-1NE17-7ULO	6SL3210-1NE21-0ULO	6SL3210-1NE21-3ULO	6SL3210-1NE21-8ULO
With integrated line filter class A		6SL3210-1NE15-8ALO	6SL3210-1NE17-7ALO	6SL3210-1NE21-0ALO	6SL3210-1NE21-3ALO	6SL3210-1NE21-8ALO
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	5.9	7.7	10.2	13.2	18
• Base-load current $I_L^{1)}$	A	5.9	7.7	10.2	13.2	18
• Base-load current $I_H^{2)}$	A	4.1	5.9	7.7	10.2	13.2
• I_{max}	A	8.9	11.8	15.4	20.4	27
Rated power						
• Based on I_L	kW (hp)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)	7.5 (10)
• Based on I_H	kW (hp)	1.5 (2.0)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.96	0.96	0.97	0.97	0.97
Power loss at rated current	kW	0.08	0.11	0.12	0.15	0.24
Cooling air requirement	m ³ /s (ft ³ /s)	0.005 (0.18)	0.005 (0.18)	0.009 (0.32)	0.009 (0.32)	0.009 (0.32)
Sound pressure level L_{pA} (1 m)	dB	61.9	61.9	62.8	62.8	62.8
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	6.1	8.0	11	14	19
• Based on I_H	A	4.2	6.1	8.0	11	14
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 6	1.5 ... 6	1.5 ... 6
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 6	1.5 ... 6	1.5 ... 6
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection						
		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	73 (2.87)	73 (2.87)	100 (3.94)	100 (3.94)	100 (3.94)
• Height	mm (in)	196 (7.72)	196 (7.72)	292 (11.50)	292 (11.50)	292 (11.50)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)
- With operator panel, max.	mm (in)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)
Frame size						
		FSA	FSA	FSB	FSB	FSB
Weight, approx.						
• Without integrated line filter	kg (lb)	1.4 (3.1)	1.4 (3.1)	2.8 (6.2)	2.8 (6.2)	2.8 (6.2)
• With integrated line filter	kg (lb)	1.6 (3.5)	1.6 (3.5)	3.0 (6.6)	3.0 (6.6)	3.0 (6.6)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2. With unshielded cables, Category C2 is not maintained.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant				
Without integrated line filter		6SL3210-1NE22-6UL0	6SL3210-1NE23-2UL0	6SL3210-1NE23-8UL0	6SL3210-1NE24-5UL0	6SL3210-1NE26-0UL0
With integrated line filter class A		6SL3210-1NE22-6AL0	6SL3210-1NE23-2AL0	6SL3210-1NE23-8AL0	6SL3210-1NE24-5AL0	6SL3210-1NE26-0AL0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	26	32	38	45	60
• Base-load current $I_L^{1)}$	A	26	32	38	45	60
• Base-load current $I_H^{2)}$	A	18	26	32	38	45
• I_{max}	A	39	52	64	57	67
Rated power						
• Based on I_L	kW (hp)	11 (15)	15 (20)	18.5 (25)	22 (30)	30 (40)
• Based on I_H	kW (hp)	7.5 (10)	11 (15)	15 (20)	18.5 (25)	22 (30)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.97	0.97	0.98	0.98	0.97
Power loss at rated current	kW	0.30	0.35	0.45	0.52	0.68
Cooling air requirement	m ³ /s (ft ³ /s)	0.019 (0.67)	0.019 (0.67)	0.019 (0.67)	0.08 (2.83)	0.08 (2.83)
Sound pressure level L_{pA} (1 m)	dB	<60	<60	<60	<60	<60
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Input current ³⁾						
• Rated current	A	27	33	39	42	56
• Based on I_H	A	19	27	33	36	42
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	6 ... 16	6 ... 16	6 ... 16	16 ... 35	16 ... 35
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	6 ... 16	6 ... 16	6 ... 16	16 ... 35	16 ... 35
Motor cable length, max. ⁴⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection						
		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	140 (5.51)	140 (5.51)	140 (5.51)	275 (10.83)	275 (10.83)
• Height						
- Without integrated line filter	mm (in)	355 (13.98)	355 (13.98)	355 (13.98)	419 (16.50)	419 (16.50)
- With integrated line filter	mm (in)	355 (13.98)	355 (13.98)	355 (13.98)	512 (20.16)	512 (20.16)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	204 (8.03)	204 (8.03)
- With operator panel, max.	mm (in)	248 (9.76)	248 (9.76)	248 (9.76)	287 (11.30)	287 (11.30)
Frame size						
		FSC	FSC	FSC	FSD	FSD
Weight, approx.						
• Without integrated line filter	kg (lb)	4.5 (9.92)	4.5 (9.92)	4.5 (9.92)	11 (24.3)	11 (24.3)
• With integrated line filter	kg (lb)	5.1 (11.2)	5.1 (11.2)	5.1 (11.2)	14 (30.9)	14 (30.9)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2. With unshielded cables, Category C2 is not maintained.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant			
Without integrated line filter		6SL3210-1NE27-5UL0	6SL3210-1NE28-8UL0	6SL3210-1NE31-1UL0	6SL3210-1NE31-5UL0
With integrated line filter class A		6SL3210-1NE27-5AL0	6SL3210-1NE28-8AL0	6SL3210-1NE31-1AL0	6SL3210-1NE31-5AL0
Output current					
at 50 Hz 400 V 3 AC					
• Rated current $I_{rated}^{1)}$	A	75	90	110	145
• Base-load current $I_L^{1)}$	A	75	90	110	145
• Base-load current $I_H^{2)}$	A	60	75	90	110
• I_{max}	A	90	112	135	165
Rated power					
• Based on I_L	kW (hp)	37 (50)	45 (60)	55 (75)	75 (100)
• Based on I_H	kW (hp)	30 (40)	37 (50)	45 (60)	55 (75)
Rated pulse frequency		kHz	4	4	4
Efficiency η			0.97	0.97	0.97
Power loss		kW	0.99	1.2	1.4
at rated current					2.0
Cooling air requirement		m ³ /s (ft ³ /s)	0.08 (2.83)	0.08 (2.83)	0.15 (5.30)
Sound pressure level L_{pA} (1 m)		dB	<60	<60	<60
24 V DC power supply		A	1	1	1
for the Control Unit					
Input current ³⁾					
• Rated current	A	70	84	102	135
• Based on I_H	A	56	70	84	102
Line supply connection			M6 screw studs	M6 screw studs	M8 screw studs
U1/L1, V1/L2, W1/L3					M8 screw studs
• Conductor cross-section	mm ²	25 ... 50	25 ... 50	35 ... 120	35 ... 120
Motor connection			M6 screw studs	M6 screw studs	M8 screw studs
U2, V2, W2					M8 screw studs
• Conductor cross-section	mm ²	25 ... 50	25 ... 50	35 ... 120	35 ... 120
Motor cable length, max. ⁴⁾					
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection			IP20	IP20	IP20
Dimensions					
• Width	mm (in)	275 (10.83)	275 (10.83)	350 (13.78)	350 (13.78)
• Height					
- Without integrated line filter	mm (in)	499 (19.65)	499 (19.65)	634 (24.96)	634 (24.96)
- With integrated line filter	mm (in)	635 (25.00)	635 (25.00)	934 (36.77)	934 (36.77)
• Depth					
- Without operator panel	mm (in)	204 (8.03)	204 (8.03)	316 (12.44)	316 (12.44)
- With operator panel, max.	mm (in)	287 (11.30)	287 (11.30)	399 (15.71)	399 (15.71)
Frame size			FSE	FSE	FSF
Weight, approx.					
• Without integrated line filter	kg (lb)	15 (33.1)	15 (33.1)	34 (75)	34 (75)
• With integrated line filter	kg (lb)	22 (48.5)	22 (48.5)	46 (101)	46 (101)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2. With unshielded cables, Category C2 is not maintained.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

PM230 Power Modules degree of protection IP20 push-through variant

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 push-through variant					
Without integrated line filter		6SL3211-1NE17-7ULO		6SL3211-1NE21-8ULO		6SL3211-1NE23-8ULO	
With integrated line filter class A		6SL3211-1NE17-7ALO		6SL3211-1NE21-8ALO		6SL3211-1NE23-8ALO	
Output current at 50 Hz 400 V 3 AC							
• Rated current I_{rated} ¹⁾	A	7.7	18	38			
• Base-load current I_L ¹⁾	A	7.7	18	38			
• Base-load current I_H ²⁾	A	5.9	13.2	32			
• I_{max}	A	11.8	27	64			
Rated power							
• Based on I_L	kW (hp)	3 (4.0)	7.5 (10)	18.5 (25)			
• Based on I_H	kW (hp)	2.2 (3.0)	5.5 (7.5)	15 (20)			
Rated pulse frequency		kHz	4	4	4		
Efficiency η			0.96	0.97	0.98		
Power loss at rated current		kW	0.11	0.24	0.45		
Cooling air requirement		m ³ /s (ft ³ /s)	0.005 (0.18)	0.009 (0.32)	0.019 (0.67)		
Sound pressure level L_{pA} (1 m)		dB	<45	<50	<60		
24 V DC power supply for the Control Unit		A	1	1	1		
Input current ³⁾							
• Rated current	A	8.0	19	39			
• Based on I_H	A	6.1	14	33			
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in		Screw terminals, plug-in		Screw terminals, plug-in	
• Conductor cross-section	mm ²	1.5 ... 2.5	4 ... 6	6 ... 16			
Motor connection U2, V2, W2		Screw terminals, plug-in		Screw terminals, plug-in		Screw terminals, plug-in	
• Conductor cross-section	mm ²	1 ... 2.5	4 ... 6	10 ... 16			
Motor cable length, max. ⁴⁾							
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)			
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)			
Degree of protection			IP20	IP20	IP20		
Dimensions							
• Width	mm (in)	126 (4.96)	154 (6.06)	200 (7.87)			
• Height	mm (in)	238 (9.37)	345 (13.58)	411 (16.18)			
• Depth							
- Without operator panel	mm (in)	171 (6.73)	171 (6.73)	171 (6.73)			
- With operator panel, max.	mm (in)	254 (10.00)	254 (10.00)	254 (10.00)			
Frame size			FSA	FSB	FSC		
Weight, approx.							
• Without integrated line filter	kg (lb)	1.7 (3.75)	3.4 (7.50)	5.4 (11.9)			
• With integrated line filter	kg (lb)	1.9 (4.2)	3.6 (7.94)	6.0 (13.2)			

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2. With unshielded cables, Category C2 is not maintained.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

PM240-2 Power Modules standard variant

Line voltage 380 ... 480 V 3 AC		PM240-2 Power Modules standard variant					
Without integrated line filter		6SL3210-1PE11-8U0L0	6SL3210-1PE12-3U0L0	6SL3210-1PE13-2U0L0	6SL3210-1PE14-3U0L0	6SL3210-1PE16-1U0L0	6SL3210-1PE18-0U0L0
With integrated line filter class A		6SL3210-1PE11-8AL0	6SL3210-1PE12-3AL0	6SL3210-1PE13-2AL0	6SL3210-1PE14-23L0	6SL3210-1PE16-1AL0	–
Output current at 50 Hz 400 V 3 AC							
• Rated current $I_{rated}^{1)}$	A	1.7	2.2	3.1	4.1	5.9	7.7
• Base-load current $I_L^{1)}$	A	1.7	2.2	3.1	4.1	5.9	7.7
• Base-load current $I_H^{2)}$	A	1.3	1.7	2.2	3.1	4.1	5.9
• I_{max}	A	2.6	3.4	4.4	6.2	8.2	11.8
Rated power							
• Based on I_L	kW (hp)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)	2.2 (3.0)	3.0 (4.0)
• Based on I_H	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.55 (0.75)	1.1 (1.5)	1.5 (2.0)	2.2 (3.0)
Max. energy recovery capability	kW	0.37	0.55	0.55	1.1	1.5	2.2
Rated pulse frequency	kHz	4	4	4	4	4	4
Efficiency η		>0.92	>0.93	>0.94	>0.94	>0.95	>0.95
Power loss at rated current	kW	0.044	0.049	0.059	0.074	0.105	0.123
Cooling air requirement	m ³ /s (ft ³ /s)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)	0.007 (0.25)
Sound pressure level L_{pA} (1 m)	dB	<52	<52	<52	<52	<52	<52
24 V DC power supply for the Control Unit	A	1	1	1	1	1	1
Input current ³⁾							
• Rated current	A	2.3	2.9	4.1	5.5	7.7	10.1
• Based on I_H	A	2	2.6	3.3	4.7	6.1	8.8
Line supply connection U1/L1, V1/L2, W1/L3		Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor connection U2, V2, W2		Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
PE connection		Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector
Motor cable length, max.							
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)
• Height (without Control Unit)		196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)
• Depth (without Control Unit)		165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)
Frame size		FSA	FSA	FSA	FSA	FSA	FSA
Weight, approx.							
• Without integrated line filter	kg (lb)	1.4 (3.09)	1.4 (3.09)	1.4 (3.09)	1.4 (3.09)	1.4 (3.09)	1.4 (3.09)
• With integrated line filter	kg (lb)	1.5 (3.31)	1.5 (3.31)	1.5 (3.31)	1.5 (3.31)	1.5 (3.31)	–

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. The current values are specified on the rating plate of the Power Module.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

PM240-2 Power Modules push-through variant

Line voltage 380 ... 480 V 3 AC		PM240-2 Power Modules push-through variant	
Without integrated line filter		–	6SL3211-1PE18-0UL0
With integrated line filter class A		6SL3211-1PE16-1AL0	–
Output current at 50 Hz 400 V 3 AC			
• Rated current I_{rated} ¹⁾	A	5.9	7.7
• Base-load current I_L ¹⁾	A	5.9	7.7
• Base-load current I_H ²⁾	A	4.1	5.9
• I_{max}	A	8.2	11.8
Rated power			
• Based on I_L	kW (hp)	2.2 (3.0)	3.0 (4.0)
• Based on I_H	kW (hp)	1.5 (2.0)	2.2 (3.0)
Max. energy recovery capability	kW	1.5	2.2
Rated pulse frequency	kHz	4	4
Efficiency η		>0.95	>0.95
Power loss at rated current	kW	0.105	0.123
Cooling air requirement	m ³ /s (ft ³ /s)	0.005 (0.18)	0.007 (0.25)
Sound pressure level L_{pA} (1 m)	dB	<52	<52
24 V DC power supply for the Control Unit	A	1	1
Input current ³⁾			
• Rated current	A	7.7	10.1
• Based on I_H	A	6.1	8.8
Line supply connection U1/L1, V1/L2, W1/L3		Terminal connector	Terminal connector
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5
Motor connection U2, V2, W2		Terminal connector	Terminal connector
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5
PE connection		Included in terminal connector	Included in terminal connector
Motor cable length, max.			
• Shielded	m (ft)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)
Degree of protection		IP20	IP20
Dimensions			
• Width	mm (in)	126 (4.96)	126 (4.96)
• Height (without Control Unit)		238 (9.37)	238 (9.37)
• Depth (without Control Unit)		171 (6.73)	171 (6.73)
Frame size		FSA	FSA
Weight, approx.			
• Without integrated line filter	kg (lb)	–	1.7 (3.75)
• With integrated line filter	kg (lb)	1.8 (3.97)	–

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. The current values are specified on the rating plate of the Power Module.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

PM240 Power Modules

Line voltage 380 ... 480 V 3 AC		PM240 Power Modules				
Without integrated line filter		6SL3224- OBE13-7UA0	6SL3224- OBE15-5UA0	6SL3224- OBE17-5UA0	6SL3224- OBE21-1UA0	6SL3224- OBE21-5UA0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_L^{1)}$	A	1.3	1.7	2.2	3.1	4.1
• Base-load current $I_H^{2)}$	A	1.3	1.7	2.2	3.1	4.1
• I_{max}	A	2.6	3.4	4.4	6.2	8.2
Rated power						
• Based on I_L	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• Based on I_H	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.97	0.97	0.97	0.97	0.97
Power loss at rated current	kW	0.09	0.1	0.1	0.1	0.11
Cooling air requirement	m ³ /s (ft ³ /s)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)
Sound pressure level L_{pA} (1 m)	dB	<45	<45	<45	<45	<45
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Rated input current ³⁾						
• With line reactor	A	1.4	1.8	2.3	3.2	4.3
• Without line reactor	A	1.7	2.1	2.6	3.9	4.9
Length of cable to braking resistor, max.	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals				
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor connection U2, V2, W2		Screw terminals				
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Screw terminals				
• Conductor cross-section	mm ²	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
PE connection		On housing with M4 screw				
Motor cable length ⁴⁾, max.						
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20				
Dimensions						
• Width	mm (in)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)
• Height	mm (in)	173 (6.81)	173 (6.81)	173 (6.81)	173 (6.81)	173 (6.81)
• Depth						
- Without Control Unit	mm (in)	145 (5.71)	145 (5.71)	145 (5.71)	145 (5.71)	145 (5.71)
- With Control Unit	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)	210 (8.27)	210 (8.27)
Frame size		FSA				
Weight, approx.	kg (lb)	1.1 (2.43)	1.1 (2.43)	1.1 (2.43)	1.1 (2.43)	1.1 (2.43)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. These current values without line reactor are specified on the rating plate of the Power Module.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM240 Power Modules				
Without integrated line filter		6SL3224-0BE22-2UA0	6SL3224-0BE23-0UA0	6SL3224-0BE24-0UA0	6SL3224-0BE25-5UA0	6SL3224-0BE27-5UA0
With integrated line filter		6SL3224-0BE22-2AA0	6SL3224-0BE23-0AA0	6SL3224-0BE24-0AA0	6SL3224-0BE25-5AA0	6SL3224-0BE27-5AA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} ¹⁾	A	5.9	7.7	10.2	18	25
• Base-load current I_L ¹⁾	A	5.9	7.7	10.2	18	25
• Base-load current I_H ²⁾	A	5.9	7.7	10.2	13.2	19
• I_{max}	A	11.8	15.4	20.4	26.4	38
Rated power						
• Based on I_L	kW (hp)	2.2 (3.0)	3 (4)	4 (5)	7.5 (10)	11 (15)
• Based on I_H	kW (hp)	2.2 (3.0)	3 (4)	4 (5)	5.5 (7.5)	7.5 (10)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.95	0.95	0.95	0.95	0.95
Power loss at rated current	kW	0.14	0.16	0.18	0.24	0.30
Cooling air requirement	m ³ /s (ft ³ /s)	0.024 (0.85)	0.024 (0.85)	0.024 (0.85)	0.055 (1.94)	0.055 (1.94)
Sound pressure level L_{pA} (1 m)	dB	<50	<50	<50	<60	<60
24 V DC power supply for the Control Unit	A	1	1	1	1	1
Rated input current³⁾						
• With line reactor	A	6.1	8	10.4	18.7	26
• Without line reactor	A	7.6	10.2	13.4	21.9	31.5
Length of cable to braking resistor, max.	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	1 ... 6	1 ... 6	1 ... 6	2.5 ... 10	2.5 ... 10
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	1 ... 6	1 ... 6	1 ... 6	2.5 ... 10	2.5 ... 10
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	1 ... 6	1 ... 6	1 ... 6	2.5 ... 10	2.5 ... 10
PE connection		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
Motor cable length⁴⁾, max.						
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	153 (6.02)	153 (6.02)	153 (6.02)	189 (7.44)	189 (7.44)
• Height	mm (in)	270 (10.63)	270 (10.63)	270 (10.63)	334 (13.15)	334 (13.15)
• Depth						
- Without Control Unit	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	185 (7.28)	185 (7.28)
- With Control Unit	mm (in)	230 (9.06)	230 (9.06)	230 (9.06)	250 (9.84)	250 (9.84)
Frame size		FSB	FSB	FSB	FSC	FSC
Weight, approx.	kg (lb)	4 (8.8)	4 (8.8)	4 (8.8)	7 (15.4)	7 (15.4)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. These current values without line reactor are specified on the rating plate of the Power Module.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM240 Power Modules				
Without integrated line filter		6SL3224-0BE31-1UA0	6SL3224-0BE31-5UA0	6SL3224-0BE31-8UA0	6SL3224-0BE32-2UA0	6SL3224-0BE33-0UA0
With integrated line filter		6SL3224-0BE31-1AA0	6SL3224-0BE31-5AA0	6SL3224-0BE31-8AA0	6SL3224-0BE32-2AA0	6SL3224-0BE33-0AA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} ¹⁾	A	32	38	45	60	75
• Base-load current I_L ¹⁾	A	32	38	45	60	75
• Base-load current I_H ²⁾	A	26	32	38	45	60
• I_{max}	A	52	64	76	90	124
Rated power						
• Based on I_L	kW (hp)	15 (20)	18.5 (25)	22 (30)	30 (40)	37 (50)
• Based on I_H	kW (hp)	11 (15)	15 (20)	18.5 (25)	22 (30)	30 (40)
Rated pulse frequency						
	kHz	4	4	4	4	4
Efficiency η						
		>0.97	>0.97	>0.97	>0.97	>0.97
Power loss at rated current						
	kW	0.4	0.42	0.52	0.69	0.99
Cooling air requirement						
	m ³ /s (ft ³ /s)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)
Sound pressure level L_{pA} (1 m)						
	dB	<60	<60	<60	<61	<60
24 V DC power supply for the Control Unit						
	A	1	1	1	1	1
Rated input current ³⁾						
• With line reactor	A	33	40	47	63	78
• Without line reactor	A	39	46	53	72	88
Length of cable to braking resistor, max.						
	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	2.5 ... 10	10 ... 50	10 ... 50	10 ... 50	10 ... 50
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	2.5 ... 10	10 ... 50	10 ... 50	10 ... 50	10 ... 50
DC link connection, connection for braking resistor DCP/R1, DCN, R2						
• Conductor cross-section	mm ²	2.5 ... 10	10 ... 50	10 ... 50	10 ... 50	10 ... 50
PE connection						
		On housing with M5 screw	On housing with M6 screw	On housing with M6 screw	On housing with M6 screw	On housing with M6 screw
Motor cable length ⁴⁾, max.						
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection						
		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	189 (7.44)	275 (10.83)	275 (10.83)	275 (10.83)	275 (10.83)
• Height						
- Without integrated line filter	mm (in)	334 (13.15)	419 (16.50)	419 (16.50)	419 (16.50)	499 (19.65)
- With integrated line filter	mm (in)	334 (13.15)	512 (20.16)	512 (20.16)	512 (20.16)	635 (25.0)
• Depth						
- Without Control Unit	mm (in)	185 (7.28)	204 (8.03)	204 (8.03)	204 (8.03)	204 (8.03)
- With Control Unit	mm (in)	250 (9.84)	260 (10.24)	260 (10.24)	260 (10.24)	260 (10.24)
Frame size						
		FSC	FSD	FSD	FSD	FSE
Weight, approx.						
• Without integrated line filter	kg (lb)	7 (15.4)	13 (28.7)	13 (28.7)	13 (28.7)	16 (35.3)
• With integrated line filter	kg (lb)	7 (15.4)	16 (35.3)	16 (35.3)	16 (35.3)	23 (50.7)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to $u_k = 1\%$. These current values without line reactor are specified on the rating plate of the Power Module.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM240 Power Modules					
Without integrated line filter		6SL3224-0BE33-7UA0	6SL3224-0BE34-5UA0	6SL3224-0BE35-5UA0	6SL3224-0BE37-5UA0	6SL3224-0BE38-8UA0	6SL3224-0BE41-1UA0
With integrated line filter		6SL3224-0BE33-7AA0	6SL3224-0BE34-5AA0	6SL3224-0BE35-5AA0	6SL3224-0BE37-5AA0	–	–
Output current at 50 Hz 400 V 3 AC							
• Rated current $I_{rated}^{1)}$	A	90	110	145	178	205	250
• Base-load current $I_L^{1)}$	A	90	110	145	178	205	250
• Base-load current $I_H^{2)}$	A	75	90	110	145	178	205
• I_{max}	A	150	180	220	290	308	375
Rated power							
• Based on I_L	kW (hp)	45 (60)	55 (75)	75 (100)	90 (125)	110 (150)	132 (200)
• Based on I_H	kW (hp)	37 (50)	45 (60)	55 (75)	75 (100)	90 (125)	110 (150)
Rated pulse frequency		kHz	4	4	4	4	2
Efficiency η			>0.97	>0.97	>0.97	>0.97	>0.97
Power loss at rated current		kW	1.21	1.42	1.93	2.31	2.43
Cooling air requirement		m ³ /s (ft ³ /s)	2 × 0.055 (1.94)	0.15 (5.3)	0.15 (5.3)	0.15 (5.3)	0.15 (5.3)
Sound pressure level L_{pA} (1 m)		dB	<62	<60	<60	<65	<65
24 V DC power supply for the Control Unit		A	1	1	1	1	1
Rated input current ³⁾							
• With line reactor	A	94	115	151	186	210	250
• Without line reactor	A	105	129	168	204	245	299
Length of cable to braking resistor, max.		m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line supply connection U1/L1, V1/L2, W1/L3			M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section	mm ²	10 ... 50	25 ... 120	25 ... 120	25 ... 120	25 ... 120	25 ... 120
Motor connection U2, V2, W2			M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section	mm ²	10 ... 50	25 ... 120	25 ... 120	25 ... 120	25 ... 120	25 ... 120
DC link connection, connection for braking resistor DCP/R1, DCN, R2			M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section	mm ²	10 ... 50	25 ... 120	25 ... 120	25 ... 120	25 ... 120	25 ... 120
PE connection			On housing with M6 screw	On housing with M8 screw	On housing with M8 screw	On housing with M8 screw	On housing with M8 screw
Motor cable length ⁴⁾, max.							
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection			IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	275 (10.83)	350 (13.78)	350 (13.78)	350 (13.78)	350 (13.78)	350 (13.78)
• Height							
- Without integrated line filter	mm (in)	499 (19.65)	634 (24.96)	634 (24.96)	634 (24.96)	634 (24.96)	634 (24.96)
- With integrated line filter	mm (in)	635 (25.0)	934 (36.77)	934 (36.77)	934 (36.77)	–	–
• Depth							
- Without Control Unit	mm (in)	204 (8.03)	316 (12.44)	316 (12.44)	316 (12.44)	316 (12.44)	316 (12.44)
- With Control Unit	mm (in)	260 (10.24)	372 (14.65)	372 (14.65)	372 (14.65)	372 (14.65)	372 (14.65)
Frame size			FSE	FSF	FSF	FSF	FSF
Weight, approx.							
• Without integrated line filter	kg (lb)	16 (35.3)	36 (79.4)	36 (79.4)	36 (79.4)	39 (86)	39 (86)
• With integrated line filter	kg (lb)	23 (50.7)	52 (115)	52 (115)	52 (115)	–	–

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. These current values without line reactor are specified on the rating plate of the Power Module.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM240 Power Modules		
		Without integrated line filter	6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0
Output current at 50 Hz 400 V 3 AC				
• Rated current $I_{rated}^{1)}$	A	302	370	477
• Base-load current $I_L^{1)}$	A	302	370	477
• Base-load current $I_H^{2)}$	A	250	302	370
• I_{max}	A	400	483	592
Rated power				
• Based on I_L	kW (hp)	160 (250)	200 (300)	250 (400)
• Based on I_H	kW (hp)	132 (200)	160 (215)	200 (300)
Rated pulse frequency		kHz	2	2
Efficiency η			>0.98	>0.98
Power loss at rated current		kW	3.9	4.4
Cooling air requirement		m ³ /s (ft ³ /s)	0.36 (12.7)	0.36 (12.7)
Sound pressure level L_{pA} (1 m)		dB	<69	<69
24 V DC power supply for the Control Unit		A	1	1
Rated input current ³⁾				
• With line reactor	A	245	297	354
• Without line reactor	A	297	354	442
Length of cable to braking resistor, max.		m (ft)	50 (164)	50 (164)
Line supply connection U1/L1, V1/L2, W1/L3			M10 screw stud	M10 screw stud
• Conductor cross-section	mm ²	2 × 240	2 × 240	2 × 240
Motor connection U2, V2, W2			M10 screw stud	M10 screw stud
• Conductor cross-section	mm ²	2 × 240	2 × 240	2 × 240
PE connection			On housing with M10 screw	On housing with M10 screw
Motor cable length ⁴⁾, max.				
• Shielded	m (ft)	200 (656)	200 (656)	200 (656)
• Unshielded	m (ft)	300 (984)	300 (984)	300 (984)
Degree of protection			IP20	IP20
Dimensions				
• Width	mm (in)	326 (12.83)	326 (12.83)	326 (12.83)
• Height	mm (in)	1533 (60.35)	1533 (60.35)	1533 (60.35)
• Depth	mm (in)	547 (21.54)	547 (21.54)	547 (21.54)
Frame size			FSGX	FSGX
Weight, approx.		kg (lb)	174 (384)	174 (384)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. These current values without line reactor are specified on the rating plate of the Power Module.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

PM250 Power Modules

Line voltage 380 ... 480 V 3 AC		PM250 Power Modules		
With integrated line filter		6SL3225-0BE25-5AA1	6SL3225-0BE27-5AA1	6SL3225-0BE31-1AA1
Output current at 50 Hz 400 V 3 AC				
• Rated current I_{rated} ¹⁾	A	18	25	32
• Base-load current I_L ¹⁾	A	18	25	32
• Base-load current I_H ²⁾	A	13.2	19	26
• I_{max}	A	26.4	38	52
Rated power				
• Based on I_L	kW (hp)	7.5 (10)	11 (15)	15 (20)
• Based on I_H	kW (hp)	5.5 (7.5)	7.5 (10)	11 (15)
Rated pulse frequency	kHz	4	4	4
Efficiency η		0.95	0.95	0.95
Power loss at rated current	kW	0.26	0.28	0.31
Cooling air requirement	m ³ /s (ft ³ /s)	0.038 (1.34)	0.038 (1.34)	0.038 (1.34)
Sound pressure level L_{pA} (1 m)	dB	<60	<60	<60
24 V DC power supply for the Control Unit	A	1	1	1
Input current³⁾				
• Rated current	A	18	25	32
• Based on I_H	A	13.2	19	26
Line supply connection U1/L1, V1/L2, W1/L3				
• Conductor cross-section	mm ²	2.5 ... 10	2.5 ... 10	2.5 ... 10
Motor connection U2, V2, W2				
• Conductor cross-section	mm ²	2.5 ... 10	2.5 ... 10	2.5 ... 10
PE connection				
		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
Motor cable length, max.				
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)
Degree of protection				
		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	189 (7.44)	189 (7.44)	189 (7.44)
• Height	mm (in)	334 (13.15)	334 (13.15)	334 (13.15)
• Depth				
- Without Control Unit	mm (in)	185 (7.28)	185 (7.28)	185 (7.28)
- With Control Unit	mm (in)	250 (9.84)	250 (9.84)	250 (9.84)
Frame size				
		FSC	FSC	FSC
Weight, approx.	kg (lb)	7.5 (16.5)	7.5 (16.5)	7.5 (16.5)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM250 Power Modules		
Without integrated line filter		6SL3225-0BE31-5UA0	6SL3225-0BE31-8UA0	6SL3225-0BE32-2UA0
With integrated line filter		6SL3225-0BE31-5AA0	6SL3225-0BE31-8AA0	6SL3225-0BE32-2AA0
Output current at 50 Hz 400 V 3 AC				
• Rated current $I_{rated}^{1)}$	A	38	45	60
• Base-load current $I_L^{1)}$	A	38	45	60
• Base-load current $I_H^{2)}$	A	32	38	45
• I_{max}	A	64	76	90
Rated power				
• Based on I_L	kW (hp)	18.5 (25)	22 (30)	30 (40)
• Based on I_H	kW (hp)	15 (20)	18.5 (25)	22 (30)
Rated pulse frequency		kHz	4	4
Efficiency η			>0.97	>0.97
Power loss at rated current		kW	0.42	0.52
Cooling air requirement		m ³ /s (ft ³ /s)	0.022 (0.78)	0.022 (0.78)
Sound pressure level L_{pA} (1 m)		dB	<60	<61
24 V DC power supply for the Control Unit		A	1	1
Input current ³⁾				
• Rated current	A	36	42	56
• Based on I_H	A	30	36	42
Line supply connection U1/L1, V1/L2, W1/L3		M6 screw studs		
• Conductor cross-section	mm ²	10 ... 35	10 ... 35	10 ... 35
Motor connection U2, V2, W2		M6 screw studs		
• Conductor cross-section	mm ²	10 ... 35	10 ... 35	10 ... 35
PE connection		On housing with M6 screw		
Motor cable length ⁴⁾, max.				
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20		
Dimensions				
• Width	mm (in)	275 (10.83)	275 (10.83)	275 (10.83)
• Height				
- Without integrated line filter	mm (in)	419 (16.50)	419 (16.50)	419 (16.50)
- With integrated line filter	mm (in)	512 (20.16)	512 (20.16)	512 (20.16)
• Depth				
- Without Control Unit	mm (in)	204 (8.03)	204 (8.03)	204 (8.03)
- With Control Unit	mm (in)	260 (10.24)	260 (10.24)	260 (10.24)
Frame size		FSD		
Weight, approx.				
• Without integrated line filter	kg (lb)	13 (28.7)	13 (28.7)	13 (28.7)
• With integrated line filter	kg (lb)	15 (33.1)	15 (33.1)	16 (35.3)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM250 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 380 ... 480 V 3 AC		PM250 Power Modules				
Without integrated line filter		6SL3225-0BE33-0UA0	6SL3225-0BE33-7UA0	6SL3225-0BE34-5UA0	6SL3225-0BE35-5UA0	6SL3225-0BE37-5UA0
With integrated line filter		6SL3225-0BE33-0AA0	6SL3225-0BE33-7AA0	6SL3225-0BE34-5AA0	6SL3225-0BE35-5AA0	6SL3225-0BE37-5AA0
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	75	90	110	145	178
• Base-load current $I_L^{1)}$	A	75	90	110	145	178
• Base-load current $I_H^{2)}$	A	60	75	90	110	145
• I_{max}	A	120	150	180	220	290
Rated power						
• Based on I_L	kW (hp)	37 (50)	45 (60)	55 (75)	75 (100)	90 (125)
• Based on I_H	kW (hp)	30 (40)	37 (50)	45 (60)	55 (75)	75 (100)
Rated pulse frequency		kHz	4	4	4	4
Efficiency η			>0.97	>0.97	>0.97	>0.97
Power loss at rated current		kW	0.99	1.21	1.42	1.93
Cooling air requirement		m ³ /s (ft ³ /s)	0.022 (0.78)	0.039 (1.38)	0.094 (3.32)	0.094 (3.32)
Sound pressure level L_{pA} (1 m)		dB	<60	<62	<60	<65
24 V DC power supply for the Control Unit		A	1	1	1	1
Input current ³⁾						
• Rated current	A	70	84	102	135	166
• Based on I_H	A	56	70	84	102	135
Line supply connection U1/L1, V1/L2, W1/L3			M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section, max.	mm ²	10 ... 50	10 ... 50	25 ... 120	25 ... 120	25 ... 120
Motor connection U2, V2, W2			M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section, max.	mm ²	10 ... 50	10 ... 50	25 ... 120	25 ... 120	25 ... 120
PE connection			On housing with M6 screw	On housing with M6 screw	On housing with M8 screw	On housing with M8 screw
Motor cable length ⁴⁾, max.						
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection			IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	275 (10.83)	275 (10.83)	350 (13.78)	350 (13.78)	350 (13.78)
• Height						
- Without integrated line filter	mm (in)	499 (19.65)	499 (19.65)	634 (24.96)	634 (24.96)	634 (24.96)
- With integrated line filter	mm (in)	635 (25.0)	635 (25.0)	934 (36.77)	934 (36.77)	934 (36.77)
• Depth						
- Without Control Unit	mm (in)	204 (8.03)	204 (8.03)	316 (12.44)	316 (12.44)	316 (12.44)
- With Control Unit	mm (in)	260 (10.24)	260 (10.24)	372 (14.65)	372 (14.65)	372 (14.65)
Frame size			FSE	FSE	FSF	FSF
Weight, approx.						
• Without integrated line filter	kg (lb)	14 (30.9)	14 (30.9)	35 (77.2)	35 (77.2)	35 (77.2)
• With integrated line filter	kg (lb)	21 (46.3)	21 (46.3)	51 (112)	51 (112)	51 (112)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Max. motor cable length 25 m (82 ft) (shielded) for PM250 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

PM260 Power Modules

Line voltage 500 ... 690 V 3 AC		PM260 Power Modules		
Without integrated line filter		6SL3225-0BH27-5UA1	6SL3225-0BH31-1UA1	6SL3225-0BH31-5UA1
With integrated line filter		6SL3225-0BH27-5AA1	6SL3225-0BH31-1AA1	6SL3225-0BH31-5AA1
Output current at 50 Hz 690 V 3 AC				
• Rated current I_{rated} ¹⁾	A	14	19	23
• Base-load current I_L ¹⁾	A	14	19	23
• Base-load current I_H ²⁾	A	10	14	19
• I_{max}	A	20	28	38
Rated power				
• Based on I_L	kW (hp)	11 (15)	15 (20)	18.5 (25)
• Based on I_H	kW (hp)	7.5 (10)	11 (15)	15 (20)
Rated pulse frequency		kHz	16	16
Efficiency η			0.95	0.95
Power loss at rated current		kW	0.58	0.82
Cooling air requirement		m ³ /s (ft ³ /s)	0.044 (1.55)	0.044 (1.55)
Sound pressure level L_{pA} (1 m)		dB	<64	<64
24 V DC power supply for the Control Unit		A	1	1
Input current ³⁾				
• Rated current	A	13	18	22
• Based on I_H	A	10	13	18
Line supply connection U1/L1, V1/L2, W1/L3		Terminal strip		
• Conductor cross-section	mm ²	2.5 ... 16	2.5 ... 16	2.5 ... 16
Motor connection U2, V2, W2		Terminal strip		
• Conductor cross-section	mm ²	2.5 ... 16	2.5 ... 16	2.5 ... 16
PE connection		On housing with M6 screw		
Motor cable length, max. ⁴⁾				
• Shielded	m (ft)	200 (656)	200 (656)	200 (656)
• Unshielded	m (ft)	300 (984)	300 (984)	300 (984)
Degree of protection		IP20		
Dimensions				
• Width	mm (in)	275 (10.83)	275 (10.83)	275 (10.83)
• Height	mm (in)	512 (20.16)	512 (20.16)	512 (20.16)
• Depth				
- Without Control Unit	mm (in)	204 (8.03)	204 (8.03)	204 (8.03)
- With Control Unit	mm (in)	260 (10.24)	260 (10.24)	260 (10.24)
Frame size		FSD		
Weight, approx.				
• Without integrated line filter	kg (lb)	22 (48.5)	22 (48.5)	22 (48.5)
• With integrated line filter	kg (lb)	23 (50.7)	23 (50.7)	23 (50.7)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Shielded motor cables must be used in order to maintain the limit values for field-conducted disturbances according to EN 61800-3 Class C2.

SINAMICS G120 standard inverters

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

Power Modules

Technical specifications

Line voltage 500 ... 690 V 3 AC		PM260 Power Modules		
Without integrated line filter		6SL3225-0BH32-2UA1	6SL3225-0BH33-0UA1	6SL3225-0BH33-7UA1
With integrated line filter		6SL3225-0BH32-2AA1	6SL3225-0BH33-0AA1	6SL3225-0BH33-7AA1
Output current at 50 Hz 690 V 3 AC				
• Rated current $I_{rated}^{1)}$	A	35	42	62
• Base-load current $I_L^{1)}$	A	35	42	62
• Base-load current $I_H^{2)}$	A	26	35	42
• I_{max}	A	52	70	84
Rated power				
• Based on I_L	kW (hp)	30 (40)	37 (50)	55 (75)
• Based on I_H	kW (hp)	22 (30)	30 (40)	37 (50)
Rated pulse frequency				
	kHz	16	16	16
Efficiency η				
		0.95	0.95	0.95
Power loss at rated current				
	kW	1.13	1.29	1.73
Cooling air requirement				
	m ³ /s (ft ³ /s)	0.131 (4.63)	0.131 (4.63)	0.131 (4.63)
Sound pressure level L_{pA} (1 m)				
	dB	<70	<70	<70
24 V DC power supply for the Control Unit				
	A	1	1	1
Input current ³⁾				
• Rated current	A	34	41	60
• Based on I_H	A	26	34	41
Line supply connection U1/L1, V1/L2, W1/L3				
• Conductor cross-section	mm ²	10 ... 50	10 ... 50	10 ... 50
Motor connection U2, V2, W2				
• Conductor cross-section	mm ²	10 ... 50	10 ... 50	10 ... 50
PE connection				
		On housing with M6 screw	On housing with M6 screw	On housing with M6 screw
Motor cable length, max. ⁴⁾				
• Shielded	m (ft)	200 (656)	200 (656)	200 (656)
• Unshielded	m (ft)	300 (984)	300 (984)	300 (984)
Degree of protection				
		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	350 (13.78)	350 (13.78)	350 (13.78)
• Height	mm (in)	634 (24.96)	634 (24.96)	634 (24.96)
• Depth				
- Without Control Unit	mm (in)	316 (12.44)	316 (12.44)	316 (12.44)
- With Control Unit	mm (in)	372 (14.65)	372 (14.65)	372 (14.65)
Frame size				
		FSF	FSF	FSF
Weight, approx.				
• Without integrated line filter	kg (lb)	56 (123)	56 (123)	56 (123)
• With integrated line filter	kg (lb)	58 (128)	58 (128)	58 (128)

¹⁾ The rated output current I_{rated} and the base-load current I_L are based on the duty cycle for low overload (LO).

²⁾ The base-load current I_H is based on the duty cycle for high overload (HO).

³⁾ The input current depends on the motor load and line impedance and applies for a line impedance corresponding to $u_K = 1\%$. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

⁴⁾ Shielded motor cables must be used in order to maintain the limit values for field-conducted disturbances according to EN 61800-3 Class C2.

SINAMICS G120 standard inverters

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

Power Modules

Characteristic curves

Derating data, PM230 Power Modules

Pulse frequency

Rated power ¹⁾ at 50 Hz 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.37	0.5	1.3	1.11	0.91	0.78	0.65	0.59	0.52
0.55	0.75	1.7	1.45	1.19	1.02	0.85	0.77	0.68
0.75	1.0	2.2	1.87	1.54	1.32	1.10	0.99	0.88
1.1	1.5	3.1	2.64	2.17	1.86	1.55	1.40	1.24
1.5	2.0	4.1	3.49	2.87	2.46	2.05	1.85	1.64
2.2	3.0	5.9	5.02	4.13	3.54	2.95	2.66	2.36
3.0	4.0	7.7	6.55	5.39	4.62	3.85	3.47	3.08
4.0	5.0	10.2	8.67	7.14	6.12	5.1	4.59	4.08
5.5	7.5	13.2	11.22	9.24	7.92	6.6	5.94	5.28
7.5	10	18.0	15.3	12.6	10.8	9.0	8.1	7.2
11.0	15	26.0	22.1	18.2	15.6	13.0	11.7	10.4
15.0	20	32.0	27.2	22.4	19.2	16.0	14.4	12.8
18.5	25	38.0	32.3	26.6	22.8	19.0	17.1	15.2
22	30	45.0	38.25	31.5	27.0	22.5	20.25	18.0
30	40	60.0	51.0	42.0	36.0	30.0	27.0	24.0
37	50	75.0	63.75	52.5	45.0	37.5	33.75	30.0
45	60	90.0	76.5	63.0	54.0	45.0	40.5	36.0
55	75	110	93.5	77.0	66.0 ²⁾	55.0 ²⁾	49.5 ²⁾	44.0 ²⁾
75	100	145	123.3	101.5	–	–	–	–
90	125	178	151.3	124.6	–	–	–	–

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¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

²⁾ Values apply only to IP20 variants.

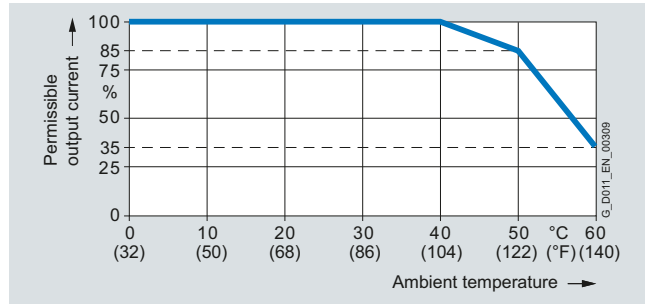
SINAMICS G120 standard inverters

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

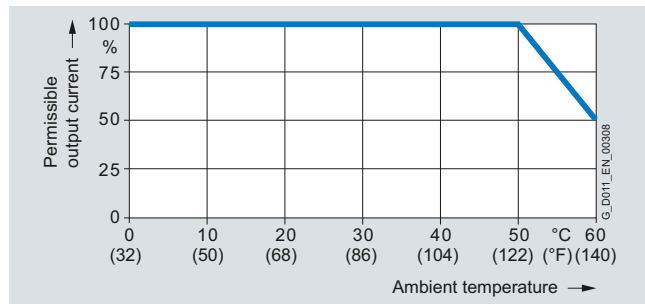
Power Modules

Characteristic curves

Ambient temperature



Low overload (LO) for PM230 Power Modules, frame sizes FSA to FSF



High overload (HO) for PM230 Power Modules, frame sizes FSA to FSF

Note:

The operating temperature ranges of the Control Units should be taken into account. [The temperature ranges are specified in the section Technical specifications under Control Units](#)

Installation altitude

The clearance inside the inverter can isolate surge voltages in accordance with overvoltage category III as defined by EN 60664-1 up to an installation altitude of up to 2000 m (6562 ft) above sea level.

At least one of the following conditions must be fulfilled for altitudes above 2000 m (6562 ft) and below 4000 m (13124 ft) above sea level:

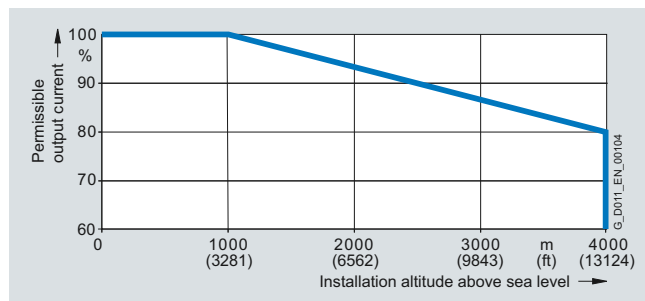
The inverter is connected to:

- A TN system with isolated neutral (not an externally grounded connector) or
- via an isolation transformer which provides a TN system with a grounded neutral.

There is no need to reduce the line voltage.

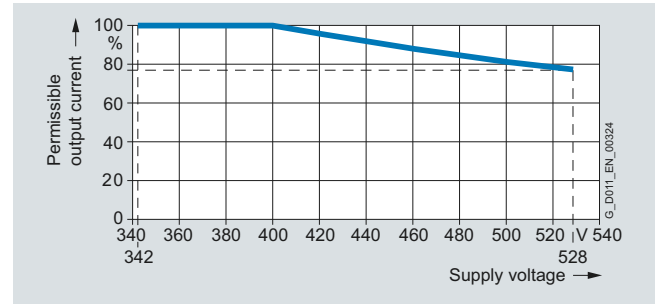
Note:

The connected motors and power elements must be considered separately.

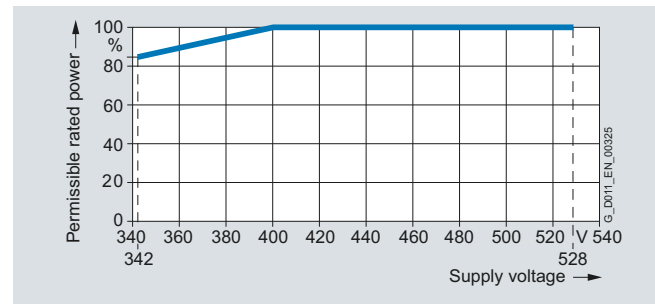


Permissible output current as a function of installation altitude

System operating voltage



Permissible output current as a function of line voltage



Permissible rated power as a function of line voltage

SINAMICS G120 standard inverters

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

Power Modules

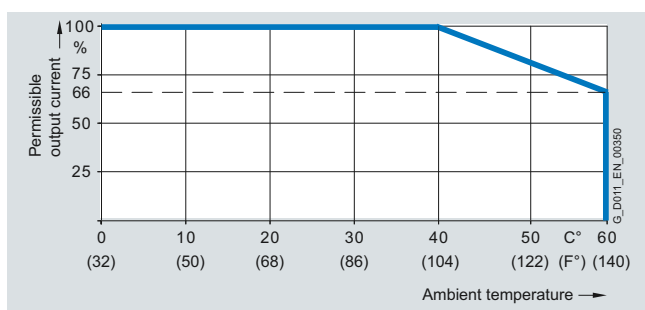
Characteristic curves

Derating data, PM240-2 Power Modules

Pulse frequency

Rated power ¹⁾ at 50 Hz 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.55	0.75	1.7	1.45	1.19	1.02	0.85	0.77	0.68
0.75	1.0	2.2	1.87	1.54	1.32	1.10	0.99	0.88
1.1	1.5	3.1	2.64	2.17	1.86	1.55	1.40	1.24
1.5	2.0	4.1	3.49	2.87	2.46	2.05	1.85	1.64
2.2	3.0	5.9	5.02	4.13	3.54	2.95	2.66	2.36
3.0	4.0	7.7	6.55	5.39	4.62	3.85	3.47	3.08

Ambient temperature



Low overload (LO)

Note:

The operating temperature ranges of the Control Units should be taken into account. [The temperature ranges are specified in the section Technical specifications under Control Units.](#)

Installation altitude

The clearance inside the inverter can isolate surge voltages in accordance with overvoltage category III as defined by EN 60664-1 up to an installation altitude of up to 2000 m (6562 ft) above sea level.

At least one of the following conditions must be fulfilled for altitudes above 2000 m (6562 ft) and below 4000 m (13124 ft) above sea level:

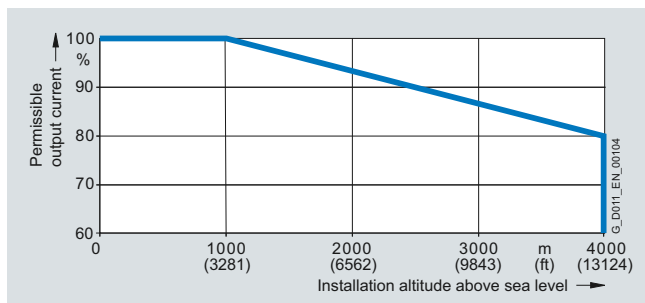
The inverter is connected to:

- a TN system with isolated neutral (not an externally grounded connector) or
- via an isolation transformer which provides a TN system with a grounded neutral.

There is no need to reduce the line voltage.

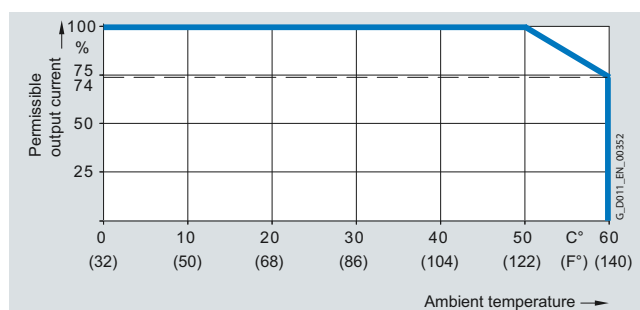
Note:

The connected motors and power elements must be considered separately.

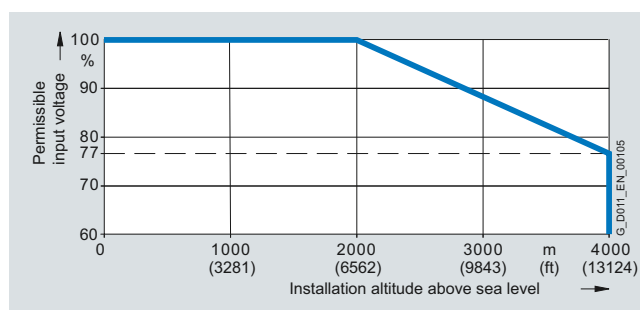


Permissible output current as a function of installation altitude

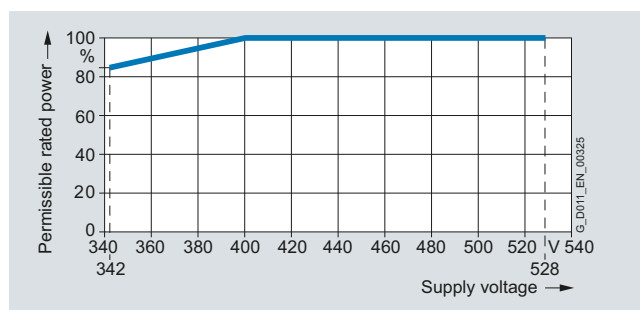
Line voltage



High overload (HO)



Permissible input voltage as a function of installation altitude



Permissible rated power as a function of line voltage

Note:

The operating temperature ranges of the Control Units should be taken into account. [The temperature ranges are specified in the section Technical specifications under Control Units.](#)

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

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SINAMICS G120 standard inverters

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

Power Modules

Characteristic curves

Derating data, PM240 Power Modules

Pulse frequency

Rated power at 400 V 3 AC		Rated output current in A for a pulse frequency of							
kW	hp	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.37	0.50	–	1.3	1.1	0.9	0.8	0.7	0.6	0.5
0.55	0.75	–	1.7	1.4	1.2	1.0	0.9	0.8	0.7
0.75	1.0	–	2.2	1.9	1.5	1.3	1.1	1.0	0.9
1.1	1.5	–	3.1	2.6	2.2	1.9	1.6	1.4	1.2
1.5	2.0	–	4.1	3.5	2.9	2.5	2.1	1.8	1.6
2.2	3.0	–	5.9	5.0	4.1	3.5	3.0	2.7	2.4
3.0	4.0	–	7.7	6.5	5.4	4.6	3.9	3.5	3.1
4.0	5.0	–	10.2	8.7	7.1	6.1	5.1	4.6	4.1
7.5	10	–	18.0	16.2	13.3	11.4	9.5	8.6	7.6
11.0	15	–	25.0	22.1	18.2	15.6	13.0	11.7	10.4
15.0	20	–	32.0	27.2	22.4	19.2	16.0	14.4	12.8
18.5	25	–	38.0	32.3	26.6	22.8	19.0	17.1	15.2
22.0	30	–	45.0	38.3	31.5	27.0	22.5	20.3	18.0
30.0	40	–	62.0	52.7	43.4	37.2	31.0	27.9	24.8
37.0	50	–	75.0	63.8	52.5	45.0	37.5	33.8	30.0
45.0	60	–	90.0	76.5	63.0	54.0	45.0	40.5	36.0
55.0	75	–	110.0	93.5	77.0	–	–	–	–
75.0	100	–	145.0	123.3	101.5	–	–	–	–
90.0	125	–	178.0	151.3	124.6	–	–	–	–
110.0	150	205.0 ¹⁾	178.0	–	–	–	–	–	–
132.0	200	250.0 ¹⁾	202.0	–	–	–	–	–	–
160.0	250	302.0 ¹⁾	250.0	–	–	–	–	–	–
200.0	300	370.0 ¹⁾	302.0	–	–	–	–	–	–
250.0	400	477.0 ¹⁾	370.0	–	–	–	–	–	–

¹⁾ The pulse frequency can only be switched over from 4 kHz (default) to 2 kHz for the low overload (LO) duty cycle.

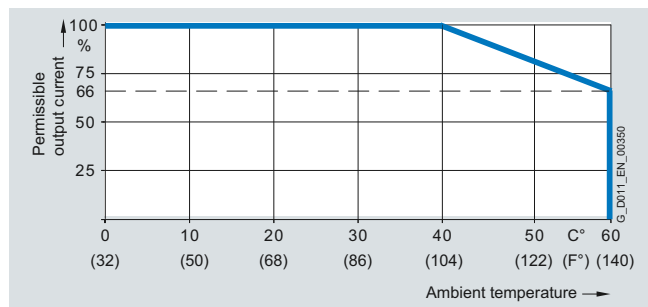
SINAMICS G120 standard inverters

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

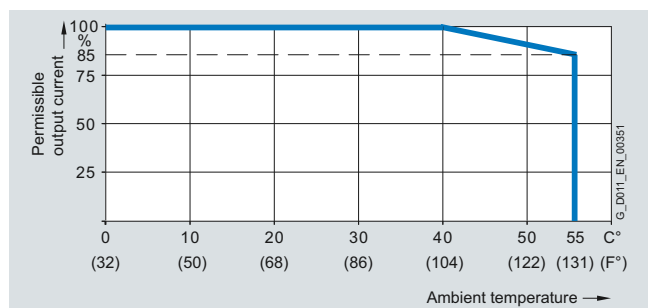
Power Modules

Characteristic curves

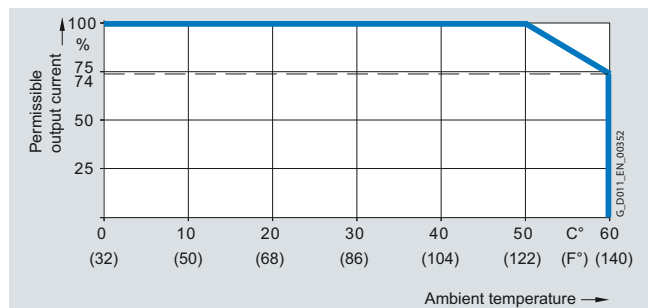
Ambient temperature



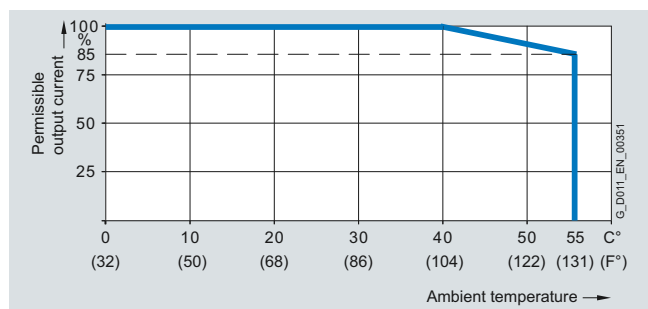
Low overload (LO) for PM240 Power Modules, frame sizes FSA to FSF



Low overload (LO) for PM240 Power Modules, frame size FSGX



High overload (HO) for PM240 Power Modules, frame sizes FSA to FSF



High overload (HO) for PM240 Power Modules, frame size FSGX

Note:

The operating temperature ranges of the Control Units should be taken into account. [The temperature ranges are specified in the section Technical specifications under Control Units.](#)

Installation altitude

The clearance inside the inverter can isolate surge voltages in accordance with overvoltage category III as defined by EN 60664-1 up to an installation altitude of up to 2000 m (6562 ft) above sea level.

At least one of the following conditions must be fulfilled for altitudes above 2000 m (6562 ft) and below 4000 m (13124 ft) above sea level:

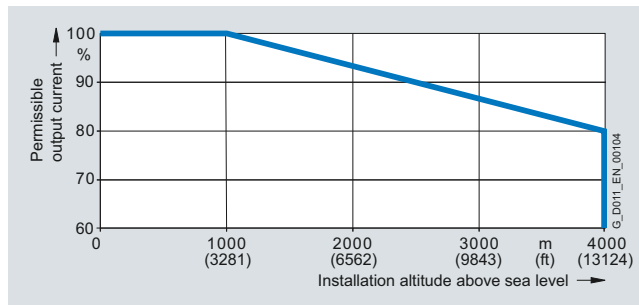
The inverter is connected to:

- a TN system with isolated neutral (not an externally grounded connector) or
- via an isolation transformer which provides a TN system with a grounded neutral.

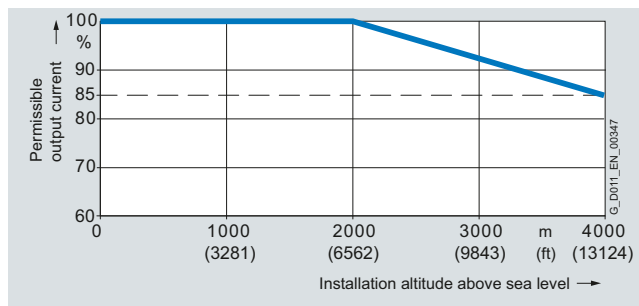
There is no need to reduce the line voltage.

Note:

The connected motors and power elements must be considered separately.



Permissible output current as a function of the installation altitude for PM240 Power Modules, frame sizes FSA to FSF



Permissible output current as a function of the installation altitude for PM240 Power Modules, frame size FSGX

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SINAMICS G120 standard inverters

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

Power Modules

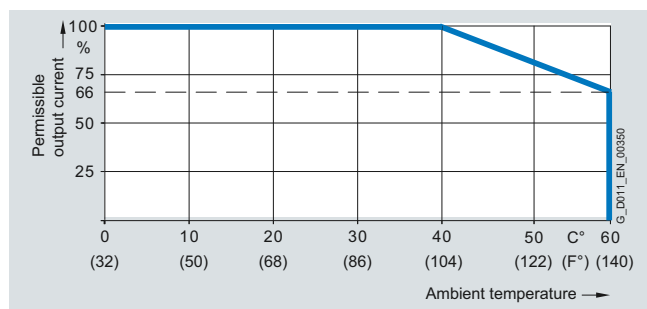
Characteristic curves

Derating data, PM250 Power Modules

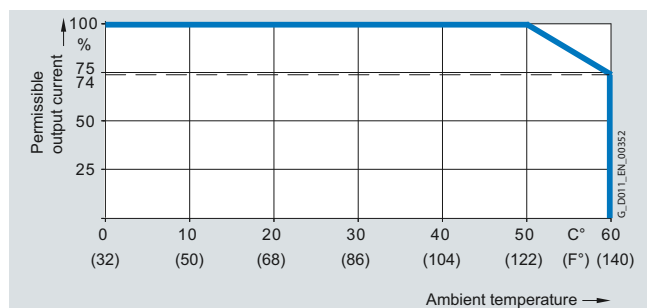
Pulse frequency

Rated power at 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
7.5	10	18	12.5	11.9	10.6	9.2	7.9	6.6
11.0	15	25	18.1	17.1	15.2	13.3	11.4	9.5
15.0	20	32	24.7	23.4	20.8	18.2	15.6	13
18.5	25	38	32	27	23	19	17	15
22.0	30	45	38	32	27	23	20	18
30.0	40	60	51	42	36	30	27	24
37.0	50	75	64	53	45	38	34	30
45.0	60	90	77	63	54	45	41	36
55.0	75	110	94	77	–	–	–	–
75.0	100	145	123	102	–	–	–	–
90.0	125	178	151	125	–	–	–	–

Ambient temperature



Low overload (LO) for PM250 Power Modules, frame sizes FSC to FSF



High overload (HO) for PM250 Power Modules, frame sizes FSC to FSF

Note:

The operating temperature ranges of the Control Units should be taken into account. The temperature ranges are specified in the section [Technical specifications under Control Units](#).

Installation altitude

The clearance inside the inverter can isolate surge voltages in accordance with overvoltage category III as defined by EN 60664-1 up to an installation altitude of up to 2000 m (6562 ft) above sea level.

At least one of the following conditions must be fulfilled for altitudes above 2000 m (6562 ft) and below 4000 m (13124 ft) above sea level:

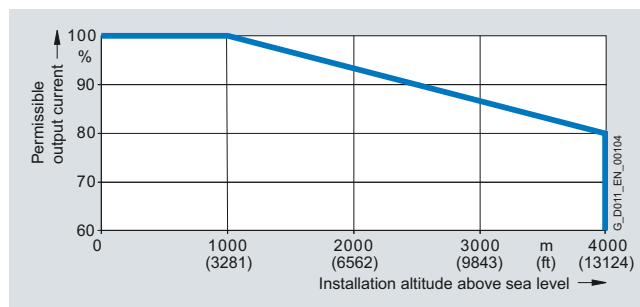
The inverter is connected to:

- a TN system with isolated neutral (not an externally grounded connector) or
- via an isolation transformer which provides a TN system with a grounded neutral.

There is no need to reduce the line voltage.

Note:

The connected motors and power elements must be considered separately.



Permissible output current as a function of the installation altitude for PM250 Power Modules, frame sizes FSC to FSF

SINAMICS G120 standard inverters

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

Power Modules

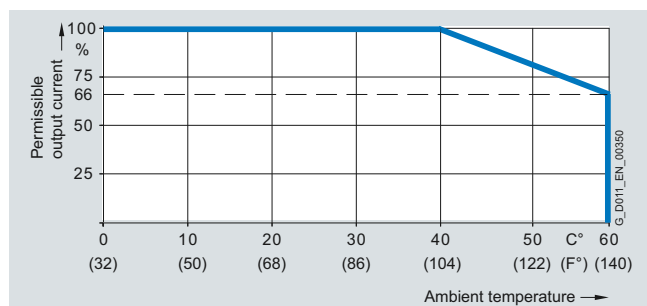
Characteristic curves

Derating data, PM260 Power Modules

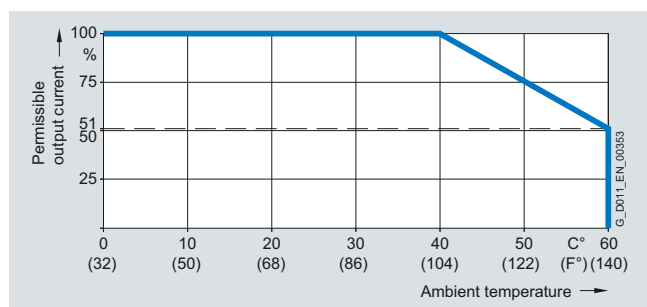
Pulse frequency

No pulse frequency derating, as the PM260 Power Modules continuously operate with 16 kHz.

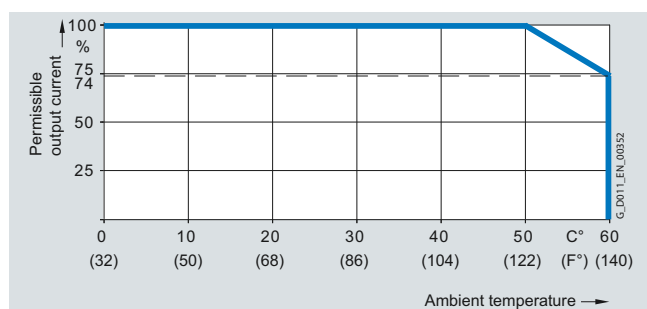
Ambient temperature



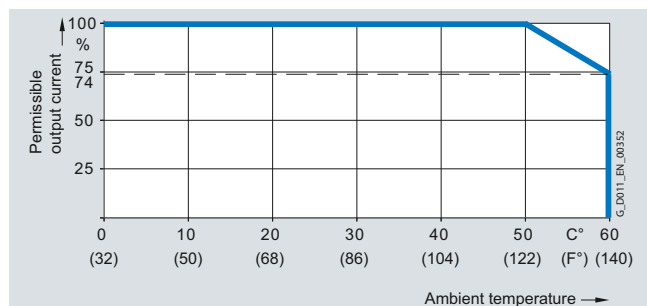
Low overload (LO) for PM260 Power Modules, frame size FSD



Low overload (LO) for PM260 Power Modules, frame size FSF



High overload (HO) for PM260 Power Modules, frame size FSD



High overload (HO) for PM260 Power Modules, frame size FSF

Note:

The operating temperature ranges of the Control Units should be taken into account. [The temperature ranges are specified in the section Technical specifications under Control Units.](#)

Installation altitude

The clearance inside the inverter can isolate surge voltages in accordance with overvoltage category III as defined by EN 60664-1 up to an installation altitude of up to 2000 m (6562 ft) above sea level.

At least one of the following conditions must be fulfilled for altitudes above 2000 m (6562 ft) and below 4000 m (13124 ft) above sea level:

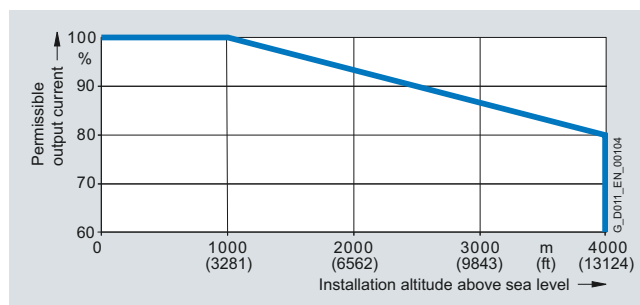
The inverter is connected to:

- a TN system with isolated neutral (not an externally grounded connector) or
- via an isolation transformer which provides a TN system with a grounded neutral.

There is no need to reduce the line voltage.

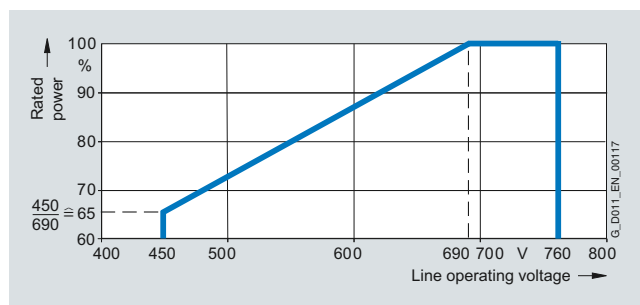
Note:

The connected motors and power elements must be considered separately.



Permissible output current as a function of the installation altitude for PM260 Power Modules, frame sizes FSD and FSF

System operating voltage



Permissible rated power as a function of the system operating voltage for PM260 Power Modules, frame sizes FSD and FSF

Note:

The power units can be operated with 500 V -10%. In this case, the power is linearly reduced correspondingly.

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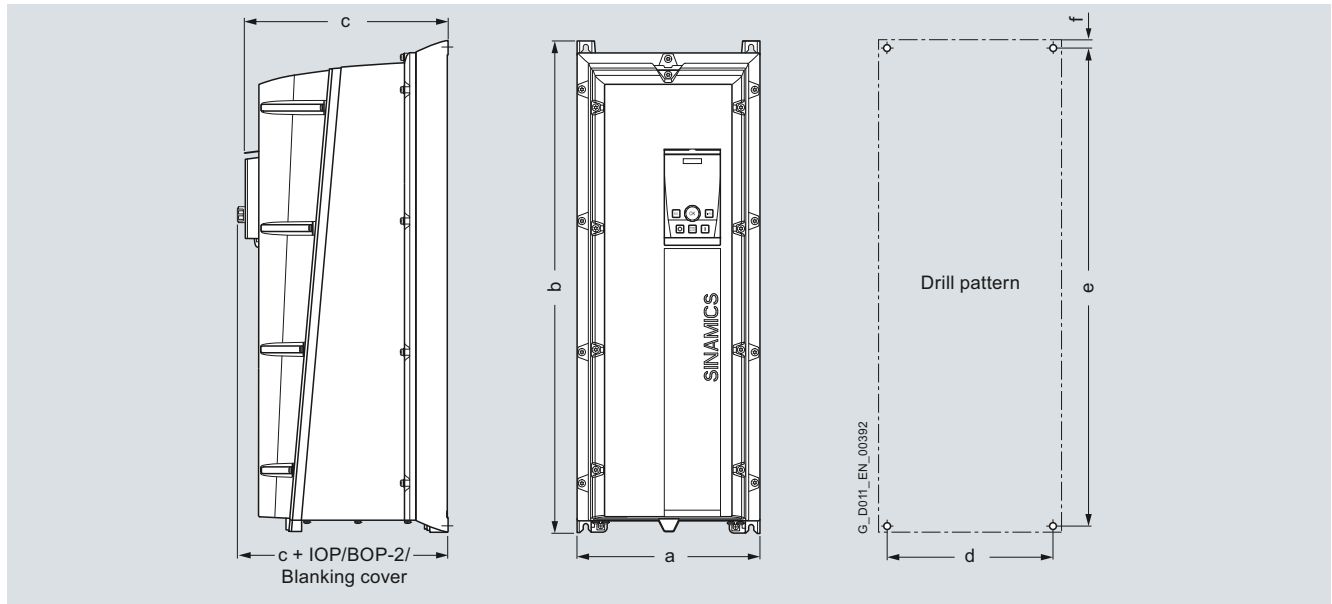
SINAMICS G120 standard inverters

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

Power Modules

Dimensional drawings

PM230 Power Modules, degree of protection IP55/UL Type 12



Principle dimension drawing and drill pattern for PM230 Power Modules, degree of protection IP55/UL Type 12 with integrated line filter class A/B

Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)			Cooling clearance in mm (inches)			Mounting With bolts, nuts and washers
	a (width)	b (height)	c (depth) ¹⁾	d	e	f	top	bottom	side	
PM230 Power Modules, degree of protection IP55/UL Type 12 with integrated line filter class A/B										
FSA	154 (6.06)	460 (18.11)	249 (9.8)	132 (5.19)	445 (17.51)	11 (0.43)	100 (3.94)	0 (0)	0 (0)	4 × M4
FSB	180 (7.08)	540 (21.25)	249 (9.8)	158 (5.9)	524 (20.62)	11 (0.43)	100 (3.94)	0 (0)	0 (0)	4 × M4
FSC	230 (9.05)	620 (24.4)	249 (9.8)	208 (8.18)	604 (23.77)	11 (0.43)	125 (4.92)	0 (0)	0 (0)	4 × M5
FSD	320 (12.59)	640 (25.19)	329 (12.95)	285 (11.22)	600 (23.62)	17.5 (0.69)	300 (11.81)	0 (0)	50 (1.97) ²⁾	4 × M8
FSE	320 (12.59)	751 (29.56)	329 (12.95)	285 (11.22)	710 (27.95)	17.5 (0.69)	300 (11.81)	0 (0)	50 (1.97) ²⁾	4 × M8
FSF	410 (16.14)	915 (36.02)	416 (16.38)	370 (14.56)	870 (34.25)	20 (0.79)	350 (13.78)	0 (0)	50 (1.97) ²⁾	4 × M8

¹⁾ Increased depth:

- When the IOP is plugged on, the depth increases by 15 mm (0.59 in)
- When the BOP-2/blanking cover is plugged on, the depth increases by 5 mm (0.2 in)

²⁾ Up to 40 °C (104 °F) without any lateral clearance.

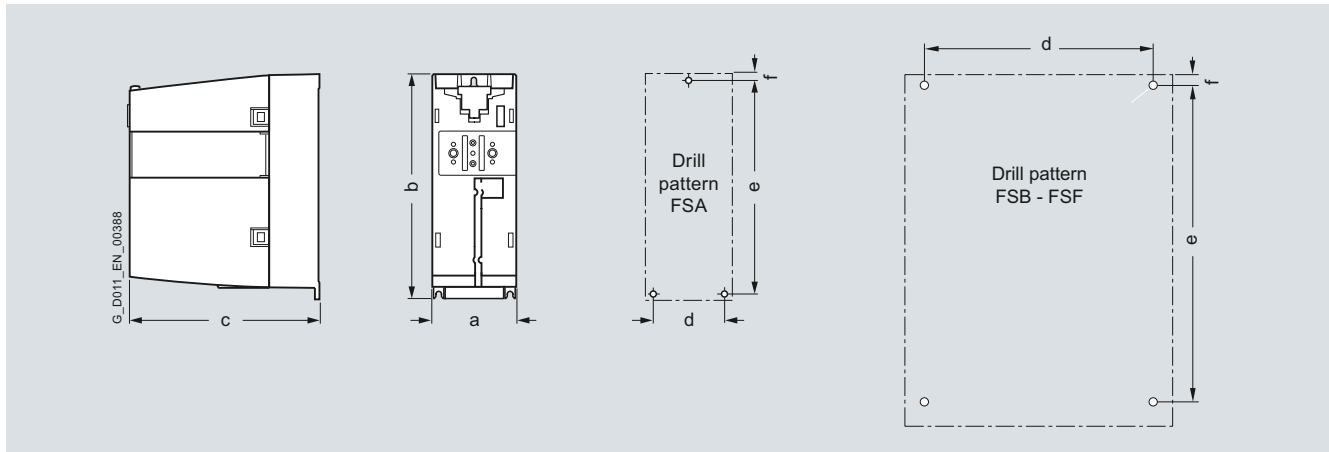
SINAMICS G120 standard inverters

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

Power Modules

Dimensional drawings

PM230 Power Modules, degree of protection IP20, standard variant and PM240-2 Power Modules, standard variant



Principle dimension drawing and drill pattern for PM230 Power Modules, degree of protection IP20, standard variant, with/without integrated line filter class A and PM240-2 Power Modules, standard variant, with/without integrated line filter class A

Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)			Cooling clearance in mm (inches)			Mounting With bolts
	a (width)	b (height)	c (depth) ¹⁾	d	e	f	top	bottom	side ²⁾	
PM230 Power Modules, degree of protection IP20, standard variant, with/without integrated line filter class A										
FSA	73 (2.87)	196 (7.72)	165 (6.5)	62.3 (2.45)	186 (7.32)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	3 × M4
FSB	100 (3.94)	292 (11.5)	165 (6.5)	80 (3.15)	281 (11.06)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	4 × M4
FSC	140 (5.51)	355 (13.98)	165 (6.5)	120 (4.72)	343 (13.5)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	4 × M5
FSD	275 (10.83)	419/512 (16.50/20.16)	204 (8.03)	235 (9.25)	325/419 (12.8/16.5)	11 (0.43)	300 (11.81)	300 (11.81)	0 (0)	4 × M6
FSE	275 (10.83)	499/635 (19.65/25)	204 (8.03)	235 (9.25)	405/541 (15.94/21.3)	11 (0.43)	300 (11.81)	300 (11.81)	0 (0)	4 × M6
FSF	350 (13.78)	634/934 (24.96/36.77)	316 (12.44)	300 (11.81)	598/899 (23.54/35.39)	11 (0.43)	350 (13.78)	350 (13.78)	0 (0)	4 × M8
PM240-2 Power Modules, standard variant, with/without integrated line filter class A										
FSA	73 (2.87)	196 (7.72)	165 (6.5)	62.3 (2.45)	186 (7.32)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	3 × M4

¹⁾ Increased depth:

- When the CU230P-2 Control Unit is plugged on, the depth increases by 58 mm (2.28 in).
- When the CU240B-2 or CU240E-2 Control Unit is plugged on, the depth increases by 40 mm (1.57 in).
- When the IOP is plugged on, the depth increases by a further 25 mm (0.98 in).
- When the BOP-2 is plugged on, the depth increases by a further 15 mm (0.59 in).

²⁾ The Power Modules can be mounted side by side. A side clearance of 1 mm (0.04 in) is recommended for tolerance-related reasons.

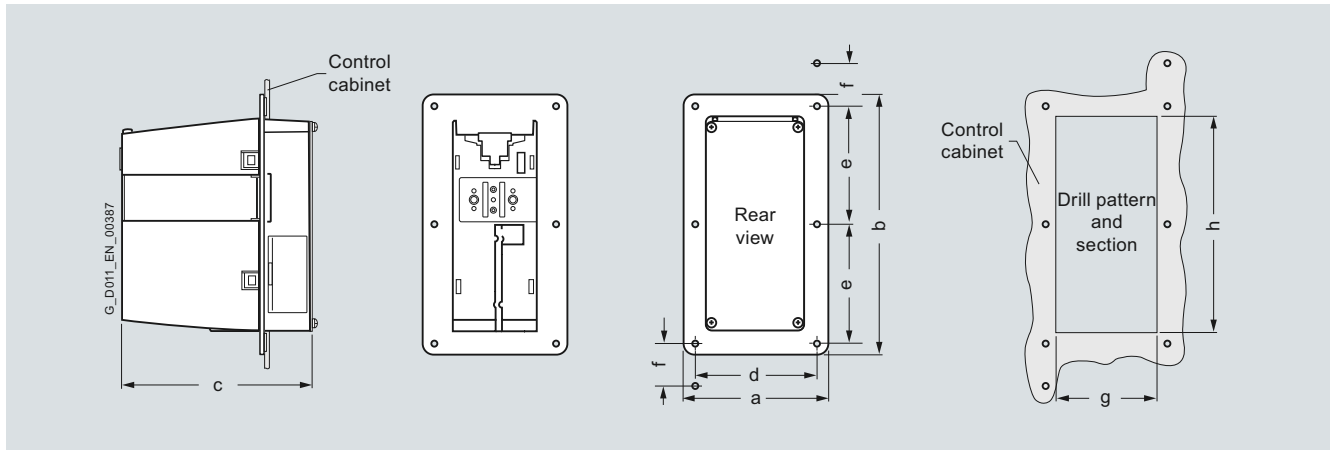
SINAMICS G120 standard inverters

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

Power Modules

Dimensional drawings

PM230 Power Modules, degree of protection IP20, push-through variant and PM240-2 Power Modules, push-through variant



Principle dimension drawing and drill pattern for PM230 Power Modules, degree of protection IP20, push-through variant, with/without integrated line filter class A and PM240-2 Power Modules, push-through variant, with/without integrated line filter class A

Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)			Section of cabinet in mm (inches)		Cooling clearance in mm (inches)			Mounting With bolts
	a (width)	b (height)	c (depth) ¹⁾	d	e	f	g (width)	h (height)	top	bottom	side ²⁾	
PM230 Power Modules, degree of protection IP20, push-through variant, with/without integrated line filter class A												
FSA	125.9 (4.96)	238 (9.37)	171 (6.73)	106 (4.17)	103 (4.06)	27 (1.06)	88 (3.46)	198 (7.8)	80 (3.15)	100 (3.94)	0 (0)	M5
FSB	153.9 (6.06)	345 (13.58)	171 (6.73)	134 (5.28)	147.5 (5.81)	34.5 (1.36)	116 (4.57)	304 (11.97)	80 (3.15)	100 (3.94)	0 (0)	M5
FSC	200 (7.87)	410.5 (16.16)	171 (6.73)	174 (6.85)	123 (4.84)	30.5 (1.2)	156 (6.14)	365 (14.37)	80 (3.15)	100 (3.94)	0 (0)	M5
PM240-2 Power Modules, push-through variant, with/without integrated line filter class A												
FSA	125.9 (4.96)	238 (9.37)	171 (6.73)	106 (4.17)	103 (4.06)	27 (1.06)	88 (3.46)	198 (7.8)	80 (3.15)	100 (3.94)	0 (0)	M5

¹⁾ Overall depth, of which 117.7 mm (4.63 in) is inside and 53.1 mm (2.09 in) is outside the control cabinet.

Increased depth:

- When the CU230P-2 Control Unit is plugged on, the depth increases by 58 mm (2.28 in).
- When the CU240B-2 or CU240E-2 Control Unit is plugged on, the depth increases by 40 mm (1.57 in).
- When the IOP is plugged on, the depth increases by a further 25 mm (0.98 in).
- When the BOP-2 is plugged on, the depth increases by a further 15 mm (0.59 in).

²⁾ The Power Modules can be mounted side by side (mounting frame to mounting frame). A side clearance of 1 mm (0.04 in) is recommended for tolerance-related reasons.

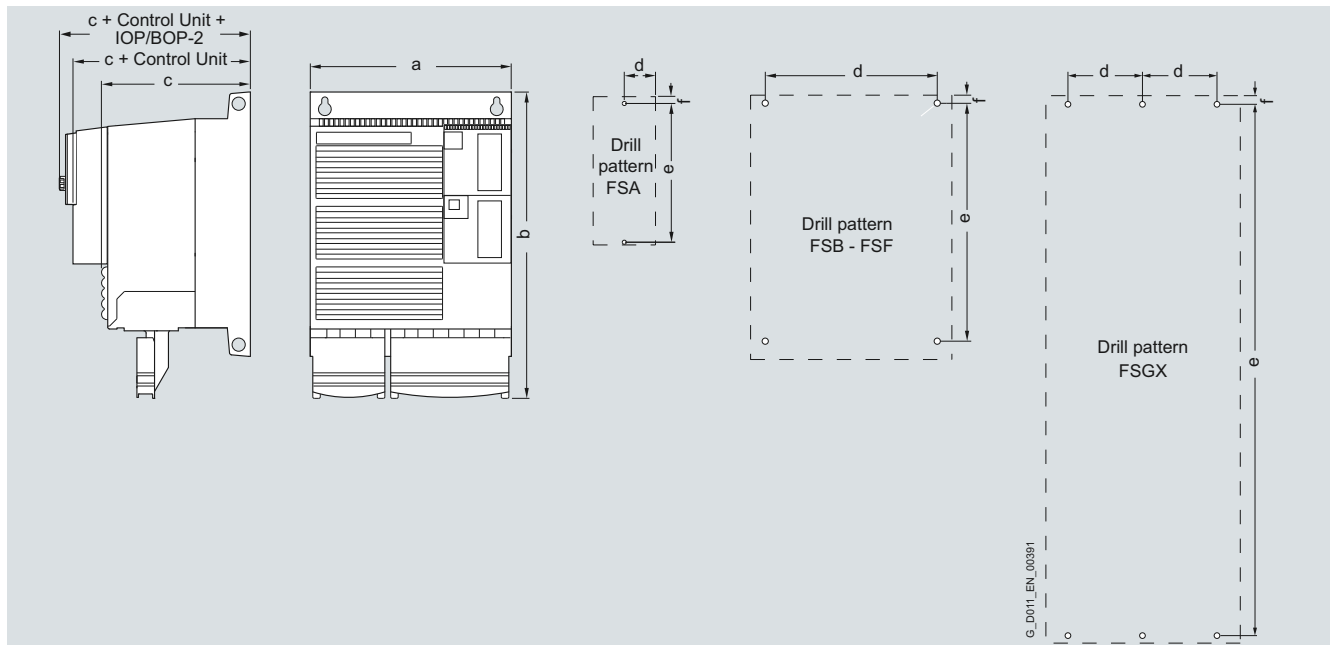
SINAMICS G120 standard inverters

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

Power Modules

Dimensional drawings

PM240, PM250 and PM260 Power Modules, degree of protection IP20



Principle dimension drawing and drill pattern for PM240, PM250 and PM260 Power Modules, degree of protection IP20, with/without integrated line filter class A

Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)			Cooling clearance in mm (inches)			Mounting With bolts, nuts and washers
	a (width)	b (height)	c (depth) ¹⁾	d	e	f	top/ bottom	front	side	
PM240 Power Modules, degree of protection IP20, with/without integrated line filter class A										
FSA	73 (2.87)	173 (6.81)	145 (5.71)	36.5 (1.44)	160 (6.3)	6 (0.24)	100 (3.94)	0 (0)	30 (1.18) ²⁾	2 × M4
FSB	153 (6.02)	270 (10.63)	165 (6.5)	133 (5.24)	258 (10.16)	6 (0.24)	100 (3.94)	0 (0)	40 (1.57) ²⁾	4 × M4
PM240 or PM250 Power Modules, degree of protection IP20, with/without integrated line filter class A										
FSC	189 (7.44)	334 (13.15)	185 (7.28)	167 (6.57)	323 (12.72)	6 (0.24)	125 (4.92)	0 (0)	50 (1.97) ²⁾	4 × M5
FSD	275 (10.83)	419/512 (16.5/20.16)	204 (8.03)	235 (9.25)	325/419 (12.8/16.5)	11 (0.43)	300 (11.81)	0 (0)	0 (0)	4 × M8
FSE	275 (10.83)	499/635 (19.65/25)	204 (8.03)	235 (9.25)	405/541 (15.94/21.3)	11 (0.43)	300 (11.81)	0 (0)	0 (0)	4 × M8
FSF	350 (13.78)	634/934 (24.96/36.77)	316 (12.44)	300 (11.81)	598/899 (23.54/35.39)	11 (0.43)	350 (13.78)	0 (0)	0 (0)	4 × M8
PM240 Power Modules, degree of protection IP20, without integrated line filter										
FSGX	326 (12.9)	1533 (60.35)	547 (21.6)	125 (4.92)	1506 (59.29)	14.5 (0.57)	250/150 (9.84/5.91)	50 (1.97)	0 (0)	6 × M8
PM260 Power Modules, degree of protection IP20, with/without integrated line filter class A										
FSD	275 (10.83)	512 (20.16)	204 (8.03)	235 (9.25)	419 (16.5)	11 (0.43)	300 (11.81)	0 (0)	0 (0)	4 × M8
FSF	350 (13.78)	634 (24.96)	316 (12.44)	300 (11.81)	598 (23.54)	11 (0.43)	350 (13.78)	0 (0)	0 (0)	4 × M8

¹⁾ Increased depth:

- When the CU230P-2 Control Unit is plugged on, the depth increases by 58 mm (2.28 in).
- When the CU240B-2 or CU240E-2 Control Unit is plugged on, the depth increases by 40 mm (1.57 in).
- When the IOP is plugged on, the depth increases by a further 25 mm (0.98 in).
- When the BOP-2 is plugged on, the depth increases by a further 15 mm (0.59 in).

With the PM240 Power Module, frame size FSGX, the depth does not increase when devices are plugged on.

²⁾ Up to 40 °C (104 °F) without any lateral clearance.

SINAMICS G120 standard inverters

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

Line-side components
Line filters

Overview



Line filter for Power Modules, frame size FSA



Line filter for PM240 Power Modules, frame size FSGX

With one of the additional line filters, the Power Module reaches a higher radio interference class.

Selection and ordering data

Rated power		SINAMICS G120 PM240 Power Module		Line filter class A according to EN 55011
kW	hp	Type 6SL3224-...	Frame size	
380 ... 480 V 3 AC				
0.37	0.50	0BE13-7UA0	FSA	6SE6400-2FA00-6AD0
0.55	0.75	0BE15-5UA0		
0.75	1.0	0BE17-5UA0		
1.1	1.5	0BE21-1UA0		
1.5	2.0	0BE21-5UA0		
110	150	0BE38-8UA0	FSF	6SL3203-0BE32-5AA0
132	200	0BE41-1UA0		
160	250	0XE41-3UA0	FSGX	6SL3000-0BE34-4AA0
200	300	0XE41-6UA0		
250	400	0XE42-0UA0	FSGX	6SL3000-0BE36-0AA0

Rated power		SINAMICS G120 PM240 Power Module		Line filter class B according to EN 55011
kW	hp	Type 6SL3224-...	Frame size	
380 ... 480 V 3 AC				
0.37	0.50	0BE13-7UA0	FSA	6SE6400-2FB00-6AD0
0.55	0.75	0BE15-5UA0		
0.75	1.0	0BE17-5UA0		
1.1	1.5	0BE21-1UA0		
1.5	2	0BE21-5UA0		
2.2	3	0BE22-2AA0	FSB	6SL3203-0BE21-6SA0
3.0	4	0BE23-0AA0		
4.0	5	0BE24-0AA0		6SL3203-0BD23-8SA0
7.5	10	0BE25-5AA0	FSC	
11	15	0BE27-5AA0		
15	20	0BE31-1AA0		

Rated power		SINAMICS G120 PM250 Power Module		Line filter class B according to EN 55011
kW	hp	Type 6SL3225-...	Frame size	
380 ... 480 V 3 AC				
7.5	10	0BE25-5AA1	FSC	6SL3203-0BD23-8SA0
11	15	0BE27-5AA1		
15	20	0BE31-1AA1		

SINAMICS G120 standard inverters

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

Line-side components
Line filters

Integration

Frame sizes FSA to FSF of the PM230 Power Module in degree of protection IP20 are available both with and without an integrated line filter class A.

Frame size FSA of the PM240 Power Module is available only without integrated line filter class A. A base filter is therefore available so that class A can be achieved. A base filter class B is also available so that class B can be achieved.

Frame sizes FSB and FSC of the PM240 Power Module are available both with and without integrated line filter class A. For compliance with class B, PM240 Power Modules with integrated line filter class A must be fitted additionally with a base filter class B.

An external line filter class A is available for frame size FSGX of the PM240 Power Module.

Frame sizes FSC of the PM250 Power Module are available only with integrated line filter class A. To achieve class B, PM250 Power Modules must be additionally fitted with a base filter class B.

No additional line filters class B are available for the PM260 Power Module.

Line filters that are optionally available depending on the Power Module used

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM230 Power Module degree of protection IP55/UL Type 12							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Line-side power components							
Line filter class A	I	I	I	I	I	I	–
Line filter class B	I	I	I	I	I	I	–
PM230 Power Module degree of protection IP20							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Line-side power components							
Line filter class A	F	F	F	F	F	F	–
PM240-2 Power Module with integrated braking chopper							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Line-side power components							
Line filter class A	I	–	–	–	–	–	–
PM240 Power Module with integrated braking chopper							Without integrated braking chopper
Available frame sizes	✓	✓	✓	✓	✓	✓	
Line-side power components							
Line filter class A	U	F	F	F	F	F/S ¹⁾	S ¹⁾
Line filter class B	U	U	U	–	–	–	–
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side power components							
Line filter class A	–	–	I	F	F	F	–
Line filter class B	–	–	U	–	–	–	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Line-side power components							
Line filter class A	–	–	–	F	–	F	–
Line filter class B	–	–	–	–	–	–	–

U = Base component

S = Lateral mounting

I = Integrated

F = Power Modules available with and without integrated filter class A

– = Not possible

¹⁾ PM240 FSF Power Modules from 110 kW (150 hp) and higher and FSGX, are available only without an integrated filter class A. An optional line filter class A for lateral mounting is available instead.

SINAMICS G120 standard inverters

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

Line-side components

Line filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line filter class A			
		6SE6400-2FA00-6AD0	6SL3203-0BE32-5AA0	6SL3000-0BE34-4AA0	6SL3000-0BE36-0AA0
Rated current	A	6	250	440	600
Line supply connection L1, L2, L3		Screw terminals	On housing with M8 screw stud	1 × hole for M10 Provided for busbar connection	1 × hole for M10 Provided for busbar connection
• Conductor cross-section	mm ²	2.5	–	–	–
Load connection U, V, W		Shielded cable	On housing with M8 screw stud	On housing with M10 screw stud	On housing with M10 screw stud
• Conductor cross-section	mm ²	3 × 2.5	–	–	–
• Length	m (ft)	0.4 (1.31)	–	–	–
PE connection		On housing with M4 screw stud	Flat connector for M10 screw	1 × hole for M8	1 × hole for M10
Degree of protection		IP20	IP00	IP00	IP00
Dimensions					
• Width	mm (in)	73 (2.87)	240 (9.45)	360 (14.17)	400 (15.75)
• Height	mm (in)	200 (7.87)	360 (14.17)	240 (9.45)	265 (10.43)
• Depth	mm (in)	42.5 (1.67)	116 (4.57)	116 (4.57)	140 (5.51)
Possible as base component		Yes	No	No	No
Weight, approx.	kg (lb)	0.5 (1.10)	12.4 (27.3)	12.3 (27.1)	19 (41.9)
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0 6SL3224-0BE15-5UA0 6SL3224-0BE17-5UA0 6SL3224-0BE21-1UA0 6SL3224-0BE21-5UA0	6SL3224-0BE38-8UA0 6SL3224-0BE41-1UA0	6SL3224-0XE41-3UA0 6SL3224-0XE41-6UA0	6SL3224-0XE42-0UA0
Suitable for PM250 Power Module		–	–	–	–
• Frame size		FSA	FSF	FSGX	FSGX

Line voltage 380 ... 480 V 3 AC		Line filter class B		
		6SE6400-2FB00-6AD0	6SL3203-0BE21-6SA0	6SL3203-0BD23-8SA0
Rated current	A	6	10.2	39.4
Line supply connection L1, L2, L3		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	2.5	2.5	4
Load connection U, V, W		Shielded cable	Shielded cable	Shielded cable
• Conductor cross-section	mm ²	3 × 2.5	3 × 2.5	3 × 4
• Length	m (ft)	0.4 (1.31)	0.4 (1.31)	0.4 (1.31)
PE connection		On housing with M4 screw stud	On housing with M4 screw stud	On housing with M4 screw stud
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	73 (2.87)	153 (6.02)	190 (7.48)
• Height	mm (in)	200 (7.87)	296 (11.65)	362 (14.25)
• Depth	mm (in)	42.5 (1.67)	50 (1.97)	55 (2.17)
Possible as base component		Yes	Yes	Yes
Weight, approx.	kg (lb)	0.5 (1.10)	1.5 (3.31)	2.3 (5.07)
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0 6SL3224-0BE15-5UA0 6SL3224-0BE17-5UA0 6SL3224-0BE21-1UA0 6SL3224-0BE21-5UA0	6SL3224-0BE22-2AA0 6SL3224-0BE23-0AA0 6SL3224-0BE24-0AA0	6SL3224-0BE25-5AA0 6SL3224-0BE27-5AA0 6SL3224-0BE31-1AA0
Suitable for PM250 Power Module		–	–	6SL3225-0BE25-5AA1 6SL3225-0BE27-5AA1 6SL3225-0BE31-1AA1
• Frame size		FSA	FSB	FSC

SINAMICS G120 standard inverters

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

Line-side components
Line reactors

Overview



Line reactors for Power Modules, frame sizes FSA to FSE



Line reactor for PM240-2 Power Modules, frame size FSA



Line reactor for PM240 Power Modules, frame size FSGX



Power Module frame size FSB, with base line reactor and shield connection plate

Line reactors are used to smooth voltage peaks or to bridge commutating dips. Line reactors also reduce the effects of harmonics on the inverter and the line supply.

Note:

A line reactor must not be used in combination with a PM230, PM250 or PM260 Power Module.

Benefits

Only AC reactors are available as reactors for the inverter.

- Only an AC reactor provides protection for the input rectifier of the inverter.
- The capacitor lifetime of the inverter increases by a factor of 2 when using an AC reactor instead of a DC reactor.
- The harmonic behavior of AC reactors remains almost constant over the complete lifetime. The harmonic behavior of DC reactors changes over time (months).
- An AC reactor reduces possible asymmetries between the current phases. In this case, a DC reactor would not be effective.

SINAMICS G120 standard inverters

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

Line-side components Line reactors

Selection and ordering data

Rated power		SINAMICS G120 PM240-2 Power Module Standard variant		Line reactor
kW	hp	Type 6SL3210-...	Frame size	Order No.
380 ... 480 V 3 AC				
0.55	0.75	1PE11-8..0	FSA	6SL3203-0CE13-2AA0
0.75	1.0	1PE12-3..0		
1.1	1.5	1PE13-2..0		
1.5	2	1PE14-3..0	FSA	
2.2	3	1PE16-1..0		6SL3203-0CE21-0AA0
3.0	4	1PE18-0..0		

Rated power		SINAMICS G120 PM240-2 Power Module Push-through variant		Line reactor
kW	hp	Type 6SL3211-...	Frame size	Order No.
380 ... 480 V 3 AC				
2.2	3	1PE16-1AL0	FSA	6SL3203-0CE21-0AA0
3.0	4	1PE18-0UL0		

Rated power		SINAMICS G120 PM240 Power Module		Line reactor
kW	hp	Type 6SL3224-...	Frame size	Order No.
380 ... 480 V 3 AC				
0.37	0.50	0BE13-7UA0	FSA	6SE6400-3CC00-2AD3
0.55	0.75	0BE15-5UA0		
0.75	1.0	0BE17-5UA0	FSA	6SE6400-3CC00-4AD3
1.1	1.5	0BE21-1UA0		
1.5	2	0BE21-5UA0	FSA	6SE6400-3CC00-6AD3
2.2	3	0BE22-2 . A0	FSB	
3.0	4	0BE23-0 . A0		6SL3203-0CD21-0AA0
4.0	5	0BE24-0 . A0	FSB	
7.5	10	0BE25-5 . A0	FSC	6SL3203-0CD22-2AA0
11.0	15	0BE27-5 . A0		
15.0	20	0BE31-1 . A0	FSC	6SL3203-0CD23-5AA0
18.5	25	0BE31-5 . A0	FSD	
22	30	0BE31-8 . A0		6SL3203-0CJ24-5AA0
30	40	0BE32-2 . A0	FSD	
37	50	0BE33-0 . A0	FSE	6SL3203-0CJ28-6AA0
45	60	0BE33-7 . A0		
55	75	0BE34-5 . A0	FSF	6SE6400-3CC11-2FD0
75	100	0BE35-5 . A0		
90	125	0BE37-5 . A0	FSF	6SE6400-3CC11-7FD0
110	150	0BE38-8UA0	FSF	
132	200	0BE41-1UA0	FSF	6SL3000-0CE32-3AA0
160	250	0XE41-3UA0	FSGX	
200	300	0XE41-6UA0	FSGX	6SL3000-0CE33-3AA0
250	400	0XE42-0UA0		
				6SL3000-0CE35-1AA0

SINAMICS G120 standard inverters

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

Line-side components
Line reactors

Integration

The line reactors for PM240 Power Modules of frame sizes FSA to FSE are designed as base components. The line reactor is attached to the mounting surface and the Power Module is mounted directly on the line reactor. The cables to the Power Module are already connected at the line reactor.

The line reactor is connected to the line supply through terminals.

Line reactors that are optionally available depending on the Power Module used

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM230 Power Module degree of protection IP20 or IP55/UL Type 12							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Line-side power components							
Line reactor ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	–
PM240-2 Power Module with integrated braking chopper							
Available frame sizes	✓	–	–	–	–	–	–
Line-side power components							
Line reactor	S	–	–	–	–	–	–
PM240 Power Module with integrated braking chopper							Without integrated braking chopper
Available frame sizes	✓	✓	✓	✓	✓	✓	
Line-side power components							
Line reactor	U	U	U	U	U	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side power components							
Line reactor ¹⁾	–	–	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Line-side power components							
Line reactor ¹⁾	–	–	–	– ¹⁾	–	– ¹⁾	–

U = Base component
S = Lateral mounting
– = Not possible

¹⁾ A line reactor is not required and must not be used in conjunction with a PM230, PM250 or PM260 Power Module.

SINAMICS G120 standard inverters

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

Line-side components Line reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line reactor	
		6SL3203-0CE13-2AA0	6SL3203-0CE21-0AA0
Rated current	A	4	11.3
Power loss at 50/60 Hz	W	23/26	36/40
Line supply/load connection 1L1, 1L2, 1L3/ 2L1, 2L2, 2L3		Screw terminals	Screw terminals
• Conductor cross-section	mm ²	4	4
PE connection		M4 × 8; U washer; spring lock washer	M4 × 8; U washer; spring lock washer
Degree of protection		Control cabinet built-in unit IP20	Control cabinet built-in unit IP20
Dimensions			
• Width	mm (in)	125 (4.92)	125 (4.92)
• Height	mm (in)	120 (4.72)	140 (4.72)
• Depth	mm (in)	71 (2.80)	71 (2.80)
Weight, approx.	kg (lb)	1.1 (2.43)	2.1 (4.63)
Suitable for PM240-2 Power Module standard variant	Type	6SL3210-1PE11-8..0 6SL3210-1PE12-3..0 6SL3210-1PE13-2..0	6SL3210-1PE14-3..0 6SL3210-1PE16-1..0 6SL3210-1PE18-0..0
Suitable for PM240-2 Power Module push-through variant	Type	–	6SL3211-1PE16-1AL0 6SL3211-1PE18-0UL0
• Frame size		FSA	FSA

Line voltage 380 ... 480 V 3 AC		Line reactor			
		6SE6400-3CC00-2AD3	6SE6400-3CC00-4AD3	6SE6400-3CC00-6AD3	6SL3203-0CD21-0AA0
Rated current	A	1.9	3.5	4.8	9
Power loss at 50/60 Hz, approx.	W	6/7	12.5/15	7.5/9	9/11
Line supply connection U1, V1, W1		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	6	6	6	6
Load connection		Cable	Cable	Cable	Cable
• Conductor cross-section		4 × AWG16 (1.5 mm ²)	4 × AWG16 (1.5 mm ²)	4 × AWG16 (1.5 mm ²)	4 × AWG16 (1.5 mm ²)
• Length, approx.	m (ft)	0.38 (1.25)	0.38 (1.25)	0.38 (1.25)	0.46 (1.51)
PE connection		On housing with M5 screw stud	On housing with M5 screw stud	On housing with M5 screw stud	On housing with M5 screw stud
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)	153 (6.02)
• Height	mm (in)	200 (7.87)	200 (7.87)	200 (7.87)	270 (10.63)
• Depth	mm (in)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)
Possible as base component		Yes	Yes	Yes	Yes
Weight, approx.	kg (lb)	0.6 (1.32)	0.8 (1.76)	0.6 (1.32)	3.4 (7.5)
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0 6SL3224-0BE15-5UA0	6SL3224-0BE17-5UA0 6SL3224-0BE21-1UA0	6SL3224-0BE21-5UA0	6SL3224-0BE22-2 . A0 6SL3224-0BE23-0 . A0
• Frame size		FSA	FSA	FSA	FSB

SINAMICS G120 standard inverters

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

Line-side components
Line reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line reactor			
		6SL3203-0CD21-4AA0	6SL3203-0CD22-2AA0	6SL3203-0CD23-5AA0	6SL3203-0CJ24-5AA0
Rated current	A	11.6	25	31.3	47
Power loss at 50/60 Hz, approx.	W	27/32	98/118	37/44	90/115
Line supply connection U1, V1, W1		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	6	6	16	16
Load connection		Cable	Cable	Cable	Cable
• Conductor cross-section		4 × AWG16 (1.5 mm ²)	4 × AWG10 (2.5 mm ²)	4 × AWG10 (2.5 mm ²)	4 × 16 mm ²
• Length, approx.	m (ft)	0.46 (1.51)	0.49	0.49	0.7
PE connection		On housing with M5 screw stud	On housing with M5 screw stud	On housing with M5 screw stud	On housing with M5 screw stud
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	153 (6.02)	189 (7.44)	189 (7.44)	275 (10.83)
• Height	mm (in)	270 (10.63)	336 (13.23)	336 (13.23)	455 (17.91)
• Depth	mm (in)	50 (1.97)	50 (1.97)	50 (1.97)	84 (3.31)
Possible as base component		Yes	Yes	Yes	Yes
Weight, approx.	kg (lb)	3.4 (7.5)	5.2 (11.5)	5.9 (13)	13 (28.7)
Suitable for PM240 Power Module	Type	6SL3224-0BE24-0 . A0	6SL3224-0BE25-5 . A0 6SL3224-0BE27-5 . A0	6SL3224-0BE31-1 . A0	6SL3224-0BE31-5 . A0 6SL3224-0BE31-8 . A0
• Frame size		FSB	FSC	FSC	FSD

Line voltage 380 ... 480 V 3 AC		Line reactor					
		6SL3203-0CD25-3AA0	6SL3203-0CJ28-6AA0	6SE6400-3CC11-2FD0	6SE6400-3CC11-7FD0	6SL3000-0CE32-3AA0	6SL3000-0CE32-8AA0
Rated current	A	63	94	151	186	224	278
Power loss at 50/60 Hz, approx.	W	90/115	170/215	280/360	280/360	240/270	210/250
Line supply connection U1, V1, W1		Screw terminals	Screw terminals	Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M10 screw	Flat connector for M10 screw
• Conductor cross-section	mm ²	16	50	–	–	–	–
Load connection		Cable	Cable	Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M10 screw	Flat connector for M10 screw
• Conductor cross-section	mm ²	4 × 16	4 × 35	–	–	–	–
• Length, approx.	m (ft)	0.7 (2.3)	0.7 (2.3)	–	–	–	–
PE connection		On housing with M8 screw	On housing with M8 screw	On housing with M8 screw stud	On housing with M8 screw stud	M6 screw	M6 screw
Degree of protection		IP20	IP20	IP00	IP00	IP00	IP00
Dimensions							
• Width	mm (in)	275 (10.83)	275 (10.83)	240 (9.45)	240 (9.45)	270 (10.63)	270 (10.63)
• Height	mm (in)	455 (17.91)	577 (22.72)	228 (8.98)	228 (8.98)	248 (9.76)	248 (9.76)
• Depth	mm (in)	84 (3.31)	94 (3.70)	141 (5.55)	141 (5.55)	200 (7.87)	200 (7.87)
Possible as base component		Yes	Yes	No	No	No	No
Weight, approx.	kg (lb)	13 (28.7)	19 (41.9)	25 (55.1)	25 (55.1)	24 (52.9)	24 (52.9)
Suitable for PM240 Power Module	Type	6SL3224-0BE32-2 . A0	6SL3224-0BE33-0 . A0 6SL3224-0BE33-7 . A0	6SL3224-0BE34-5 . A0 6SL3224-0BE35-5 . A0	6SL3224-0BE37-5 . A0	6SL3224-0BE38-8UA0	6SL3224-0BE41-1UA0
• Frame size		FSD	FSE	FSF	FSF	FSF	FSF

SINAMICS G120 standard inverters

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

Line-side components

Line reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line reactor	
		6SL3000-0CE33-3AA0	6SL3000-0CE33-5AA0
Rated current	A	331	508
Power loss at 50/60 Hz, approx.	W	267	365
Line supply connection U1, V1, W1		1 × hole for M10 Provided for busbar connection	1 × hole for M12 Provided for busbar connection
Load connection		Provided for busbar connection	Provided for busbar connection
PE connection		M6 screw	M6 screw
Degree of protection		IP00	IP00
Dimensions			
• Width	mm (in)	270 (10.63)	300 (11.81)
• Height	mm (in)	248 (9.76)	269 (10.59)
• Depth	mm (in)	200 (7.87)	212 (8.35)
Possible as base component		No	No
Weight, approx.	kg (lb)	27.8 (61.3)	38.0 (83.8)
Suitable for Power Module PM240	Type	6SL3224-0XE41-3UAA0	6SL3224-0XE41-6UAA0 6SL3224-0XE42-0UAA0
• Frame size		FSGX	FSGX

SINAMICS G120 standard inverters

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

Line-side components
Recommended line-side power components

Selection and ordering data


The following table lists recommendations for additional line-side components, such as fuses and circuit breakers. The values in the table take into account the overload capability of the inverter.

Notes for use in compliance with IEC standards:

3NA3 or 3NE1 fuses and 3RV10 or 3VL circuit breakers are recommended for European countries.


Notes for use in compliance with UL regulations:

UL-approved fuses and circuit breakers must be used in North America.

- Examples of fuses:
 - Type 3NE1 fuses are UL-compliant (corresponds to .
 - Class J fuses, fuse series Class NOS supplied by Bussmann
- Examples of circuit breakers:
 - Approved SIRIUS 3RV circuit breakers and 3VL molded-case circuit breakers in accordance with UL 489 (category control number CCN: DiV Q).

An overvoltage protection device is required for installation in conformance with UL corresponding to the UL certification of SINAMICS G120 PM230 and PM240-2 Power Modules. The overvoltage protection device must be marked with the Listed test symbol and category code VZCA. The detailed UL installation guidelines are included in the equipment manual.

Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 10.1, IC 10 and IC 10 AO.

Rated power ¹⁾		SINAMICS G120 PM230 Power Modules Degree of protection IP55/ UL Type 12		Fuse		Circuit breaker
kW	hp	Type 6SL3223-...	Frame size	Type 3NA3 Order No.	Type 3NE1 () Order No.	Order No.
380 ... 480 V 3 AC						
0.37	0.50	0DE13-7 . A0	FSA	3NA3803	3NE1813-0	3RV1021-1CA10
0.55	0.75	0DE15-5 . A0	FSA			3RV1021-1DA10
0.75	1.0	0DE17-5 . A0	FSA			3RV1021-1FA10
1.1	1.5	0DE21-1 . A0	FSA			3RV1021-1GA10
1.5	2	0DE21-5 . A0	FSA			3RV1021-1JA10
2.2	3	0DE22-2 . A0	FSA			3RV1021-1KA10
3.0	4	0DE23-0 . A0	FSA			3RV1021-4AA10
4.0	5	0DE24-0 . A0	FSB	3NA3805	3NE1814-0	3RV1021-4BA10
5.5	7.5	0DE25-5 . A0	FSB	3NA3807		3RV1031-4EA10
7.5	10	0DE27-5 . A0	FSB	3NA3810	3NE1815-0	3RV1031-4FA10
11.0	15	0DE31-1 . A0	FSC	3NA3814	3NE1803-0	3RV1031-4HA10
15.0	20	0DE31-5 . A0	FSC	3NA3820	3NE1817-0	3RV1042-4KA10
18.5	25	0DE31-8 . A0	FSC/FSD	3NA3822	3NE1818-0	
22	30	0DE32-2 . A0	FSD			3RV1042-4MA10
30	40	0DE33-0 . A0	FSD	3NA3824	3NE1820-0	3VL1712-.DD33-....^{*)}
37	50	0DE33-7 . A0	FSE	3NA3830	3NE1021-0	3VL1716-.DD33-....^{*)}
45	60	0DE34-5 . A0	FSE	3NA3832	3NE1022-0	3VL3720-.DC36-....^{*)}
55	75	0DE35-5 . A0	FSF	3NA3836	3NE1224-0	3VL3725-.DC36-....^{*)}
75	100	0DE37-5 . A0	FSF	3NA3140	3NE1225-0	3VL4731-.DC36-....^{*)}
90	125	0DE38-8 . A0	FSF	3NA3144	3NE1227-0	

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).


^{*)} See Catalog LV 10.1 for Order No. supplements.


SINAMICS G120 standard inverters

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

Line-side components
Recommended line-side power components

Selection and ordering data

Rated power ¹⁾		SINAMICS G120 PM230 Power Modules Degree of protection IP20 standard variant		Fuse Corresponding to the UL/cUL standard Type 3NE1 () and Class J	
kW	hp	Type 6SL3210-...	Frame size	Order No.	Type
380 ... 480 V 3 AC					
0.37	0.50	1NE11-3 . L0	FSA	3NE1813-0	AJT2
0.55	0.75	1NE11-7 . L0	FSA		AJT4
0.75	1.0	1NE12-2 . L0	FSA		AJT4
1.1	1.5	1NE13-1 . L0	FSA		AJT6
1.5	2	1NE14-1 . L0	FSA		AJT6
2.2	3	1NE15-8 . L0	FSA		AJT10
3.0	4	1NE17-7 . L0	FSA		AJT10
4.0	5	1NE21-0 . L0	FSB		AJT15
5.5	7.5	1NE21-3 . L0	FSB	3NE1814-0	AJT20
7.5	10	1NE21-8 . L0	FSB	3NE1815-0	AJT25
11.0	15	1NE22-6 . L0	FSC	3NE1803-0	AJT35
15.0	20	1NE23-2 . L0	FSC	3NE1817-0	AJT45
18.5	25	1NE23-8 . L0	FSC		AJT50
22	30	1NE24-5 . L0	FSD	3NE1818-0	–
30	40	1NE26-0 . L0	FSD	3NE1820-0	–
37	50	1NE27-5 . L0	FSE	3NE1021-0	–
45	60	1NE28-8 . L0	FSE	3NE1022-0	–
55	75	1NE31-1 . L0	FSF	3NE1224-0	–
75	100	1NE31-5 . L0	FSF	3NE1225-0	–

Rated power ¹⁾		SINAMICS G120 PM230 Power Modules Degree of protection IP20 push-through variant		Fuse Corresponding to the UL/cUL standard Type 3NE1 () and Class J	
kW	hp	Type 6SL3211-...	Frame size	Order No.	Type
380 ... 480 V 3 AC					
3.0	4	1NE17-7 . L0	FSA	3NE1813-0	AJT10
7.5	10	1NE21-8 . L0	FSB	3NE1815-0	AJT25
18.5	25	1NE23-8 . L0	FSC	3NE1817-0	AJT50

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

SINAMICS G120 standard inverters

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

Line-side components
Recommended line-side power components

Selection and ordering data

Rated power ¹⁾		SINAMICS G120 PM240-2 Power Modules <u>Standard variant</u>	Corresponding to the IEC standard			Corresponding to the UL/cUL standard	
kW	hp		Standard fuse type		Circuit breaker	Standard fuse type	
		Type 6SL3210-...	Current in A	Order No.	Order No.	Current in A	Class
380 ... 480 V 3 AC							
0.55	0.75	1PE11-8 . L0	6	3NA3801	3RV1021-1DA10	10	J
0.75	1.0	1PE12-3 . L0	6	3NA3801	3RV1021-1EA10	10	J
1.1	1.5	1PE13-2 . L0	6	3NA3801	3RV1021-1FA10	10	J
1.5	2	1PE14-3 . L0	10	3NA3803	3RV1021-1HA10	10	J
2.2	3	1PE16-1 . L0	10	3NA3803	3RV1021-1JA10	10	J
3.0	4	1PE18-0 . L0	16	3NA3805	3RV1021-1KA10	15	J

Rated power ¹⁾		SINAMICS G120 PM240-2 Power Modules <u>Push-through variant</u>	Corresponding to the IEC standard			Corresponding to the UL/cUL standard	
kW	hp		Standard fuse type		Circuit breaker	Standard fuse type	
		Type 6SL3211-...	Current in A	Order No.	Order No.	Current in A	Class
380 ... 480 V 3 AC							
2.2	3	1PE16-1AL0	10	3NA3803	3RV1021-1JA10	10	J
3.0	4	1PE18-0UL0	16	3NA3805	3RV1021-1KA10	15	J

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¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

SINAMICS G120 standard inverters

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

Line-side components
Recommended line-side power components

Selection and ordering data

Rated power ¹⁾		SINAMICS G120 PM240 Power Modules		Fuse		Circuit breaker
kW	hp	Type 6SL3224-...	Frame size	Type 3NA3 Order No.	Type 3NE1 () Order No.	Order No.
380 ... 480 V 3 AC						
0.37	0.50	0BE13-7UA0	FSA	3NA3803	UL-listed fuses such as the Class NON fuse series from Bussmann are required for North America.	3RV1021-1CA10
0.55	0.75	0BE15-5UA0	FSA			3RV1021-1DA10
0.75	1.0	0BE17-5UA0	FSA			3RV1021-1FA10
1.1	1.5	0BE21-1UA0	FSA			3RV1021-1GA10
1.5	2	0BE21-5UA0	FSA			3RV1021-1JA10
2.2	3	0BE22-2 . A0	FSB	3NA3805		3RV1021-1KA10
3.0	4	0BE23-0 . A0	FSB			3RV1021-4AA10
4.0	5	0BE24-0 . A0	FSB	3NA3807		3RV1021-4BA10
7.5	10	0BE25-5 . A0	FSC			3RV1031-4EA10
11.0	15	0BE27-5 . A0	FSC	3NA3812		3RV1031-4FA10
15.0	20	0BE31-1 . A0	FSC	3NA3814		3RV1031-4HA10
18.5	25	0BE31-5 . A0	FSD	3NA3820	3NE1817-0	3RV1042-4KA10
22	30	0BE31-8 . A0	FSD	3NA3822	3NE1818-0	
30	40	0BE32-2 . A0	FSD	3NA3824	3NE1820-0	3RV1042-4MA10
37	50	0BE33-0 . A0	FSE	3NA3830	3NE1021-0	3VL1712-.DD33-.... ^{*)}
45	60	0BE33-7 . A0	FSE	3NA3832	3NE1022-0	3VL1716-.DD33-.... ^{*)}
55	75	0BE34-5 . A0	FSF	3NA3836	3NE1224-0	3VL3720-.DC36-.... ^{*)}
75	100	0BE35-5 . A0	FSF	3NA3140	3NE1225-0	3VL3725-.DC36-.... ^{*)}
90	125	0BE37-5 . A0	FSF	3NA3144	3NE1227-0	3VL4731-.DC36-.... ^{*)}
110	150	0BE38-8UA0	FSF	–		
132	200	0BE41-1UA0	FSF	–	3NE1230-0	
160	250	0XE41-3UA0	FSGX	3NA3254	3NE1333-2	3VL4740-.DC36-.... ^{*)}
200	300	0XE41-6UA0	FSGX	3NA3260		3VL5750-.DC36-.... ^{*)}
250	400	0XE42-0UA0	FSGX	3NA3372	3NE1436-2	

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).


^{*)} See Catalog LV 10.1 for Order No. supplements.


SINAMICS G120 standard inverters

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

Line-side components
Recommended line-side power components

Selection and ordering data

Rated power ¹⁾		SINAMICS G120 PM250 Power Modules		Fuse		Circuit breaker
kW	hp	Type 6SL3225-...	Frame size	Type 3NA3 Order No.	Type 3NE1 () Order No.	Order No.
380 ... 480 V 3 AC						
7.5	10	0BE25-5AA1	FSC	3NA3807	UL-listed fuses such as the Class NON fuse series from Bussmann are required for North America.	3RV1031-4EA10
11.0	15	0BE27-5AA1	FSC	3NA3812		3RV1031-4FA10
15.0	20	0BE31-1AA1	FSC	3NA3814		3RV1031-4HA10
18.5	25	0BE31-5 . A0	FSD	3NA3820	3NE1817-0	3RV1042-4KA10
22	30	0BE31-8 . A0	FSD	3NA3822	3NE1818-0	
30	40	0BE32-2 . A0	FSD	3NA3824	3NE1820-0	3RV1042-4MA10
37	50	0BE33-0 . A0	FSE	3NA3830	3NE1021-0	3VL1712-.DD33-.... ^{*)}
45	60	0BE33-7 . A0	FSE	3NA3832	3NE1022-0	3VL1716-.DD33-.... ^{*)}
55	75	0BE34-5 . A0	FSF	3NA3836	3NE1224-0	3VL3720-.DC36-.... ^{*)}
75	100	0BE35-5 . A0	FSF	3NA3140	3NE1225-0	3VL3725-.DC36-.... ^{*)}
90	125	0BE37-5 . A0	FSF	3NA3144	3NE1227-0	3VL4731-.DC36-.... ^{*)}

Rated power ¹⁾		SINAMICS G120 PM260 Power Modules		Fuse		Circuit breaker
kW	hp	Type 6SL3225-...	Frame size	Type 3NA3 Order No.	Type 3NE1 () Order No.	Order No.
500 ... 690 V 3 AC						
11.0	15	0BH27-5 . A1	FSD	3NA3120-6	-	3RV1041-4FA10
15.0	20	0BH31-1 . A1	FSD			
18.5	25	0BH31-5 . A1	FSD			
30	40	0BH32-2 . A1	FSF	3NA3122-6		3RV1041-4JA10
37	50	0BH33-0 . A1	FSF			3RV1041-4KA10
55	75	0BH33-7 . A1	FSF	3NA3130-6		3RV1041-4MA10

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for low overload (LO).

^{*)} See Catalog LV 10.1 for Order No. supplements.

SINAMICS G120 standard inverters

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

DC link components

Braking resistors

Overview



Braking resistors for Power Modules, frame sizes FSA and FSC



Braking resistor for PM240 Power Modules, frame size FSGX

Excess energy in the DC link is dissipated in the braking resistor. The braking resistors are intended for use with PM240 Power Modules which feature an integrated braking chopper, but cannot regenerate energy to the supply system. There is an optional plug-in Braking Module for frame size FSGX. For regenerative operation, e.g. the braking of a rotating mass with high moment of inertia, a braking resistor must be connected to convert the resulting energy into heat.

The braking resistors can be installed at the side next to the PM240 Power Modules. The braking resistors for the FSA and FSB frame sizes are designed as base components. If the PM240 Power Modules of the FSA or FSB frame size are operated without line reactor, the braking resistors can also be installed under the Power Modules.

The braking resistors for the Power Modules, frame sizes FSC to FSGX, should be placed outside the control cabinet or outside the switchgear room so that the heat is dissipated away from the Power Modules. The level of air conditioning required is therefore reduced.

Every braking resistor has a temperature switch (UL-listed). The temperature switch can be evaluated to prevent consequential damage if the braking resistor overheats.

Selection and ordering data

Rated power		SINAMICS G120 PM240-2 Power Module Standard variant		Braking resistor	
kW	hp	Type 6SL3210-...	Frame size	Order No.	
380 ... 480 V 3 AC					
0.55	0.75	1PE11-8..0	FSA	6SL3201-0BE14-3AA0	
0.75	1.0	1PE12-3..0			
1.1	1.5	1PE13-2..0			
1.5	2	1PE14-3..0	FSA	6SL3201-0BE21-0AA0	
2.2	3	1PE16-1..0			
3.0	4	1PE18-0..0			

Rated power		SINAMICS G120 PM240-2 Power Module Push-through variant		Braking resistor	
kW	hp	Type 6SL3211-...	Frame size	Order No.	
380 ... 480 V 3 AC					
2.2	3	1PE16-1AL0	FSA	6SL3201-0BE21-0AA0	
3.0	4	1PE18-0UL0			

Rated power		SINAMICS G120 PM240 Power Module		Braking resistor	
kW	hp	Type 6SL3224-...	Frame size	Order No.	
380 ... 480 V 3 AC					
0.37	0.50	0BE13-7UA0	FSA	6SE6400-4BD11-0AA0	
0.55	0.75	0BE15-5UA0			
0.75	1.0	0BE17-5UA0			
1.1	1.5	0BE21-1UA0		6SL3201-0BE12-0AA0	
1.5	2	0BE21-5UA0			
2.2	3	0BE22-2 . A0	FSB		
3.0	4	0BE23-0 . A0		6SE6400-4BD21-2DA0	
4.0	5	0BE24-0 . A0			
7.5	10	0BE25-5 . A0	FSC		
11.0	15	0BE27-5 . A0		6SE6400-4BD16-5CA0	
15.0	20	0BE31-1 . A0			
18.5	25	0BE31-5 . A0	FSD		
22	30	0BE31-8 . A0		6SE6400-4BD22-2EA1	
30	40	0BE32-2 . A0			
37	50	0BE33-0 . A0	FSE		
45	60	0BE33-7 . A0		6SE6400-4BD24-0FA0	
55	75	0BE34-5 . A0	FSF		
75	100	0BE35-5 . A0			
90	125	0BE37-5 . A0		6SE6400-4BD26-0FA0	
110	150	0BE38-8UA0	FSF		
132	200	0BE41-1UA0			
160	250	0XE41-3UA0	FSGX ¹⁾	6SL3000-1BE31-3AA0	
200	300	0XE41-6UA0	FSGX ¹⁾		
250	400	0XE42-0UA0			

¹⁾ A Braking Module must be additionally ordered for connection.

SINAMICS G120 standard inverters

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

DC link components
Braking resistors

Integration

Braking resistors that are optionally available depending on the Power Module used

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM240-2 Power Module with integrated braking chopper							
Available frame sizes	✓	–	–	–	–	–	–
DC link components							
Braking resistor	S	–	–	–	–	–	–
PM240 Power Module with integrated braking chopper							Without integrated braking chopper
Available frame sizes	✓	✓	✓	✓	✓	✓	
DC link components							
Braking resistor	U	U	S	S	S	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
DC link components							
Braking resistor ¹⁾	–	–	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
DC link components							
Braking resistor ¹⁾	–	–	–	– ¹⁾	–	– ¹⁾	–

U = Base component
S = Lateral mounting
– = Not possible

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¹⁾ PM250 and PM260 Power Modules are capable of line-commutated energy feedback. A braking resistor cannot be connected and is not necessary.

SINAMICS G120 standard inverters

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

DC link components Braking resistors

Technical specifications

Line voltage 380 V ... 480 V 3 AC		Braking resistor	
		6SL3201-0BE14-3AA0	6SL3201-0BE21-0AAA0
Resistance	Ω	370	140
Rated power P_{DB}	kW	0.075	0.2
Peak power P_{max} (on-load factor 5 %)	kW	1.5	4
Power connections		Terminal block	Terminal block
• Conductor cross-section	mm ²	2.5	2.5
Thermostatic switch		NC contact	NC contact
• Contact load, max.		250 V AC/2.5 A	250 V AC/2.5 A
• Conductor cross-section	mm ²	2.5	2.5
PE connection		Terminal block	Terminal block
• PE connection on housing		M4 screw	M4 screw
Degree of protection		IP20	IP20
Dimensions			
• Width	mm (in)	105 (4.13)	105 (4.13)
• Height	mm (in)	295 (11.61)	345 (13.58)
• Depth	mm (in)	100 (3.94)	100 (3.94)
Weight, approx.	kg (lb)	1.48 (3.26)	1.8 (3.97)
Suitable for PM240-2 Power Module standard variant	Type	6SL3210-1PE11-8..0 6SL3210-1PE12-3..0 6SL3210-1PE13-2..0 6SL3210-1PE14-3..0	6SL3210-1PE16-1..0 6SL3210-1PE18-0..0
Suitable for PM240-2 Power Module push-through variant	Type	–	6SL3211-1PE16-1AL0 6SL3211-1PE18-0ULO
• Frame size		FSA	FSA

Line voltage 380 V ... 480 V 3 AC		Braking resistor		
		6SE6400-4BD11-0AAA0	6SL3201-0BE12-0AAA0	6SE6400-4BD16-5CA0
Resistance	Ω	390	160	56
Rated power P_{DB}	kW	0.1	0.2	0.65
Peak power P_{max} (cycle time 12 s)	kW	2	4	11
Power connections		Shielded cable	Shielded cable	Shielded cable
• Conductor cross-section	mm ²	3 × 1.5	3 × 1.5	3 × 1.5
• Length	m (ft)	0.5 (1.64)	0.5 (1.64)	0.9 (2.95)
Thermostatic switch		NC contact	NC contact	NC contact
• Contact load, max.		250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A
Degree of protection		IP20	IP20	IP20
Frame size		FSA	FSB	FSC
Dimensions				
• Width	mm (in)	72 (2.83)	153 (6.02)	185 (7.28)
• Height	mm (in)	230 (9.06)	329 (12.95)	285 (11.22)
• Depth	mm (in)	43.5 (1.71)	43.5 (1.71)	150 (5.91)
Possible as base component		Yes	Yes	No
Weight, approx.	kg (lb)	1 (2.21)	2 (4.41)	3.8 (8.38)
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0 6SL3224-0BE15-5UA0 6SL3224-0BE17-5UA0 6SL3224-0BE21-1UA0 6SL3224-0BE21-5UA0	6SL3224-0BE22-2.A0 6SL3224-0BE23-0.A0 6SL3224-0BE24-0.A0	6SL3224-0BE25-5.A0 6SL3224-0BE27-5.A0 6SL3224-0BE31-1.A0
• Frame size		FSA	FSB	FSC

SINAMICS G120 standard inverters

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

DC link components
Braking resistors

Technical specifications

Line voltage 380 V ... 480 V 3 AC		Braking resistor			
		6SE6400-4BD21-2DA0	6SE6400-4BD22-2EA1	6SE6400-4BD24-0FA0	6SE6400-4BD26-0FA0
Resistance	Ω	27	15	8.2	5.5
Rated power P_{DB}	kW	1.2	2.2	4	5.6
Peak power P_{max} (cycle time 12 s)	kW	24	44	80	120
Power connections		M6 screw studs	M6 screw studs	M6 screw studs	M6 screw studs
Thermostatic switch		NC contact	NC contact	NC contact	NC contact
• Contact load, max.		250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A
Degree of protection		IP20	IP20	IP20	IP20
Frame size		FSD	FSE	FSF	FSF
Dimensions					
• Width	mm (in)	270 (10.63)	326 (12.83)	395 (15.55)	526 (20.71)
• Height	mm (in)	515 (20.28)	301 (11.85)	650 (25.59)	301 (11.85)
• Depth	mm (in)	175 (6.89)	484 (19.06)	315 (12.40)	484 (19.06)
Possible as base component		No	No	No	No
Weight, approx.	kg (lb)	7.4 (16.3)	11 (24.3)	16.7 (36.8)	17.5 (38.6)
Suitable for PM240 Power Module	Type	6SL3224-0BE31-5.A0 6SL3224-0BE31-8.A0 6SL3224-0BE32-2.A0	6SL3224-0BE33-0.A0 6SL3224-0BE33-7.A0	6SL3224-0BE34-5.A0 6SL3224-0BE35-5.A0 6SL3224-0BE37-5.A0	6SL3224-0BE38-8.UA0 6SL3224-0BE41-1.UA0
• Frame size		FSD	FSE	FSF	FSF

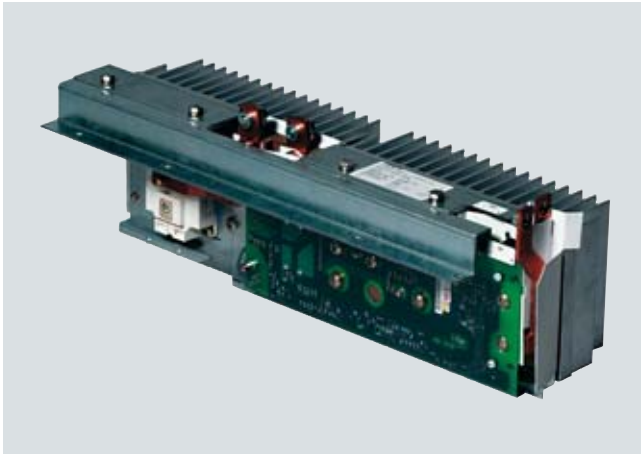
Line voltage 380 V ... 480 V 3 AC		Braking resistor	
		6SL3000-1BE31-3AA0	6SL3000-1BE32-5AA0
Resistance	Ω	4.4	2.2
Rated power P_{DB}	kW	25	50
Peak power P_{max} (cycle time 12 s every 90 s)	kW	125	250
Power connections		M10 screw stud	M10 screw stud
Thermostatic switch		NC contact	NC contact
• Contact load, max.		250 V AC/2.5 A	250 V AC/2.5 A
Degree of protection		IP20	IP20
Frame size		FSGX	FSGX
Dimensions			
• Width	mm (in)	740 (29.13)	810 (31.89)
• Height	mm (in)	605 (23.82)	1325 (52.17)
• Depth	mm (in)	485 (19.09)	485 (19.09)
Possible as base component		No	No
Weight, approx.	kg (lb)	50 (110)	120 (265)
Suitable for PM240 Power Module	Type	6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0 6SL3224-0XE42-0UA0
• Frame size		FSGX	FSGX

SINAMICS G120 standard inverters

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

DC link components Braking Modules

Overview



A Braking Module and the matching external braking resistor are required to bring drives to a controlled standstill in the event of a power failure (e.g. emergency retraction or EMERGENCY STOP Category 1) or to limit the DC link voltage during a short period of generator operation. The Braking Module includes the power electronics and the associated control circuit. During operation, the DC link power is converted into heat loss in an external braking resistor. Braking Modules function autonomously.

The Braking Module is designed for installation in the PM240 Power Modules, frame size FSGX, and is cooled using the Power Module fan. The supply voltage for the electronics is taken from the DC link. The Braking Module is connected to the DC link using the busbar sets included in the scope of delivery.

The activation threshold of the Braking Module can be adjusted by means of a DIP switch. The braking power values specified in the technical specifications apply to the upper activation threshold.

Design

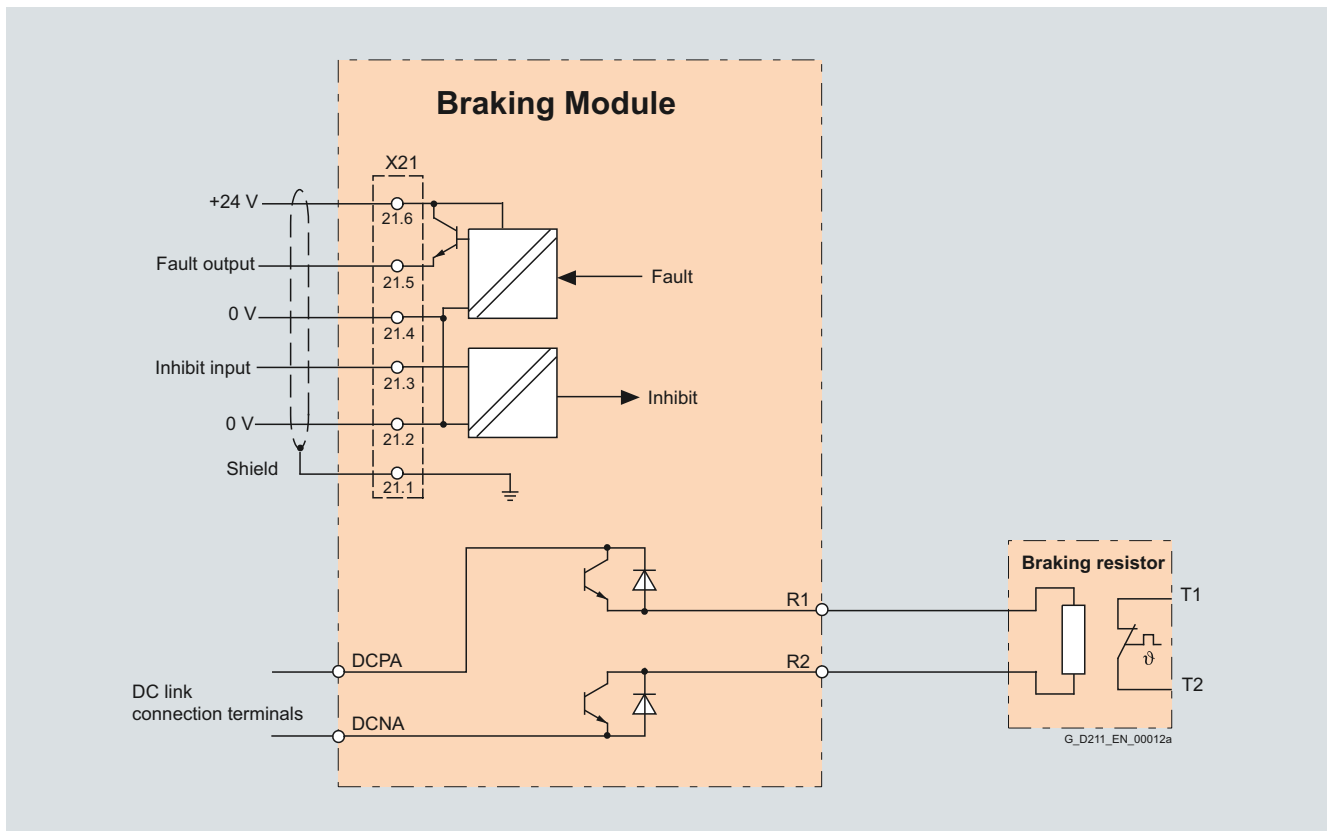
The Braking Modules in chassis format feature the following connections and interfaces as standard:

- 1 DC link connection
- 1 braking resistor connection
- 1 digital input (inhibit Braking Module/acknowledge fault)
- 1 digital output (Braking Module inhibited)
- 1 DIP switch for adjusting the application threshold

Selection and ordering data

Description	Order No.
DC link voltage 510 ... 720 V DC	
Braking Module 50 kW/250 kW	6SL3300-1AE32-5AA0

Integration



Connection example of a Braking Module

SINAMICS G120 standard inverters

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

DC link components
Braking Modules

Technical specifications

DC link voltage 510 ... 720 V DC	Braking Module 6SL3300-1AE32-5AA0
Power	
• Rated power P_{DB}	50 kW
• Peak power P_{15}	250 kW
• Power P_{20}	200 kW
• Power P_{40}	100 kW
Activation thresholds Adjustable via DIP switch	774 V (factory setting) or 673 V
Cable length to braking resistor, max.	50 m (164 ft)
Digital inputs In accordance with IEC 61131-2 Type 1	
• Voltage	-3 ... +30 V
• Low level (an open digital input is interpreted as "low")	-3 ... +5 V
• High level	15 ... 30 V
• Current consumption at 24 V DC, typ.	10 mA
• Conductor cross-section, max.	1.5 mm ²
Digital outputs continuously short-circuit-proof	
• Voltage	24 V DC
• Load current per digital output, max.	500 mA
• Conductor cross-section, max.	1.5 mm ²
R1/R2 connection	M8 screw
• Conductor cross-section, max.	50 mm ²
Weight, approx.	7.3 kg (16.1 lb)
Approvals	cURus
Suitable for installation in a PM240 Power Module	Frame size FSGX

SINAMICS G120 standard inverters

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

Load-side power components Output reactors

Overview



Output reactors for Power Modules, frame sizes FSA and FSB



Output reactor for PM240 Power Modules, frame size FSGX

Output reactors reduce the voltage stress on the motor windings. At the same time, the capacitive charging/discharging currents, which place an additional load on the power unit when long motor cables are used, are reduced.

Output reactors are only provided for the PM230, PM240 and PM250 Power Modules. An output reactor is not required for the PM260 Power Module due to its integrated sine-wave filter.

The maximum permissible output frequency is 150 Hz when an output reactor is used – the pulse frequency must not exceed 4 kHz.

The output reactor must be installed as close as possible to the Power Module.

Output reactors are approved for use only in conjunction with "Vector" and "V/f control" modes.

Selection and ordering data

Rated power		SINAMICS G120 PM230 Power Modules degree of protection <u>IP20</u>	SINAMICS G120 PM230 Power Modules degree of protection <u>IP55/UL Type 12</u>	Output reactor	
kW	hp	Type 6SL3210-...	Type 6SL3223-...	Frame size	Order No.
380 ... 480 V 3 AC					
22	30	1NE24-5 . L0	0DE32-2 . A0	FSD	6SE6400-3TC03-8DD0
30	40	1NE26-0 . L0	0DE33-0 . A0	FSD	6SE6400-3TC05-4DD0
37	50	1NE27-5 . L0	0DE33-7 . A0	FSE	6SE6400-3TC08-0ED0
45	60	1NE28-8 . L0	0DE34-5 . A0	FSE	6SE6400-3TC07-5ED0
55	75	1NE31-1 . L0	0DE35-5 . A0	FSF	6SE6400-3TC14-5FD0
75	100	1NE31-5 . L0	0DE37-5 . A0	FSF	6SE6400-3TC15-4FD0
90	125	-	0DE38-8 . A0	FSF	6SE6400-3TC14-5FD0

SINAMICS G120 standard inverters

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

Load-side power components
Output reactors

Selection and ordering data

Rated power		SINAMICS G120 <u>PM240</u> Power Modules		Output reactor
kW	hp	Type 6SL3224-...	Frame size	Order No.
380 ... 480 V 3 AC				
0.37	0.50	OBE13-7UA0	FSA	6SE6400-3TC00-4AD2
0.55	0.75	OBE15-5UA0		
0.75	1.0	OBE17-5UA0		
1.1	1.5	OBE21-1UA0		
1.5	2	OBE21-5UA0		
2.2	3	OBE22-2 . A0	FSB	6SL3202-0AE21-0CA0
3.0	4	OBE23-0 . A0		
4.0	5	OBE24-0 . A0		
7.5	10	OBE25-5 . A0	FSC	6SL3202-0AJ23-2CA0
11.0	15	OBE27-5 . A0		
15.0	20	OBE31-1 . A0		
18.5	25	OBE31-5 . A0	FSD	6SE6400-3TC05-4DD0
22	30	OBE31-8 . A0	FSD	6SE6400-3TC03-8DD0
30	40	OBE32-2 . A0	FSD	6SE6400-3TC05-4DD0
37	50	OBE33-0 . A0	FSE	6SE6400-3TC08-0ED0
45	60	OBE33-7 . A0	FSE	6SE6400-3TC07-5ED0
55	75	OBE34-5 . A0	FSF	6SE6400-3TC14-5FD0
75	100	OBE35-5 . A0	FSF	6SE6400-3TC15-4FD0
90	125	OBE37-5 . A0	FSF	6SE6400-3TC14-5FD0
110	150	OBE38-8UA0	FSF	6SL3000-2BE32-1AA0
132	200	OBE41-1UA0	FSF	6SL3000-2BE32-6AA0
160	250	OXE41-3UA0	FSGX	6SL3000-2BE33-2AA0
200	300	OXE41-6UA0	FSGX	6SL3000-2BE33-8AA0
250	400	OXE42-0UA0	FSGX	6SL3000-2BE35-0AA0

Rated power		SINAMICS G120 <u>PM250</u> Power Modules		Output reactor
kW	hp	Type 6SL3225-...	Frame size	Order No.
380 ... 480 V 3 AC				
7.5	10	OBE25-5AA1	FSC	6SL3202-0AJ23-2CA0
11.0	15	OBE27-5AA1		
15.0	20	OBE31-1AA1		
18.5	25	OBE31-5 . A0	FSD	6SE6400-3TC05-4DD0
22	30	OBE31-8 . A0	FSD	6SE6400-3TC03-8DD0
30	40	OBE32-2 . A0	FSD	6SE6400-3TC05-4DD0
37	50	OBE33-0 . A0	FSE	6SE6400-3TC08-0ED0
45	60	OBE33-7 . A0	FSE	6SE6400-3TC07-5ED0
55	75	OBE34-5 . A0	FSF	6SE6400-3TC14-5FD0
75	100	OBE35-5 . A0	FSF	6SE6400-3TC15-4FD0
90	125	OBE37-5 . A0	FSF	6SE6400-3TC14-5FD0

SINAMICS G120 standard inverters

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

Load-side power components Output reactors

Integration

Output reactors that are optionally available depending on the Power Module used

The following line-side power components, DC link components and load-side power components are optionally available in the appropriate frames sizes for the Power Modules:

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM230 Power Module degree of protection IP20 or IP55/UL Type 12							
Available frame sizes	–	–	–	✓	✓	✓	–
Load-side power components							
Output reactor	–	–	–	S	S	S	–
PM240 Power Module with integrated braking chopper							
Available frame sizes	✓	✓	✓	✓	✓	✓	Without integrated braking chopper
Load-side power components							
Output reactor	U	U	U	S	S	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Load-side power components							
Output reactor	–	–	U	S	S	S	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Load-side power components							
Output reactor ¹⁾	–	–	–	–	–	–	–

U = Base component
S = Lateral mounting
– = Not possible

¹⁾ PM260 Power Modules do not require output reactors as they are already equipped with sine-wave filters.

SINAMICS G120 standard inverters

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

Load-side power components Output reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)				
		6SE6400-3TC00-4AD2				
Rated current	A	4	4	4	4	4
Power loss	kW	0.005	0.005	0.005	0.005	0.005
Connection to the Power Module		Cable	Cable	Cable	Cable	Cable
• Conductor cross-section		4 × AWG16 (1.5 mm ²)	4 × AWG16 (1.5 mm ²)	4 × AWG16 (1.5 mm ²)	4 × AWG16 (1.5 mm ²)	4 × AWG16 (1.5 mm ²)
• Length, approx.	m (ft)	0.3 (0.98)	0.3 (0.98)	0.3 (0.98)	0.3 (0.98)	0.3 (0.98)
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	6	6	6	6	6
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Cable length, max. between output reactor and motor						
• 380 -10 % ... 400 V 3 AC						
- Shielded	m (ft)	150 (492)	150 (492)	150 (492)	150 (492)	150 (492)
- Unshielded	m (ft)	225 (738)	225 (738)	225 (738)	225 (738)	225 (738)
• 401 ... 480 V 3 AC +10 %						
- Shielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
- Unshielded	m (ft)	150 (492)	150 (492)	150 (492)	150 (492)	150 (492)
Dimensions						
• Width	mm (in)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)
• Height	mm (in)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)
• Depth	mm (in)	110 (4.33)	110 (4.33)	110 (4.33)	110 (4.33)	110 (4.33)
Possible as base component		Yes	Yes	Yes	Yes	Yes
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	2 (4.41)	2 (4.41)	2 (4.41)	2 (4.41)	2 (4.41)
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0	6SL3224-0BE15-5UA0	6SL3224-0BE17-5UA0	6SL3224-0BE21-1UA0	6SL3224-0BE21-5UA0
• Rated power of the Power Module	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• Rated current I_{rated} of the Power Module	A	1.3	1.7	2.2	3.1	4.1
• Frame size		FSA	FSA	FSA	FSA	FSA

SINAMICS G120 standard inverters

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

Load-side power components

Output reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)					
		6SL3202-0AE21-0CA0			6SL3202-0AJ23-2CA0		
Rated current	A	9.4	9.4	9.4	32	32	32
Power loss	kW	0.02	0.02	0.02	0.06	0.06	0.06
Connection to the Power Module		Cable	Cable	Cable	Cable	Cable	Cable
• Conductor cross-section		4 × AWG14 (1.5 mm ²)	4 × AWG14 (1.5 mm ²)	4 × AWG14 (1.5 mm ²)	4 × AWG14 (1.5 mm ²)	4 × AWG14 (1.5 mm ²)	4 × AWG14 (1.5 mm ²)
• Length, approx.	m (ft)	0.4 (1.31)	0.4 (1.31)	0.4 (1.31)	0.35 (1.15)	0.35 (1.15)	0.35 (1.15)
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	6	6	6	6	6	6
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Cable length, max. between output reactor and motor							
• 380 -10 % ... 400 V 3 AC							
- Shielded	m (ft)	150 (492)	150 (492)	150 (492)	150 (492)	150 (492)	150 (492)
- Unshielded	m (ft)	225 (738)	225 (738)	225 (738)	225 (738)	225 (738)	225 (738)
• 401 ... 480 V 3 AC +10 %							
- Shielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
- Unshielded	m (ft)	150 (492)	150 (492)	150 (492)	150 (492)	150 (492)	150 (492)
Dimensions							
• Width	mm (in)	154 (6.06)	154 (6.06)	154 (6.06)	189 (7.44)	189 (7.44)	189 (7.44)
• Height	mm (in)	270 (10.63)	270 (10.63)	270 (10.63)	334 (13.15)	334 (13.15)	334 (13.15)
• Depth	mm (in)	70 (2.76)	70 (2.76)	70 (2.76)	80 (3.15)	80 (3.15)	80 (3.15)
Possible as base component		Yes	Yes	Yes	Yes	Yes	Yes
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	4.4 (9.7)	4.4 (9.7)	4.4 (9.7)	9.1 (20.1)	9.1 (20.1)	9.1 (20.1)
Suitable for PM240 Power Module	Type	6SL3224-0BE22-2UA0 6SL3224-0BE22-2AA0	6SL3224-0BE23-0UA0 6SL3224-0BE23-0AA0	6SL3224-0BE24-0UA0 6SL3224-0BE24-0AA0	6SL3224-0BE25-5UA0 6SL3224-0BE25-5AA0	6SL3224-0BE27-5UA0 6SL3224-0BE27-5AA0	6SL3224-0BE31-1UA0 6SL3224-0BE31-1AA0
Suitable for PM250 Power Module	Type	–	–	–	6SL3225-0BE25-5AA1	6SL3225-0BE27-5AA1	6SL3225-0BE31-1AA1
• Rated power of the Power Module	kW (hp)	2.2 (3.0)	3 (4)	4 (5)	7.5 (10)	11 (15)	15 (20)
• Rated current I_{rated} of the Power Module	A	5.9	7.7	10.2	18	25	32
• Frame size		FSB	FSB	FSB	FSC	FSC	FSC

SINAMICS G120 standard inverters

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

Load-side power components
Output reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)				
		6SE6400-3TC05-4DD0	6SE6400-3TC03-8DD0	6SE6400-3TC05-4DD0	6SE6400-3TC08-0ED0	6SE6400-3TC07-5ED0
Rated current	A	68 ¹⁾	45 ¹⁾	68 ¹⁾	104 ¹⁾	90 ¹⁾
Power loss	kW	0.2	0.2	0.2	0.17	0.27
Connection to the Power Module		Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug
Motor connection		Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between output reactor and motor						
• 380 -10 % ... 400 V 3 AC						
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
• 401 ... 480 V 3 AC +10 %						
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions						
• Width	mm (in)	225 (8.86)	225 (8.86)	225 (8.86)	225 (8.86)	270 (10.63)
• Height	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)	210 (8.27)	248 (9.76)
• Depth	mm (in)	150 (5.91)	179 (7.05)	150 (5.91)	150 (5.91)	209 (8.23)
Possible as base component		No	No	No	No	No
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	10.7 (23.6)	16.1 (35.5)	10.7 (23.6)	10.4 (22.9)	24.9 (54.9)
Suitable for PM230 Power Module degree of protection IP20	Type	–	6SL3210-1NE24-5UL0 6SL3210-1NE24-5AL0	6SL3210-1NE26-0UL0 6SL3210-1NE26-0AL0	6SL3210-1NE27-5UL0 6SL3210-1NE27-5AL0	6SL3210-1NE28-8UL0 6SL3210-1NE28-8AL0
Suitable for PM230 Power Module degree of protection IP55/UL Type 12	Type	–	6SL3223-0DE32-2UA0 6SL3223-0DE32-2AA0	6SL3223-0DE33-0UA0 6SL3223-0DE33-0AA0	6SL3223-0DE33-7UA0 6SL3223-0DE33-7AA0	6SL3223-0DE34-5UA0 6SL3223-0DE34-5AA0
Suitable for PM240 Power Module	Type	6SL3224-0BE31-5UA0 6SL3224-0BE31-5AA0	6SL3224-0BE31-8UA0 6SL3224-0BE31-8AA0	6SL3224-0BE32-2UA0 6SL3224-0BE32-2AA0	6SL3224-0BE33-0UA0 6SL3224-0BE33-0AA0	6SL3224-0BE33-7UA0 6SL3224-0BE33-7AA0
Suitable for PM250 Power Module	Type	6SL3225-0BE31-5 . A0	6SL3225-0BE31-8 . A0	6SL3225-0BE32-2 . A0	6SL3225-0BE33-0 . A0	6SL3225-0BE33-7 . A0
• Rated power of the Power Module	kW (hp)	18.5 (25)	22 (30)	30 (40)	37 (50)	45 (60)
• Rated current I_{rated} of the Power Module	A	38	45	60	75	90
• Frame size		FSD	FSD	FSD	FSE	FSE

¹⁾ On the rating plate of the reactor the current is specified according to high overload HO, which is lower than the indicated value for the low overload current of the Power Module.

SINAMICS G120 standard inverters

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

Load-side power components

Output reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)				
		6SE6400-3TC14-5FD0	6SE6400-3TC15-4FD0	6SE6400-3TC14-5FD0	6SL3000-2BE32-1AA0	6SL3000-2BE32-6AA0
Rated current	A	178 ¹⁾	178 ¹⁾	178 ¹⁾	210	260
Power loss	kW	0.47	0.25	0.47	0.49	0.5
Connection to the Power Module		Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M10 screw	Flat connector for M10 screw
Motor connection		Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M10 screw	Flat connector for M10 screw
PE connection		M8 screw	M6 screw	M8 screw	M8 screw	M8 screw
Cable length, max. between output reactor and motor						
• 380 -10 % ... 400 V 3 AC						
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
• 401 ... 480 V 3 AC +10 %						
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions						
• Width	mm (in)	350 (13.78)	270 (10.63)	350 (13.78)	300 (11.81)	300 (11.81)
• Height	mm (in)	321 (12.64)	248 (9.76)	321 (12.64)	285 (11.22)	315 (12.40)
• Depth	mm (in)	288 (11.34)	209 (8.23)	288 (11.34)	257 (10.12)	277 (10.91)
Possible as base component		No	No	No	No	No
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	51.5 (114)	24 (52.9)	51.5 (114)	60 (132)	66 (146)
Suitable for PM230 Power Module degree of protection IP20	Type	6SL3210-1NE31-1UL0 6SL3210-1NE31-1AL0	6SL3210-1NE31-5UL0 6SL3210-1NE31-5AL0	–	–	–
Suitable for PM230 Power Module degree of protection IP55/UL Type 12	Type	6SL3223-0DE35-5UA0 6SL3223-0DE35-5AA0	6SL3223-0DE37-5UA0 6SL3223-0DE37-5AA0	6SL3223-0DE38-8UA0 6SL3223-0DE38-8AA0	–	–
Suitable for PM240 Power Module	Type	6SL3224-0BE34-5UA0 6SL3224-0BE34-5AA0	6SL3224-0BE35-5UA0 6SL3224-0BE35-5AA0	6SL3224-0BE37-5UA0 6SL3224-0BE37-5AA0	6SL3224-0BE38-8UA0	6SL3224-0BE41-1UA0
Suitable for PM250 Power Module	Type	6SL3225-0BE34-5 . A0	6SL3225-0BE35-5 . A0	6SL3225-0BE37-5 . A0	–	–
• Rated power of the Power Module	kW (hp)	55 (75)	75 (100)	90 (125)	110 (150)	132 (200)
• Rated current I_{rated} of the Power Module	A	110	145	178	205	250
• Frame size		FSF	FSF	FSF	FSF	FSF

¹⁾ On the rating plate of the reactor the current is specified according to high overload HO, which is lower than the indicated value for the low overload current of the Power Module.

SINAMICS G120 standard inverters

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

Load-side power components
Output reactors

Technical specifications

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)		
		6SL3000-2BE33-2AA0	6SL3000-2BE33-8AA0	6SL3000-2BE35-0AA0
Rated current	A	310	380	490
Power loss	kW	0.470	0.500	0.500
Connection to the Power Module		1 × hole for M10	1 × hole for M10	1 × hole for M12
Motor connection		1 × hole for M10	1 × hole for M10	1 × hole for M12
PE connection		M6 screw	M6 screw	M6 screw
Cable length, max. between output reactor and motor				
• 380 -10 % ... 400 V 3 AC				
- Shielded	m (ft)	300 (984)	300 (984)	300 (984)
- Unshielded	m (ft)	450 (1476)	450 (1476)	450 (1476)
• 401 ... 480 V 3 AC +10 %				
- Shielded	m (ft)	300 (984)	300 (984)	300 (984)
- Unshielded	m (ft)	450 (1476)	450 (1476)	450 (1476)
Dimensions				
• Width	mm (in)	300 (11.81)	300 (11.81)	300 (11.81)
• Height	mm (in)	285 (11.22)	285 (11.22)	365 (14.37)
• Depth	mm (in)	257 (10.12)	277 (10.91)	277 (10.91)
Possible as base component		No	No	No
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg (lb)	66 (146)	73 (161)	100 (221)
Suitable for PM240 Power Module	Type	6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0	6SL3224-0XE42-0UA0
Suitable for PM250 Power Module	Type	–	–	–
• Rated power of the Power Module	kW (hp)	160 (250)	200 (300)	250 (400)
• Rated current I_{rated} of the Power Module	A	302	370	477
• Frame size		FSGX	FSGX	FSGX

SINAMICS G120 standard inverters

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

Load-side power components Sine-wave filters

Overview



Sine-wave filter for PM240 Power Modules, frame size FSGX

A sine-wave filter limits the rate of rise of voltage and the capacitive charging/discharging currents that usually occur with inverter operation. An output reactor is not required. Sine-wave filters are only provided for the PM230, PM240 and PM250 Power Modules. PM260 Power Modules already have an integrated sine-wave filter and an additional sine-wave filter is not required.

The sine-wave filter at the inverter output supplies almost perfect sinusoidal voltages at the motor so that standard motors can be used without special cables. Standard cables can be used. The maximum permissible motor feeder cable length is 300 m (984 ft). The maximum output frequency is 150 Hz at 380 V to 480 V.

When using sine-wave filters, the following should be observed:

- May be used for rated outputs up to and including 90 kW (125 hp) operation at pulse frequencies of between 4 kHz and 8 kHz.
- May be used for rated outputs of 110 kW (150 hp) and above only at a pulse frequency of 4 kHz – note additional current derating as compared with rated pulse frequency of 2 kHz ([see derating data](#))
- It must be ensured that the automatic pulse frequency reduction functions are also deactivated
- A derating of 5 % must be observed when the appropriate PM240 and PM250 Power Module is selected.
- 80 % of the line input voltage is available as an output voltage for PM230 Power Modules.
- The output frequency is limited to 150 Hz.
- Operation and commissioning may only be performed with the motor connected as the sine-wave filter is not no-load proof

Selection and ordering data

Rated power		SINAMICS G120 PM230 Power Modules degree of protection <u>IP20</u>	SINAMICS G120 PM230 Power Modules degree of protection <u>IP55/UL Type 12</u>		Sine-wave filter
kW	hp	Type 6SL3210-...	Type 6SL3223-...	Frame size	Order No.
380 ... 480 V 3 AC					
22	30	1NE24-5 . L0	0DE32-2 . A0	FSD	6SL3202-0AE24-6SA0
30	40	1NE26-0 . L0	0DE33-0 . A0	FSD	6SL3202-0AE26-2SA0
37	50	1NE27-5 . L0	0DE33-7 . A0	FSE	6SL3202-0AE28-8SA0
45	60	1NE28-8 . L0	0DE34-5 . A0	FSE	
55	75	1NE31-1 . L0	0DE35-5 . A0	FSF	6SL3202-0AE31-5SA0
75	100	1NE31-5 . L0	0DE37-5 . A0	FSF	
90	125	–	0DE38-8 . A0	FSF	6SL3202-0AE31-8SA0

SINAMICS G120 standard inverters

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

Load-side power components
Sine-wave filters

Selection and ordering data

Rated power		SINAMICS G120 <u>PM240</u> Power Module		Sine-wave filter
kW	hp	Type 6SL3224-...	Frame size	Order No.
380 ... 480 V 3 AC				
0.37	0.50	OBE13-7UA0	FSA	6SL3202-0AE20-3SA0
0.55	0.75	OBE15-5UA0		
0.75	1.0	OBE17-5UA0		
1.1	1.5	OBE21-1UA0	FSA	6SL3202-0AE20-6SA0
1.5	2.0	OBE21-5UA0		
2.2	3.0	OBE22-2 . A0	FSB	6SL3202-0AE21-1SA0
3.0	4.0	OBE23-0 . A0		
4.0	5.0	OBE24-0 . A0	FSB	6SL3202-0AE21-4SA0
7.5	10	OBE25-5 . A0	FSC	6SL3202-0AE22-0SA0
11.0	15	OBE27-5 . A0	FSC	6SL3202-0AE23-3SA0
15.0	20	OBE31-1 . A0		
18.5	25	OBE31-5 . A0	FSD	6SL3202-0AE24-6SA0
22	30	OBE31-8 . A0		
30	40	OBE32-2 . A0	FSD	6SL3202-0AE26-2SA0
37	50	OBE33-0 . A0	FSE	6SL3202-0AE28-8SA0
45	60	OBE33-7 . A0		
55	75	OBE34-5 . A0	FSF	6SL3202-0AE31-5SA0
75	100	OBE35-5 . A0		
90	125	OBE37-5 . A0	FSF	6SL3202-0AE31-8SA0
110	150	OBE38-8UA0	FSF	6SL3000-2CE32-3AA0
132	200	OBE41-1UA0		
160	250	OXE41-3UA0	FSGX	6SL3000-2CE32-8AA0
200	300	OXE41-6UA0	FSGX	6SL3000-2CE33-3AA0
250	400	OXE42-0UA0	FSGX	6SL3000-2CE34-1AA0

Rated power		SINAMICS G120 <u>PM250</u> Power Module		Sine-wave filter
kW	hp	Type 6SL3225-...	Frame size	Order No.
380 ... 480 V 3 AC				
7.5	10	OBE25-5AA1	FSC	6SL3202-0AE22-0SA0
11.0	15	OBE27-5AA1	FSC	6SL3202-0AE23-3SA0
15.0	20	OBE31-1AA1		
18.5	25	OBE31-5 . A0	FSD	6SL3202-0AE24-6SA0
22	30	OBE31-8 . A0		
30	40	OBE32-2 . A0	FSD	6SL3202-0AE26-2SA0
37	50	OBE33-0 . A0	FSE	6SL3202-0AE28-8SA0
45	60	OBE33-7 . A0		
55	75	OBE34-5 . A0	FSF	6SL3202-0AE31-5SA0
75	100	OBE35-5 . A0		
90	125	OBE37-5 . A0	FSF	6SL3202-0AE31-8SA0

SINAMICS G120 standard inverters

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

Load-side power components
Sine-wave filters

Integration

Sine-wave filters that are optionally available depending on the Power Module used

	Frame size						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM230 Power Module degree of protection IP20 and IP55/UL Type 12							
Available frame sizes	✓	✓	✓	✓	✓	✓	–
Load-side power components							
Sine-wave filter	–	–	–	S	S	S	–
PM240 Power Module with integrated braking chopper							Without integrated braking chopper
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Load-side power components							
Sine-wave filter	U	U	U	S	S	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Load-side power components							
Sine-wave filter	–	–	U	S	S	S	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Load-side power components							
Sine-wave filter	–	–	–	I	–	I	–

U = Base component

S = Lateral mounting

I = Integrated

– = Not possible

SINAMICS G120 standard inverters

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

Load-side power components
Sine-wave filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Sine-wave filter (for pulse frequencies 4 ... 8 kHz)				
		6SL3202-0AE20-3SA0			6SL3202-0AE20-6SA0	
Rated current	A	3.5	3.5	3.5	6.0	6.0
Power loss	kW	0.027	0.027	0.027	0.049	0.049
Connection to the Power Module		Cable	Cable	Cable	Cable	Cable
• Conductor cross-section	mm ²	6	6	6	6	6
• Length, approx.	m (ft)	0.5 (1.64)	0.5 (1.64)	0.5 (1.64)	0.5 (1.64)	0.5 (1.64)
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	6	6	6	6	6
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Cable length, max. between sine-wave filter and motor						
• 380 ... 480 V 3 AC ±10 %						
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions						
• Width	mm (in)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)
• Height	mm (in)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)
• Depth	mm (in)	110 (4.33)	110 (4.33)	110 (4.33)	110 (4.33)	110 (4.33)
Possible as base component		Yes	Yes	Yes	Yes	Yes
Degree of protection		IP20	IP20	IP20	IP20	IP20
Weight, approx.	kg (lb)	2.6 (5.73)	2.6 (5.73)	2.6 (5.73)	3.0 (6.62)	3.0 (6.62)
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0	6SL3224-0BE15-5UA0	6SL3224-0BE17-5UA0	6SL3224-0BE21-1UA0	6SL3224-0BE21-5UA0
• Rated power of the Power Module	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• Rated current I_{rated} of the Power Module	A	1.3	1.7	2.2	3.1	4.1
• Frame size		FSA	FSA	FSA	FSA	FSA

SINAMICS G120 standard inverters

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

Load-side power components
Sine-wave filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Sine-wave filter (for pulse frequencies 4 ... 8 kHz)					
		6SL3202-0AE21-1SA0	6SL3202-0AE21-4SA0	6SL3202-0AE22-0SA0	6SL3202-0AE23-3SA0		
Rated current	A	9.0	9.0	14.0	20.0	33.0	33.0
Power loss	kW	0.052	0.052	0.085	0.099	0.151	0.151
Connection to the Power Module		Cable	Cable	Cable	Cable	Cable	Cable
• Conductor cross-section	mm ²	6	6	6	10	10	10
• Length, approx.	m (ft)	0.5 (1.64)	0.5 (1.64)	0.5 (1.64)	0.5 (1.64)	0.5 (1.64)	0.5 (1.64)
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	6	6	6	6	6	6
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Cable length, max. between sine-wave filter and motor							
• 380 ... 480 V 3 AC ±10 %							
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions							
• Width	mm (in)	153 (6.02)	153 (6.02)	153 (6.02)	189 (7.44)	189 (7.44)	189 (7.44)
• Height	mm (in)	270 (10.63)	270 (10.63)	270 (10.63)	336 (13.23)	336 (13.23)	336 (13.23)
• Depth	mm (in)	100 (3.94)	100 (3.94)	100 (3.94)	140 (5.51)	140 (5.51)	140 (5.51)
Possible as base component		Yes	Yes	Yes	Yes	Yes	Yes
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Weight, approx.	kg (lb)	6 (13.2)	6 (13.2)	10 (22.1)	12 (26.5)	23 (50.7)	23 (50.7)
Suitable for PM240 Power Module	Type	6SL3224-0BE22-2UA0 6SL3224-0BE22-2AA0	6SL3224-0BE23-0UA0 6SL3224-0BE23-0AA0	6SL3224-0BE24-0UA0 6SL3224-0BE24-0AA0	6SL3224-0BE25-5UA0 6SL3224-0BE25-5AA0	6SL3224-0BE27-5UA0 6SL3224-0BE27-5AA0	6SL3224-0BE31-1UA0 6SL3224-0BE31-1AA0
Suitable for PM250 Power Module	Type	–	–	–	6SL3225-0BE25-5AA1	6SL3225-0BE27-5AA1	6SL3225-0BE31-1AA1
• Rated power of the Power Module	kW (hp)	2.2 (3)	3 (4)	4 (5)	7.5 (10)	11 (15)	15 (20)
• Rated current I_{rated} of the Power Module	A	5.9	7.7	10.2	18	25	32
• Frame size		FSB	FSB	FSB	FSC	FSC	FSC

SINAMICS G120 standard inverters

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

Load-side power components
Sine-wave filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Sine-wave filter (for pulse frequencies 4 ... 8 kHz)				
		6SL3202-0AE24-6SA0		6SL3202-0AE26-2SA0		6SL3202-0AE28-8SA0
Rated current	A	47	47	61.8	92	92
Power loss	kW	0.185	0.185	0.152	0.251	0.251
Connection to the Power Module		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	50	50	50	95	95
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	50	50	50	95	95
PE connection		M6 screw	M6 screw	M6 screw	M8 screw	M8 screw
Cable length, max. between sine-wave filter and motor						
• 380 ... 480 V 3 AC ±10 %						
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions						
• Width	mm (in)	250 (9.84)	250 (9.84)	250 (9.84)	275 (10.83)	275 (10.83)
• Height	mm (in)	315 (12.40)	315 (12.40)	305 (12.01)	368 (14.49)	368 (14.49)
• Depth	mm (in)	262 (10.31)	262 (10.31)	262 (10.31)	275 (10.83)	275 (10.83)
Possible as base component		No	No	No	No	No
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	24.0 (52.9)	24.0 (52.9)	34.0 (75)	45.0 (99.2)	45.0 (99.2)
Suitable for PM230 Power Module degree of protection IP20	Type	–	6SL3210-1NE24-5UL0 6SL3210-1NE24-5AL0	6SL3210-1NE26-0UL0 6SL3210-1NE26-0AL0	6SL3210-1NE27-5UL0 6SL3210-1NE27-5AL0	6SL3210-1NE28-8UL0 6SL3210-1NE28-8AL0
Suitable for PM230 Power Module degree of protection IP55/UL Type 12	Type	–	6SL3223-ODE32-2UA0 6SL3223-ODE32-2AA0	6SL3223-ODE33-0UA0 6SL3223-ODE33-0AA0	6SL3223-ODE33-7UA0 6SL3223-ODE33-7AA0	6SL3223-ODE34-5UA0 6SL3223-ODE34-5AA0
Suitable for PM240 Power Module	Type	6SL3224-0BE31-5UA0 6SL3224-0BE31-5AA0	6SL3224-0BE31-8UA0 6SL3224-0BE31-8AA0	6SL3224-0BE32-2UA0 6SL3224-0BE32-2AA0	6SL3224-0BE33-0UA0 6SL3224-0BE33-0AA0	6SL3224-0BE33-7UA0 6SL3224-0BE33-7AA0
Suitable for PM250 Power Module	Type	6SL3225-0BE31-5 . A0	6SL3225-0BE31-8 . A0	6SL3225-0BE32-2 . A0	6SL3225-0BE33-0 . A0	6SL3225-0BE33-7 . A0
• Rated power of the Power Module	kW (hp)	18.5 (25)	22 (30)	30 (40)	37 (50)	45 (60)
• Rated current I_{rated} of the Power Module	A	38	45	60	75	90
• Frame size		FSD	FSD	FSD	FSE	FSE

SINAMICS G120 standard inverters

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

Load-side power components
Sine-wave filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Sine-wave filter (for pulse frequencies 4 ... 8 kHz, only 4 kHz permissible at 110 kW and above – note additional current derating as compared with rated pulse frequency of 2 kHz, see derating data)				
		6SL3202-0AE31-5SA0		6SL3202-0AE31-8SA0	6SL3000-2CE32-3AA0	
Rated current	A	150	150	182	225	225
Power loss	kW	0.43	0.43	0.47	0.221	0.221
Connection to the Power Module		Screw terminals	Screw terminals	Screw terminals	1 × hole for M10	1 × hole for M10
• Conductor cross-section	mm ²	150	150	150		
Motor connection		Screw terminals	Screw terminals	Screw terminals	1 × hole for M10	1 × hole for M10
• Conductor cross-section	mm ²	150	150	150		
PE connection		M8 screw	M6 screw	M8 screw	1 × hole for M10	1 × hole for M10
Cable length, max. between sine-wave filter and motor						
• 380 ... 480 V 3 AC ±10 %						
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	300 (984)	300 (984)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	450 (1476)	450 (1476)
Dimensions						
• Width	mm (in)	350 (13.78)	350 (13.78)	350 (13.78)	620 (24.41)	620 (24.41)
• Height	mm (in)	440 (17.32)	440 (17.32)	468 (18.43)	300 (11.81)	300 (11.81)
• Depth	mm (in)	305 (12.01)	305 (12.01)	305 (12.01)	320 (12.60)	320 (12.60)
Possible as base component		No	No	No	No	No
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	63.0 (139)	63.0 (139)	80.0 (176)	124 (273)	124 (273)
Suitable for PM230 Power Module degree of protection IP20	Type	6SL3210-1NE31-1UL0 6SL3210-1NE31-1AL0	6SL3210-1NE31-5UL0 6SL3210-1NE31-5AL0	–	–	–
Suitable for PM230 Power Module degree of protection IP55/UL Type 12	Type	6SL3223-0DE35-5UA0 6SL3223-0DE35-5AA0	6SL3223-0DE37-5UA0 6SL3223-0DE37-5AA0	6SL3223-0DE38-8UA0 6SL3223-0DE38-8AA0	–	–
Suitable for PM240 Power Module	Type	6SL3224-0BE34-5UA0 6SL3224-0BE34-5AA0	6SL3224-0BE35-5UA0 6SL3224-0BE35-5AA0	6SL3224-0BE37-5UA0 6SL3224-0BE37-5AA0	6SL3224-0BE38-8UA0	6SL3224-0BE41-1UA0
Suitable for PM250 Power Module	Type	6SL3225-0BE34-5 . A0	6SL3225-0BE35-5 . A0	6SL3225-0BE37-5 . A0	–	–
• Rated power of the Power Module	kW (hp)	55 (75)	75 (100)	90 (125)	110 (150)	132 (200)
• Rated current I_{rated} of the Power Module	A	110	145	178	205	250
• Frame size		FSF	FSF	FSF	FSF	FSF

SINAMICS G120 standard inverters

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

Load-side power components
Sine-wave filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Sine-wave filter (permissible for 4 kHz pulse frequency – note additional current derating as compared with rated pulse frequency of 2 kHz, see derating data)		
		6SL3000-2CE32-8AA0	6SL3000-2CE33-3AA0	6SL3000-2CE34-1AA0
Rated current	A	276	333	408
Power loss	kW	0.235	0.245	0.34
Connection to the Power Module		1 × hole for M10	1 × hole for M10	1 × hole for M10
Motor connection		1 × hole for M10	1 × hole for M10	1 × hole for M10
PE connection		1 × hole for M10	1 × hole for M10	1 × hole for M10
Cable length, max. between sine-wave filter and motor				
• 380 ... 480 V 3 AC ±10 %				
- Shielded	m (ft)	300 (984)	300 (984)	300 (984)
- Unshielded	m (ft)	450 (1476)	450 (1476)	450 (1476)
Dimensions				
• Width	mm (in)	620 (24.41)	620 (24.41)	620 (24.41)
• Height	mm (in)	300 (11.81)	370 (14.57)	370 (14.57)
• Depth	mm (in)	320 (12.60)	360 (14.17)	360 (14.17)
Possible as base component		No	No	No
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg (lb)	127 (280)	136 (300)	198 (437)
Suitable for PM240 Power Module	Type	6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0	6SL3224-0XE42-0UA0
Suitable for PM250 Power Module	Type	–	–	–
• Rated power of the Power Module	kW (hp)	160 (250)	200 (300)	250 (400)
• Rated current I_{rated} of the Power Module	A	302	370	477
• Frame size		FSGX	FSGX	FSGX

SINAMICS G120 standard inverters

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

Supplementary system components Operator panels

Overview

Operator panel	Intelligent Operator Panel IOP and IOP Handheld	Basic Operator Panel BOP-2
		
Description	<p>Thanks to the large plain text display, menu-based operation and the application wizards, commissioning of the standard drives is easy. Integrated application wizards guide the user interactively through the commissioning process for important applications such as pumps, fans, compressors and conveyor systems.</p>	<p>Commissioning of standard drives is easy with the menu-prompted dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.</p>
Possible applications	<ul style="list-style-type: none"> • Directly mounted on SINAMICS G120 • Can be mounted in the control cabinet door using a door mounting kit (achievable degree of protection is IP54/UL Type 12) • Available as a handheld version (with PM230 in degree of protection IP55, degree of protection IP55/UL Type 12 is no longer provided at the connection point) • 5 languages available 	<ul style="list-style-type: none"> • Directly mounted on SINAMICS G120 • Can be mounted in the control cabinet door using a door mounting kit (achievable degree of protection is IP54/UL Type 12)
Quick commissioning without expert knowledge	<ul style="list-style-type: none"> • Standard commissioning using the clone function • User-defined parameter list with a reduced number of self-selected parameters • Simple commissioning of standard applications using application-specific wizards, it is not necessary to know the parameter structure • Simple local commissioning using the handheld version • Commissioning largely without documentation 	<ul style="list-style-type: none"> • Standard commissioning using the clone function
High degree of operator friendliness and intuitive operation	<ul style="list-style-type: none"> • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes • Intuitive navigation using a rotary knob – just like in everyday applications • Graphic display to show status values such as pressure or flow in bar-type diagrams • Status display with freely selectable units to specify physical values 	<ul style="list-style-type: none"> • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes – • 2-line display for showing up to 2 process values with text • Status display of predefined units
Minimization of maintenance times	<ul style="list-style-type: none"> • Diagnostics using plain text display, can be used locally on-site without documentation • Simple update of languages, wizards and firmware via USB 	<ul style="list-style-type: none"> • Diagnostics with menu prompting with 7-segment display

SINAMICS G120 standard inverters

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

Supplementary system components
Intelligent Operator Panel IOP

Overview

Intelligent Operator Panel IOP



Intelligent Operator Panel IOP

The Intelligent Operator Panel IOP is a very user-friendly and powerful operator panel for the SINAMICS G120, SINAMICS G120C, SINAMICS G120D and SINAMICS G120P standard drives.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu-based operation and the application wizards, it is easy to commission standard drives. A drive can be essentially commissioned without having to use a printed parameter list – as the parameters are displayed in plain text, and explanatory help texts and the parameter filtering function are provided.

Application wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There are quick commissioning wizards for general commissioning.

The drives are easily controlled manually using directly assigned buttons and the navigation wheel. The IOP has a dedicated switchover button to switch from automatic to manual mode.

The inverter can be diagnosed in a user-friendly fashion using the plain text display of faults and alarms. Help texts can be obtained by pressing the INFO button.

Up to two process values can be displayed graphically or numerically on the status screen/status display. Process values can also be displayed in technological units.

The IOP supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the IOP and downloaded into other drive units of the same type as required.

The IOP includes the following language packages:
English, French, German, Italian and Spanish.

The IOP can be installed in control cabinet doors using the optionally available door mounting kit (not possible in conjunction with the PM230 Power Module in degree of protection IP55).

The operating temperature of the IOP is 0 ... 50 °C (32 ... 122 °F).

IOP Handheld



IOP Handheld

A handheld version of the IOP can be ordered for mobile use. In addition to the IOP, this includes a housing with rechargeable batteries, charging unit and RS232 connecting cable. The charging unit is supplied with connector adapters for Europe, the US and UK. When the batteries are fully charged, the operating time is up to 8 hours.

To connect the IOP Handheld to SINAMICS G110D and SINAMICS G120D, the RS232 connecting cable with optical interface is required in addition.

The IOP Handheld can be used in conjunction with SINAMICS G120P. In this case, the degree of protection IP55/UL Type 12 is no longer provided at the connection point.

Updating the IOP

The IOP can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be transferred from the PC to the IOP via drag & drop. Further, the USB interface allows user languages and wizards that become available in the future to be subsequently downloaded and the firmware to be updated for the IOP.

The IOP is supplied with power via the USB interface during an update.

SINAMICS G120 standard inverters

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

Supplementary system components Intelligent Operator Panel IOP

Selection and ordering data

Description	Order No.
Intelligent Operator Panel IOP	6SL3255-0AA00-4JA0
IOP Handheld For use with SINAMICS G120, SINAMICS G110D or SINAMICS G120D Included in the scope of delivery: <ul style="list-style-type: none"> • IOP • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable (3 m/9.84 ft long, can only be used for SINAMICS G120) • USB cable (1 m/3.28 ft long) 	6SL3255-0AA00-4HA0
Accessories	
Door mounting kit IP54 degree of protection for mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 ... 0.12 in) IP54 degree of protection for IOP IP55 degree of protection for BOP-2 Included in the scope of delivery: <ul style="list-style-type: none"> • Seal • Mounting material • Connecting cable (5 m/16.41 ft long, also supplies voltage to the IOP directly via the Control Unit) 	6SL3256-0AP00-0JA0
RS232 connecting cable With optical interface to connect the SINAMICS G110D or SINAMICS G120D inverters to the IOP Handheld (2.5 m/8.2 ft long)	3RK1922-2BP00

Benefits

- Simple commissioning of standard applications using wizards, it is not necessary to know the parameter structure
- Diagnostics using plain text display; can be used locally on-site without documentation
- Direct manual operation of the drive – you can toggle between automatic and manual modes
- Status display with freely selectable units; display of real physical values
- Intuitive navigation using a wheel – just like in everyday applications
- Graphic display with bar charts, e.g. for status values such as pressure or flowrate.
- Quickly and simply mounted in the door – mechanically and electrically
- Simple local commissioning on-site using the handheld version
- Commissioning without documentation using the integrated help function
- Standard commissioning using the clone function (parameter set data is saved for fast replacement)
- User-defined parameter list with a reduced number of self-selected parameters (to generate your own commissioning screens)
- 5 integrated languages
- Simple update of languages, wizards and firmware via USB

SINAMICS G120 standard inverters

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

Supplementary system components
Intelligent Operator Panel IOP

Integration

Using the IOP with the inverters

	SINAMICS G120 with CU230P-2, CU240B-2 or CU240E-2 Control Units	SINAMICS G120P (PM230) with CU230P-2 Control Unit	SINAMICS G110D and SINAMICS G120D
Plugging the IOP onto the inverter (power supply from the Control Unit)	✓	✓	–
Door mounting with door mounting kit (power supply directly from the Control Unit) For this purpose, the IOP must be connected up by means of the connecting cable supplied with the door mounting kit.)	✓	For PM230 IP20: ✓ For PM230 IP55: –	–
Mobile use of the IOP Handheld (supplied from rechargeable batteries)	✓	For PM230 IP20: ✓ For PM230 IP55: Restricted because degree of protection IP55 is no longer provided at the connection point	✓ (RS232 connecting cable with optical interface required, 3RK1922-2BP00)

Mounting the IOP on a Control Unit

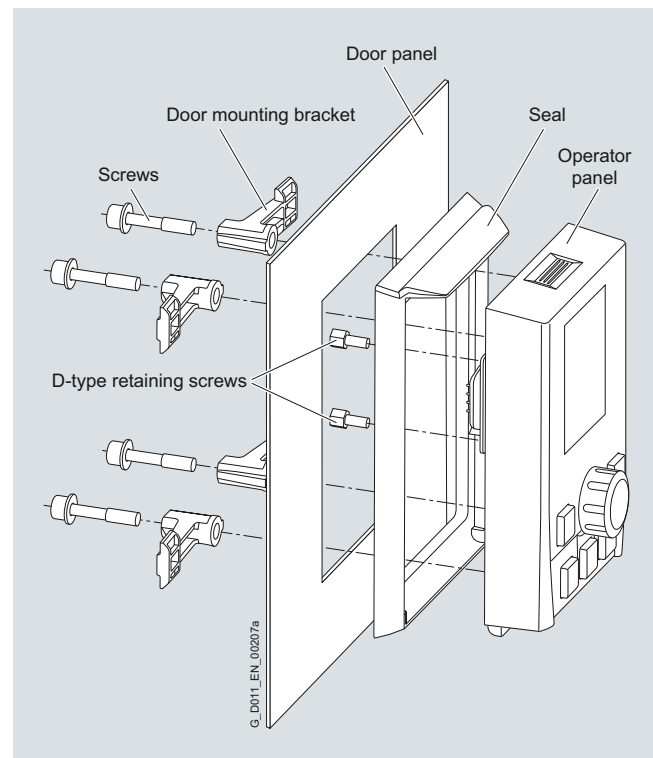
The IOP can be directly plugged onto the Control Unit.



CU230P-2 Control Unit with plugged-on IOP

Door mounting

An IOP can be installed in a control cabinet door in a few simple steps using the optionally available door mounting kit (not possible in conjunction with the PM230 Power Module in degree of protection IP55). Degree of protection IP54/UL Type 12 is achieved for door mounting.



Door mounting kit with plugged-on IOP

SINAMICS G120 standard inverters

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

Supplementary system components

Basic Operator Panel BOP-2

Overview



Basic Operator Panel BOP-2

The Basic Operator Panel BOP-2 can be used to commission drives, monitor drives in operation and input individual parameter settings.

Commissioning of standard drives is easy with the menu-prompted dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.

The drives are easily controlled manually using directly assigned navigation buttons. The BOP-2 has a dedicated switchover button to switch from automatic to manual mode.

Diagnostics can easily be performed on the connected inverter by following the menus.

Up to two process values can be numerically visualized simultaneously.

BOP-2 supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the BOP-2 and when required, downloaded into other drive units of the same type.

The operating temperature of the BOP-2 is 0 ... 50 °C (32 ... 122 °F).

Selection and ordering data

Description	Order No.
Basic Operator Panel BOP-2	6SL3255-0AA00-4CA1
Accessories	
Door mounting kit For mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 ... 0.12 in) IP54 degree of protection for IOP IP55 degree of protection for BOP-2 Included in the scope of delivery: • Seal • Mounting material • Connecting cable (5 m/16.41 ft long, also supplies voltage to the BOP-2 directly via the Control Unit)	6SL3256-0AP00-0JA0

Benefits

- Shorten commissioning times – Easy commissioning of standard drives using basic commissioning wizards (setup)
- Minimize standstill times – Fast detection and rectification of errors (Diagnostics)
- Greater transparency in the process – The status display of the BOP-2 makes process variable monitoring easy (Monitoring)
- Direct mounting on the inverter (also see IOP)
- User-friendly user interface:
 - Easy navigation using clear menu structure and clearly assigned control keys
 - Two-line display

SINAMICS G120 standard inverters

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

Supplementary system components
Basic Operator Panel BOP-2

Integration

Using the BOP-2 with SINAMICS G120 inverters

	CU230P-2	CU240B-2	CU240E-2
Plugging the BOP-2 onto the inverter	✓	✓	✓
Door mounting with door mounting kit	✓	✓	✓

Mounting the BOP-2 on a CU230P-2, CU240B-2 or CU240E-2 Control Unit

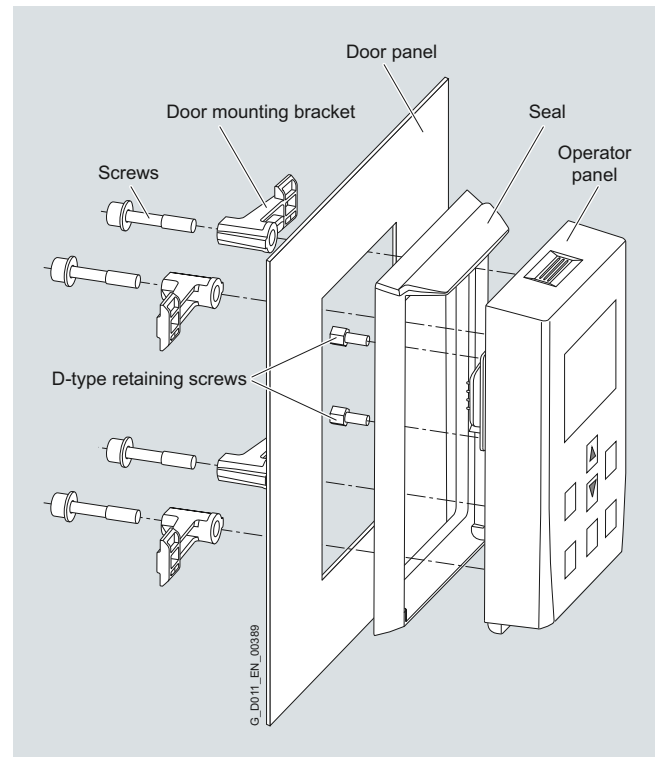
The BOP-2 can be directly plugged onto a Control Unit "-2" (e.g. CU230P-2, CU240B-2, CU240E-2).



CU240E-2 Control Unit with plugged-on BOP-2

Door mounting

A BOP-2 can be installed in a control cabinet door in a few simple steps using the optionally available door mounting kit (not possible in conjunction with the PM230 Power Module in degree of protection IP55). Degree of protection IP55 is achieved for door mounting.



Door mounting kit with plugged-on BOP-2

SINAMICS G120 standard inverters

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

Supplementary system components Blanking cover for PM230 Power Modules

Overview



PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC, with blanking cover

The blanking cover is mounted on the inverter in place of an operator panel, if an operator panel is not required. When the blanking cover is plugged onto the PM230 Power Module, degree of protection IP55/UL Type 12 is achieved.

Selection and ordering data

Description	Order No.
Blanking cover For PM230 Power Modules, degree of protection IP55/UL Type 12	6SL3256-1BA00-0AA0

Supplementary system components Push-through mounting frame

Overview

It is advisable to use an optionally available mounting frame to install the push-through unit in a control cabinet. This mounting frame includes the necessary seals and frame to ensure compliance with degree of protection IP54.

If the Power Module is installed without use of the optional mounting frame, the user is responsible for ensuring that the requisite degree of protection is provided.

Tightening torque for fixing the mounting frame and the inverter: 3 ... 3.5 Nm.

Selection and ordering data

Description	Order No.
Push-through mounting frame	
• For PM230 Power Modules degree of protection IP20 push-through variants	
- Frame size FSA	new 6SL3260-6AA00-0DA0
- Frame size FSB	new 6SL3260-6AB00-0DA0
- Frame size FSC	new 6SL3260-6AC00-0DA0

SINAMICS G120 standard inverters

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

Supplementary system components
Memory cards

Overview



SINAMICS micro memory cards (MMC), SINAMICS SD card

The parameter settings for an inverter can be stored on the SINAMICS micro memory card (MMC) or the SINAMICS SD card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card, the drive system is immediately ready for use again.

- Parameter settings can be written from the memory card to the inverter or saved from the inverter to the memory card.
- Up to 100 parameter sets can be stored.
- The memory card supports standard commissioning without the use of an operator panel such as the BOP-2 or the STARTER commissioning tool.

Note:

The memory card is not required for operation and does not have to remain inserted.

Selection and ordering data

Description	Order No.
SINAMICS micro memory card (MMC) 64 MB	6SL3254-0AM00-0AA0
SINAMICS SD card 512 MB	new ¹⁾ 6SL3054-4AG00-2AA0

¹⁾ Available soon.

SINAMICS G120 standard inverters

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

Supplementary system components

Brake Relay

Overview



The Brake Relay allows the Power Module to be connected to an electromechanical motor brake, thereby allowing the motor brake to be driven directly by the Control Unit.

Selection and ordering data

Description	Order No.
Brake Relay Including cable harness for connection with the Power Module	6SL3252-0BB00-0AA0

Technical specifications

Brake Relay	
	6SL3252-0BB00-0AA0
Switching capability of the NO contact, max.	440 V AC / 3.5 A 30 V DC / 12 A
Conductor cross-section, max.	2.5 mm ²
Degree of protection	IP20
Dimensions	
• Width	68 mm (2.68 in)
• Height	63 mm (2.48 in)
• Depth	33 mm (1.30 in)
Weight, approx.	0.17 kg (0.37 lb)

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Integration

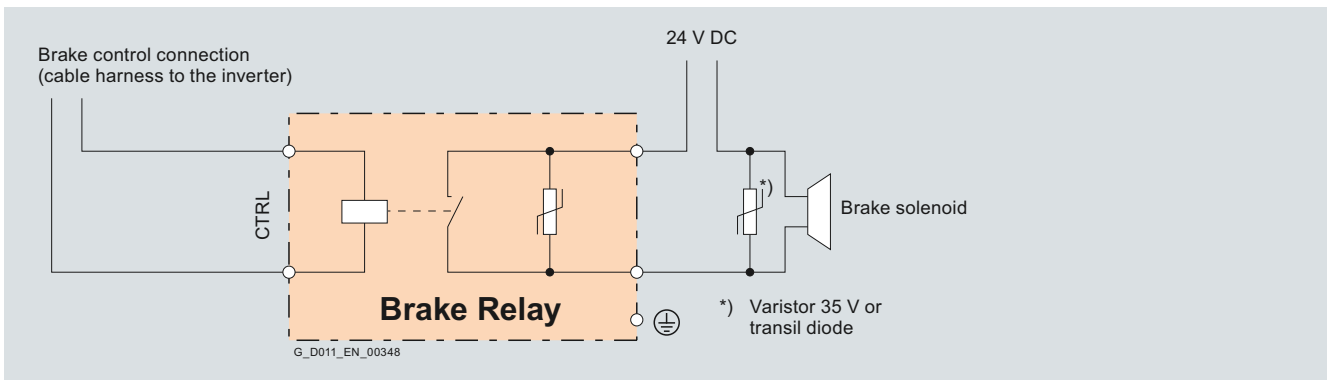
The Brake Relay has the following interfaces:

- A switch contact (NO contact) to control the motor brake solenoid
- A connection for the cable harness (CTRL) for connection to the Power Module

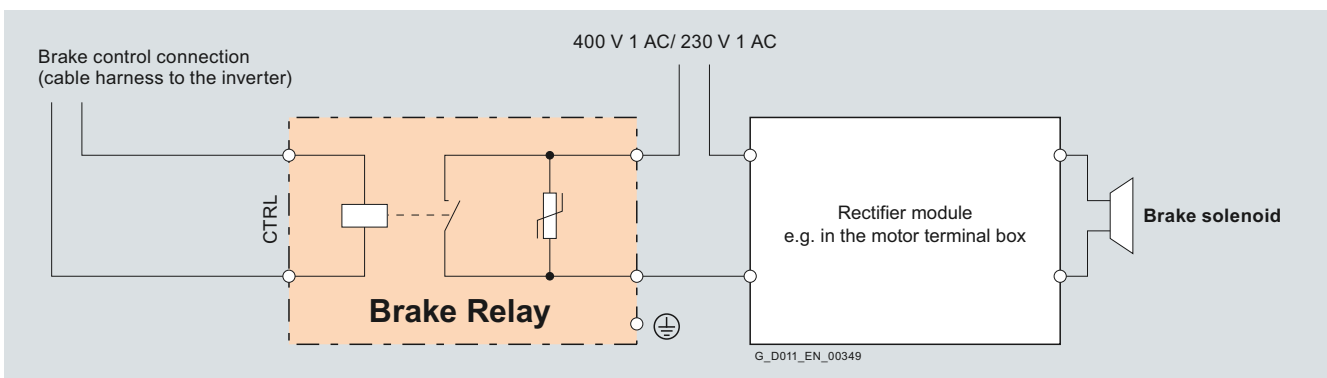
The Brake Relay can be installed on the shield bonding plate near the power terminals of the Power Module.

The supplied Brake Relay includes the cable harness for connection with the Power Module.

The 24 V DC solenoid of the motor brake is connected via an external power supply. For 24 V DC, external surge arrestors are required (e.g. varistor, transil diode).



Connection example of 24 V DC Brake Relay



Connection example of 230 ... 400 V 1 AC Brake Relay

SINAMICS G120 standard inverters

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

Supplementary system components Adapter for mounting on DIN rails

Overview

The adapter for DIN rail mounting can be used to mount inverters, frame sizes FSA and FSB, on DIN mounting rails (2 units with a center-to-center distance of 100 mm/3.94 in).

Furthermore, the motor cable shield connection and other cable shields required for mounting inverters on DIN rails comply with the same standards for emissions and conducted emissions as if the inverter were directly installed in a control cabinet.

The adapter for inverter frame size FSA can be used to mount converters singly or with matching line filter.

The adapter for inverter frame size FSB can be used to mount inverters with or without an integrated line filter.

Selection and ordering data

Description	Order No.
Adapter for mounting on DIN rails	
• For Power Module, frame size FSA	6SL3262-1BA00-0BA0
• For Power Module, frame size FSB	6SL3262-1BB00-0BA0

Supplementary system components PC inverter connection kit 2

Overview



PC inverter connection kit 2

For controlling and commissioning an inverter directly from a PC if the STARTER commissioning tool has been installed on the PC. With this, the inverter can be

- parameterized (commissioning, optimization)
- monitored (diagnostics)
- controlled (master control via the STARTER commissioning tool for test purposes).

A USB cable (3 m/9.84 ft) and the STARTER commissioning tool¹⁾ on DVD-ROM are included in the scope of delivery.

The PC inverter connection kit 2 is suitable for the following SINAMICS G120 Control Units:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 PN
- CU230P-2 CAN
- CU240B-2
- CU240B-2 DP
- CU240E-2
- CU240E-2 DP
- CU240E-2 PN
- CU240E-2 F
- CU240E-2 DP-F

Selection and ordering data

Description	Order No.
PC inverter connection kit 2 For CU230P-2, CU240B-2 and CU240E-2 Control Units Including USB cable (length 3 m/9.84 ft) and STARTER commissioning tool ¹⁾ on DVD-ROM	6SL3255-0AA00-2CA0

¹⁾ The STARTER commissioning tool is also available on the Internet at <http://support.automation.siemens.com/WW/view/en/10804985/133100>

SINAMICS G120 standard inverters

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

Supplementary system components Shield connection kits for Control Units

Overview

The shield connection kit offers for all signal and communication cables

- Optimum shield connection
- Strain relief

It contains the following:

- A matching shield bonding plate
- All of the necessary connecting and retaining elements for mounting

The shield connection kits are suitable for the following SINAMICS G120 Control Units:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 PN
- CU230P-2 CAN
- CU240B-2
- CU240B-2 DP
- CU240E-2
- CU240E-2 DP
- CU240E-2 PN
- CU240E-2 F
- CU240E-2 DP-F
- CU240E-2 PN-F

Selection and ordering data

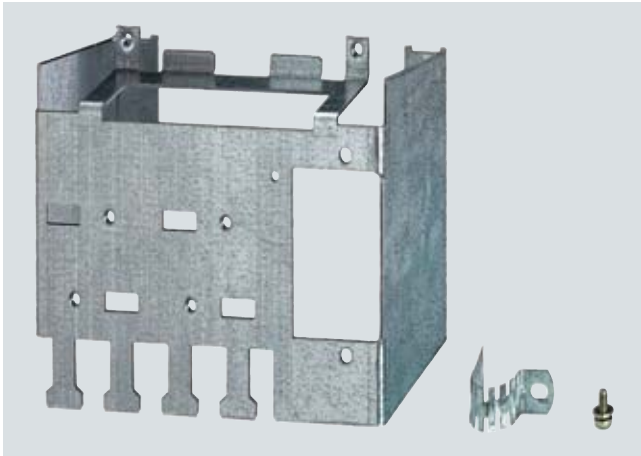
Description	Order No.
Shield connection kit 1 For CU230P-2 HVAC/DP/CAN Control Units	6SL3264-1EA00-0FA0
Shield connection kit 2 For CU240B-2 and CU240E-2 Control Units	6SL3264-1EA00-0HA0
Shield connection kit 3 For CU230P-2 PN, CU240E-2 PN and CU240E-2 PN-F Control Units	new 6SL3264-1EA00-0HB0

SINAMICS G120 standard inverters

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

Supplementary system components – Shield connection kits and shield plates for Power Modules

Overview



Shield connection kit for Power Module frame size FSB

The shield connection kit

- makes it easier to connect the shields of supply and control cables
- provides mechanical strain relief
- ensures optimum EMC performance
- is used to attach the Brake Relay

The shield connection kit includes

- a shield bonding plate for the required Power Module
- connection elements and clamps for mounting
- Mounting device for Brake Relay, frame sizes FSB to FSF

A shield plate for motor and signal cables is supplied with PM230 Power Modules, frame sizes FSA to FSC, in degree of protection IP20 standard variants.

Shield connection kits are available for PM230 Power Modules, frame sizes FSD to FSF, in degree of protection IP20 standard variants, and shield plates for PM230 Power Modules, frame sizes FSA to FSC, in degree of protection IP20 push-through variants.

Selection and ordering data

Description	Order No.
Shield plate For PM230 Power Module degree of protection IP20 standard variants • Frame sizes FSA to FSC	Supplied with the Power Modules, available as a spare part
Shield connection kit For PM230 Power Module degree of protection IP20 standard variants • Frame sizes FSD and FSE • Frame size FSF	6SL3262-1AD00-0DA0 6SL3262-1AF00-0DA0
Shield plate For PM230 Power Module degree of protection IP20 push-through variants • Frame size FSA • Frame size FSB • Frame size FSC	new 6SL3266-1EA00-0DA0 new 6SL3266-1EB00-0DA0 new 6SL3266-1EC00-0DA0
Shield connection kit For PM240 and PM250 Power Modules • Frame size FSA • Frame size FSB • Frame size FSC • Frame sizes FSD and FSE • Frame size FSF	6SL3262-1AA00-0BA0 6SL3262-1AB00-0DA0 6SL3262-1AC00-0DA0 6SL3262-1AD00-0DA0 6SL3262-1AF00-0DA0
Shield connection kit For PM260 Power Modules • Frame size FSD • Frame size FSF	6SL3262-1FD00-0CA0 6SL3262-1FF00-0CA0

SINAMICS G120 standard inverters

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

Spare parts Spare parts kit for Control Units

Overview

The spare parts kit comprises small parts for all variants of the following SINAMICS G120 Control Units:

- CU230P-2
- CU240B-2
- CU240E-2
- CU240E-2 F

The delivery includes

- Label set for all variants of CU230P-2, CU240B-2, CU240E-2 and CU240E-2 F Control Units
- 2 replacement doors (top/bottom)
- 2 labeling strips for the doors
- Terminal blocks 6-pole, 7-pole, 9-pole, 10-pole and 5-pole (1 unit each)
- 1 protective element for SD/MMC card slot

Selection and ordering data

Description	Order No.
Spare parts kit for Control Units	
CU230P-2, CU240B-2, CU240E-2 and CU240E-2 F	6SL3200-0SK01-0AA0

Spare parts Shield plate for PM230 Power Modules

Overview

A shield plate for motor and signal cables is supplied with PM230 Power Modules, frame sizes FSA to FSC, in degree of protection IP20 standard variants. This shield plate is also available as a spare part.

Selection and ordering data

Description	Order No.
Shield plate For PM230 Power Module degree of protection IP20 standard variants (and SINAMICS G120C)	
• Frame size FSA	6SL3266-1EA00-0KA0
• Frame size FSB	6SL3266-1EB00-0KA0
• Frame size FSC	6SL3266-1EC00-0KA0

Spare parts Mounting set

Overview

The following parts are supplied from the factory for each PM230 Power Module in degree of protection IP55/UL Type 12 or IP20:

Frame sizes FSA to FSC	Frame sizes FSD to FSF (only for Power Modules in degree of protection IP55/UL Type 12)
<ul style="list-style-type: none"> • 1 SUB-D connector with mounting material for connecting the CU230P-2 HVAC/DP/PN/CAN Control Units to the operator panel (e.g. IOP) • 1 motor connector and 1 power supply connector • 2 serrated strips including mounting material for connecting the shield • 3 sleeves for inserting in the cutouts for the signal cables of the cable bonding plate • Ferrite cores (only necessary for devices with integrated line filter class B) • 2-page Quick Start Guide with mounting instructions 	<ul style="list-style-type: none"> • 1 adapter cable for connecting the CU230P-2 HVAC/DP/PN/CAN Control Units to the operator panel (e.g. IOP) • 4 clips to connect the shields of signal cables • 6 serrated strips including mounting material for the motor and supply cables • 4 sleeves (pre-installed in the cutouts for the signal cables of the cable bonding plate) • 1 cable bonding plate without cutouts for customers to configure their own connection system • 1 cabinet key • 2-page Quick Start Guide with mounting instructions

A **mounting set** can be ordered for every frame size in degree of protection IP55/UL Type 12 or IP20. It contains the following parts:

Frame sizes FSA to FSC	Frame sizes FSD to FSF (only for Power Modules in degree of protection IP55/UL Type 12)
<ul style="list-style-type: none"> • 1 SUB-D connector with mounting material • 1 motor connector and 1 power supply connector • 2 serrated strips including mounting material for connecting the shield • 3 sleeves for inserting in the cutouts for the signal cables of the cable bonding plate • Ferrite cores (only necessary for devices with integrated line filter class B) • Screws for fixing the cable bonding plate and the cover 	<ul style="list-style-type: none"> • 1 adapter cable including mounting material • 6 serrated strips including mounting material for the motor and supply cables • 1 cabinet key

Selection and ordering data

Description	Order No.
Mounting set For PM230 Power Modules, degree of protection IP55/ UL Type 12 or IP20	
• Frame size FSA	6SL3200-0SK02-0AA0
• Frame size FSB	6SL3200-0SK03-0AA0
• Frame size FSC	6SL3200-0SK04-0AA0
Mounting set For PM230 Power Modules, degree of protection IP55/ UL Type 12	
• Frame size FSD	6SL3200-0SK05-0AA0
• Frame size FSE	6SL3200-0SK06-0AA0
• Frame size FSF	6SL3200-0SK07-0AA0

SINAMICS G120 standard inverters

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

Spare parts – Replacement door for PM240 Power Modules, frame size FSGX

Overview

Complete replacement door for the PM240 Power Module, frame size FSGX

Selection and ordering data

Description	Order No.
Replacement door For PM240 Power Modules, frame size FSGX	6SL3200-0SM10-0AA0

Spare parts Terminal cover kit for frame sizes FSD and FSE

Overview

The terminal cover kit includes a replacement cover for the connecting terminals.

The terminal cover kit is suitable for the following SINAMICS G120 Power Modules in frame sizes FSD and FSE:

- PM230 degree of protection IP20 standard variant
- PM240
- PM250

Selection and ordering data

Description	Order No.
Terminal cover kit For frame sizes FSD and FSE	6SL3200-0SM11-0AA0

Spare parts Terminal cover kit for frame size FSF

Overview

The terminal cover kit includes a replacement cover for the connecting terminals.

The terminal cover kit is suitable for the following SINAMICS G120 Power Modules in frame size FSF:

- PM230 degree of protection IP20 standard variant
- PM240
- PM250
- PM260

Selection and ordering data

Description	Order No.
Terminal cover kit For frame size FSF	6SL3200-0SM12-0AA0

Spare parts Replacement connectors

Overview

A set of replacement connectors for the line feeder cable, braking resistor and motor cable is available for SINAMICS G120 PM240-2 Power Modules (and SINAMICS G120C) in frame size FSA.

A replacement connector for the input and output sides is available for SINAMICS G120 PM260 Power Modules in frame size FSD.

Selection and ordering data

Description	Order No.
Replacement connectors • For SINAMICS G120 PM240-2 and SINAMICS G120C in frame size FSA	6SL3200-0ST05-0AA0
• For PM260 Power Modules in frame size FSD	6SL3200-0ST04-0AA1

SINAMICS G120 standard inverters

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

Spare parts Fan units

Overview

The Power Module fans are designed for extra long service life. For special requirements, replacement fans are available that can be exchanged quickly and easily. The following pictures show the mounting location of the internal or external fan units as an example:



PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC, with external fan unit in heat sink



PM230 Power Module, degree of protection IP55/UL Type 12, frame size FSC, with internal fan unit above CU230P-2 Control Unit

Selection and ordering data

Rated power (LO)		PM230 Power Module degree of protection IP55/UL Type 12		External fan unit	Internal fan unit
kW	hp	Type 6SL3223-...	Frame size	Order No.	Order No.
380 ... 480 V 3 AC ±10 %					
0.37	0.50	ODE13-7 . A0	FSA	6SL3200-0SF21-0AA0	6SL3200-0SF31-0AA0
0.55	0.75	ODE15-5 . A0			
0.75	1.0	ODE17-5 . A0			
1.1	1.5	ODE21-1 . A0			
1.5	2.0	ODE21-5 . A0			
2.2	3.0	ODE22-2 . A0			
3.0	4.0	ODE23-0 . A0			
4.0	5.0	ODE24-0 . A0	FSB	6SL3200-0SF22-0AA0	
5.5	7.5	ODE25-5 . A0			
7.5	10	ODE27-5 . A0			
11.0	15	ODE31-1 . A0	FSC	6SL3200-0SF23-0AA0	
15.0	20	ODE31-5 . A0			
18.5	25	ODE31-8AA0			
18.5	25	ODE31-8BA0	FSD	6SL3200-0SF24-0AA0	6SL3200-0SF32-0AA0
22	30	ODE32-2 . A0			
30	40	ODE33-0 . A0			
37	50	ODE33-7 . A0	FSE	6SL3200-0SF26-0AA0	
45	60	ODE34-5 . A0			
55	75	ODE35-5 . A0	FSF		
75	100	ODE37-5 . A0			
90	125	ODE38-8UA0			

SINAMICS G120 standard inverters

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

Spare parts
Fan units

Selection and ordering data

Rated power (LO)		PM230 Power Module degree of protection IP20 standard variant		External fan unit	
kW	hp	Type 6SL3210-...	Frame size	Order No.	
380 ... 480 V 3 AC ± 10 %					
0.37	0.50	1NE11-3 . LO	FSA	6SL3200-0SF12-0AA0	
0.55	0.75	1NE11-7 . LO			
0.75	1.0	1NE12-2 . LO			
1.1	1.5	1NE13-1 . LO			
1.5	2.0	1NE14-1 . LO			
2.2	3.0	1NE15-8 . LO			
3.0	4.0	1NE17-7 . LO			
4.0	5.0	1NE21-0 . LO	FSB	6SL3200-0SF13-0AA0	
5.5	7.5	1NE21-3 . LO			
7.5	10	1NE21-8 . LO			
11.0	15	1NE22-6 . LO	FSC	6SL3200-0SF14-0AA0	
15.0	20	1NE23-2 . LO			
18.5	25	1NE23-8 . LO			
22	30	1NE24-5 . LO	FSD	6SL3200-0SF05-0AA0	
30	40	1NE26-0 . LO			
37	50	1NE27-5 . LO	FSE		
45	60	1NE28-8 . LO			
55	75	1NE31-1 . LO	FSF	6SL3200-0SF08-0AA0	
75	100	1NE31-5 . LO			

Rated power (LO)		PM230 Power Module degree of protection IP20 push-through variant		External fan unit	
kW	hp	Type 6SL3211-...	Frame size	Order No.	
380 ... 480 V 3 AC ± 10 %					
3.0	4.0	1NE17-7 . LO	FSA	6SL3200-0SF21-0AA0	
7.5	10	1NE21-8 . LO	FSB	6SL3200-0SF22-0AA0	
18.5	25	1NE23-8 . LO	FSC	6SL3200-0SF23-0AA0	

Description	Order No.
Fan unit For SINAMICS G120 PM240-2 Power Module (and SINAMICS G120C) • Frame size FSA	6SL3200-0SF12-0AA0

SINAMICS G120 standard inverters

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

Spare parts Replacement fans

Overview

The Power Module fans are designed for extra long service life. Replacement fans can be ordered.

Selection and ordering data

Rated power		SINAMICS G120 PM240 Power Module		Replacement fan	
kW	hp	Type 6SL3224-...	Frame size and number of fans	Order No.	
380 ... 480 V 3 AC					
0.37	0.50	OBE13-7UA0	FSA, 1 fan	6SL3200-0SF01-0AA0 (includes 1 replacement fan)	
0.55	0.75	OBE15-5UA0			
0.75	1.0	OBE17-5UA0			
1.1	1.5	OBE21-1UA0			
1.5	2	OBE21-5UA0			
2.2	3	OBE22-2 . A0	FSD, 2 fans ¹⁾		
3.0	4	OBE23-0 . A0			
4.0	5	OBE24-0 . A0			
7.5	10	OBE25-5 . A0	FSC, 2 fans ¹⁾	6SL3200-0SF03-0AA0 (includes 1 replacement fan)	
11.0	15	OBE27-5 . A0			
15.0	20	OBE31-1 . A0			
18.5	25	OBE31-5 . A0	FSD, 2 fans	6SL3200-0SF04-0AA0 (includes 2 replacement fans)	
22	30	OBE31-8 . A0			
30	40	OBE32-2 . A0		6SL3200-0SF05-0AA0 (includes 2 replacement fans)	
37	50	OBE33-0 . A0	FSE, 2 fans	6SL3200-0SF04-0AA0 (includes 2 replacement fans)	
45	60	OBE33-7 . A0		6SL3200-0SF05-0AA0 (includes 2 replacement fans)	
55	75	OBE34-5 . A0	FSF, 2 fans	6SL3200-0SF06-0AA0 (includes 2 replacement fans)	
75	100	OBE35-5 . A0			
90	125	OBE37-5 . A0		6SL3200-0SF07-0AA0 (includes 2 replacement fans)	
110	150	OBE38-8UA0		6SL3200-0SF08-0AA0 (includes 2 replacement fans)	
132	200	OBE41-1UA0			
160	250	OXE41-3UA0	FSGX, 2 fans	6SL3362-0AG00-0AA1 (includes 2 replacement fans)	
200	300	OXE41-6UA0			
250	400	OXE42-0UA0			

Rated power		SINAMICS G120 PM250 Power Module		Replacement fan	
kW	hp	Type 6SL3225-...	Frame size and number of fans	Order No.	
380 ... 480 V 3 AC					
7.5	10	OBE25-5AA1	FSC, 2 fans ¹⁾	6SL3200-0SF03-0AA0 (includes 1 replacement fan)	
11.0	15	OBE27-5AA1			
15.0	20	OBE31-1AA1			
18.5	25	OBE31-5 . A0	FSD, 2 fans	6SL3200-0SF04-0AA0 (includes 2 replacement fans)	
22	30	OBE31-8 . A0			
30	40	OBE32-2 . A0		6SL3200-0SF05-0AA0 (includes 2 replacement fans)	
37	50	OBE33-0 . A0	FSE, 2 fans	6SL3200-0SF04-0AA0 (includes 2 replacement fans)	
45	60	OBE33-7 . A0		6SL3200-0SF05-0AA0 (includes 2 replacement fans)	
55	75	OBE34-5 . A0	FSF, 2 fans	6SL3200-0SF06-0AA0 (includes 2 replacement fans)	
75	100	OBE35-5 . A0			
90	125	OBE37-5 . A0		6SL3200-0SF08-0AA0 (includes 2 replacement fans)	

Rated power		SINAMICS G120 PM260 Power Module		Replacement fan	
kW	hp	Type 6SL3225-...	Frame size and number of fans	Order No.	
660 ... 690 V 3 AC					
11.0	15	OBH27-5 . A1	FSD, 2 fans	6SL3200-0SF11-0AA0 (includes 2 replacement fans)	
15.0	20	OBH31-1 . A1			
18.5	25	OBH31-5 . A1			
30	40	OBH32-2 . A1	FSF, 2 fans	6SL3200-0SF07-0AA0 (includes 2 replacement fans)	
37	50	OBH33-0 . A1			
55	75	OBH33-7 . A1			

¹⁾ Recommendation: Even if only one fan on the Power Module is defective, it is advisable to replace both. In this case, the order quantity must be doubled.

SINAMICS G120D

distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

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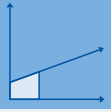
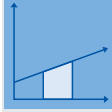
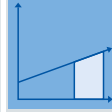
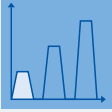
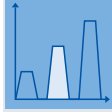
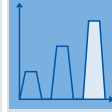

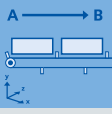
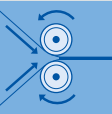
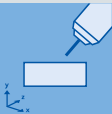
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SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

Introduction

Application

Application	Continuous motion			Non-continuous motion		
	Requirements for torque accuracy / speed accuracy / position accuracy / coordination of axes / functionality					
	Basic 	Medium 	High 	Basic 	Medium 	High 
Pumping, ventilating, compressing 	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	G110, G120C (G130, G150, GM150, GL150)	G120P, G120C, G120 (G130, G150, GM150, GL150)	S120	S110	S110, S120	S120 (GM150)
Moving 	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/disengagers
	G110, G110D, G120C (G130, G150, GM150)	G120D, G120C, G120, S120 (G130, G150, S150, GM150, GL150, SM150, DCM)	S120 (S150, SM150, SL150, GM150, DCM)	G120D, S110	S110, S120 (DCM)	S120 (DCM)
Processing 	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders and unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile	Tubular bagging machines Single-axis motion control such as • Position profile • Path profile	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	G120C (G130, G150, GM150)	G120C, G120 (G130, G150, S150, GM150, GL150, DCM)	S120 (S150, DCM)	S110	S110, S120	S120 (SM150, SL150, DCM)
Machining 	Main drives for • Turning • Drilling • Milling	Main drives for • Drilling • Sawing	Main drives for • Turning • Drilling • Milling • Gear cutting • Grinding	Axle drives for • Turning • Drilling • Milling	Axle drives for • Drilling • Sawing	Axle drives for • Turning • Drilling • Milling • Lasering • Gear cutting • Grinding • Nibbling and punching
	S110	S110, S120	S120	S110	S110, S120	S120

(Devices in brackets are not included in Catalog D 31)

SINAMICS G120D is ideally suited for demanding conveyor system applications in the industrial environment for which a distributed drive with communications capability is required. This applies in particular to the automotive sector, e.g. for assembly lines.

SINAMICS G120D is also suitable for many additional high-performance applications, e.g. in the airport sector, the food and beverage industry (without surfactants) and in distribution logistics (e.g. electric monorail systems).

More information

You may also be interested in these inverters/converters:

- Reduced functional scope ⇒ SINAMICS G110D
- More performance for the control cabinet in IP20 degree of protection ⇒ SINAMICS G120, SINAMICS G120C
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS S110

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

SINAMICS G120D distributed inverters

Overview

The SINAMICS G120D distributed inverters are the solution for demanding drive tasks especially in the field of conveyor systems. SINAMICS G120D inverters continuously control the speed of three-phase asynchronous (induction) motors and fulfill all the requirements of conveyor system applications from simple frequency control through to demanding vector control and positioning requirements. With its intelligent modular design with IP65 degree of protection, it can be seamlessly integrated into the plant or system and supports a high plant availability and low stocks of spare parts. The innovative power unit concept capable of energy recovery helps to save energy. The patented implementation concept of the integrated safety functions is unique worldwide and has been extended further, without the use of external components. This drive can be optimally integrated into the Siemens TIA world of automation via PROFIBUS or PROFINET.

With different device versions (frame sizes FSA to FSC) in a power range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp), it is suitable for a wide variety of drive solutions.



Example: SINAMICS G120D, frame size FSA, comprising PM250D Power Module and fail-safe CU250D-2 PN-F Control Unit

Reasons for using distributed drive systems

- Modular drive solutions – therefore standardized mechatronic elements that can be individually tested
- A control cabinet is not required, resulting in a smaller space requirement and lower cooling requirements
- Long cables between the inverter and motor can be avoided (which means lower power losses, reduced noise emission and lower costs for shielded cables and additional filters)
- Distributed configurations offer considerable benefits for conveyor systems with their extensive coverage (e.g. in the automotive and logistics sectors)

Siemens family of distributed drives

Siemens offers an innovative portfolio of frequency inverters to optimally implement distributed drive solutions. The strengths of the individual members of the drive family permit simple adaptation to the widest range of application demands:

- Identical connection systems
- Identical mounting dimensions for SINAMICS G110D and SINAMICS G120D
- Standard commissioning and configuration tool

Products from the family of distributed drives:

- SINAMICS G110D inverters
- SINAMICS G120D inverters
- SIRIUS M200D motor starters

Modularity

SINAMICS G120D is a modular inverter system with IP65 degree of protection comprising various function units. The main units are

- Control Unit (CU)
- Power Module (PM)

The Control Unit controls and monitors the Power Module and the connected motor using several different closed-loop control types that can be selected. The digital inputs, analog inputs and digital outputs on the device support the simple wiring of sensors and actuators directly at the drive. The input signals can either be directly linked within the Control Unit and initiate local responses independently or they can be transferred to the central control via PROFIBUS or PROFINET for further processing within the context of the overall plant.

The Power Module supplies the motor in a power range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp). The Power Module is controlled by a microprocessor in the Control Unit. State-of-the-art IGBT technology with pulse-width-modulation is used for highly reliable and flexible motor operation. Comprehensive protection functions provide a high degree of protection for the Power Module and the motor. The unusually low profile mechanical design is optimized so that the device can be directly used in the plant or system. The Power Module also has the same drilling dimensions for all power ratings (standard footprint). Further, the dimensions are identical to those of SINAMICS G110D. This significantly simplifies the mechanical design, installation and retrofit of a system.

The latest technical documentation (catalogs, dimension drawings, certificates, manuals and operating instructions) is available in the Internet at the following address:

www.siemens.com/sinamics-g120d/documentation

and offline on the DVD-ROM CA 01 in the DT Configurator. In addition, the DT Configurator can be used on the Internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

SINAMICS G120D distributed inverters

Overview

Safety Integrated

The SINAMICS G120D distributed inverters include versions for safety-oriented applications. All Power Modules are already designed for Safety Integrated. In conjunction with a fail-safe Control Unit, the drive can be turned into a Safety Integrated Drive.

The safety function "Safe Torque Off" (STO) (certified according to EN 954-1, Category 3 and IEC 61508 SIL 2 as well as ISO 13849-1 PL d) is already integrated into the standard versions of the CU240D-2 series (CU240D-2 DP and CU240D-2 PN). It can be activated either over PROFIsafe or over the safety input.

With the fail-safe variants of the CU240D-2 series (CU240D-2 DP-F, CU240D-2 PN-F, CU240D-2 PN-F PP) and with the entire CU250D-2 series, the fail-safe SINAMICS G120D inverter provides five safety functions which are certified according to EN 954-1 Category 3, IEC 61508 SIL 2 as well as ISO 13849-1 PL d:

- Safe Torque Off (STO)
to protect against active movement of the drive
- Safe Stop 1 (SS1)
for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS)
for protection against dangerous movements on exceeding a speed limit
- Safe direction (SDI)
This function ensures that the drive can only rotate in the selected direction.
- Safe speed monitoring (SSM)
This function signals if a drive is operating below a specific speed/feed velocity.

These functions can be activated by means of PROFIsafe or via the safety inputs. A safety output is provided in addition.

All safety functions can be implemented without having to use a motor encoder; the implementation costs are minimal. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SSM and SDI functions are only permissible for applications where the load can never accelerate when the inverter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

[Additional information is provided in Catalog D 31, chapter Highlights, section Safety Integrated.](#)

Efficient Infeed Technology

The innovative Efficient Infeed Technology is employed in PM250D Power Modules. This technology allows the energy produced by motors operating in generator mode connected to standard inverters to be fed back into the supply system. At the same time, considerable savings can be achieved in terms of energy consumption and operating costs.

[Additional information is provided in Catalog D 31, chapter Highlights, section Efficient Infeed Technology.](#)

STARTER commissioning tool

The STARTER commissioning tool (V4.3 and higher) allows commissioning and maintenance of SINAMICS G120D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

SINAMICS G120D distributed inverters

Benefits

- Mechanical design, installation and retrofit of systems are significantly simplified as a result of the compact and space-saving design with an extremely low profile and with the same drilling dimensions for all power ratings; further, the dimensions are identical to those of the SINAMICS G110D distributed inverter
- Wide power range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp)
- The safety functions make it easier to integrate drives into safety-oriented machines or plants
- The innovative circuit design (bidirectional input rectifier with "pared-down" DC link) allows the kinetic energy of a load to be fed back into the line supply system. This feedback capability provides enormous potential for energy saving because generated energy no longer has to be converted into heat in a braking resistor. Braking resistors and reactors are not necessary – this is a particular advantage in terms of the project engineering outlay, space requirement and installation costs for the high IP65 degree of protection
- Easy commissioning and maintenance due to a mini USB parameterization interface and screen-based parameterization software and wizards
- The same, standardized plug-in connections for the bus, power and I/O connections (ISO 23570) for the complete range of power ratings of SINAMICS G110D and SINAMICS G120D
- Integrated positioning functionality supports process-related implementation of positioning tasks with a high dynamic response. Positioning can be implemented with an incremental and/or absolute encoder (SSI)
- Increased degree of ruggedness and longer service life as the electronic modules are coated
- Flexibility due to modularity for a future-oriented distributed drive concept with a high IP65 degree of protection
 - Module replacement under voltage (hot swapping)
 - The modules can be easily replaced, which makes the system extremely service friendly
- Simple, standard implementation of completely distributed plant and system concepts by using products in a scalable fashion:
 - SIRIUS M200D (motor starter)
 - SINAMICS G110D (inverter for basic, conveyor-related applications)
 - SINAMICS G120D (inverter for demanding, conveyor-related applications)
- The same connectors are used as for the SIRIUS M200D motor starter
- Communications-capable via PROFINET or PROFIBUS with PROFIdrive profile 4.1:
 - PROFINET features:
 - Neighbor recognition (LLDP)
 - Ring topology possible (MRP (Media redundancy protocol), MRPD (media redundancy with planned duplication)
 - Isochronous real-time communication (IRT)
 - PROFEnergy
 - PROFIsafe
 - Diagnostics, interrupts
 - Shared Device
- Simple connection, engineering, data management as well as control of the inverter in sophisticated plants and systems as a result of the consequential integration in TIA (Totally Integrated Automation)
- High degree of operator friendliness by using the Intelligent Operator Panel (IOP) to parameterize, diagnose, control (open-loop) and copy drive parameters
- The ability to connect up to 6 sensors and up to 2 actuators to the Control Unit directly ensures that almost all the information relevant to the drive can be managed directly. Fail-safe Control Units can process signals from up to three fail-safe sensors and one fail-safe actuator. The CU240D-2 Control Units are also equipped with two analog inputs. Local pre-processing of the signals relieves the fieldbus of the task and ensures a faster and more reproducible response time
- Integrated EMC filter class A (acc. to EN 55011)
- Integrated brake control, brake voltage supported: 180 V DC (at 400 V AC line voltage)
- Integrated motor protection using a thermal motor model and evaluation of PTC, Thermo-Click or KTY 84 temperature sensors
- Software parameters for simple adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- Easy replacement of devices and time-saving copying of parameters to the optional memory cards
- Engineering and commissioning with standard engineering tools such as SIZER for Siemens Drives (V2.9 and higher), STARTER (V4.3 and higher) and Drive ES ensure fast engineering and easy commissioning – STARTER is integrated in STEP 7 with Drive ES Basic with all the advantages of central data storage and totally integrated communication
- Certified worldwide for compliance with CE, UL, cUL, c-tick and Safety Integrated according to EN 954-1 Category 3, IEC 61508 SIL 2 and ISO 13849-1 PL d

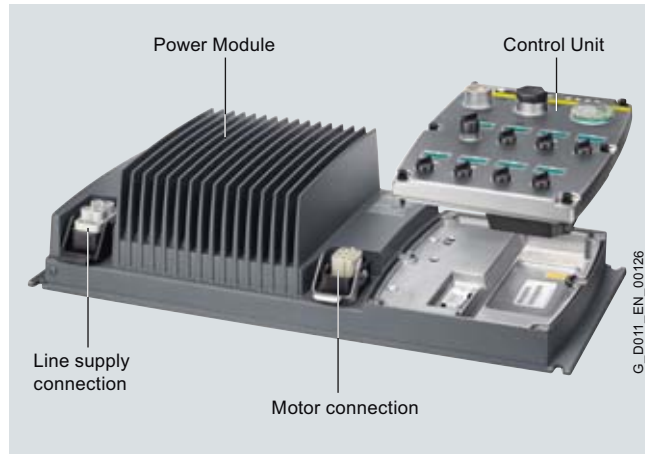
SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

SINAMICS G120D distributed inverters

Design

The SINAMICS G120D distributed inverters are modular inverters for standard drives. Each SINAMICS G120D comprises two operative units – a Power Module and a Control Unit.



PM250D Power Module with line supply and motor connections and CU240D-2 Control Unit

Power Modules

The following Power Modules are available for the SINAMICS G120D distributed inverters:

PM250D Power Modules

PM250D Power Modules (0.75 kW to 7.5 kW/1.0 hp to 10 hp) have an innovative circuit design which allows line-commutated energy recovery back into the line supply. This innovative circuit permits generated energy to be fed back into the supply system and therefore saves energy.

Control Units

A Control Unit performs closed-loop control functions for the inverter. In addition to the closed-loop control, it has additional functions that can be adapted to the particular application through parameterization.

The following Control Units are available for SINAMICS G120D distributed inverters:

CU240D-2 Control Units

Several Control Units are available in different versions:

- CU240D-2 DP → PROFIBUS
- CU240D-2 DP-F → PROFIBUS fail-safe
- CU240D-2 PN → PROFINET
- CU240D-2 PN-F → PROFINET fail-safe
- CU240D-2 PN-F PP → PROFINET fail-safe Push Pull

CU250D-2 Control Units

CU250D-2 Control Units can be used to implement applications with positioning requirements in the drive. Several Control Units are available in different versions:

- CU250D-2 DP-F → PROFIBUS fail-safe
- CU250D-2 PN-F → PROFINET fail-safe
- CU250D-2 PN-F PP → PROFINET fail-safe Push Pull

Supplementary system components

Intelligent Operator Panel IOP Handheld

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu-based operation and the application wizards, it is easy to commission, diagnose and locally control standard drives.

Memory cards

The parameter settings for an inverter can be stored on the SINAMICS micro memory card (MMC) or the SINAMICS SD card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card, the drive system is immediately ready for use again. The associated slot is located on the rear of the Control Unit.

Mini USB interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool V4.3 and higher) has been installed.

Connecting cable for the Control Units

Flexible plug-in cables to transfer data between the Industrial Ethernet stations or PROFIBUS stations, as well as to supply power to the Control Unit.

Connecting cable for the Power Modules

Connector sets to connect to the line supply and the outgoing motor feeder are available as accessories as well as pre-assembled motor cables for connection to the motor.

Spare parts kit

A spare parts kit is available which comprises small parts such as seals, caps, PROFIBUS address windows and screws.

Replacement fan

A replacement fan is available, which comprises a pre-mounted unit with cover, fan and screws.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

SINAMICS G120D distributed inverters

Configuration

The following electronic configuring aids and engineering tools are available for the SINAMICS G120D distributed inverters:

Selection guide DT Configurator within the CA 01

The interactive catalog CA 01 – the offline mall of Siemens Industry Automation & Drive Technologies – contains over 100000 products with approximately 5 million possible drive system product variants. The DT Configurator has been developed to facilitate selection of the optimum motor and/or inverter from the wide spectrum of drives. The configurator is integrated as a "selection guide" in this catalog on the DVD-ROM with the selection and configuration tools.

Online DT Configurator

In addition, the DT Configurator can be used in the Internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

SIZER for Siemens Drives engineering tool

The SIZER for Siemens Drives engineering tool makes it easy to engineer the SINAMICS and MICROMASTER 4 drive families. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER for Siemens Drives covers the full range of operations required to configure a complete drive system, from basic single drives to demanding multi-axis applications, for SINAMICS G120D from SIZER for Siemens Drives V2.9 and higher.

STARTER commissioning tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics. Apart from the SINAMICS drives, STARTER is also suitable for MICROMASTER 4 devices. For SINAMICS G120D, STARTER V4.3 and higher.

Drive ES engineering system

Drive ES is the engineering system used to integrate the communication, configuration and data management functions of Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively. The STEP 7 Manager user interface provides the ideal basis for this. A variety of software packages are available for SINAMICS – Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7.1.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

SINAMICS G120D distributed inverters

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all the following SINAMICS G120D distributed inverter components listed here.

SINAMICS G120D	
Mechanical specifications	
Vibratory load according to EN 60068-2-6	
• Transport ¹⁾	5 ... 9 Hz: Constant deflection 3.1 mm 9 ... 200 Hz: Constant acceleration = 9.81 m/s ² (1 × g)
• Operation	10 ... 58 Hz: Constant deflection 0.15 mm 58 ... 200 Hz: Constant acceleration = 19.62 m/s ² (2 × g)
Shock load according to EN 60068-2-27	
• Transport ¹⁾	147.15 m/s ² (15 × g)/11 ms 3 shocks in each axis and direction
• Operation	147.15 m/s ² (15 × g)/11 ms 3 shocks in each axis and direction
Ambient conditions	
Protection class according to EN 61800-5-1	Class III (PELV)
Touch protection according to EN 61800-5-1	Class I (with protective conductor system)
Permissible ambient and coolant temperature (air) during operation for Power Modules	-10 ... +40 °C (14 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units	-10 ... +55 °C (14 ... 131 °F) with derating Limit values are determined by the Control Unit used (>40 ... 55 °C (104 ... 131 °F) see derating characteristics) up to 2000 m above sea level
Humidity, max.	95 % at 40 °C (104 °F)
Ambient temperature	
• Storage ¹⁾ acc. to EN 60068-2-1	-40 ... +70 °C (-40 ... +158 °F)
• Transport ¹⁾ acc. to EN 60068-2-1	-40 ... +70 °C (-40 ... +158 °F)
• Operation acc. to EN 60068-2-2	-10 ... +40 °C (14 ... 104 °F) without derating
Environmental class/harmful chemical substances	
• Operation acc. to EN 60721-3-3	Class 3C2
Degree of pollution acc. to EN 61800-5-1	2
Certification for fail-safe versions	
• According to EN 954-1	Category 3
• According to IEC 61508	SIL 2
• According to ISO 13849-1	PL d
• PFH _D	5 × 10 ⁻⁸
• T1	20 years
Standards	
Compliance with standards	UL 508C (UL list number E121068), CE, c-tick
CE marking, according to	Low-Voltage Directive 2006/95/EC
EMC Directive ²⁾	Category C2 ³⁾ according to EN 61800-3 (corresponds to class A according to EN 55011)
• Frame sizes FSA to FSC with integrated line filter class A	Note: The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter. The frequency inverters on their own do not generally require identification according to the EMC Directive.

¹⁾ In transport packaging.

²⁾ For further general information, [see also Catalog D.31, chapter SINAMICS G110, section Technical specifications, Compliance with standards.](#)

³⁾ With shielded motor cable up to 15 m (49 ft).

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Overview

The Control Unit performs closed-loop control functions for the inverter. In addition to the closed-loop control, it has additional functions that can be adapted to the particular application through parameterization. The CU240D-2 Control Units supersede the CU240D Control Units, whereby both versions can be operated with PM250D Power Modules.

CU250D-2 Control Units can be used to implement applications with positioning requirements in the drive. This expansion opens up their use in lifting, swiveling, traversing or rotating applications. The positioning functionality is comparable to that of SINAMICS S110 servo drives.

Two points must be noted in this context:

- Vector control (VC) and sensorless vector control (SLVC) are possible (but not servo control)
- Positioning using one encoder (HTL/SSI) or using two encoders simultaneously (HTL and SSI)

Control Units are available in different versions:

- CU240D-2 DP
- CU240D-2 DP-F
- CU240D-2 PN
- CU240D-2 PN-F
- CU240D-2 PN-F PP (Push Pull)
- CU250D-2 DP-F
- CU250D-2 PN-F
- CU250D-2 PN-F PP (Push Pull)

The Push Pull version comprises an alternative connection method for the 24 V supply voltage and the PN communication.



CU240D-2 DP Control Unit



CU250D-2 DP-F Control Unit



CU240D-2 PN Control Unit



CU250D-2 PN-F Control Unit

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Overview



CU250D-2 PN-F PP Control Unit

Safety Integrated functions

The safety function "Safe Torque Off" (STO) (certified according to EN 954-1, Category 3 and IEC 61508 SIL 2 as well as ISO 13849-1 PL d) is already integrated into the standard versions of the CU240D-2 series (CU240D-2 DP and CU240D-2 PN). It can be activated either over PROFIsafe or over the safety input.

With the fail-safe variants of the CU240D-2 series (CU240D-2 DP-F, CU240D-2 PN-F, CU240D-2 PN-F PP) and with the entire CU250D-2 series, the fail-safe SINAMICS G120D inverter provides five safety functions which are certified according to EN 954-1 Category 3, IEC 61508 SIL 2 as well as ISO 13849-1 PL d:

- Safe Torque Off (STO)
to protect against active movement of the drive
- Safe Stop 1 (SS1)
for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS)
for protection against dangerous movements on exceeding a speed limit
- Safe direction (SDI)
This function ensures that the drive can only rotate in the selected direction.
- Safe speed monitoring (SSM)
This function signals if a drive is operating below a specific speed/feed velocity.

These functions can be activated by means of PROFIsafe or via the safety inputs. A safety output is provided in addition.

All safety functions can be implemented without having to use a motor encoder; the implementation costs are minimal. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

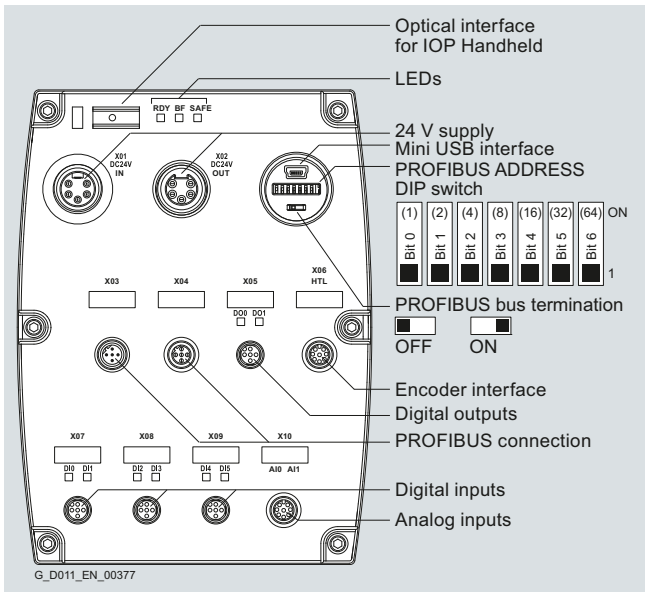
The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SSM and SDI functions are only permissible for applications where the load can never accelerate when the inverter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

Additional information is provided in Catalog D 31, chapter Highlights, section Safety Integrated.

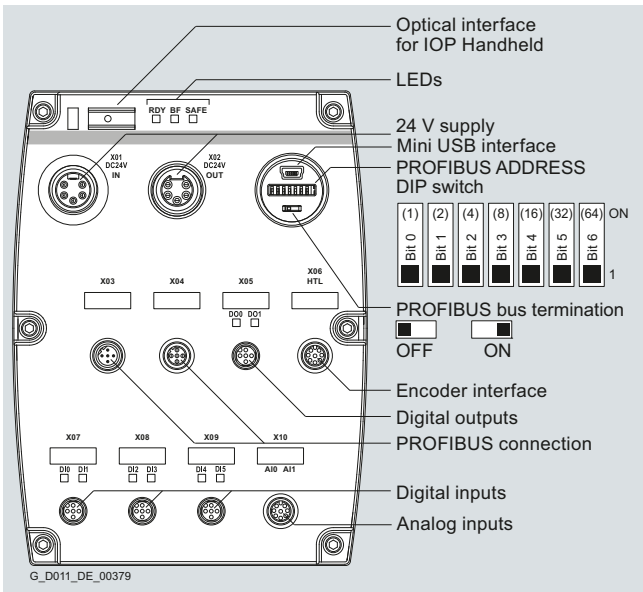
Selection and ordering data

Communication	Digital inputs (number which can be parameterized as fail-safe given below)	Analog inputs	Digital outputs (number which can be parameterized as fail-safe given below)	Encoder interfaces HTL/SSI	Safety Integrated functions	Designation	Control Unit Order No.
CU240D-2 series – standard							
PROFIBUS DP	6 (1)	2	2	1/–	STO	CU240D-2 DP	new 6SL3544-0FB20-1PA0
PROFINET	6 (1)	2	2	1/–	STO	CU240D-2 PN	new 6SL3544-0FB20-1FA0
CU240D-2 series – fail-safe for Safety Integrated							
PROFIBUS DP	6 (3)	2	2 (1)	1/–	STO, SLS, SS1, SSM, SDI	CU240D-2 DP-F	new 6SL3544-0FB21-1PA0
PROFINET	6 (3)	2	2 (1)	1/–	STO, SLS, SS1, SSM, SDI	CU240D-2 PN-F	new 6SL3544-0FB21-1FA0
PROFINET	6 (3)	2	2 (1)	1/–	STO, SLS, SS1, SSM, SDI	CU240D-2 PN-F PP	new 6SL3544-0FB21-1FB0
CU250D-2 series – basic positioner (EPos) and fail-safe for Safety Integrated							
PROFIBUS DP	6 (3)	–	2 (1)	1/1	STO, SLS, SS1, SSM, SDI	CU250D-2 DP-F	new 6SL3546-0FB21-1PA0
PROFINET	6 (3)	–	2 (1)	1/1	STO, SLS, SS1, SSM, SDI	CU250D-2 PN-F	new 6SL3546-0FB21-1FA0
PROFINET	6 (3)	–	2 (1)	1/1	STO, SLS, SS1, SSM, SDI	CU250D-2 PN-F PP	new 6SL3546-0FB21-1FB0

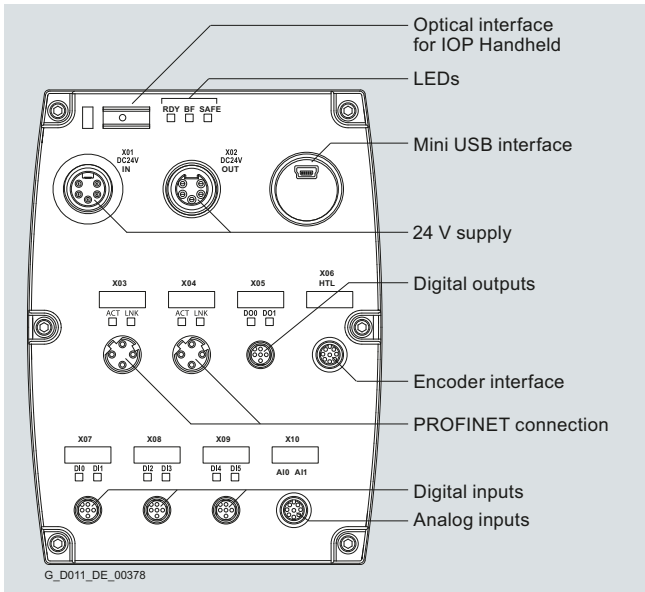
Design



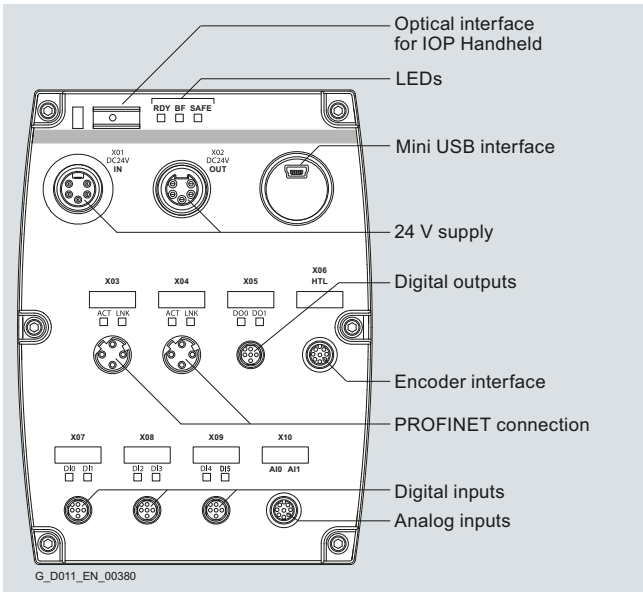
CU240D-2 DP Control Unit



CU240D-2 DP-F Control Unit



CU240D-2 PN Control Unit



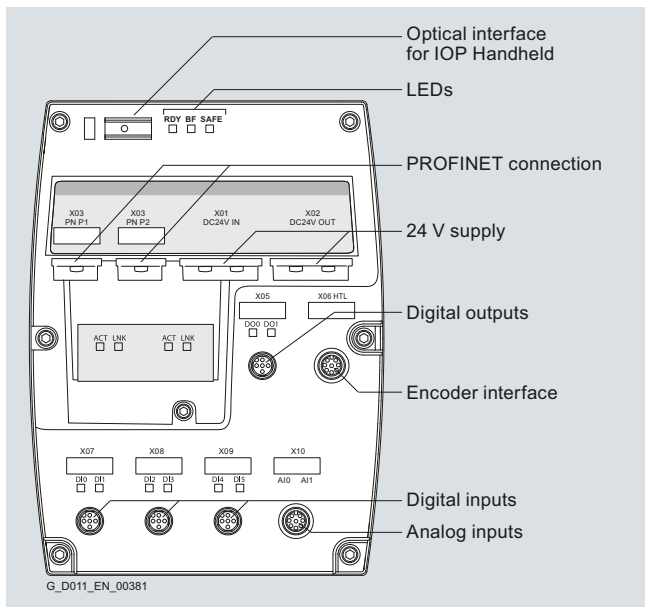
CU240D-2 PN-F Control Unit

SINAMICS G120D distributed inverters

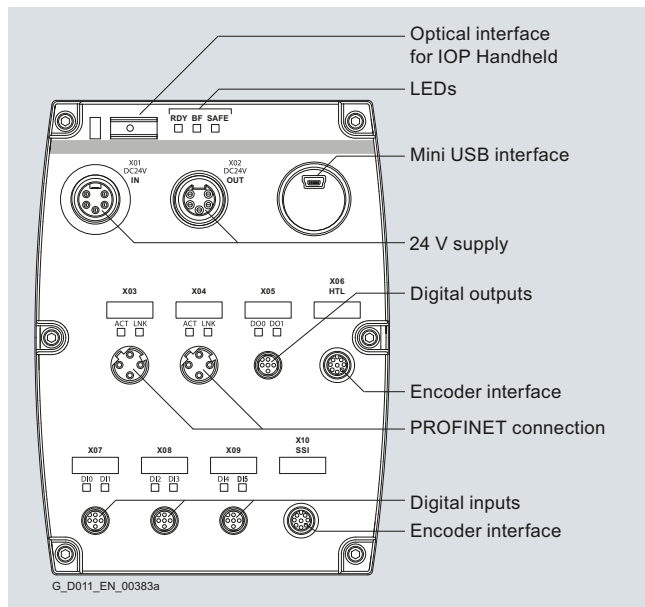
0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

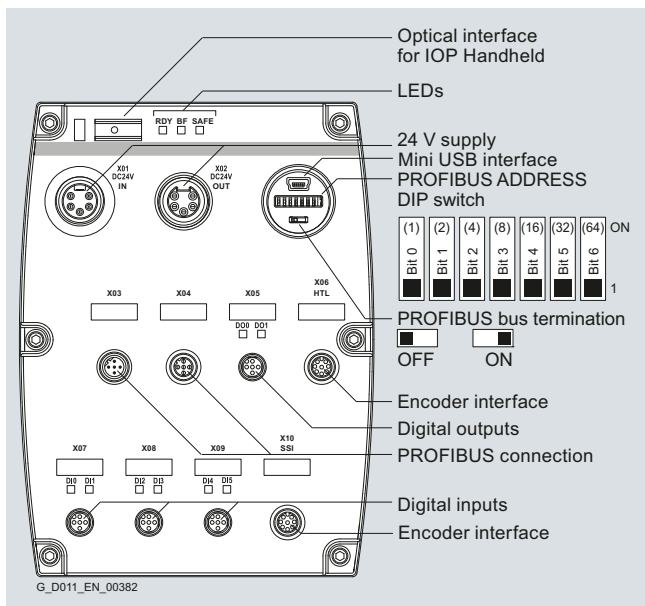
Design



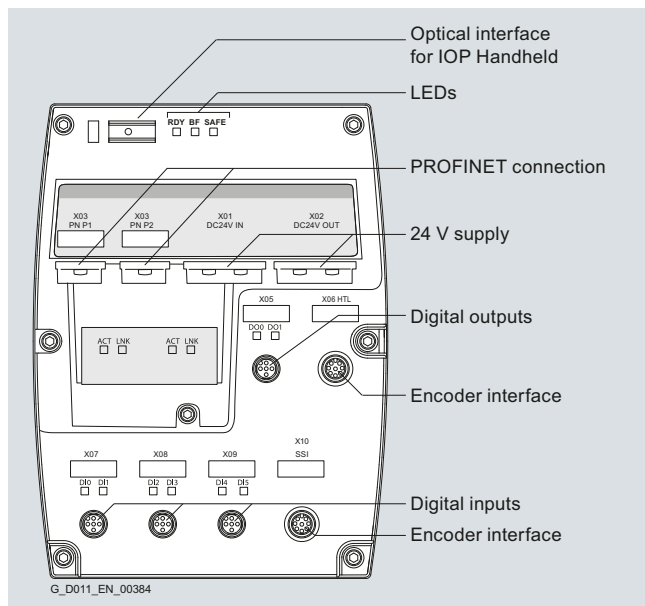
CU240D-2 PN-F PP Control Unit



CU250D-2 PN-F Control Unit



CU250D-2 DP-F Control Unit



CU250D-2 PN-F PP Control Unit



Control Unit, view from the rear, memory card slot at the top and PM-IF interface at bottom center

Function

Basic positioner (EPos)

Overview

- Absolute and relative positioning
- Linear and rotary axis
- Motor encoder or direct measuring system
- 4 referencing modes
- 16 traversing blocks
- Direct setpoint input (MDI)
- Jogging
- Backlash compensation
- Following error monitoring
- Cam signals

The positioning functions are only available in the CU250D-2 Control Unit and are functionally identical to the positioning functionality of SINAMICS S110. Due to its flexibility and adaptability, the basic positioner can be used for a wide range of positioning tasks.

The functions are easy to handle both during commissioning and during operation. Furthermore, they are characterized by their comprehensive monitoring functions.

Many applications can be carried out without external position controllers.

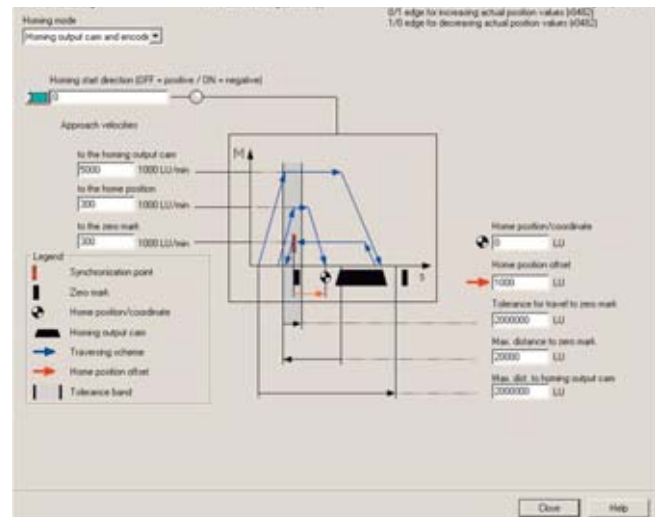
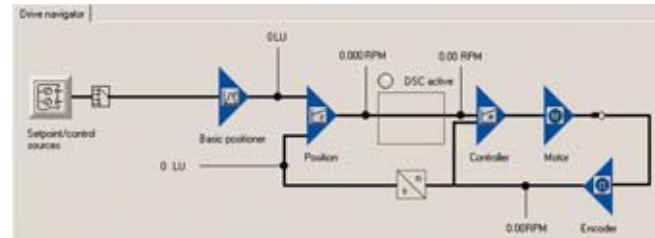
The EPos basic positioner is available as an additional function module that can be activated, and is used for the absolute/relative positioning of linear and rotary axes (modulo) with both rotary and linear motor encoders (indirect measuring system).

User-friendly configuring and commissioning including control panel (operation using PC) and diagnostics with the STARTER commissioning tool Version 4.3 and higher.

In addition to extremely flexible positioning functions, EPos offers a high degree of user-friendliness and reliability thanks to integral monitoring and compensation functions.

Different operating modes and their functionality increase flexibility and plant productivity, for example, by means of "on-the-fly" and bumpless correction of the motion control.

Preconfigured PROFIdrive positioning frames are available which, when selected, automatically establish the internal "connection" to the basic positioner.



SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Function

Functionality of the EPos basic positioner

Lower-level closed-loop position control with the following essential components

- Position actual value sensing (including the lower-level measuring input evaluation and reference mark search)
- Position controller (including limits, adaptation and pre-control calculation)
- Position control cycle 8 ms (speed control cycle 2 ms)
- Monitoring functions (standstill, positioning and dynamic following error monitoring, cam signals)

Mechanical system

- Backlash compensation

Limitations

- Speed/acceleration/delay/jerk limitation
- Software limit switches (traversing range limitation by means of position setpoint evaluation)
- Stop cams (traversing range limitation by means of hardware limit switch evaluation)

Referencing or adjustment

- Setting reference point (with stationary axis)
- Search for reference (separate mode including reversing cam functionality, automatic reversal of direction, referencing to "output cam and encoder zero mark" or only "encoder zero mark" or "external zero mark (BERO)")
- Flying referencing (seamless subordinate referencing is possible during "normal" traversing with the aid of measuring input evaluation; generally evaluation, e.g. of a BERO. Subordinate function for the modes "jog", "direct setpoint input/MDI" and "traversing blocks")
- Absolute encoder alignment

Traversing blocks mode (16 traversing blocks)

- Positioning by means of traversing blocks stored in the device, including continuation conditions and specific jobs for previously homed axis
- Traversing block editor using STARTER
- A traversing block contains the following information:
 - Job number and job (e.g. positioning, waiting, GOTO block jump, setting of binary outputs, travel to fixed endstop)
 - Motion parameters (target position, override speed for acceleration and deceleration)
 - Mode (e.g.: hide block, continuation conditions such as "Continue_with_stop", "Continue_flying" and "Continue_externally using high-speed measuring inputs")
 - Job parameters (e.g. wait time, block step conditions)

Direct setpoint specification mode (MDI)

- Positioning (absolute, relative) and setting-up (endless closed-loop position control) using direct setpoint inputs (e.g. via the PLC using process data)
- It is always possible to influence the motion parameters during traversing (on-the-fly setpoint acceptance) as well as for on-the-fly changes between the setup and positioning modes.
- The direct setpoint specification mode (MDI) can also be used in the relative positioning or setup mode if the axis is not referenced. This means that on-the-fly synchronization and re-referencing can be carried out using "flying referencing".

Jog mode

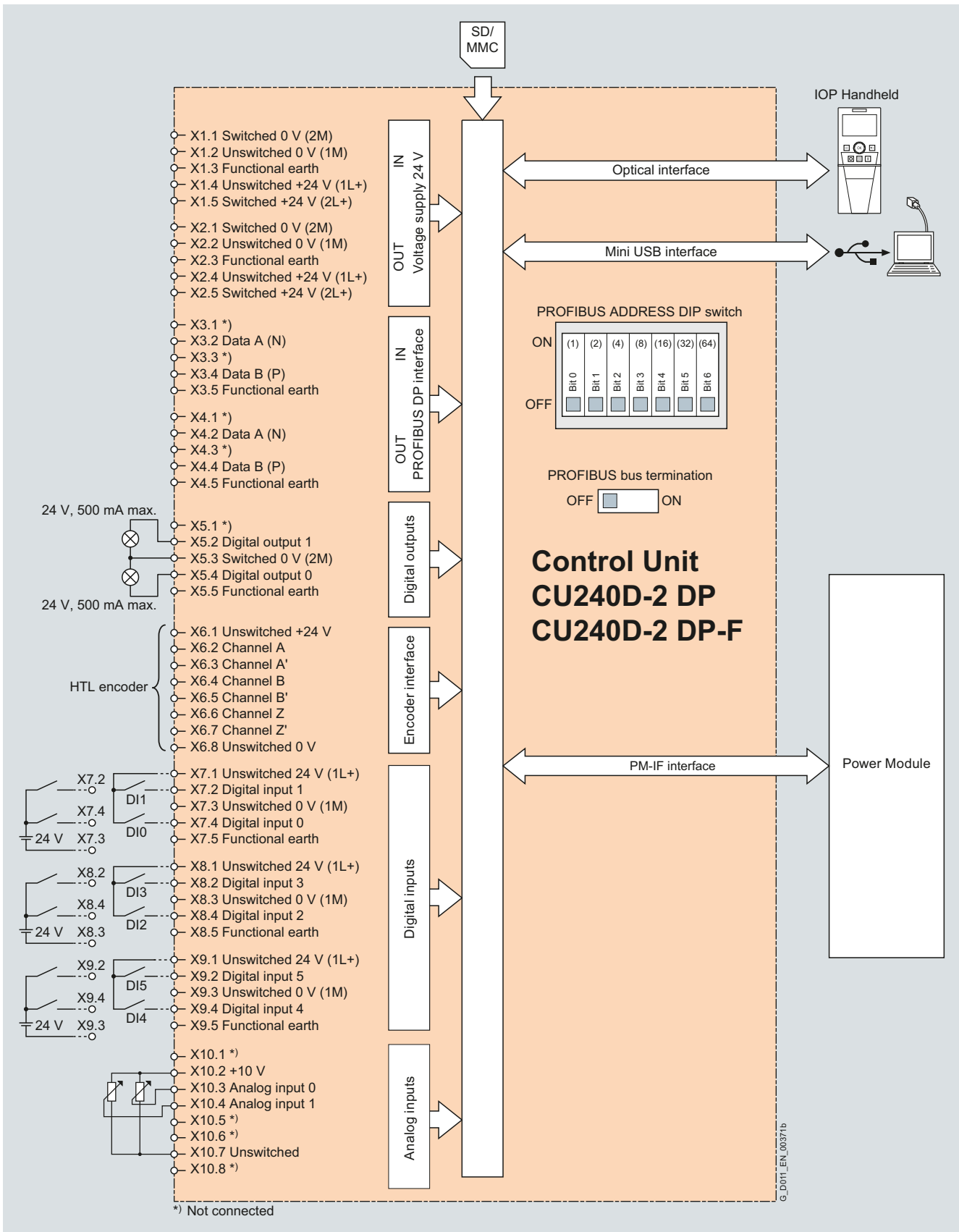
- Closed-loop position controlled traversing of the axis with "endless position controlled" or "jog incremental" modes (traverse through a "step width"), which can be toggled between

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Integration



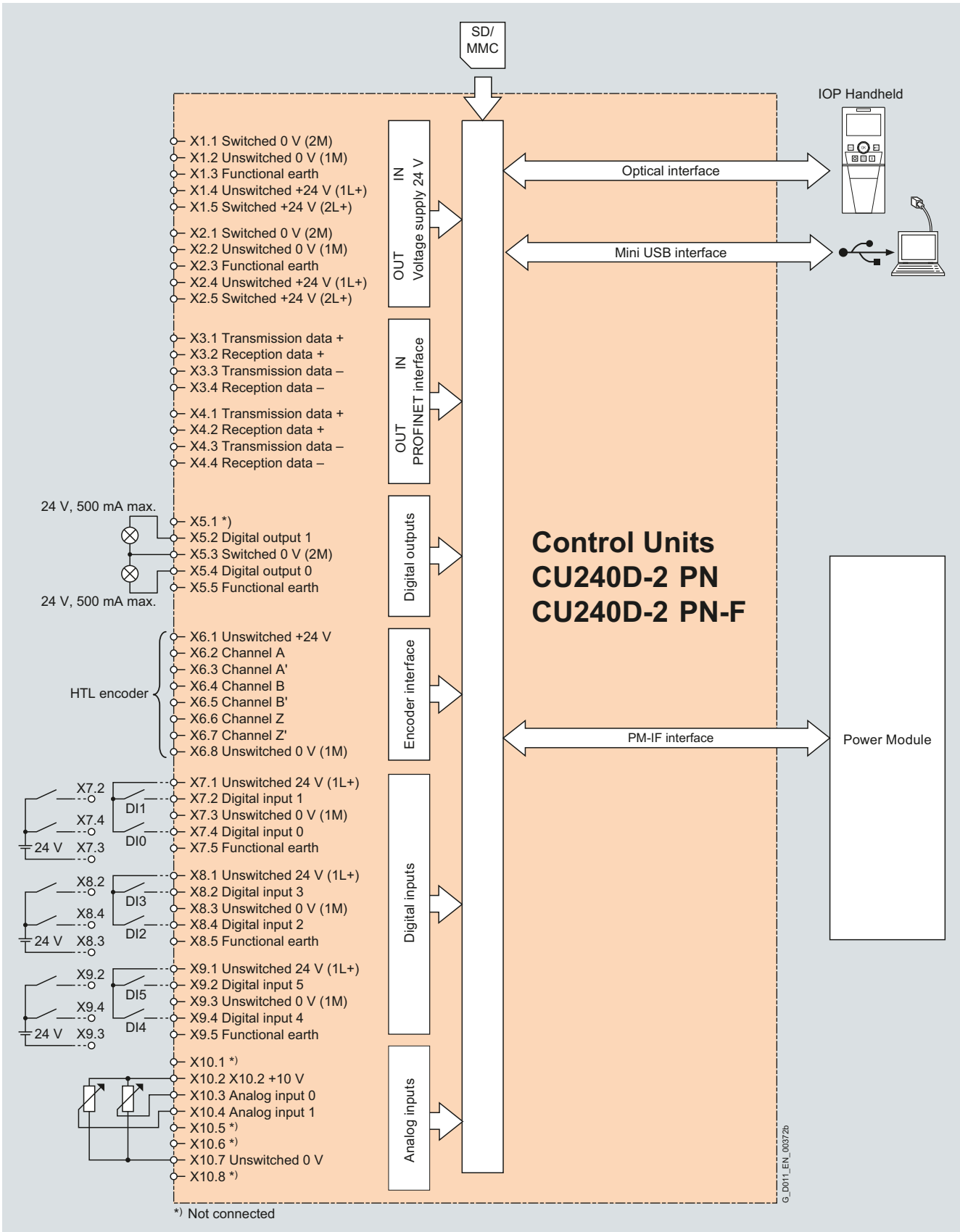
Connection example for CU240D-2 DP and CU240D-2 DP-F Control Units

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Integration



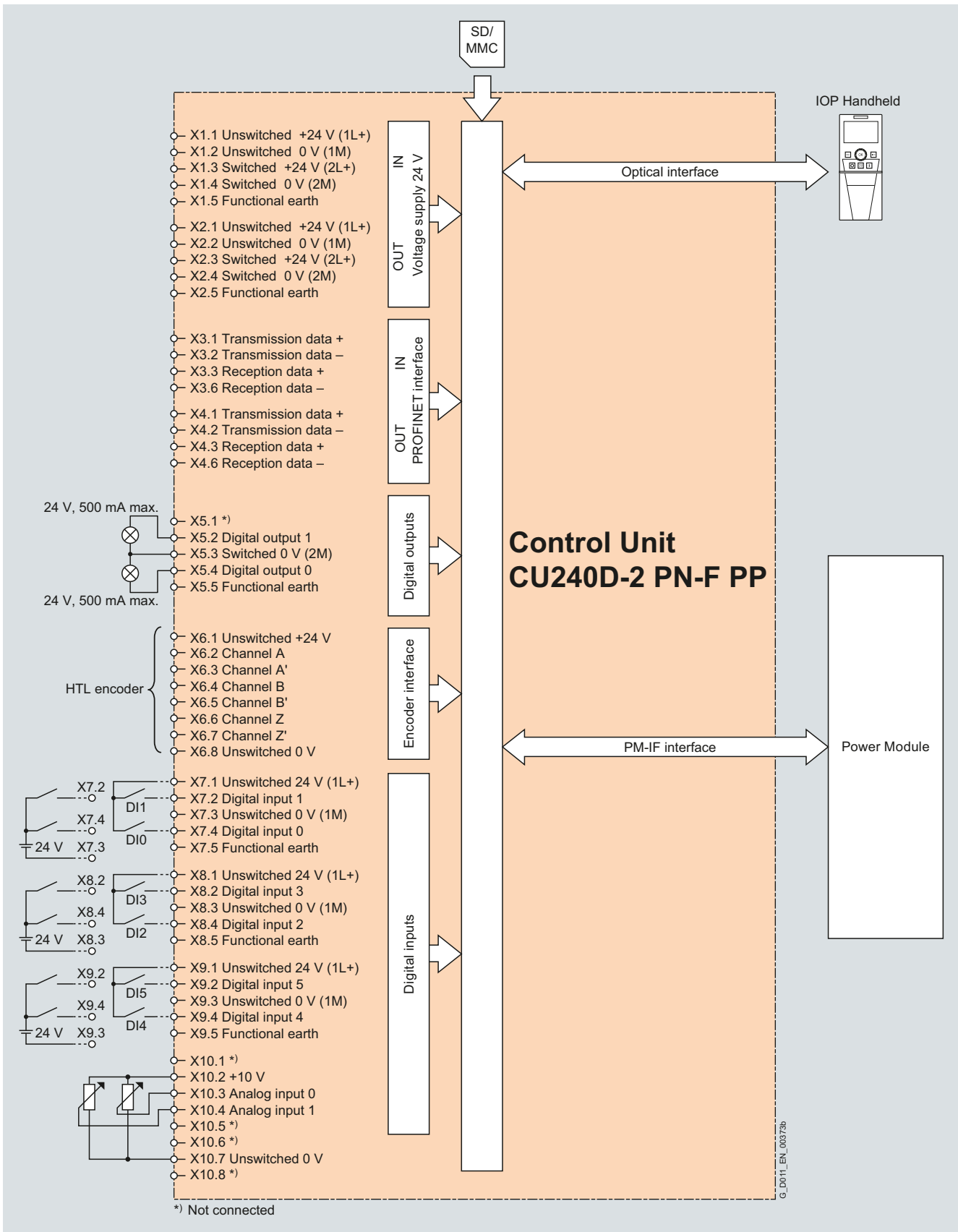
Connection example for CU240D-2 PN and CU240D-2 PN-F Control Units

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Integration



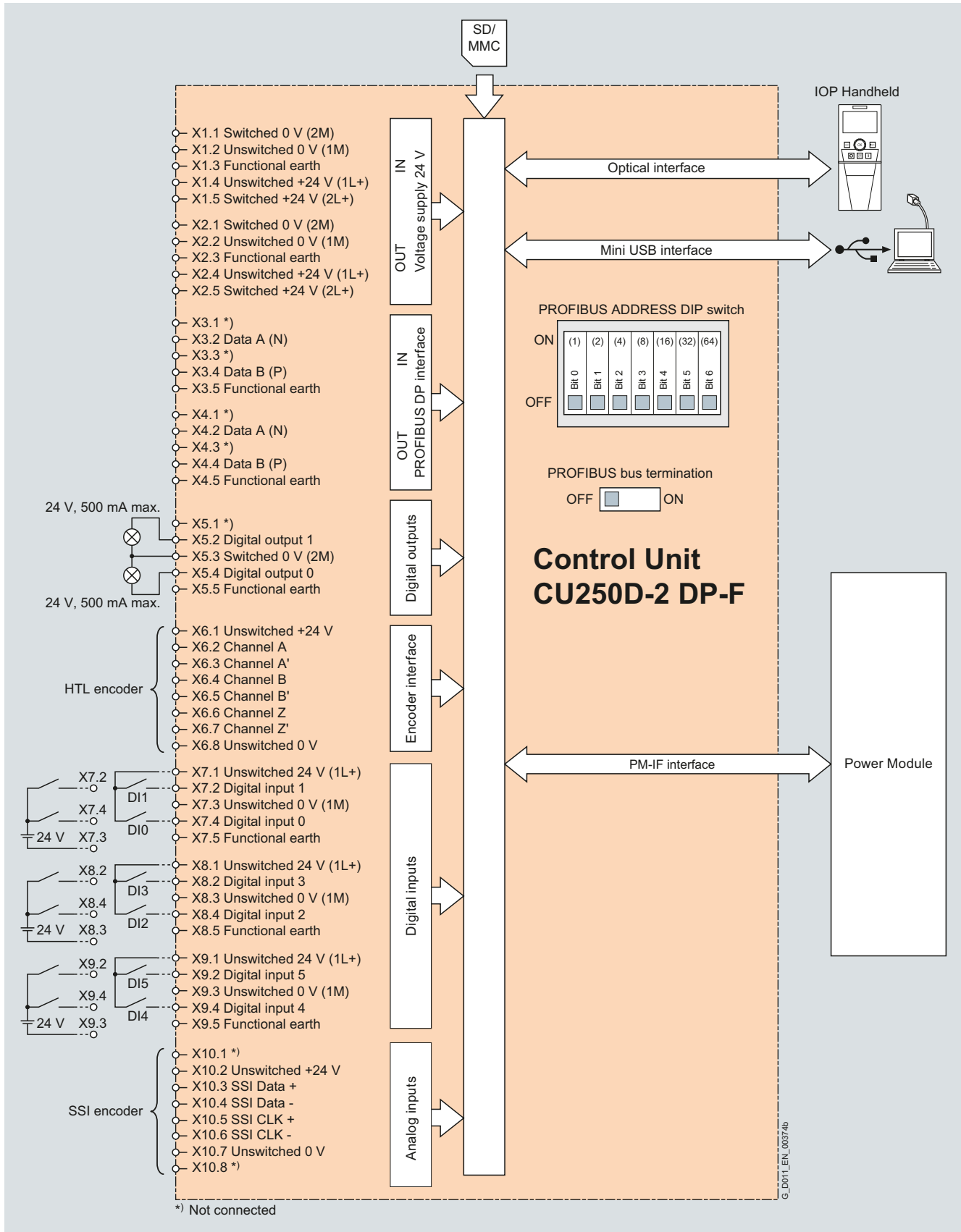
Connection example for CU240D-2 PN-F PP Control Unit

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Integration



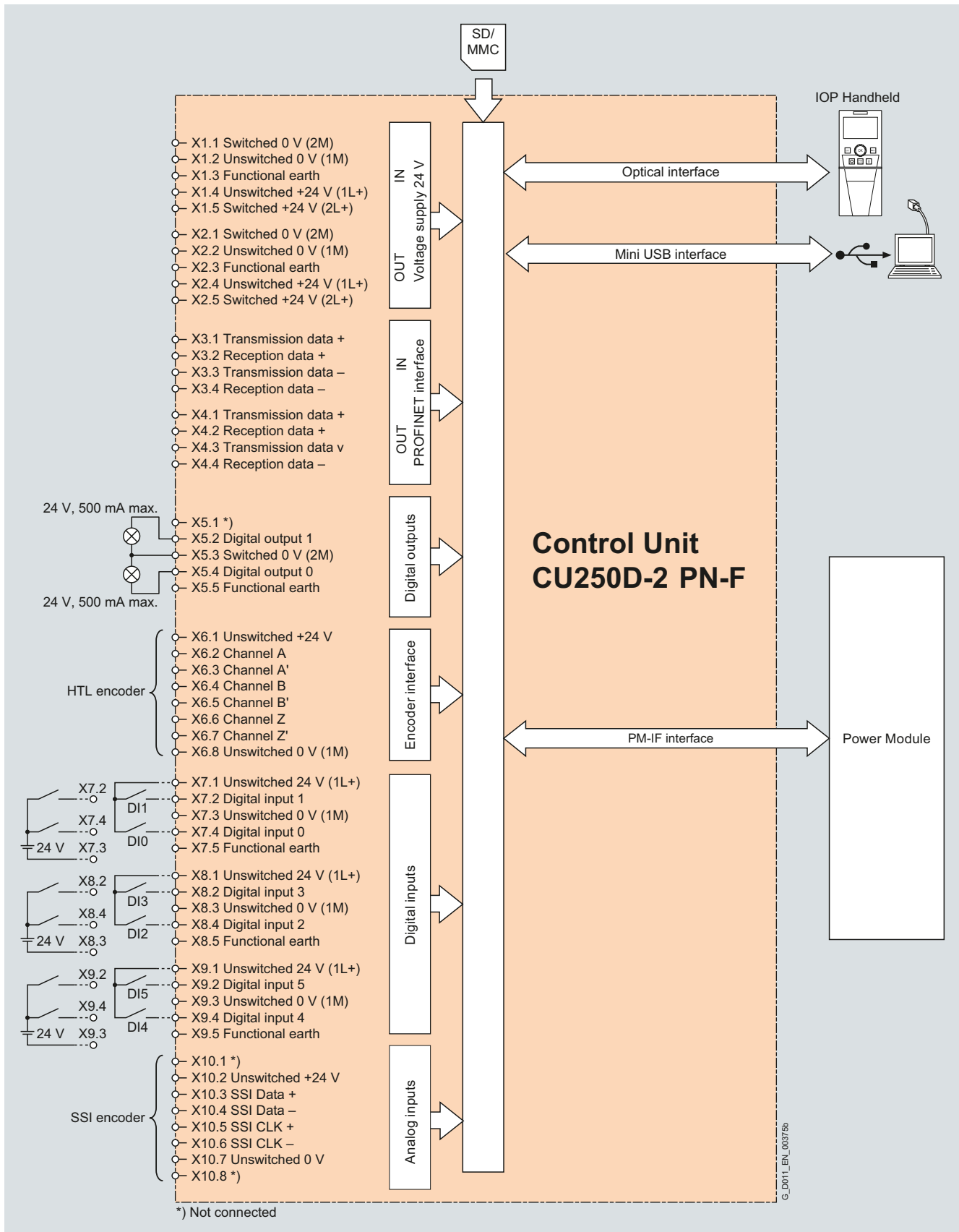
Connection example for CU250D-2 DP-F Control Unit

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Integration



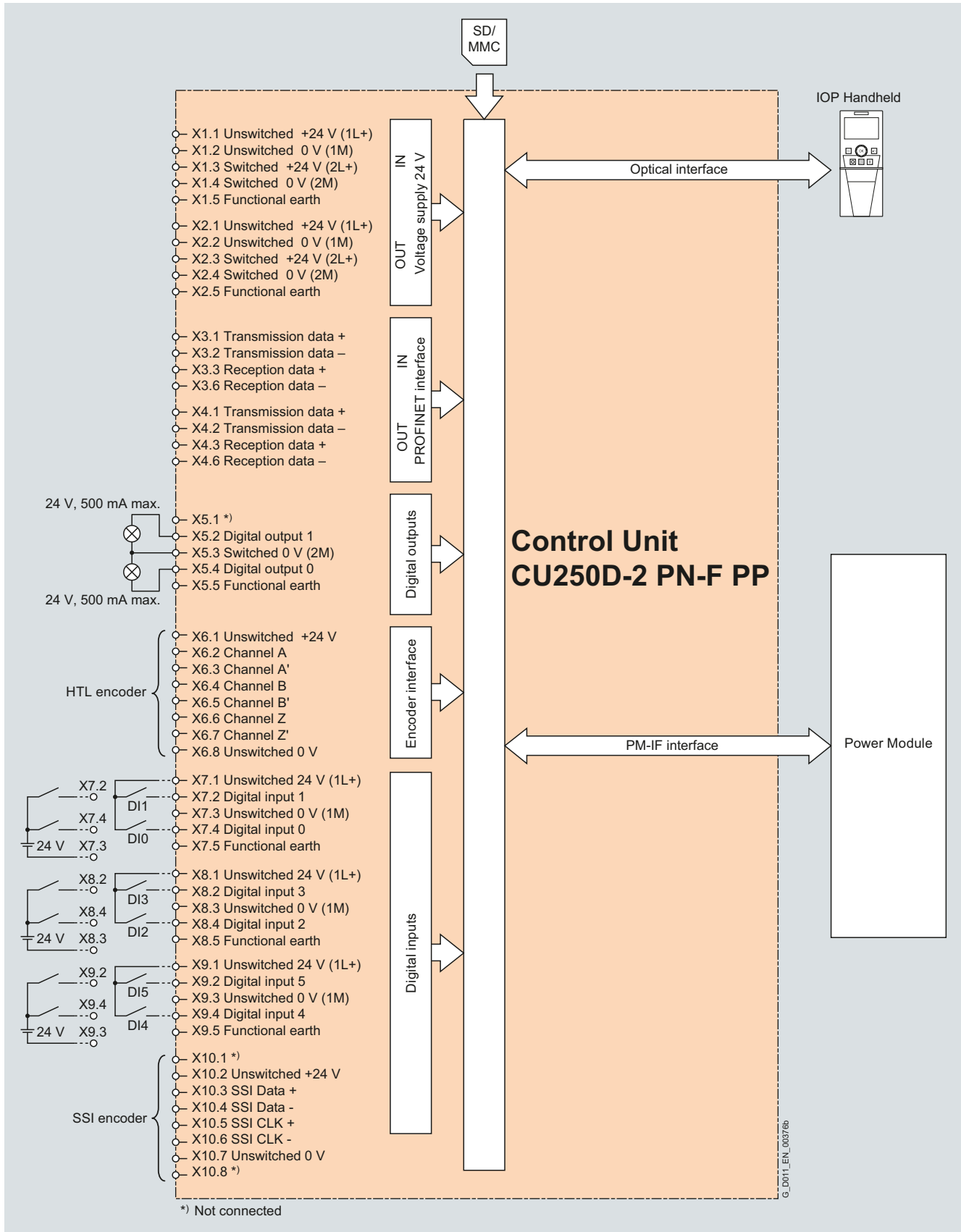
Connection example for CU250D-2 PN-F Control Unit

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Integration



Connection example for CU250D-2 PN-F PP Control Unit

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SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Technical specifications

Control Unit	CU240D-2 DP 6SL3544-0FB20-1PA0	CU240D-2 PN 6SL3544-0FB20-1FA0	CU240D-2 DP-F 6SL3544-0FB21-1PA0	CU240D-2 PN-F 6SL3544-0FB21-1FA0	CU240D-2 PN-F PP 6SL3544-0FB21-1FB0	CU250D-2 DP-F 6SL3546-0FB21-1PA0	CU250D-2 PN-F 6SL3546-0FB21-1FA0	CU250D-2 PN-F PP 6SL3546-0FB21-1FB0
Electrical specifications								
Operating voltage	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary
Current consumption ¹⁾ (from the 24 V supply)								
• With Power Module frame sizes FSA and FSB	300 mA	400 mA	300 mA	400 mA	300 mA	400 mA	300 mA	400 mA
• With Power Module frame size FSC	450 mA	550 mA	450 mA	550 mA	450 mA	550 mA	450 mA	550 mA
Interfaces								
Digital inputs (non-isolated)	6	6	6	6	6	6	6	6
• Optionally parameterizable as safe inputs	1	1	3	3	3	3	3	3
Analog inputs (0 ... 10 V)	2	2	2	2	–	–	–	–
Digital outputs (0.5 A, fed through switched 24 V DC, isolated)	2	2	2	2	2	2	2	2
• Optionally parameterizable as safe digital output	–	–	1	1	1	1	1	1
Bus interface	PROFIBUS DP	PROFINET	PROFIBUS DP, PROFIsafe	PROFINET, PROFIsafe	PROFIBUS DP, PROFIsafe	PROFINET, PROFIsafe	PROFIBUS DP, PROFIsafe	PROFINET, PROFIsafe
HTL encoder interface (incremental interface, bipolar up to 2048 pulses, max. 150 mA)	1	1	1	1	1	1	1	1
SSI encoder interface (absolute encoder, singleturn and multiturn 4096 pulses, 24 V, max. 250 mA)	–	–	–	–	1	1	1	1
PTC/KTY interface (connection via Power Module)	✓	✓	✓	✓	✓	✓	✓	✓
• Motor temperature sensor	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click
Control of a mechanical motor brake (connection via Power Module)	✓	✓	✓	✓	✓	✓	✓	✓
Slot for SD or MMC memory card	✓	✓	✓	✓	✓	✓	✓	✓
Commissioning interface (mini USB)	✓	✓	✓	✓	Not with PP variant	✓	✓	Not with PP variant

¹⁾ The current consumption of connected encoders (HTL ≤ 100 mA or SSI ≤ 250 mA), sensors (total, max. 300 mA) as well as the current drawn from the digital outputs (total, max. 500 mA) must be added, where applicable.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Technical specifications

Control Unit	CU240D-2 DP 6SL3544-0FB20-1PA0	CU240D-2 PN 6SL3544-0FB20-1FA0	CU240D-2 DP-F 6SL3544-0FB21-1PA0	CU240D-2 PN-F 6SL3544-0FB21-1FA0 CU240D-2 PN-F PP 6SL3544-0FB21-1FB0	CU250D-2 DP-F 6SL3546-0FB21-1PA0	CU250D-2 PN-F 6SL3546-0FB21-1FA0 CU250D-2 PN-F PP 6SL3546-0FB21-1FB0
Safety functions						
Integrated safety functions to EN 954-1 Category 3, IEC 61508 SIL 2 and ISO 13849-1 PL d	<ul style="list-style-type: none"> • Safe Torque Off (STO) 	<ul style="list-style-type: none"> • Safe Torque Off (STO) 	<ul style="list-style-type: none"> • Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • Safe Direction (SDI) • Safe Speed Monitor (SSM) 	<ul style="list-style-type: none"> • Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • Safe Direction (SDI) • Safe Speed Monitor (SSM) 	<ul style="list-style-type: none"> • Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • Safe Direction (SDI) • Safe Speed Monitor (SSM) 	<ul style="list-style-type: none"> • Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • Safe Direction (SDI) • Safe Speed Monitor (SSM)
Open-loop/closed-loop control techniques						
V/f linear/square/parameterizable	✓	✓	✓	✓	✓	✓
V/f with flux current control (FCC)	✓	✓	✓	✓	✓	✓
Vector control, sensorless	✓	✓	✓	✓	✓	✓
Vector control, with sensor	✓	✓	✓	✓	✓	✓
Torque control, sensorless	✓	✓	✓	✓	–	–
Torque control, with sensor	✓	✓	✓	✓	–	–
Software functions						
Basic positioner (EPos)	–	–	–	–	✓	✓
Fixed frequencies	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable
Signal interconnection with BICO technology	✓	✓	✓	✓	✓	✓
Automatic restart after line supply failure or operational fault	✓	✓	✓	✓	✓	✓
Slip compensation	✓	✓	✓	✓	✓	✓
Free function blocks (FFB) for logical and arithmetic operations	✓	✓	✓	✓	–	–
Ramp smoothing	✓	✓	✓	✓	✓	✓
3 selectable drive data sets	✓	✓	✓	✓	✓	✓
3 selectable command data sets (CDS) (manual/auto)	✓	✓	✓	✓	✓	✓
Flying restart	✓	✓	✓	✓	–	–
JOG	✓	✓	✓	✓	–	–
Cyclic recording of ramp-up and ramp-down	✓	✓	✓	✓	✓	✓
Technology controller (PID)	✓	✓	✓	✓	–	–
Thermal motor protection	✓	✓	✓	✓	✓	✓

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Technical specifications

Control Unit	CU240D-2 DP 6SL3544- 0FB20-1PA0	CU240D-2 PN 6SL3544- 0FB20-1FA0	CU240D-2 DP-F 6SL3544- 0FB21-1PA0	CU240D-2 PN-F 6SL3544- 0FB21-1FA0 CU240D-2 PN-F PP 6SL3544- 0FB21-1FB0	CU250D-2 DP-F 6SL3546- 0FB21-1PA0	CU250D-2 PN-F 6SL3546- 0FB21-1FA0 CU250D-2 PN-F PP 6SL3546- 0FB21-1FB0
Software functions (continued)						
Thermal inverter protection	✓	✓	✓	✓	✓	✓
Setpoint input	✓	✓	✓	✓	✓	✓
Motor identification	✓	✓	✓	✓	✓	✓
Motor holding brake	✓	✓	✓	✓	✓	✓
Mechanical specifications and ambient conditions						
Degree of protection	IP65/UL Type 3	IP65/UL Type 3	IP65/UL Type 3	IP65/UL Type 3	IP65/UL Type 3	IP65/UL Type 3
Operating temperature	-10 ... +55 °C (14 ... 131 °F)	-10 ... +50 °C (14 ... 122 °F)	0 ... 55 °C (32 ... 131 °F)	0 ... 50 °C (32 ... 122 °F)	0 ... 55 °C (32 ... 131 °F)	0 ... 50 °C (32 ... 122 °F)
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible
Dimensions						
• Width	153 mm (6.02 in)	153 mm (6.02 in)	153 mm (6.02 in)	153 mm (6.02 in)	153 mm (6.02 in)	153 mm (6.02 in)
• Height	208 mm (8.19 in)	208 mm (8.19 in)	208 mm (8.19 in)	208 mm (8.19 in)	208 mm (8.19 in)	208 mm (8.19 in)
• Depth	55 mm (2.17 in)	55 mm (2.17 in)	55 mm (2.17 in)	55 mm (2.17 in) (PP variant: 118 mm/4.65 in)	55 mm (2.17 in)	55 mm (2.17 in) (PP variant: 118 mm/4.65 in)
Weight, approx.	0.8 kg (1.76 lb)	0.8 kg (1.76 lb)	0.8 kg (1.76 lb)	0.8 kg (1.76 lb) (PP variant: 1.3 kg/2.87 lb)	0.8 kg (1.76 lb)	0.8 kg (1.76 lb) (PP variant: 1.3 kg/2.87 lb)

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

PM250D Power Modules

Overview



Example of PM250D Power Module, frame size FSA

The regenerative feedback capability of the PM250D Power Module in generating mode (electronic braking) means that energy is returned to the supply system and not wasted in a braking resistor. This saves space, time-consuming dimensioning of the braking resistor as well as its wiring. Generated heat is also reduced. [Additional information is provided in Catalog D 31, chapter Highlights, section Efficient Infeed Technology.](#)

An innovative circuit design reduces the line harmonics. A line reactor is not required. This saves space and costs for engineering and procurement.

The PM250D Power Module is also designed for safety-oriented applications. In conjunction with a fail-safe Control Unit, the drive can be transformed into a Safety Integrated Drive ([see Control Units](#)).

The PM250D Power Modules with integrated line filter class A are suitable for connection to TN and TT supply systems.

Selection and ordering data

Rated power ¹⁾		Rated output current ²⁾	Input current	Frame size	PM250D Power Module with integrated line filter class A Order No.
kW	hp				
380 ... 500 V 3 AC					
0.75	1	2.2	2.1	FSA	6SL3525-0PE17-5AA1
1.5	1.5 ³⁾	4.1	3.8	FSA	6SL3525-0PE21-5AA1
3	4	7.7	7.2	FSB	6SL3525-0PE23-0AA1
4	5	10.2	9.5	FSC	6SL3525-0PE24-0AA1
5.5	7.5	13.2	12.2	FSC	6SL3525-0PE25-5AA1
7.5	10	19.0	17.7	FSC	6SL3525-0PE27-5AA1

¹⁾ Rated power based on the rated output current I_{rated} . The rated output current I_{rated} is based on the duty cycle for high overload (HO).

²⁾ The rated output current I_{rated} is based on the duty cycle for high overload (HO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

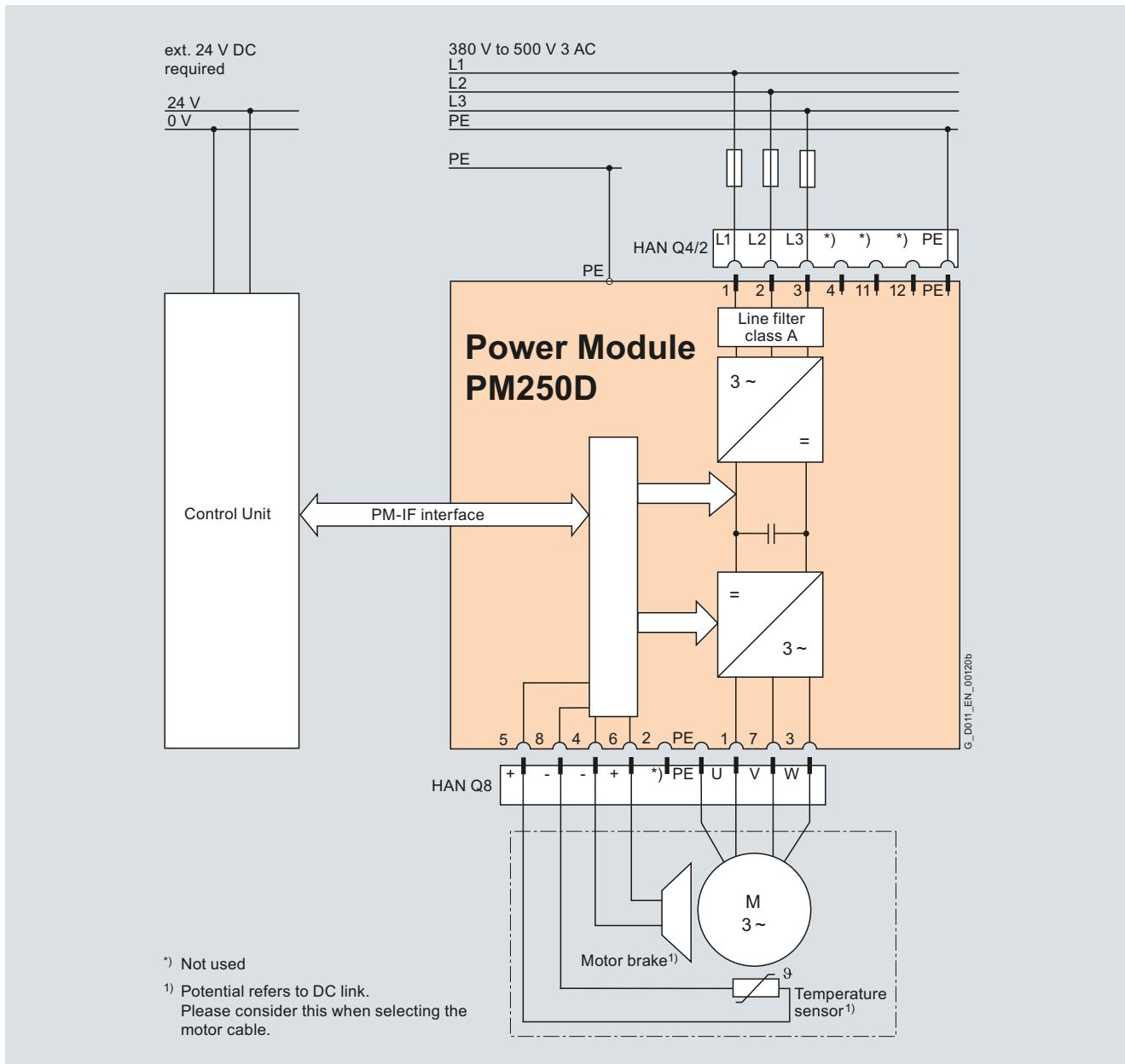
³⁾ It is not possible to make any assignment to a particular standard.

Integration

PM250D Power Modules communicate with the Control Unit via the PM-IF interface.

PM250D Power Modules have the following interfaces as standard:

- PM-IF interface to connect the PM250D Power Module to the Control Unit.
- Motor connection via a HAN Q8 (connector) including control of the motor brake and temperature sensor
- Line supply connection via HAN Q4/2 (socket)



Connection diagram for PM250D Power Module with integrated line filter class A

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

PM250D Power Modules

Technical specifications

General technical specifications

PM250D Power Modules													
System operating voltage	380 ... 500 V 3 AC ±10 %												
Line supply requirements	≤1 %												
Line short circuit voltage u_K													
Input frequency	47 ... 63 Hz												
Output frequency													
• Control type V/f	0 ... 650 Hz												
• Control type Vector	0 ... 200 Hz												
Pulse frequency	4 kHz (standard), for higher pulse frequencies up to 16 kHz, see derating data												
Power factor λ	0.95												
Inverter efficiency η	95 ... 97 %												
Output voltage, max. In % of input voltage	87 %												
Overload capability													
• High overload (HO)	<ul style="list-style-type: none"> • Average maximum rated output current during a cycle time of 300 s • 1.5 × rated output current (i.e. 150 % overload) over 60 s at a cycle time of 300 s • 2 × rated output current (i.e. 200 % overload) over 3 s at a cycle time of 300 s 												
Electromagnetic compatibility	Integrated line filter class A according to EN 55011												
Possible braking methods	Energy recovery in regenerative mode (max. with rated power possible); Integrated brake control supplies the DC supply voltage for the brake												
	<table border="1"> <thead> <tr> <th>Line input voltage</th> <th>380 V AC</th> <th>400 V AC</th> <th>440 V AC</th> <th>480 V AC</th> <th>500 V AC</th> </tr> </thead> <tbody> <tr> <td>Resulting brake voltage</td> <td>171 V DC</td> <td>180 V DC</td> <td>198 V DC</td> <td>216 V DC</td> <td>225 V DC</td> </tr> </tbody> </table>	Line input voltage	380 V AC	400 V AC	440 V AC	480 V AC	500 V AC	Resulting brake voltage	171 V DC	180 V DC	198 V DC	216 V DC	225 V DC
Line input voltage	380 V AC	400 V AC	440 V AC	480 V AC	500 V AC								
Resulting brake voltage	171 V DC	180 V DC	198 V DC	216 V DC	225 V DC								
	Disconnection on the DC permits "fast" braking (max. output current 1 A)												
Degree of protection	IP65/UL Type 3												
Operating temperature	-10 ... +55 °C (14 ... 131 °F) (operating temperature ranges of the Control Units should be taken into account)												
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)												
Permissible mounting position	Horizontal wall mounting and mounting in the horizontal position												
Relative humidity	<95 % RH, condensation not permissible												
Cooling	FSA and FSB: Convection FSC: Air cooling as required using the integrated fan												
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics												
Standard SCCR (Short Circuit Current Rating) ¹⁾	40 kA												
Protection functions	<ul style="list-style-type: none"> • Undervoltage • Phase failure detection • Overvoltage • Overcontrol/Overload • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking 												
Compliance with standards	UL 508C (UL list number E121068), cUL, CE, c-tick												
CE marking, according to	Low-Voltage Directive 2006/95/EC												

¹⁾ Applies to industrial control cabinet installations to NEC Article 409/UL 508A.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

PM250D Power Modules

Technical specifications

Line voltage 380 ... 500 V 3 AC		PM250D Power Modules		
		6SL3525-0PE17-5AA1	6SL3525-0PE21-5AA1	6SL3525-0PE23-0AA1
Rated output current I_{rated} ¹⁾	A	2.2	4.1	7.7
Output current I_{max}	A	4.4	8.2	15.4
Rated power	kW (hp)	0.75 (1.0)	1.5 (1.5) ³⁾	3 (4.0)
Rated pulse frequency	kHz	4	4	4
Efficiency η		>0.95	>0.95	>0.95
Power loss	kW	0.047	0.061	0.103
Cooling air requirement	m ³ /s (ft ³ /s)	0.004 (0.14)	0.005 (0.18)	0.009 (0.32)
Sound pressure level L_{pA} (1 m)	dB	–	–	–
Rated input current ²⁾	A	2.1	3.8	7.2
Line supply connection U1/L1, V1/L2, W1/L3, PE		HAN Q4/2 (connector)	HAN Q4/2 (connector)	HAN Q4/2 (connector)
• Conductor cross-section	mm ²	1.5 ... 6	1.5 ... 6	2.5 ... 6
PE connection (external connection)		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
• Conductor cross-section (recommended)	mm ²	10 ... 16	10 ... 16	10 ... 16
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		HAN Q8 (socket)	HAN Q8 (socket)	HAN Q8 (socket)
• Conductor cross-section	mm ²	1 ... 4	1 ... 4	2.5 ... 4
Motor cable length, max. shielded	m (ft)	15 (49)	15 (49)	15 (49)
Degree of protection		IP65/UL Type 3	IP65/UL Type 3	IP65/UL Type 3
Dimensions				
• Width	mm (in)	445 (17.52)	445 (17.52)	445 (17.52)
• Height	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)
• Depth	mm (in)	110 (4.33)	110 (4.33)	180 (7.09)
Frame size		FSA	FSA	FSB
Weight, approx.	kg (lb)	5.7 (12.6)	5.7 (12.6)	8 (17.6)

¹⁾ The rated output current I_{rated} is based on the duty cycle for high overload (HO).

²⁾ The input current depends on the motor load and line impedance.
The input currents apply for load at rated power for a line impedance corresponding to $u_K = 1\%$.

³⁾ It is not possible to make any assignment to a particular standard.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

PM250D Power Modules

Technical specifications

Line voltage 380 ... 500 V 3 AC		PM250D Power Modules		
		6SL3525-0PE24-0AA1	6SL3525-0PE25-5AA1	6SL3525-0PE27-5AA1
Rated output current $I_{rated}^{1)}$	A	10.2	13.2	19
Output current I_{max}	A	20.4	26.4	38
Rated power	kW (hp)	4 (5)	5.5 (7.5)	7.5 (10)
Rated pulse frequency	kHz	4	4	4
Efficiency η		>0.95	>0.95	>0.95
Power loss	kW	0.141	0.209	0.295
Cooling air requirement	m ³ /s (ft ³ /s)	0.012 (0.42)	0.018 (0.64)	0.025 (0.88)
Sound pressure level L_{pA} (1 m)	dB	74.5	74.5	74.5
Rated input current ²⁾	A	9.5	12.2	17.7
Line supply connection U1/L1, V1/L2, W1/L3, PE		HAN Q4/2 (connector)	HAN Q4/2 (connector)	HAN Q4/2 (connector)
• Conductor cross-section	mm ²	2.5 ... 6	4 ... 6	4 ... 6
PE connection (external connection)		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
• Conductor cross-section (recommended)	mm ²	10 ... 16	10 ... 16	10 ... 16
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		HAN Q8 (socket)	HAN Q8 (socket)	HAN Q8 (socket)
• Conductor cross-section	mm ²	2.5 ... 4	4	4
Motor cable length, max. shielded	m (ft)	15 (49)	15 (49)	15 (49)
Degree of protection		IP65/UL Type 3	IP65/UL Type 3	IP65/UL Type 3
Dimensions				
• Width	mm (in)	445 (17.52)	445 (17.52)	445 (17.52)
• Height	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)
• Depth	mm (in)	220 (8.66)	220 (8.66)	220 (8.66)
Frame size		FSC	FSC	FSC
Weight, approx.	kg (lb)	8.5 (18.7)	8.5 (18.7)	8.5 (18.7)

¹⁾ The rated output current I_{rated} is based on the duty cycle for high overload (HO).

²⁾ The input current depends on the motor load and line impedance.
The input currents apply for load at rated power for a line impedance corresponding to $u_K = 1\%$.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

PM250D Power Modules

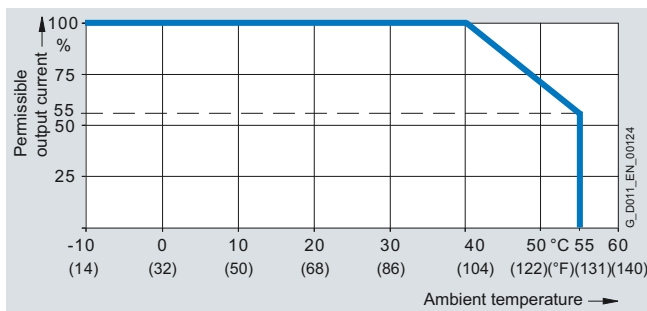
Characteristic curves

Derating data

Pulse frequency

Rated power at 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.75	1.0	2.2	1.9	1.5	1.3	1.1	1.0	0.9
1.5	1.5 ¹⁾	4.1	3.5	2.9	2.5	2.1	1.8	1.6
3.0	4.0	7.7	6.5	5.4	4.6	3.9	3.5	3.1
4.0	5.0	10.2	8.7	7.1	6.1	5.1	4.6	4.1
5.5	7.5	13.2	11.2	9.2	7.9	6.6	5.9	5.3
7.5	10	19	16.2	13.3	11.4	9.5	8.6	7.6

Ambient temperature

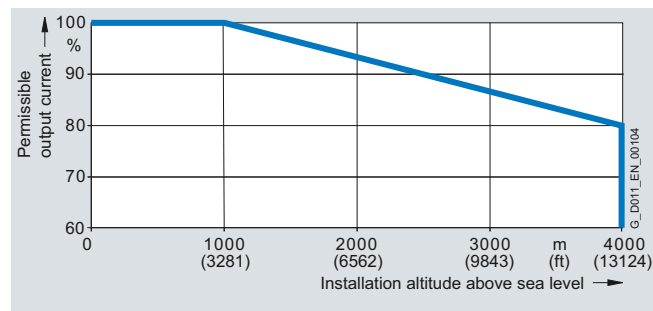


Permissible output current as a function of the ambient temperature for PM250D Power Modules, frame sizes FSA to FSC

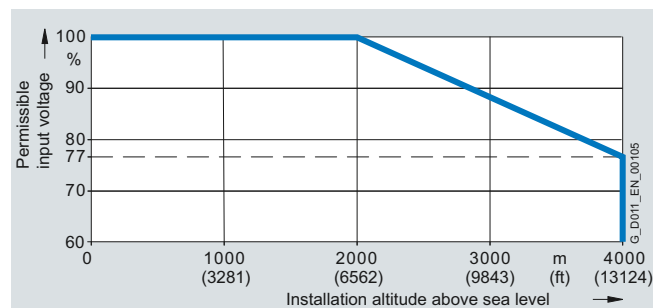
Note:

The operating temperature ranges of the Control Units should be taken into account. [The temperature ranges are specified in the technical specifications under Control Units.](#)

Installation altitude



Permissible output current as a function of the installation altitude for PM250D Power Modules, frame sizes FSA to FSC



Permissible input voltage as a function of the installation altitude for PM250D Power Modules, frame sizes FSA to FSC

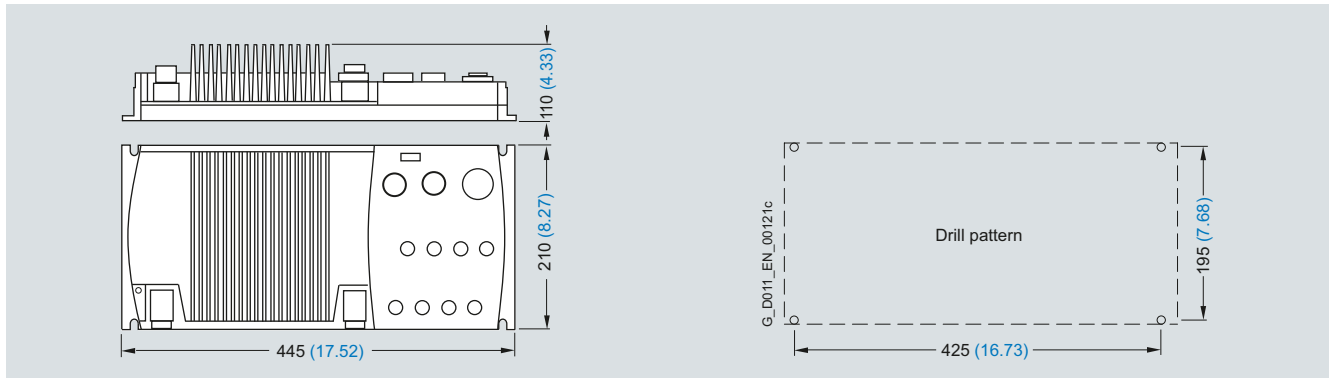
¹⁾ It is not possible to make any assignment to a particular standard.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

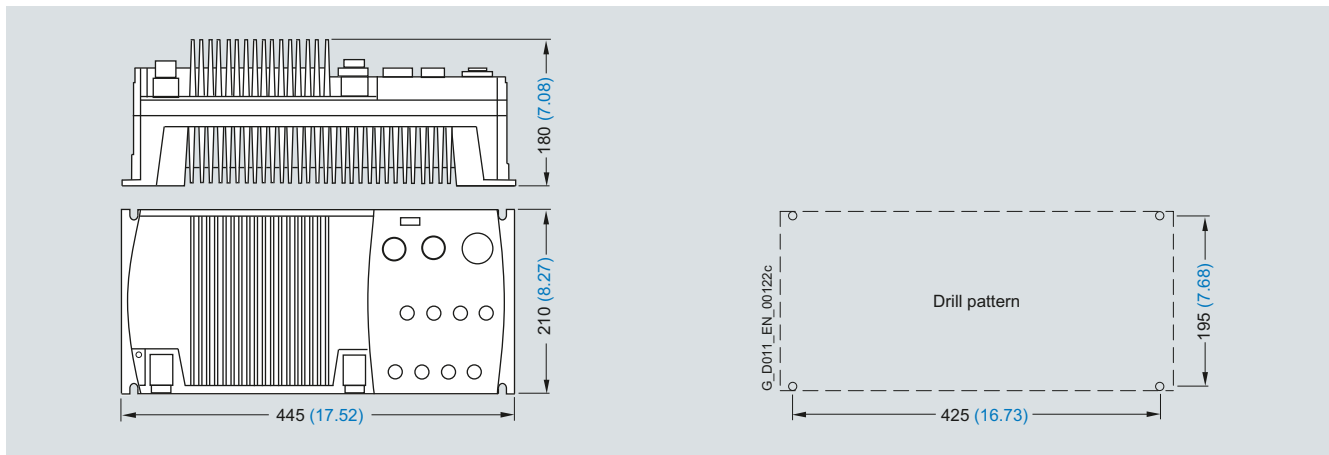
PM250D Power Modules

Dimensional drawings



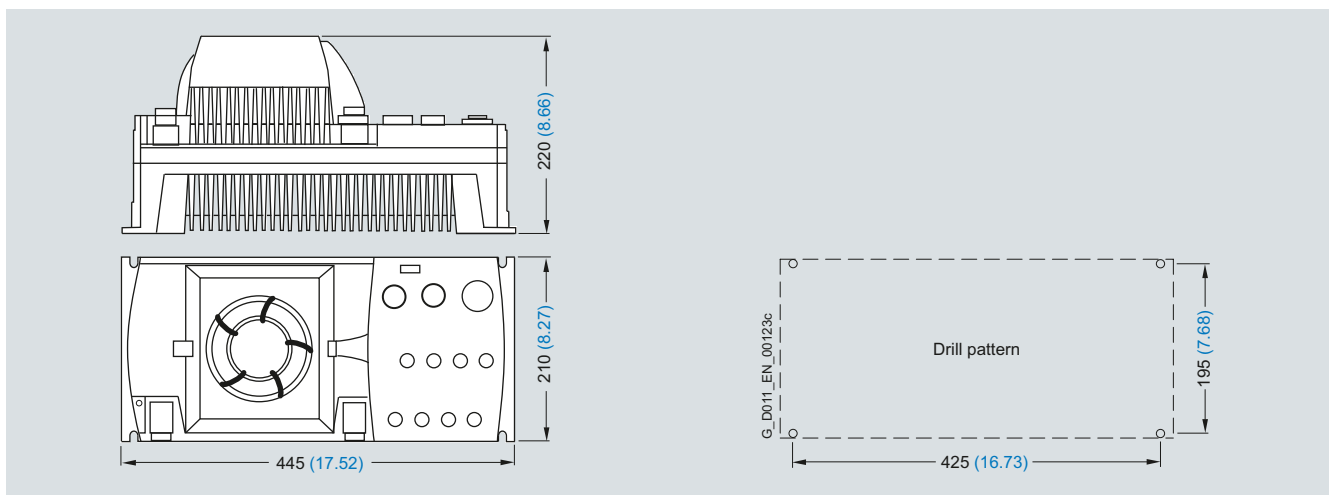
PM250D Power Module, frame size FSA, with integrated line filter class A and plugged-in Control Unit

If the CU240D-2 PN-F PP or CU250D-2 PN-F PP Control Unit is used, the height increases to 128.3 mm (5.05 inches).



PM250D Power Module, frame size FSB, with integrated line filter class A and plugged-in Control Unit

If the CU240D-2 PN-F PP or CU250D-2 PN-F PP Control Unit is used, the height increases to 198.3 mm (7.81 inches).



PM250D Power Module, frame size FSC, with integrated line filter class A and plugged-in Control Unit

Mounted with M5 or M6 screwed joints with a maximum washer diameter of 12 mm (0.47 inches).

3 mm (0.12 inch) allen screw for the Control Unit.

Ventilation clearance required (for wall mounting) at top and bottom: 150 mm (5.9 inches).

All dimensions in mm (values in brackets are in inches).

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

Recommended line-side power components

Selection and ordering data

The following table lists recommendations for additional line-side components, such as fuses and circuit breakers (line-side components dimensioned in accordance with IEC standards). The specified circuit breakers are UL-certified. 3NA3 fuses are recommended for European countries.

Furthermore, only contactors complying with the utilization category AC-3 (according to IEC 60947-4-1) may be used. The values in the table take into account the overload capability of the inverter.

Individual protection

Rated power		SINAMICS G120D PM250D Power Modules		Protection	Fuse	Circuit breaker
kW	hp	Type 6SL3525-...	Frame size	A	Order No.	Order No.
380 ... 500 V 3 AC						
0.75	1	0PE17-5AA1	FSA	10	3NA3803	3RV2011-1JA10
1.5	1.5 ¹⁾	0PE21-5AA1	FSA	10	3NA3803	3RV2011-1JA10
3	4	0PE23-0AA1	FSB	16	3NA3805	3RV2011-4AA10
4	5	0PE24-0AA1	FSC	20	3NA3807	3RV2021-4BA10
5.5	7.5	0PE25-5AA1	FSC	20	3NA3807	3RV2021-4BA10
7.5	10	0PE27-5AA1	FSC	32	3NA3812	3RV2021-4PA10

Group fusing (installation on power bus)

For installations with several inverters, the inverters are normally supplied from a 400 V power bus. Further information can be found in the operating instructions on the following website www.siemens.com/sinamics-g120d/documentation

Fuses for use in North America must be UL-certified, such as the Class NON fuse series from Bussmann or approved circuit breakers from the SIRIUS 3RV circuit breakers and 3VL molded-case circuit breakers series according to UL 489 (category control number CCN: DiV Q).

[Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 10.1, IC 10 and IC 10 AO.](#)

¹⁾ It is not possible to make any assignment to a particular standard.

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

Supplementary system components

Accessories

Intelligent Operator Panel IOP Handheld



IOP Handheld for mobile use

The Intelligent Operator Panel IOP Handheld is a very user-friendly and powerful operator panel for commissioning and diagnostics as well as local operator control and monitoring of the SINAMICS G120D distributed inverter.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu-based operation and the application wizards, it is easy to commission standard drives. A drive can be essentially commissioned without having to use a printed parameter list – as the parameters are displayed in plain text, and explanatory help texts and the parameter filtering function are provided.

Application wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors.

There are quick commissioning wizards for general commissioning.

The drives are easily controlled manually using directly assigned buttons and the navigation wheel. The IOP Handheld has a dedicated switchover button to switch over from automatic to manual mode.

The inverter can be diagnosed in a user-friendly fashion using the plain text display of faults and alarms. Help texts can be obtained by pressing the INFO button.

Up to two process values can be displayed graphically or numerically on the status screen/status display.

Process values can also be displayed in technological units.

The IOP Handheld supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the IOP Handheld and, downloaded into other drive units of the same type as required.

The IOP Handheld includes the following language packages: English, French, German, Italian and Spanish.

In addition to the IOP, the IOP Handheld includes a housing with the rechargeable batteries, charging unit and RS232 connecting cable. The charging unit is supplied with connector adapters for Europe, the US and UK. When the batteries are fully charged, the operating time is up to 8 hours.

To connect the IOP Handheld to SINAMICS G120D, the RS232 connecting cable with optical interface is required in addition.

Updating the IOP Handheld

The IOP Handheld can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be transferred from the PC to the IOP Handheld via drag & drop. Further, the USB interface allows user languages and wizards that will become available in the future to be subsequently downloaded and the firmware to be updated for the IOP Handheld.

The IOP is supplied with power via the USB interface during an update.

Selection and ordering data

Description	Order No.
IOP Handheld to be used with SINAMICS G120, SINAMICS G120C, SINAMICS G110D or SINAMICS G120D Included in the scope of delivery: <ul style="list-style-type: none"> • IOP • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable (3 m/9.84 ft long, for SINAMICS G120 only) • USB cable (1 m/3.28 ft long) 	6SL3255-0AA00-4HA0
RS232 connecting cable with optical interface to connect the SINAMICS G110D or SINAMICS G120D inverters to the IOP Handheld (2.5 m/8.2 ft long)	3RK1922-2BP00

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

Supplementary system components

Accessories

Memory cards



SINAMICS memory card

The parameter settings for an inverter can be stored on the SINAMICS micro memory card (MMC) or the SINAMICS SD card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card, the drive system is immediately ready for use again.

- Parameter settings can be written from the memory card to the inverter or saved from the inverter to the memory card.
- Up to 100 parameter sets can be stored.
- The memory card supports standard commissioning without the use of the Intelligent Operator Panel IOP Handheld or the STARTER commissioning tool.

Note:

The memory card is not required for operation and does not have to remain inserted.

Selection and ordering data

Description	Order No.
SINAMICS micro memory card (MMC) 64 MB	6SL3254-0AM00-0AA0
SINAMICS SD card 512 MB	new ¹⁾ 6SL3054-4AG00-2AA0

¹⁾ Available soon.

²⁾ The STARTER commissioning tool is also available on the Internet at <http://support.automation.siemens.com/WW/view/en/10804985/133100>

Mini USB interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC via a point-to-point connection if the appropriate software (STARTER commissioning tool²⁾, V4.3 and higher) has been installed.

Selection and ordering data

Description	Order No.
Mini USB interface cable Standard mini B5 USB cable	—

STARTER commissioning tool

The STARTER commissioning tool (V4.3 and higher) supports the commissioning and maintenance of SINAMICS G120D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Selection and ordering data

Description	Order No.
STARTER commissioning tool ²⁾ On DVD-ROM	6SL3072-0AA00-0AG0

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

Supplementary system components

Accessories

Connecting cables for the Control Unit

PROFINET connecting cables

Flexible plug-in cables and plug-in connectors that can be assembled in the field for transmission of data (up to 100 Mbit/s) between Industrial Ethernet stations with IP65 degree of protection.

Selection and ordering data

Description	Order No.
IE connecting cable M12-180/M12-180 Pre-assembled IE FC TP trailing cable GP 2 x 2 PROFINET type C with two 4-pole M12 plugs (4-pole, D-coded), IP65/IP67 degree of protection, UL, plug/plug connector (IN/OUT) Length: <ul style="list-style-type: none"> • 0.3 m (0.98 ft) • 0.5 m (1.64 ft) • 1.0 m (3.28 ft) • 1.5 m (4.92 ft) • 2.0 m (6.56 ft) • 3.0 m (9.84 ft) • 5.0 m (16.41 ft) • 10 m (32.81 ft) • 15 m (49.22 ft) 	6XV1870-8AE30 6XV1870-8AE50 6XV1870-8AH10 6XV1870-8AH15 6XV1870-8AH20 6XV1870-8AH30 6XV1870-8AH50 6XV1870-8AN10 6XV1870-8AN15
IE M12 Plug PRO For assembly in the field, M12 plug-in connector (D-coded), metal enclosure, UL, fast connection method, plug connector <ul style="list-style-type: none"> • 1 unit • 8 units • 1 unit (angled) 	6GK1901-0DB20-6AA0 6GK1901-0DB20-6AA8 3RK1902-2DA00
RJ45 PLUG PRO connector For on-site assembly for CU240D-2 PN-F PP or CU250D-2 PN-F PP Control Unit, UL 1 package = 1 unit <ul style="list-style-type: none"> • 1 unit 	6GK1901-1BB10-6AA0

PROFIBUS connecting cables

Flexible plug-in cables/connectors for transmission of data (up to 12 Mbit/s) from PROFIBUS stations.

Selection and ordering data

Description	Order No.
PROFIBUS M12 plug-in cable Pre-assembled with two 5-pole M12 plug/socket connectors, UL Length: <ul style="list-style-type: none"> • 0.3 m (0.98 ft) • 0.5 m (1.64 ft) • 1.0 m (3.28 ft) • 1.5 m (4.92 ft) • 2.0 m (6.56 ft) • 3.0 m (9.84 ft) • 5.0 m (16.41 ft) • 10 m (32.81 ft) • 15 m (49.22 ft) 	6XV1830-3DE30 6XV1830-3DE50 6XV1830-3DH10 6XV1830-3DH15 6XV1830-3DH20 6XV1830-3DH30 6XV1830-3DH50 6XV1830-3DN10 6XV1830-3DN15
PROFIBUS M12 connector 5-pole, B-coded, metal enclosure, 1 package = 5 units <ul style="list-style-type: none"> • Pin insert • Female contact insert 	6GK1905-0EA00 6GK1905-0EB00

Connecting cables/plug-in connectors for supplying the Control Unit with power

Selection and ordering data

Description	Order No.
7/8" plug-in cable For power supply, pre-assembled with two 5-pole 7/8" plug/socket connectors, UL 5 x 1.5 mm ² Length: <ul style="list-style-type: none"> • 0.3 m (0.98 ft) • 0.5 m (1.64 ft) • 1.0 m (3.28 ft) • 1.5 m (4.92 ft) • 2.0 m (6.56 ft) • 3.0 m (9.84 ft) • 5.0 m (16.41 ft) • 10 m (32.81 ft) • 15 m (49.22 ft) 	6XV1822-5BE30 6XV1822-5BE50 6XV1822-5BH10 6XV1822-5BH15 6XV1822-5BH20 6XV1822-5BH30 6XV1822-5BH50 6XV1822-5BN10 6XV1822-5BN15
7/8" plug-in connector 5-pole, B-coded, plastic enclosure, 1 package = 5 units <ul style="list-style-type: none"> • Pin insert (IN) • Female contact insert (OUT) 	6GK1905-0FA00 6GK1905-0FB00
POWER PLUG PRO plug-in connector For the CU240D-2 PN-F PP or CU250D-2 PN-F PP 5-pole push-pull power connector for on-site assembly 1 package = 1 unit <ul style="list-style-type: none"> • 1 unit 	6GK1907-0AB10-6AA0

Connecting cables and connectors for digital inputs and outputs

Selection and ordering data

Description	Order No.
M12 plug-in cable With PUR sheath, to connect digital sensors and actuators, pre-assembled at one end, angled, plug connector, 5-pole, 5 x 0.34 mm ² , UL Length: <ul style="list-style-type: none"> • 1.5 m (4.92 ft) • 5 m (16.41 ft) • 10 m (32.81 ft) 	3RK1902-4HB15-5AA0 3RK1902-4HB50-5AA0 3RK1902-4HC01-5AA0
M12 connector For screw mounting, 5-pole screw-type connection max. 0.75 mm ² , A-coded, max. 4 A, UL, plug connector <ul style="list-style-type: none"> • Straight • Angled 	3RK1902-4BA00-5AA0 3RK1902-4DA00-5AA0

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

Supplementary system components

Accessories

Connecting cables and connectors for encoders and analog inputs

Selection and ordering data

Description	Ordering (see Solution Partner)
M12 cable connector 8-pole plug connector	
<ul style="list-style-type: none"> • Straight cable outlet new • Angled cable outlet new 	Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec
M12 plug-in cable Pre-assembled at one end, straight, plug connector, 8-pole, 4 × 2 × AWG24, shielded, PUR gray, suitable for trailing cables, for HTL and SSI encoders Length:	
<ul style="list-style-type: none"> • 1.5 m (4.92 ft) new • 5 m (16.41 ft) new • 10 m (32.81 ft) new 	Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec
M12 plug-in cable Pre-assembled at both ends, 8-pole M12 male connector to 12-pole M23 socket, 4 × 2 × AWG24, shielded, PUR gray, suitable for trailing cables	Ordered from and supplied by KnorrTec
<ul style="list-style-type: none"> • HTL plug-in cable • SSI plug-in cable Length:	
<ul style="list-style-type: none"> • 1.5 m (4.92 ft) new • 5 m (16.41 ft) new • 10 m (32.81 ft) new 	Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec
T distribution piece To connect two analog inputs 8-pole M12 male connector to 2 × 4-pole M12 socket, angled	new Ordered from and supplied by KnorrTec

Connecting cables for Power Modules

Connecting cables pre-assembled at one end and connector sets to connect to the line supply

Selection and ordering data

Description	Order No.
Connecting cable pre-assembled at one end Power supply cable, open at one end, for HAN Q4/2, angled, 4 × 4 mm ²	
<ul style="list-style-type: none"> • 1.5 m (4.92 ft) long • 5 m (16.41 ft) long 	3RK1911-0DB13 3RK1911-0DB33
Connector set for the power supply HAN Q4/2	
<ul style="list-style-type: none"> • 2.5 mm² • 4 mm² • 6 mm² 	3RK1911-2BE50 3RK1911-2BE10 3RK1911-2BE30

Motor cables pre-assembled at one end and connector sets to connect the Power Module to the motor

Selection and ordering data

Motor cables pre-assembled at one end	Order No.		
For motors with brake and temperature sensor with HAN Q8 connector, shielded	(HTG: supplied by Harting) (ZKT: supplied by KnorrTec)		
Cross-section	4 × 1.5 mm ² 2 × (2 × 0.75 mm ²)	4 × 2.5 mm ² 2 × (2 × 0.75 mm ²)	4 × 4 mm ² 2 × 1 mm ² + 2 × 1.5 mm ²
• 1.5 m (4.92 ft) long	HTG: 61 88 201 0288 ZKT: 70020501000150	HTG: 61 88 201 0291 ZKT: 70009601000150	HTG: 61 88 201 0303 ZKT: 70017001000150
• 3 m (9.84 ft) long	HTG: 61 88 201 0289 ZKT: 70020501000300	HTG: 61 88 201 0292 ZKT: 70009601000300	HTG: 61 88 201 0304 ZKT: 70017001000300
• 5 m (16.41 ft) long	HTG: 61 88 201 0290 ZKT: 70020501000500	HTG: 61 88 201 0293 ZKT: 70009601000500	HTG: 61 88 201 0305 ZKT: 70017001000500
• 10 m (32.81 ft) long	HTG: 61 88 201 0299 ZKT: 70020501001000	HTG: 61 88 201 0301 ZKT: 70009601001000	HTG: 61 88 201 0306 ZKT: 70017001001000
Connector set for motor cable HAN Q8, shielded	HTG: 61 83 401 0131 ZKT: 10032001	HTG: 61 83 401 0132 ZKT: 10032011	HTG: 61 83 401 0133 ZKT: 10032021

SINAMICS G120D distributed inverters

0.75 kW to 7.5 kW (1.0 hp to 10 hp)

Supplementary system components

Accessories

Power bus distribution 400 V in IP65 degree of protection

Selection and ordering data

Description	Ordering (see Solution Partner)
Power T clamp connector for 2.5 ... 6 mm² With attached 7-pole connector, female contact insert, grommet housing, UL Seals for various cable cross-sections must be ordered separately	Ordered from and supplied by Harting
T clamp connector Completely pre-assembled	Ordered from and supplied by KnorrTec
T distributor box, IDC connection power cable Pre-assembled, UL, uncut power cable, 2.5 ... 6 mm ² , 2 outgoing feeders: Push-in connection: 1.5 ... 6 mm ² Seals for various cable cross-sections must be ordered separately	Ordered from and supplied by Weidmüller
Y distributor For direct connection of 400 V supply line, HAN Q4/2, conductor cross-section 1.5 ... 4 mm ²	Ordered from and supplied by Harting

Additional information

For further information about the connecting cables and plug-in connectors mentioned above, please refer to Catalog IK PI.



Further selected accessories are available from Siemens Solution Partners. Please go to the "Solution Partner Finder" and select technology "Distributed Field Installation System".
www.siemens.com/automation/partnerfinder

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Spare parts Spare parts kit

Overview

A spare parts kit can be ordered, comprising small parts such as replacement seals, caps, PROFIBUS address windows and screws.

Selection and ordering data

Description	Order No.
Spare parts kit for SINAMICS G120D Comprising replacement seals, caps, PROFIBUS address windows and screws	6SL3500-0SK01-0AA0
Replacement caps for CU240D-2 PN-F PP and CU250D-2 PN-F PP <ul style="list-style-type: none"> • 24 V push-pull PLUG PRO caps 1 package = 5 units • RJ45 PLUG PRO caps 1 package = 5 units 	6ES7194-4JA50-0AA0 6ES7194-4JD50-0AA0

Spare parts Replacement fans

Overview

The Power Module fans are designed for extra long service life. Replacement fans can be ordered for special applications.

Selection and ordering data

Rated power		SINAMICS G120D PM250D Power Module		Replacement fan (pre-mounted unit with cover, fan and screws)
kW	hp	Type 6SL3525-...	Frame size	Order No.
380 ... 500 V 3 AC				
4.0	5.0	0PE24-0AA1	FSC	6SL3500-0SF01-0AA0
5.5	7.5	0PE25-5AA1		
7.5	10	0PE27-5AA1		

SIMOTICS motors



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Overview

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Servomotors for SINAMICS S110

Preferred types with shorter delivery time for SIMOTICS S-1FK7 Compact servomotors

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Mechatronic components

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Electric cylinders



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Linear motor complete axes
LTS and LTSE**CAD CREATOR**

For dimension drawing and 2D/3D CAD generator see Catalog D 31 · 2012 chapter 14 and www.siemens.com/cadcreator

SIMOTICS motors

Overview

Motor type	Features	Degree of protection	Cooling method
SIMOTICS S-1FK7 servomotor¹⁾ 	Permanent-magnet synchronous servomotor	IP64 (optionally IP65)	Natural cooling
SIMOTICS M-1PH8 main motor²⁾ 	Three-phase squirrel-cage motor without housing Asynchronous variant High power density with small motor dimensions	IP55 IP65	Forced ventilation Water cooling




The SINAMICS S110 PM340 Power Modules in blocksize format have been used as an example for the selection and ordering data for the motors.

Low-voltage motors

Low-voltage motors are available for the widest range of requirements and applications. With an output range from 0.09 to 1250 kW (0.12 to 1676 hp), they are designed to operate with the SINAMICS drive system. You will find the available product range in Catalog D 81.1 IEC Squirrel-Cage Motors, Frame Sizes 63 to 450, and on the Internet at: www.siemens.com/drives/infocenter

¹⁾ SIMOTICS S-1FK7 servomotors can be combined with SINAMICS S120 Power Modules on request.

²⁾ SIMOTICS M-1PH8 asynchronous (induction) main motors can be combined with SINAMICS G120 Power Modules on request.

Shaft height	Rated power P_{rated} for S1 duty kW (hp)	Rated torque M_{rated}	Catalog D 31 · 2012 page
SH 20/SH 28/ SH 36/SH 48/ SH 63/SH 80/ SH 100	 0.05 (0.07) 8.17 (11)	0.08 ... 37 Nm (0.71 ... 327 lb _f -in)	11/6
SH 80/SH 100/ SH 132/SH 160	 2.8 (3.75) 45 (60.3)	18 ... 310 Nm (13.3 ... 229 lb _f -ft)	11/12
SH 80/SH 100/ SH 132/SH 160	 3.5 (4.69) 68 (91.2)	22 ... 331 Nm (16.2 ... 244 lb _f -ft)	11/14

SIMOTICS motors

Servomotors for SINAMICS S110

Preferred types with shorter delivery time for SIMOTICS S-1FK7 Compact servomotors

Overview

We offer a shorter delivery time for very popular types from the SIMOTICS S-1FK7 Compact motor series. The shorter delivery period is available for the following motor types in shaft heights 28 to 100.

The shorter delivery period applies ex works following successful order clarification, particularly in the case of large-quantity orders.

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	SIMOTICS S-1FK7 Compact synchronous motors Natural cooling Preferred type	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)	
n_{rated}	SH	P_{rated} at $\Delta T = 100$ K	M_0 at $\Delta T = 100$ K	M_{rated} at $\Delta T = 100$ K	I_{rated} at $\Delta T = 100$ K	Order No.	p	J	m	
rpm		kW (hp)	Nm (lb _f -ft)	Nm (lb _f -ft)	A			10^{-4} kgm ² (10^{-3} lb _f -in-s ²)	kg (lb)	
SIMOTICS S-1FK7 Compact synchronous motors for DC link voltage 720 V DC, degree of protection IP64										
6000	28	0.38 (0.51)	0.85 (0.63)	0.6 (0.44)	1.4	1FK7022-5AK71-1 V ■ 3	3	0.28 (0.25)	1.8 (3.97)	
Encoder systems for motors with DRIVE-CLiQ interface:			AM15DQ encoder – multi-turn absolute encoder				V			
Shaft extension:			Shaft and flange accuracy:		Holding brake:					
Fitted key			Tolerance N		Without		A			
Fitted key			Tolerance N		With		B			
Plain shaft			Tolerance N		Without		G			
Plain shaft			Tolerance N		With		H			

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	SIMOTICS S-1FK7 Compact synchronous motors Natural cooling Preferred type	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)	
n_{rated}	SH	P_{rated} at $\Delta T = 100$ K	M_0 at $\Delta T = 100$ K	M_{rated} at $\Delta T = 100$ K	I_{rated} at $\Delta T = 100$ K	Order No.	p	J	m	
rpm		kW (hp)	Nm (lb _f -ft)	Nm (lb _f -ft)	A			10^{-4} kgm ² (10^{-3} lb _f -in-s ²)	kg (lb)	
SIMOTICS S-1FK7 Compact synchronous motors for DC link voltage 720 V DC, degree of protection IP64										
6000	36	0.5 (0.67)	1.15 (0.8)	0.8 (0.6)	1.3	1FK7032-2AK71-1 ■ ■ 0	3	0.65 (0.58)	2.7 (5.95)	
3000	48	0.8 (1.07)	3.0 (2.2)	2.6 (1.9)	2	1FK7042-2AF71-1 ■ ■ 0	4	2.9 (2.57)	4.6 (10.1)	
	63	1.5 (2.01)	6.0 (4.0)	4.7 (3.0)	3.7	1FK7060-2AF71-1 ■ ■ 0	4	7.7 (6.82)	7.1 (15.7)	
		2.3 (3.08)	11.0 (8.0)	7.3 (5.0)	5.6	1FK7063-2AF71-1 ■ ■ 0	4	14.7 (13.01)	11.1 (24.5)	
2000	80	2.6 (3.49)	16.0 (11.8)	12.5 (9.2)	6.3	1FK7083-2AC71-1 ■ ■ 0	4	26.0 (23)	15.6 (34.4)	
	100	4.3 (5.77)	27.0 (19.9)	20.5 (15.1)	9.7	1FK7101-2AC71-1 ■ ■ 0	4	79.0 (69.9)	23.0 (50.7)	
Encoder systems for motors with DRIVE-CLiQ interface:			AS20DQI encoder – absolute encoder, single-turn				Q			
			AM20DQI encoder – absolute encoder, multi-turn				R			
Shaft extension:			Shaft and flange accuracy:		Holding brake:					
Fitted key			Tolerance N		Without		A			
Fitted key			Tolerance N		With		B			
Plain shaft			Tolerance N		Without		G			
Plain shaft			Tolerance N		With		H			

SIMOTICS motors

Servomotors for SINAMICS S110

Preferred types with shorter delivery time
for SIMOTICS S-1FK7 Compact servomotors

Motor type (repeated)	Efficiency ¹⁾ η %	Static current I_0 at M_0 $\Delta T = 100$ K A	Calculated power P_{calc} ⁴⁾ P_{calc} for M_0 $\Delta T = 100$ K kW (hp)	SINAMICS S110 blocksize format		Pre-assembled power cable with complete shield		
				Rated output current ²⁾ I_{rated} A	PM340 Power Module Air cooling Order No.	Motor and brake connection via SPEED-CONNECT power connector	Power connector Size	Cable cross- section ³⁾ mm ²
1FK7022-5AK71...	86	1.8	0.5 (0.67)	2.2	6SL3210-1SE12-2UA0	1	4 × 1.5	6FX002-5G10-....
				Line voltage 380 ... 480 V 3 AC				
				Line filter: Without		U		
				You can find further versions and components in SINAMICS S110 servo drives in Catalog D 31 · 2012.		Power cable: MOTION-CONNECT 800 PLUS 8 MOTION-CONNECT 500 5		
						Without brake cores C With brake cores D		
						Length code	
						Information about the cables can be found in Connection system MOTION-CONNECT in Catalog D 31 · 2012.		

Motor type (repeated)	Efficiency ¹⁾ η %	Static current I_0 at M_0 $\Delta T = 100$ K A	Calculated power P_{calc} ⁴⁾ P_{calc} for M_0 $\Delta T = 100$ K kW (hp)	SINAMICS S110 blocksize format		Pre-assembled power cable with complete shield		
				Rated output current ²⁾ I_{rated} A	PM340 Power Module Air cooling Order No.	Motor and brake connection via SPEED-CONNECT power connector	Power connector Size	Cable cross- section ³⁾ mm ²
1FK7032-2AK71...	88	1.7	0.7 (0.94)	1.7	6SL3210-1SE11-7UA0	1	4 × 1.5	6FX002-5G10-....
1FK7042-2AF71...	89	2.2	0.9 (1.21)	2.2	6SL3210-1SE12-2UA0	1	4 × 1.5	6FX002-5G10-....
1FK7060-2AF71...	90	4.45	1.9 (2.55)	5.9	6SL3210-1SE16-0A0	1	4 × 1.5	6FX002-5G10-....
1FK7063-2AF71...	91	8	3.5 (4.69)	10.2	6SL3210-1SE21-0A0	1	4 × 1.5	6FX002-5G10-....
1FK7083-2AC71...	93	7.5	3.4 (4.65)	7.7	6SL3210-1SE17-7A0	1	4 × 1.5	6FX002-5G10-....
1FK7101-2AC71...	93	12.3	5.7 (7.64)	18	6SL3210-1SE21-8A0	1.5	4 × 1.5	6FX002-5G22-....
				Line voltage 380 ... 480 V 3 AC				
				Line filter: Without Integrated		U A		
				You can find further versions and components in SINAMICS S110 servo drives in Catalog D 31 · 2012.		Power cable: MOTION-CONNECT 800 PLUS 8 MOTION-CONNECT 500 5		
						Without brake cores C With brake cores D		
						Length code	
						Information about the cables can be found in Connection system MOTION-CONNECT in Catalog D 31 · 2012.		

¹⁾ Optimum efficiency in continuous duty.

²⁾ With default setting of the pulse frequency.

³⁾ The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm².

⁴⁾ $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$ $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

SIMOTICS motors

Mechatronic components

Electric cylinders

Overview



Axial mounting of a SIMOTICS S-1FK7 motor on the linear unit with mounting kit and accessories



Parallel mounting of a SIMOTICS S-1FK7 motor on the linear unit with mounting kit and accessories

The electric cylinder comprises a CASM linear unit supplied by SKF and a SIMOTICS S-1FK7 motor.

The CASM linear unit converts the rotary motion of the SIMOTICS S-1FK7 motor into a highly dynamic linear movement and is a perfect substitute for pneumatic or hydraulic cylinders in many applications. By contrast with pneumatic and hydraulic cylinders, electric cylinders allow the driven machine to approach any position with extreme precision solely on the basis of setpoints transferred to a converter from the SINAMICS S110 or SINAMICS S120 range.

Benefits

- Modular system with wide variety of options.
- Substitute for hydraulic and pneumatic cylinders in most applications.
- No compressed air/hydraulic fluid required – helps to cut costs (no need to supply compressed air or hydraulic fluid), reduces noise emissions significantly and lowers energy consumption in operation.
- Highly dynamic, precise positioning with high repeat accuracy.
- Mechanical conversion is simple because electric cylinders are essentially the same size as pneumatic cylinders. Furthermore, the relevant pneumatic cylinder accessories can also be used for electric cylinders.
- Adapters are used to attach the SIMOTICS S-1FK7 motors to the linear unit supplied by SKF, making it very easy for the customer to assemble the motor/linear unit combination.

Application

The electric cylinders (CASM linear unit supplied by SKF in conjunction with SIMOTICS S-1FK7 motors and SINAMICS S110/SINAMICS S120 converters) are used for any application which requires a linear motion and/or a defined force. Their areas of application are the same as those for pneumatic and hydraulic cylinders.

They are used, for example, in production machines such as:

- Machines used in the wood, glass, and ceramics industries
- Metalworking and coating machines
- Printing machines
- Plastics processing machines
- Packaging machines

Examples of functions:

- Positioning of cutters
- Edge guidance/edge cutting
- Retainers
- Buffers/sorters/slide gates
- Nozzle holders

Notes:

- Technical advice must be sought for applications involving continuous short-stroke movements (less than three times screw pitch).
- The electric cylinder must be assembled (depending on the stroke length) in such a way as to minimize lateral forces.
- The electric cylinder is not self-locking – it might be necessary to provide a motor holding brake.

Design

Electric cylinders essentially comprise the CASM linear unit (with a lead screw or ball screw) housed in an extruded casing and a SIMOTICS S-1FK7 servomotor attached to the linear unit by means of an adapter kit.

The motor can be mounted on the linear unit in two different ways:

- Axial mounting – see first picture beneath Overview: Motor is attached using an axial adapter kit (containing all the necessary parts including the coupling)
- Parallel mounting – see second picture beneath Overview: Motor is attached using a parallel adapter kit (containing all the necessary parts including timing pulley and toothed belt)

Depending on the linear unit and SIMOTICS S-1FK7 motor used, higher forces can be obtained with the axial arrangement option than with the parallel arrangement driven by a toothed belt.

Design (continued)

The SIMOTICS S-1FK7 motor is normally attached to the linear unit by the user by means of the appropriate adapter kit, see SKF documentation (link). The adapter kit is included in the scope of supply of the linear unit.

A fully pre-assembled electric cylinder, comprising the CASM linear unit, the SIMOTICS S-1FK7 motor and the adapter, is also available on request. Please refer to the technical specifications or follow the link below: www.skf.com/casm

Technical specifications

The technical specifications given below are intended to provide an initial overview only and refer to operation of the linear units with SIMOTICS S-1FK7 motors (see equipment combinations in the tables).

Comprehensive technical specifications can be found in the SKF documents accessible via the following link: www.skf.com/casm

CASM-32 linear unit

	Suitable motor type	CASM-32-		
		LS	BS	BN
Screw type	–	Lead screw	Ball screw	Ball screw
Screw pitch¹⁾	–	1.5 mm/rev	3 mm/rev	10 mm/rev
Max. force F_{max}				
Parallel arrangement	1FK7015	300 N	700 N	450 N
Axial arrangement	1FK7015	300 N	700 N	450 N
	1FK7022	300 N	700 N	630 N
Max. average force F_m (average force over a completed motion cycle)				
Parallel arrangement	1FK7015	203 N	293 N	151 N
Axial arrangement	1FK7015	203 N	293 N	151 N
	1FK7022	300 N	672 N	357 N
Max. velocity	–	60 mm/s	150 mm/s	500 mm/s
Stroke	–	50 ... 400 mm		

Motors mounted on CASM-32 linear unit on request:

- Parallel adapter: 1FK7015-5AK71-1SH3
- Axial adapter: 1FK7022-5AK71-1UH3

CASM-40 linear unit

	Suitable motor type	CASM-40-		
		LS	BS	BN
Screw type	–	Lead screw	Ball screw	Ball screw
Screw pitch¹⁾	–	2.5 mm/rev	5 mm/rev	12.7 mm/rev
Max. force F_{max}				
Parallel arrangement	1FK7022	600 N	2375 N	1163 N
Axial arrangement	1FK7022	600 N	2375 N	1318 N
	1FK7034	600 N	2375 N	1550 N
Max. average force F_m (average force over a completed motion cycle)				
Parallel arrangement	1FK7022	408 N	640 N	301 N
Axial arrangement	1FK7022	408 N	640 N	301 N
	1FK7034	600 N	1219 N	572 N
Max. velocity	–	70 mm/s	300 mm/s	825 mm/s
Stroke	–	100 ... 600 mm		

Motors mounted on CASM-40 linear unit on request:

- Parallel adapter: 1FK7022-5AK71-1UH3
- Axial adapter: 1FK7034-5AK71-1UH3

CASM-63 linear unit

	Suitable motor type	CASM-63-		
		LS	BS	BN
Screw type	–	Lead screw	Ball screw	Ball screw
Screw pitch¹⁾	–	4 mm/rev	10 mm/rev	20 mm/rev
Max. force F_{max}				
Parallel arrangement	1FK7034	1000 N	2583 N	1339 N
Axial arrangement	1FK7034	1000 N	3052 N	1583 N
	1FK7044	1000 N	5400 N	2800 N
Max. average force F_m (average force over a completed motion cycle)				
Parallel arrangement	1FK7034	527 N	708 N	367 N
Axial arrangement	1FK7034	527 N	708 N	367 N
	1FK7044	1000 N	1745 N	905 N
Max. velocity	–	70 mm/s	530 mm/s	1060 mm/s
Stroke	–	100 ... 800 mm		

Motors mounted on CASM-63 linear unit on request:

- Parallel adapter: 1FK7034-5AK71-1UH3
- Axial adapter: 1FK7044-7AH71-1UH3

¹⁾ Distance traveled by screw per motor revolution.

SIMOTICS motors

Mechatronic components

Electric cylinders

More information

Full selection and ordering data can be viewed or downloaded from SKF's website at: www.skf.com/casm

The following example is provided to explain the ordering process.

Example of how to order an electric cylinder (SKF linear unit and SIMOTICS S-1FK7 motor)

Requirement:

- Average force F_m : 400 N
- Precalculated: $F_{mL} = 380$ N
- Max. velocity: 280 mm/s
- Service life: 2000 km
- Stroke: 300 mm
- Parallel arrangement of 1FK7022 motor and linear unit.
- The electric cylinder must be supported by a swivel flange.
- The customer will assemble the linear unit and the motor.

Solution:

- **Step 1:**
Type CASM 40 BS is selected from the table of CASM-40 linear units:
 - $F_m = 640$ N
 - $V_{max} = 300$ mm/s
 - Stroke = 100 to 600 mm

All further steps are based on the information supplied about CASM electric cylinders on SKF's website (see link included below).

- **Step 2:**
Check the service life in the document "CASM 40 linear units". The service life ("lifetime") diagram shows that the service life with $F_{mL} = 380$ N is calculated to be 2000 km.
- **Step 3:**
Work out the correct order number from the document "CASM 40 linear units".
CASM 40 BS has been selected with:
 - Stroke: 300 mm
 - Motor, adapter and attachment parts separate (assembly by customer)

The order number for the linear unit is thus:
CASM-40-**BS**-0300**AA**-000

- **Step 4:**
Order number for the adapter, see "CASM-40 Siemens motors and adapters"

Order number for parallel adapter kit for CASM-40 and Siemens 1FK7022 motor:
ZBE-375541

- **Step 5:**
Order number for swivel flange, see "CASM-40 Accessories": ZBE-375504-4

Overview



Linear motor complete axes LTS without bellows cover

The linear motor complete axes LTS/LTSE supplied by SKF are units comprising a slide top and a base which are supplied ready for installation and operation. A profile rail guide, the primary and secondary motor parts, a linear encoder including limit switches, limit position dampers and cable trailing device connection are fully integrated into the linear complete axis.

A variant of the SIMOTICS L-1FN3 linear motor series based on convection cooling is used. These axes are thus suitable for use in precise, highly dynamic short-stroke applications which require a high degree of repeat accuracy as well as for the implementation of dynamic linear motions for positioning workpieces and tools.

The linear motors are deployed in combination with SINAMICS S120 converters.

Benefits

- Excellent dynamic response, positioning accuracy and control stability
- Outstanding synchronization characteristics coupled with high static and dynamic stability
- Incremental and absolute position measuring systems are available
- Modular system offering numerous options, lengths and widths
- Multiple slide tops (of different sizes if required) on a single base

Application

The linear motor complete axes LTS/LTSE are used whenever alternative options such as toothed belts and screws are too inaccurate, too slow or too inflexible in order to raise the throughput, the cycle time, the accuracy or the product variance of a machine or a testing facility. The low-wear design (minimum quantity lubrication required only on guides following assembly) also reduces maintenance requirements.

Typical applications for the LTS/LTSE are, for example:

- Workpiece transfer within assembly processes
- Laser machining – to achieve linear accuracies within a range of a few μm
- Measuring instruments – positioning/traversal of sensors, vision systems, probes
- Medical engineering – reliable, low-noise positioning in confined installation spaces
- Clamping systems (holding a part between two jaws (primary parts))
- Pick and place applications in (or at beginning or end of) production lines

Design

The linear motor complete axes LTS/LTSE consist of a stable aluminum base which supports a guide comprised of two profile rails, the secondary parts arranged between the rails, the linear measurement system and the inductive limit position sensors.

The 4 roller units (ball screw) belonging to the profile rail guide, the measuring probe of the linear encoder and the relevant primary part are all integrated into the slide top. The power and temperature sensor connectors are fitted to the casing of the slide top.

The scope of supply includes an adapter cable for the temperature sensor integrated in the primary part and (if required) for the measuring system to the encoder evaluation system (SME 120/125).

Convection-cooled linear motors from the tried-and-tested SIMOTICS L-1FN3 linear motor range developed by Siemens are used in the design. Each of the two series is available in three frame sizes and different lengths.

The LTS series is capable of higher operational accuracy ($<20 \mu\text{m}$). The LTSE series is more flexible in its basic design which means that it can be adapted more easily to meet individual customer requirements and also allows the use of other SIMOTICS L-1FN3 motor types.

Linear motor complete axes are supplied as standard with bellows cover.

SIMOTICS motors

Mechatronic components

Linear motor complete axes LTS and LTSE

Technical specifications

The technical specifications of the linear motor complete axes LTS and LTSE given below are intended to provide an initial overview only.

Comprehensive technical specifications can be found in the SKF documents accessible via the following link: www.skf.com/lts

Linear motor complete axis LTS

Type	Linear motor complete axis		
	LTS 154	LTS 182	LTS 212
Widths	154 mm	182 mm	212 mm
Stroke range (without bellows)	77 ... 1778 mm	77 ... 1778 mm	77 ... 1778 mm
Rated force F_{Rated}	135 ... 265 N	240 ... 725 N	330 ... 995 N
Rated current I_{Rated}	2.1 ... 3.4 A	2.9 ... 8.8 A	4.2 ... 12.8 A
Max. velocity at rated force $v_{\text{maxFrated}}$	300 m/min	300 m/min	300 m/min
Maximum force F_{Max}	320 ... 640 N	680 ... 2030 N	1030 ... 3100 N
Maximum current I_{Max}	7.7 ... 12.6 A	12.5 ... 37.6 A	20.2 ... 60.6 A
Max. velocity at maximum force v_{maxFmax}	144 ... 186 m/min	150 m/min	162 m/min

Comments on linear motor complete axes LTS:

- Incremental, optical measuring system
- Bellows cover
- Up to three primary parts on a single secondary part
- For further options, see SKF
- Special versions available on request

Linear motor complete axis LTSE

Type	Linear motor complete axis		
	LTSE 165	LTSE 210	LTSE 250
Widths	165 mm	210 mm	250 mm
Stroke range (without bellows)	80 ... 1640 mm	80 ... 3560 mm	60 ... 3540 mm
Rated force F_{Rated}	265 N	485 ... 725 N	665 ... 995 N
Rated current I_{Rated}	3.4 A	5.9 ... 8.8 A	8.5 ... 12.8 A
Max. velocity at rated force $v_{\text{maxFrated}}$	300 m/min	300 m/min	300 m/min
Maximum force F_{Max}	640 N	1350 ... 2030 N	2060 ... 3100 N
Maximum current I_{Max}	12.6 A	25.1 ... 37.6 A	40.4 ... 60.6 A
Max. velocity at maximum force v_{maxFmax}	144 m/min	150 m/min	162 m/min

Comments on linear motor complete axes LTSE:

- Incremental/optical measuring system, inductive/absolute and inductive/incremental measuring systems are available
- Clamping elements can be integrated on request
- Limit position damping by shock absorbers or buffers
- Additional fans on request
- Multiple primary parts on a single secondary part
- Further options/special versions available on request

More information

Full selection and ordering data can be viewed or downloaded from SKF's website at: www.skf.com/lts

Connection system MOTION-CONNECT



13/2 Signal cables for SINAMICS S110 and S120

13/2 MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores

13/3 Order number code

13/3 Power cables

13/4 Signal cables

13/5 Length code





Connection system MOTION-CONNECT

Signal cables for SINAMICS S110 and S120

**MOTION-CONNECT DRIVE-CLiQ signal cables
with 24 V DC cores**

Selection and ordering data

Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables for SINAMICS S120 and motors with 24 V DC cores

Type	Application	Connector/ degree of protection motor end	Connector/ degree of protection module end	Length, max.	D_{max}	Cable length	MOTION-CONNECT DRIVE-CLiQ signal cable with 24 V DC cores
				m (ft)	mm (in)	m (ft)	Order No.
To the decimeter 	For components with DRIVE-CLiQ interface in the control cabinet.	RJ45/IP20	RJ45/IP20	100 (328)	7.1 (0.28)		6FX5002-2DC00-....
	For example, for establishing the connection between SINAMICS S120 Power Modules and the cabinet bushing.	RJ45/IP20	RJ45/IP20	75 (246)	7.1 (0.28)		6FX8002-2DC00-....
To the decimeter 	For built-in or built-on encoder systems with DRIVE-CLiQ.	RJ45/IP20	RJ45/IP67	100 (328)	7.1 (0.28)		6FX5002-2DC10-....
	For example, for establishing the connection between SIMOTICS S-1FK7/ SIMOTICS M-1PH8 motors and SINAMICS S120 Power Modules.	RJ45/IP20	RJ45/IP67	75 (246)	7.1 (0.28)		6FX8002-2DC10-....
To the decimeter 	For built-in or built-on encoder systems with DRIVE-CLiQ.	RJ45/IP67	RJ45/IP67	100 (328)	7.1 (0.28)		6FX5002-2DC20-....
	For example, for establishing the connection between SIMOTICS S-1FK7/ SIMOTICS M-1PH8 motors and SINAMICS S120 cabinet bushings, couplers or DME20 Hub Module or 2 couplers or DME20 Hub Modules.	RJ45/IP67	RJ45/IP67	75 (246)	7.1 (0.28)		6FX8002-2DC20-....
Fixed lengths 	For built-on encoder systems with DRIVE-CLiQ.	RJ45/IP20	M12/IP67	30 (98.4)	7.1 (0.28)	3 (9.8) <small>new</small>	6FX002-2DC30-1AD0
	For example, as a <u>basic cable</u> between non-Siemens direct measuring systems with DRIVE-CLiQ interface and SINAMICS S120 Power Modules.					6 (19.7) <small>new</small>	6FX002-2DC30-1AG0
						15 (49.2) <small>new</small>	6FX002-2DC30-1BF0
						30 (98.4) <small>new</small>	6FX002-2DC30-1DA0
	For example, as an <u>extension</u> to the basic cable (6FX.002-2DC30-.... ¹⁾ .	M12/IP67	M12/IP67	30 (98.4)	7.1 (0.28)	3 (9.8) <small>new</small>	6FX002-2DC34-1AD0
						6 (19.7) <small>new</small>	6FX002-2DC34-1AG0
MOTION-CONNECT 500							5
MOTION-CONNECT 800PLUS							8
Length code						

¹⁾ The total cable length (basic cable plus extension cable) must not exceed 30 m (98.4 ft).

Overview

Data position of the Order No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
MOTION-CONNECT 500	6	F	X	5	0	.	2	-	5	.	.	.	-	.	.	.
MOTION-CONNECT 800PLUS	6	F	X	8	0	.	2	-	5	.	.	.	-	.	.	.
Pre-assembled at motor and module ends						0										
Pre-assembled at motor end, connector at module end supplied separately						1										
Connector at motor end supplied separately, pre-assembled at module end						4										
Without brake cores									C							
With brake cores									D							
<u>Basic cable between</u>																
<u>and</u>																
SINAMICS S120 Power Module									D	A	3	0				
Motor connector, full-thread, size 0.5										G		1				
Motor connector, full-thread, size 1/1.5										G		3				
Motor connector, full-thread, size 3										D	N	3	0			
Motor connector, SPEED-CONNECT, size 0.5										G	1	0				
Motor connector, SPEED-CONNECT, size 1/1.5										C	R					
SIMOTICS M-1PH8 with terminal box																
<u>Extension between basic cable with connector</u>																
<u>and motor connector</u>																
SPEED-CONNECT, size 0.5									M	N	0	5				
SPEED-CONNECT, size 1										Q		5				
SPEED-CONNECT, size 1.5										Q		8				
Cross-section																
Length code																
Units of 10 cm (3.94 in) or 1 meter (3.28 ft) or in fixed lengths																

Connection system MOTION-CONNECT

Order number code

Signal cables

Overview (continued)

Data position of the Order No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
MOTION-CONNECT 500	6	F	X	5	0	.	2	-	2	.	.	.	-	.	.	.
MOTION-CONNECT 800PLUS	6	F	X	8	0	.	2	-	2	.	.	.	-	.	.	.
6FX2 cables	6	F	X	2	0	0	2	-	2	.	.	.	-	.	.	.

Pre-assembled at motor and module ends

0

Pre-assembled at motor end, connector at module end supplied separately

1

Connector at motor end supplied separately, pre-assembled at module end

4

Variant: Signal cables for integrated encoder

DRIVE-CLiQ cables between

and

Power Module/SMC with IP20 connector

Power Module/SMC with IP20 connector

D C 0 0

Power Module/SMC with IP20 connector

Motor/encoder/SME IP67 connector

D C 1 0

DME20/cabinet bushing/coupler

Motor/encoder/SME IP67 connector

D C 2 0

Basic cable between

and motor with

SMC30

Incremental encoder (HTL) full-thread connector M23

A H 0 0

CU310-2

Incremental encoder (HTL) full-thread connector M23

A H 1 1

SMC20

Incremental encoder (sin/cos $1 V_{pp}$)
SPEED-CONNECT connector M23

C Q 3 1

SMC20

Incremental encoder SPEED-CONNECT connector M17

C N 2 0

SMC20

Absolute encoder SPEED-CONNECT connector M23

E Q 3 1

SMC20

Absolute encoder SPEED-CONNECT connector M17

E N 2 0

SMC10

Resolver SPEED-CONNECT connector M17

C N 2 0

Extension between

basic cable with connector

and motor connector

Full-thread or SPEED-CONNECT

Full-thread or SPEED-CONNECT

4

Variant: Signal cables for external encoder

Basic cable between

and

SMC30

Incremental encoder 6FX2001-2 (TTL/5 V supply)
Full-thread connector

C R 0 0

SMC30

Incremental encoder 6FX2001-2 (TTL/24 V supply)
Full-thread connector

C D 2 4

SMC20

Incremental encoder 6FX2001-3 (sin/cos $1 V_{pp}$)
Full-thread connector

C G 0 0

SMC30

Incremental encoder 6FX2001-4 (HTL)
Full-thread connector

C A 1 2

SMC30

Absolute encoder 6FX2001-5.S (SSI)
Full-thread connector

C C 1 1

SMC20

Absolute encoder 6FX2001-5.E (EnDat)
Full-thread connector

E Q 1 0

Extension between

basic cable with connector

and motor connector

Full-thread

Full-thread

4

Length code

Units of 10 cm (3.94 in) or 1 meter (3.28 ft) or in fixed lengths

Overview

Data position of the Order No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
MOTION-CONNECT 500	6	F	X	5	0	0	8	-	1	B	.	.	.	-	.	.	.
MOTION-CONNECT 800PLUS	6	F	X	8	0	0	8	-	1	B	.	.	.	-	.	.	.
Power cable without brake cores, sold by the meter											B						
Power cable with brake cores, sold by the meter											A						
No. of cores and cross-sections																	
Length code																	
Units of 10 cm (3.94 in) or 1 meter (3.28 ft) or in fixed lengths																	

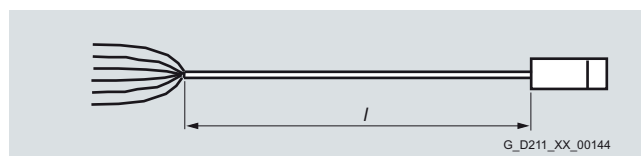
Overview

Description	Order No. supplement
Length code for pre-assembled cables	
	6FX.0.2-.....- ■ ■ ■ ■
0 m	1
100 m (328 ft)	2
200 m (656 ft)	3
0 m	A
10 m (32.8 ft)	B
20 m (65.6 ft)	C
30 m (98.4 ft)	D
40 m (131 ft)	E
50 m (164 ft)	F
60 m (197 ft)	G
70 m (230 ft)	H
80 m (262 ft)	J
90 m (295 ft)	K
0 m	A
1 m (3.28 ft)	B
2 m (6.56 ft)	C
3 m (9.84 ft)	D
4 m (13.1 ft)	E
5 m (16.4 ft)	F
6 m (19.7 ft)	G
7 m (22.9 ft)	H
8 m (26.3 ft)	J
9 m (29.5 ft)	K
0 m	0
0.1 m (3.94 in)	1
0.2 m (7.87 in)	2
0.3 m (11.81 in)	3
0.4 m (15.75 in)	4
0.5 m (19.96 in)	5
0.6 m (23.62 in)	6
0.7 m (27.56 in)	7
0.8 m (31.5 in)	8
Examples:	1.0 m (3.28 ft): 1 A B 0
	2.2 m (7.22 ft): 1 A C 2
	8.0 m (26.3 ft): 1 A J 0
	299.0 m (981 ft): 3 K K 0

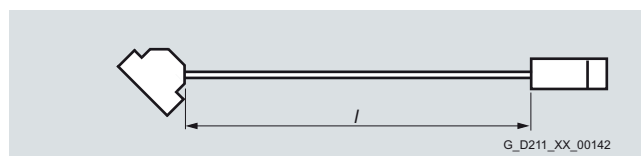
Description	Order No. supplement
Length code for power and signal cables, sold by the meter¹⁾	
	6FX.008-.....- ■ ■ A 0
50 m (164 ft)	1 F
100 m (328 ft)	2 A
200 m (656 ft)	3 A
500 m (1640 ft)	6 A

More information

Definition of lengths for pre-assembled cables



Cable with exposed core ends and pre-assembled connector



Cable with pre-assembled connectors at both ends

Tolerances:

- Cable lengths up to 10 m (32.8 ft): ± 2 %
- Cable lengths of 10 m (32.8 ft) and longer: ± 1 %

¹⁾ Note type of delivery.

Connection system MOTION-CONNECT

Notes

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Appendix



16/2	Approvals
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Appendix

Approvals

Overview



Many products in this Catalog News are in compliance with UL/CSA requirements and are labeled with the appropriate certification markings.

All certifications, certificates, declarations of conformance, test certificates, e.g. CE, UL, Safety Integrated have been performed with the associated system components as they are described in the Catalogs and Configuration Manuals.

The certificates are only valid if the products are used with the described system components, are installed according to the Installation Guidelines and are used for their intended purpose.

For cases that deviate from these conditions, the company or person marketing these products is responsible in having the certificates appropriately re-issued.

UL: Underwriters Laboratories *Independent public testing institution in North America*

Approval marks:

- **UL** for end products, tested by UL in accordance with UL standard
- **cUL** for end products, tested by UL in accordance with CSA standard
- **cULus** for end products, tested by UL in accordance with UL and CSA standards
- **UR** for mounting parts in end products, tested by UL in accordance with UL standard
- **cUR** for mounting parts in end products, tested by UL in accordance with CSA standard
- **cURus** for mounting parts in end products, tested by UL in accordance with UL and CSA standards

Test standards:

- SINAMICS: Standard UL 508C
- Motors: Standard UL 547

Product category/File No.:

- SINAMICS: E192450
- Motors: E93429

TUV: TUV Rheinland of North America Inc. *Independent public testing institution in North America* *National recognized testing laboratory (NRTL)*

Approval mark:

- **cTUVus** tested by TUV in accordance with UL and CSA standards

CSA: Canadian Standards Association *Independent public testing institution in Canada*

Approval mark:

- **CSA** tested by CSA in accordance with CSA standard

Test standard:

- Standard CAN/CSA-C22.2/No. 0-M91/No. 14-05/No. 142-M1987

Partners at Industry Automation and Drive Technologies



At Siemens Industry Automation and Drive Technologies, more than 85 000 people are resolutely pursuing the same goal: long-term improvement of your competitive ability. We are committed to this goal. Thanks to our commitment, we continue to set new standards in automation and drive technology. In all industries – worldwide.

At your service locally, around the globe for consulting, sales, training, service, support, spare parts ... on the entire Industry Automation and Drive Technologies range.

Your personal contact can be found in our Contacts Database at: www.siemens.com/automation/partner

You start by selecting a

- Product group,
- Country,
- City,
- Service.



Appendix

Partners

Siemens Solution Partner Automation

Overview

Siemens Solution Partner Automation



Solution Partner: Highest quality - guaranteed

The products and systems from Siemens Industry Automation and Drive Technologies offer the ideal platform for all automation applications.

Under the name of Siemens Solution Partner Automation, selected system integrators around the world act as uniformly qualified solution providers for the Siemens range of products and services in the fields of automation and drives. Day after day, they utilize their qualified product and system know-how as well as their excellent industry expertise to your advantage – for all requirements.

The partner emblem is the guarantee and indicator of proven quality. The basis for this are defined quality features that identify Solution Partners as reliable and competent solution providers:

- Solution quality
Always a good result with tried and tested solutions expertise.
- Expert quality
Certified technical competence ensures maximum efficiency.
- Project quality
With proven project experience straight to the target.
- Portfolio quality
Comprehensive portfolio for state-of-the-art solutions from a single source.

Solution Partner Finder

 The screenshot shows the Siemens Solution Partner Finder website. At the top, there is a navigation bar with 'Solution Partner', 'Language', and 'Contact'. Below this is a header with the Siemens logo and a navigation menu with 'Partner Finder'. The main content area is titled 'Solution Partner Finder' and contains introductory text: 'Are you looking for a qualified Solution Partner to support you in implementation of your requirements, or are you looking for reference projects in which particular requirements were met?' and 'With the aid of the selection criteria you can perform a search specifically according to your needs. You can establish contact simply and quickly via the "Inquiry" form.' Below this is a search form with two tabs: 'Partner search' (selected) and 'References and Partner search'. The search form includes dropdown menus for Technology, Industry, Service (set to 'All'), Country (set to 'worldwide'), and Region (with a note 'Please select a country first'). There are also input fields for 'Company/ZIP code' with sub-fields for 'Search word' and 'Zip code'. A 'Find' button is at the bottom right. A note on the right side of the form states: 'Note: Please note that the search criteria entered are linked with and.'

The Siemens Solution Partner Program helps you to find the optimum partner for your specific requirements.

Support is provided by the Solution Partner Finder, a comprehensive online platform that showcases the profiles of all our solution partners. You can convince yourself of the competence of the respective Solution Partner by means of the references provided. Various search criteria are available for this purpose.

Once you have located a partner, you are only one small step away from contacting them.

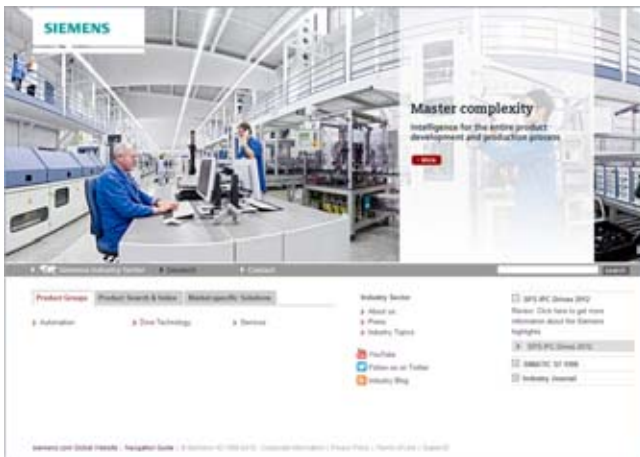
Find the right partner here for your specific task and convince yourself of the solution competence provided:

www.siemens.com/automation/partnerfinder

Additional information on the Siemens Solution Partner Program is available online at:

www.siemens.com/automation/solutionpartner

Siemens Industry Automation and Drive Technologies in the WWW



A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

Siemens Industry Automation and Drive Technologies has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

www.siemens.com/industry

you will find everything you need to know about products, systems and services.

Product Selection Using the Interactive Catalog CA 01 of Industry



Detailed information together with convenient interactive functions:

The interactive catalog CA 01 covers more than 80 000 products and thus provides a full summary of the Siemens Industry Automation and Drive Technologies product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives. All information is linked into a user interface which is easy to work with and intuitive.

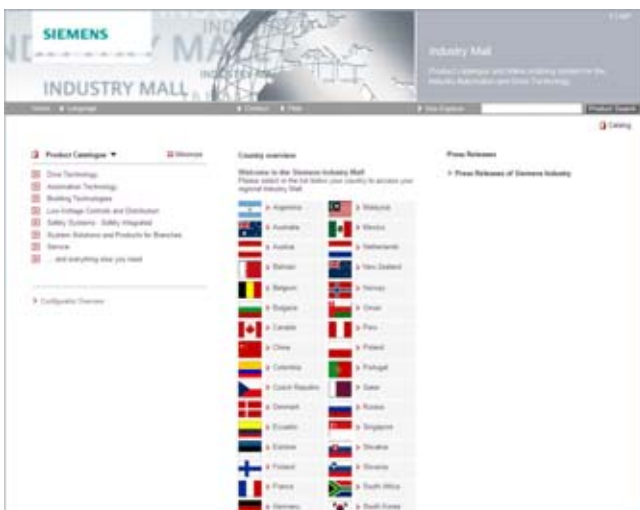
After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the interactive catalog CA 01 can be found in the Internet under

www.siemens.com/automation/ca01

or on DVD.

Easy Shopping with the Industry Mall



The Industry Mall is the virtual department store of Siemens AG on the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

Numerous functions are available to support you.

For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the Industry Mall on the Internet under:

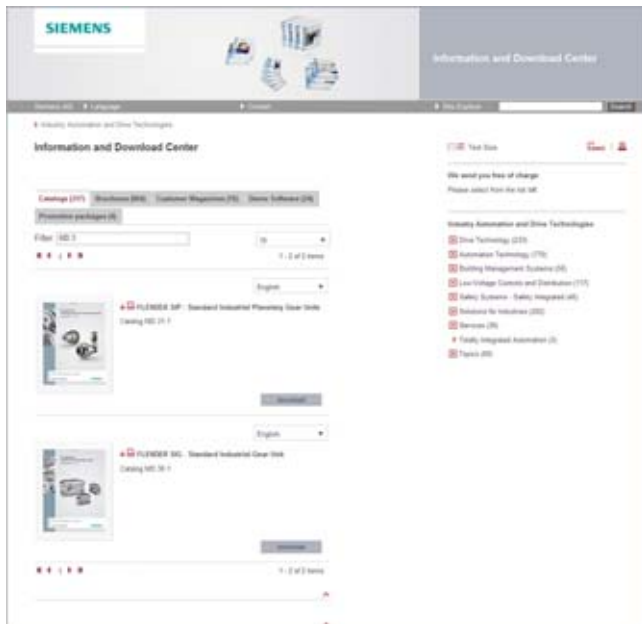
www.siemens.com/industrymall

Appendix

Online services

Information and Download Center Social Media, Mobile Media

Downloading Catalogs



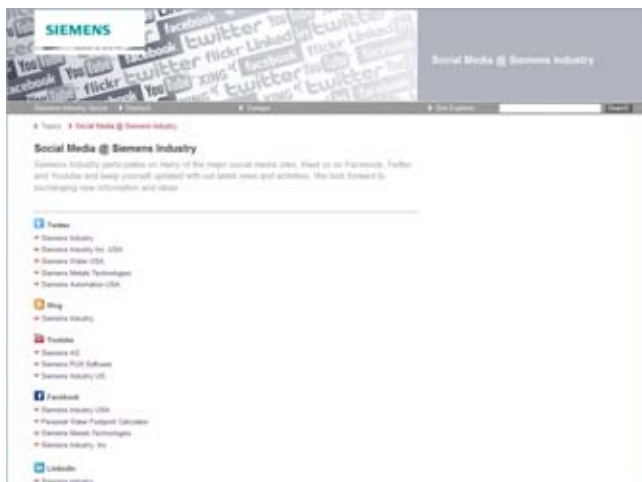
In addition to numerous other useful documents, you can also find the catalogs listed on the back inside cover of this catalog in the Information and Download Center. Without having to register, you can download these catalogs in PDF format or increasingly as digital page-turning e-books.

The filter dialog box above the first catalog displayed makes it possible to carry out targeted searches. If you enter "MD 3" for example, you will find both the MD 30.1 and MD 31.3 catalogs. If you enter "ST 70" both the ST 70 catalog and the associated news or add-ons are displayed.

Visit us on the web at:

www.siemens.com/automation/infocenter

Social Media



Connect with Siemens through social media: visit our social networking sites for a wealth of useful information, demos on products and services, the opportunity to provide feedback, to exchange information and ideas with customers and other Siemens employees, and much, much more. Stay in the know and follow us on the ever-expanding global network of social media.

Connect with Siemens Industry at our central access point:

www.siemens.com/industry/socialmedia

Or via our product pages at:

www.siemens.com/automation

or

www.siemens.com/drives

To find out more about Siemens' current social media activities visit us at:

www.siemens.com/socialmedia

Mobile Media



Discover the world of Siemens.

We are also constantly expanding our offering of cross-platform apps for smartphones and tablets. You will find the current Siemens apps at the app store (iOS) or at Google Play (Android).

The Siemens app, for example, tells you all about the history, latest developments and future plans of the company – with informative pictures, fascinating reports and the most recent press releases.

Overview

Software types

Software requiring a license is categorized into types. The following software types have been defined:

- Engineering software
- Runtime software

Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing.

Data generated with engineering software and executable programs can be duplicated for your own use or for use by third-parties free-of-charge.

Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc.

The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge.

You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc.

Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

License types

Siemens Industry Automation & Drive Technologies offers various types of software license:

- Floating license
- Single license
- Rental license
- Rental floating license
- Trial license
- Demo license
- Demo floating license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started. A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software per license.

The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per instance, per axis, per channel, etc.

One single license is required for each type of use defined.

Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific period of time (the operating hours do not have to be consecutive).

One license is required for each installation of the software.

Rental floating license

The rental floating license corresponds to the rental license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

Demo license

The demo license support the "sporadic use" of engineering software in a non-productive context, for example, use for testing and evaluation purposes. It can be transferred to another license. After the installation of the license key, the software can be operated for a specific period of time, whereby usage can be interrupted as often as required.

One license is required per installation of the software.

Demo floating license

The demo floating license corresponds to the demo license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Certificate of license (CoL)

The CoL is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated. The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.

A separate PowerPack must be purchased for each original license of the software to be replaced.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.

The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed.

A separate upgrade must be purchased for each original license of the software to be upgraded.

Appendix

Notes on software

Software licenses

Overview

ServicePack

ServicePacks are used to debug existing products. ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

License key

Siemens Industry Automation & Drive Technologies supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

Software Update Service (SUS)

As part of the SUS contract, all software updates for the respective product are made available to you free of charge for a period of one year from the invoice date. The contract will automatically be extended for one year if it is not canceled three months before it expires.

The possession of the current version of the respective software is a basic condition for entering into an SUS contract.

You can download explanations concerning license conditions from www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf

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6FX8002-2DC	13/2

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6SE6400-4BD22-2EA1	6/96
6SE6400-4BD24-0FA0	6/96
6SE6400-4BD26-0FA0	6/96

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6SL3000-2BE32-1AA0	6/103
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6SL3000-2BE33-2AA0	6/103
6SL3000-2BE33-8AA0	6/103
6SL3000-2BE35-0AA0	6/103
6SL3000-2CE32-3AA0	6/111
6SL3000-2CE32-8AA0	6/111
6SL3000-2CE33-3AA0	6/111
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6SL3244-0BB00-1	6/6, 6/17
6SL3244-0BB12-1	6/6, 6/17
6SL3244-0BB13-1	6/6, 6/17
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ZKT: 70009601000	8/35
ZKT: 70017001000	8/35
ZKT: 70020501000	8/35

Appendix

Catalog improvement suggestions

Fax form

To

Siemens AG
 I DT MC RMC MK 1
 D 31 N – January 2013
 Postfach 31 80
 91050 ERLANGEN
 GERMANY

Fax: +49 9131 98-1145

E-mail: docu.motioncontrol@siemens.com

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 Company/Department

 Street/No.

 Postal code/City

 Tel. No./Fax

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Our catalog should be an important and frequently used document.

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A small request on our part to you:

Please take time to fill in the following form and fax it to us.
 Or send us an e-mail.

Thank You!

We invite you to grade our catalog on a point system from 1 (= good) to 6 (= poor):

Do the contents of the catalog live up to your expectations?

Do the technical details meet your expectations?

Is the information easy to find?

How would you assess the graphics and tables?

Can the texts be readily understood?

Did you find any printing errors? – Improvement suggestion?

Explanation of the raw material/metal surcharges¹⁾

Surcharge calculation

To compensate for variations in the price of the raw materials silver, copper, aluminum, lead, gold, dysprosium²⁾ and/or neodym²⁾, surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. A surcharge for the respective raw material is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The surcharges are calculated in accordance with the following criteria:

- Basic official price of the raw material
Basic official price from the day prior to receipt of the order or prior to release order (daily price) for³⁾
 - Silver (sales price, processed)
 - Gold (sales price, processed)
 and for⁴⁾
 - Copper (lower DEL notation + 1 %)
 - Aluminum (aluminum in cables)
 - Lead (lead in cables)
- Metal factor of the products
Certain products are displayed with a metal factor. The metal factor determines the official price (for those raw materials concerned) as of which the metal surcharges are applied and the calculation method used (weight or percentage method). An exact explanation is given below.

Structure of the metal factor

The metal factor consists of several digits; the first digit indicates whether the percentage method of calculation refers to the list price or a possible discounted price (customer net price) (L = list price / N = customer net price).

The remaining digits indicate the method of calculation used for the respective raw material. If no surcharge is added for a raw material, a "-" is used.

1st digit	List or customer net price using the percentage method
2nd digit	for silver (AG)
3rd digit	for copper (CU)
4th digit	for aluminum (AL)
5th digit	for lead (PB)
6th digit	for gold (AU)
7th digit	for dysprosium (Dy) ²⁾
8th digit	for neodym (Nd) ²⁾

Weight method

The weight method uses the basic official price, the daily price and the raw material weight. In order to calculate the surcharge, the basic official price must be subtracted from the daily price. The difference is then multiplied by the raw material weight.

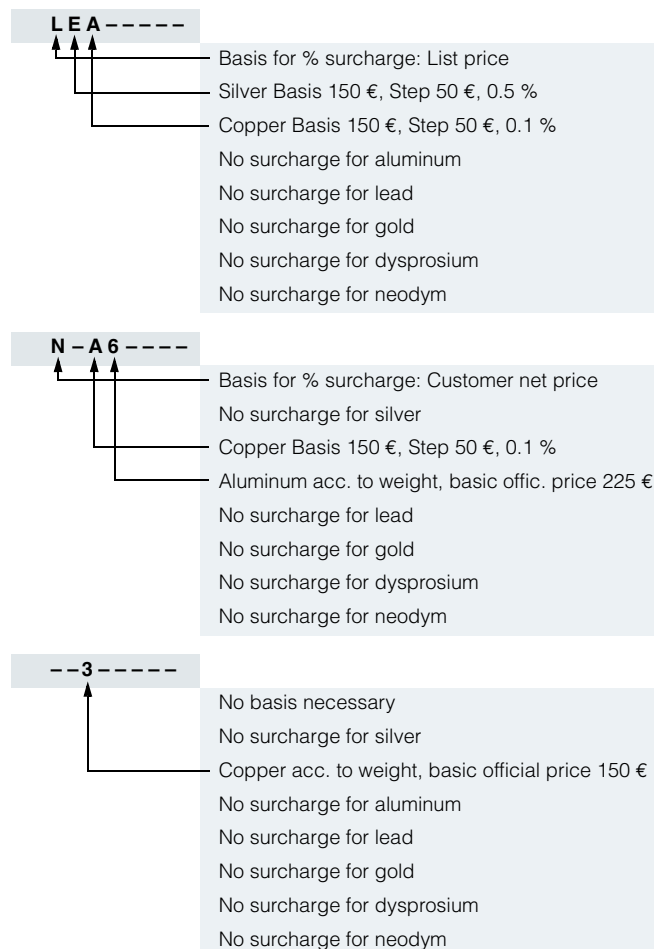
The basic official price can be found in the table below using the number (1 to 9) of the respective digit of the metal factor. The raw material weight can be found in the respective product descriptions.

Percentage method

Use of the percentage method is indicated by the letters A-Z at the respective digit of the metal factor.

The surcharge is increased - dependent on the deviation of the daily price compared with the basic official price - using the percentage method in "steps" and consequently offers surcharges that remain constant within the framework of this "step range". A higher percentage rate is charged for each new step. The respective percentage level can be found in the table below.

Metal factor examples



¹⁾ Refer to the separate explanation on the next page regarding the raw materials dysprosium and neodym (= rare earths).

²⁾ For a different method of calculation, refer to the separate explanation for these raw materials on the next page.

³⁾ Source: Umicore, Hanau (www.metalsmanagement.umicore.com).

⁴⁾ Source: German Trade Association for Cables and Conductors (www.kabelverband.org).

Appendix

Metal surcharges

Explanation of the raw material/metal surcharges for dysprosium and neodym (rare earths)

Surcharge calculation

To compensate for variations in the price of the raw materials silver¹⁾, copper¹⁾, aluminum¹⁾, lead¹⁾, gold¹⁾, dysprosium and/or neodym, surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. The surcharge for dysprosium and neodym is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The surcharge is calculated in accordance with the following criteria:

- Basic official price of the raw material²⁾
Three-month basic average price (see below) in the period before the quarter in which the order was received or the release order took place (= average official price) for
 - dysprosium (Dy metal, 99 % min. FOB China; USD/kg)
 - neodym (Nd metal, 99 % min. FOB China; USD/kg)
- Metal factor of the products
Certain products are displayed with a metal factor. The metal factor indicates (for those raw materials concerned) the basic official price as of which the surcharges for dysprosium and neodym are calculated using the weight method. An exact explanation of the metal factor is given below.

Three-month average price

The prices of rare earths vary according to the foreign currency, and there is no freely accessible stock exchange listing. This makes it more difficult for all parties involved to monitor changes in price. In order to avoid continuous adjustment of the surcharges, but to still ensure fair, transparent pricing, an average price is calculated over a three-month period using the average monthly foreign exchange rate from USD to EUR (source: European Central Bank). Since not all facts are immediately available at the start of each month, a one-month buffer is allowed before the new average price applies.

Examples of calculation of the average official price:

Period for calculation of the average price:	Period during which the order/release order is effected and the average price applies:
Sep 2012 - Nov 2012	Q1 in 2013 (Jan - Mar)
Dec 2012 - Feb 2013	Q2 in 2013 (Apr - Jun)
Mar 2013 - May 2013	Q3 in 2013 (Jul - Sep)
Jun 2013 - Aug 2013	Q4 in 2013 (Oct - Dec)

Structure of the metal factor

The metal factor consists of several digits; the first digit is not relevant to the calculation of dysprosium and neodym.

The remaining digits indicate the method of calculation used for the respective raw material. If no surcharge is added for a raw material, a "-" is used.

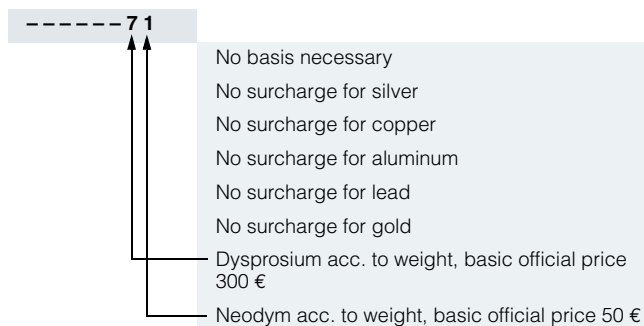
1st digit	List or customer net price using the percentage method
2nd digit	for silver (AG) ¹⁾
3rd digit	for copper (CU) ¹⁾
4th digit	for aluminum (AL) ¹⁾
5th digit	for lead (PB) ¹⁾
6th digit	for gold (AU) ¹⁾
7th digit	for dysprosium (Dy)
8th digit	for neodym (Nd)

Weight method

The weight method uses the basic official price, the average price and the raw material weight. In order to calculate the surcharge, the basic official price must be subtracted from the average price. The difference is then multiplied by the raw material weight.

The basic official price can be found in the table below using the number (1 to 9) of the respective digit of the metal factor. Your Sales contact can inform you of the raw material weight.

Metal factor examples



¹⁾ For a different method of calculation, refer to the separate explanation for these raw materials on the previous page.

²⁾ Source: Asian Metal Ltd (www.asianmetal.com)

Values of the metal factor

Percentage method	Basic official price in €	Step range in €	% surcharge 1st step	% surcharge 2nd step	% surcharge 3rd step	% surcharge 4th step	% surcharge per additional step	
			Price in € 150.01 - 200.00	Price in € 200.01 - 250.00	Price in € 250.01 - 300.00	Price in € 300.01 - 350.00		
A	150	50	0.1	0.2	0.3	0.4	0.1	
B	150	50	0.2	0.4	0.6	0.8	0.2	
C	150	50	0.3	0.6	0.9	1.2	0.3	
D	150	50	0.4	0.8	1.2	1.6	0.4	
E	150	50	0.5	1.0	1.5	2.0	0.5	
F	150	50	0.6	1.2	1.8	2.4	0.6	
G	150	50	1.0	2.0	3.0	4.0	1.0	
H	150	50	1.2	2.4	3.6	4.8	1.2	
I	150	50	1.6	3.2	4.8	6.4	1.6	
J	150	50	1.8	3.6	5.4	7.2	1.8	
			175.01 - 225.00	225.01 - 275.00	275.01 - 325.00	325.01 - 375.00		
O	175	50	0.1	0.2	0.3	0.4	0.1	
P	175	50	0.2	0.4	0.6	0.8	0.2	
R	175	50	0.5	1.0	1.5	2.0	0.5	
			225.01 - 275.00	275.01 - 325.00	325.01 - 375.00	375.01 - 425.00		
S	225	50	0.2	0.4	0.6	0.8	0.2	
U	225	50	1.0	2.0	3.0	4.0	1.0	
V	225	50	1.0	1.5	2.0	3.0	1.0	
W	225	50	1.2	2.5	3.5	4.5	1.0	
			150.01 - 175.00	175.01 - 200.00	200.01 - 225.00	225.01 - 250.00		
Y	150	25	0.3	0.6	0.9	1.2	0.3	
			400.01 - 425.00	425.01 - 450.00	450.01 - 475.00	475.01 - 500.00		
Z	400	25	0.1	0.2	0.3	0.4	0.1	
Price basis (1st digit)								
L	Calculation based on the list price							
N	Calculation based on the customer net price (discounted list price)							
Weight method	Basic official price in €							
1	50	Calculation based on raw material weight						
2	100							
3	150							
4	175							
5	200							
6	225							
7	300							
8	400							
9	555							
Miscellaneous								
-	No metal surcharge							

Appendix

Conversion tables

Rotary inertia (to convert from A to B, multiply by entry in table)

A \ B	lb-in ²	lb-ft ²	lb-in-s ²	lb-ft-s ² slug-ft ²	kg-cm ²	kg-cm-s ²	gm-cm ²	gm-cm-s ²	oz-in ²	oz-in-s ²
lb-in ²	1	6.94×10^{-3}	2.59×10^{-3}	2.15×10^{-4}	2.926	2.98×10^{-3}	2.92×10^3	2.984	16	4.14×10^{-2}
lb-ft ²	144	1	0.3729	3.10×10^{-2}	421.40	0.4297	4.21×10^5	429.71	2304	5.967
lb-in-s ²	386.08	2.681	1	8.33×10^{-2}	1.129×10^3	1.152	1.129×10^6	1.152×10^3	6.177×10^3	16
lb-ft-s ² slug-ft ²	4.63×10^3	32.17	12	1	1.35×10^4	13.825	1.355×10^7	1.38×10^4	7.41×10^4	192
kg-cm ²	0.3417	2.37×10^{-3}	8.85×10^{-4}	7.37×10^{-5}	1	1.019×10^{-3}	1000	1.019	5.46	1.41×10^{-2}
kg-cm-s ²	335.1	2.327	0.8679	7.23×10^{-2}	980.66	1	9.8×10^5	1000	5.36×10^3	13.887
gm-cm ²	3.417×10^{-4}	2.37×10^{-6}	8.85×10^{-7}	7.37×10^{-8}	1×10^{-3}	1.01×10^{-6}	1	1.01×10^{-3}	5.46×10^{-3}	1.41×10^{-5}
gm-cm-s ²	0.335	2.32×10^{-3}	8.67×10^{-4}	7.23×10^{-5}	0.9806	1×10^{-3}	980.6	1	5.36	1.38×10^{-2}
oz-in ²	0.0625	4.34×10^{-4}	1.61×10^{-4}	1.34×10^{-5}	0.182	1.86×10^{-4}	182.9	0.186	1	2.59×10^{-3}
oz-in-s ²	24.13	0.1675	6.25×10^{-2}	5.20×10^{-3}	70.615	7.20×10^{-2}	7.09×10^4	72.0	386.08	1

Torque (to convert from A to B, multiply by entry in table)

A \ B	lb-in	lb-ft	oz-in	N-m	kg-cm	kg-m	gm-cm	dyne-cm
lb-in	1	8.333×10^{-2}	16	0.113	1.152	1.152×10^{-2}	1.152×10^3	1.129×10^6
lb-ft	12	1	192	1.355	13.825	0.138	1.382×10^4	1.355×10^7
oz-in	6.25×10^{-2}	5.208×10^{-3}	1	7.061×10^{-3}	7.200×10^{-2}	7.200×10^{-4}	72.007	7.061×10^4
N-m	8.850	0.737	141.612	1	10.197	0.102	1.019×10^4	1×10^7
kg-cm	0.8679	7.233×10^{-2}	13.877	9.806×10^{-2}	1	10^{-2}	1000	9.806×10^5
kg-m	86.796	7.233	1.388×10^3	9.806	100	1	1×10^5	9.806×10^7
gm-cm	8.679×10^{-4}	7.233×10^{-5}	1.388×10^{-2}	9.806×10^{-5}	1×10^{-3}	1×10^{-5}	1	980.665
dyne-cm	8.850×10^{-7}	7.375×10^{-8}	1.416×10^{-5}	10^{-7}	1.0197×10^{-6}	1.019×10^{-8}	1.019×10^{-3}	1

Length (to convert from A to B, multiply by entry in table)

A \ B	inches	feet	cm	yd	mm	m
inches	1	0.0833	2.54	0.028	25.4	0.0254
feet	12	1	30.48	0.333	304.8	0.3048
cm	0.3937	0.03281	1	1.09×10^{-2}	10	0.01
yd	36	3	91.44	1	914.4	0.914
mm	0.03937	0.00328	0.1	1.09×10^{-3}	1	0.001
m	39.37	3.281	100	1.09	1000	1

Force (to convert from A to B, multiply by entry in table)

A \ B	lb	oz	gm	dyne	N
lb	1	16	453.6	4.448×10^5	4.4482
oz	0.0625	1	28.35	2.780×10^4	0.27801
gm	2.205×10^{-3}	0.03527	1	1.02×10^{-3}	N.A.
dyne	2.248×10^{-6}	3.59×10^{-5}	980.7	1	0.00001
N	0.22481	3.5967	N.A.	100000	1

Mass (to convert from A to B, multiply by entry in table)

A \ B	lb	oz	gm	kg	slug
lb	1	16	453.6	0.4536	0.0311
oz	6.25×10^{-2}	1	28.35	0.02835	1.93×10^{-3}
gm	2.205×10^{-3}	3.527×10^{-2}	1	10^{-3}	6.852×10^{-5}
kg	2.205	35.27	10^3	1	6.852×10^{-2}
slug	32.17	514.8	1.459×10^4	14.59	1

Power (to convert from A to B, multiply by entry in table)

A \ B	hp	Watts
hp (English)	1	745.7
(lb-in) (deg./s)	2.645×10^{-6}	1.972×10^{-3}
(lb-in) (rpm)	1.587×10^{-5}	1.183×10^{-2}
(lb-ft) (deg./s)	3.173×10^{-5}	2.366×10^{-2}
(lb-ft) (rpm)	1.904×10^{-4}	0.1420
Watts	1.341×10^{-3}	1

Rotation (to convert from A to B, multiply by entry in table)

A \ B	rpm	rad/s	degrees/s
rpm	1	0.105	6.0
rad/s	9.55	1	57.30
degrees/s	0.167	1.745×10^{-2}	1

Temperature Conversion

°F	°C	°C	°F
0	-17.8	-10	14
32	0	0	32
50	10	10	50
70	21.1	20	68
90	32.2	30	86
98.4	37	37	98.4
212	100	100	212
subtract 32 and multiply by $\frac{5}{9}$		multiply by $\frac{9}{5}$ and add 32	

Mechanism Efficiencies

Acme-screw with brass nut	~0.35–0.65
Acme-screw with plastic nut	~0.50–0.85
Ball-screw	~0.85–0.95
Chain and sprocket	~0.95–0.98
Preloaded ball-screw	~0.75–0.85
Spur or bevel-gears	~0.90
Timing belts	~0.96–0.98
Worm gears	~0.45–0.85
Helical gear (1 reduction)	~0.92

Friction Coefficients

Materials	μ
Steel on steel (greased)	~0.15
Plastic on steel	~0.15–0.25
Copper on steel	~0.30
Brass on steel	~0.35
Aluminum on steel	~0.45
Steel on steel	~0.58
Mechanism	μ
Ball bushings	<0.001
Linear bearings	<0.001
Dove-tail slides	~0.2++
Gibb ways	~0.5++

Material Densities

Material	lb-in ³	gm-cm ³
Aluminum	0.096	2.66
Brass	0.299	8.30
Bronze	0.295	8.17
Copper	0.322	8.91
Hard wood	0.029	0.80
Soft wood	0.018	0.48
Plastic	0.040	1.11
Glass	0.079–0.090	2.2–2.5
Titanium	0.163	4.51
Paper	0.025–0.043	0.7–1.2
Polyvinyl chloride	0.047–0.050	1.3–1.4
Rubber	0.033–0.036	0.92–0.99
Silicone rubber, without filler	0.043	1.2
Cast iron, gray	0.274	7.6
Steel	0.280	7.75

Wire Gauges¹⁾

Cross-section mm ²	Standard Wire Gauge (SWG)	American Wire Gauge (AWG)
0.2	25	24
0.3	23	22
0.5	21	20
0.75	20	19
1.0	19	18
1.5	17	16
2.5	15	13
4	13	11
6	12	9
10	9	7
16	7	6
25	5	3
35	3	2
50	0	1/0
70	000	2/0
95	00000	3/0
120	0000000	4/0
150	–	6/0
185	–	7/0

¹⁾ The table shows approximate SWG/AWG sizes nearest to standard metric sizes; the cross-sections do not match exactly.

Appendix

Conditions of sale and delivery

1. General Provisions

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following Terms and Conditions of Sale and Delivery (hereinafter referred to as "T&C"). Please note that the scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following T&C apply exclusively for orders placed with Siemens Aktiengesellschaft, Germany.

1.1 For customers with a seat or registered office in Germany

For customers with a seat or registered office in Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"¹⁾ and,
- for software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office in Germany"¹⁾ and,
- for other supplies and services, the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"¹⁾.

1.2 For customers with a seat or registered office outside Germany

For customers with a seat or registered office outside Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"¹⁾ and,
- for software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office outside of Germany"¹⁾ and
- for other supplies and/or services, the "General Conditions for Supplies of Siemens Industry for Customers with a Seat or Registered Office outside of Germany"¹⁾.

2. Prices

The prices are in € (Euro) ex point of delivery, exclusive of packaging.

The sales tax (value added tax) is not included in the prices. It shall be charged separately at the respective rate according to the applicable statutory legal regulations.

Prices are subject to change without prior notice. We will charge the prices valid at the time of delivery.

To compensate for variations in the price of raw materials (e.g. silver, copper, aluminum, lead, gold, dysprosium and neodym), surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. A surcharge for the respective raw material is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The metal factor of a product indicates the basic official price (for those raw materials concerned) as of which the surcharges on the price of the product are applied, and with what method of calculation.

You will find a detailed explanation of the metal factor on the page headed "Metal surcharges".

To calculate the surcharge (except in the cases of dysprosium and neodym), the official price from the day prior to that on which the order was received or the release order was effected is used.

To calculate the surcharge applicable to dysprosium and neodym ("rare earths"), the corresponding three-month basic average price in the quarter prior to that in which the order was received or the release order was effected is used with a one-month buffer (details on the calculation can be found in the explanation of the metal factor).

3. Additional Terms and Conditions

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches apply only to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the individual pages of this catalog - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

4. Export regulations

We shall not be obligated to fulfill any agreement if such fulfillment is prevented by any impediments arising out of national or international foreign trade or customs requirements or any embargoes and/or other sanctions.

Export of goods listed in this catalog may be subject to licensing requirements. We will indicate in the delivery details whether licenses are required under German, European and US export lists. Goods labeled with "AL" not equal to "N" are subject to European or German export authorization when being exported out of the EU. Goods labeled with "ECCN" not equal to "N" are subject to US re-export authorization.

The export indications can be viewed in advance in the description of the respective goods on the Industry Mall, our online catalog system. Only the export labels "AL" and "ECCN" indicated on order confirmations, delivery notes and invoices are authoritative.

Even without a label, or with label "AL:N" or "ECCN:N", authorization may be required i.a. due to the final disposition and intended use of goods.

If you transfer goods (hardware and/or software and/or technology as well as corresponding documentation, regardless of the mode of provision) delivered by us or works and services (including all kinds of technical support) performed by us to a third party worldwide, you must comply with all applicable national and international (re-)export control regulations.

If required for the purpose of conducting export control checks, you (upon request by us) shall promptly provide us with all information pertaining to the particular end customer, final disposition and intended use of goods delivered by us respectively works and services provided by us, as well as to any export control restrictions existing in this relation.

The products listed in this catalog may be subject to European/German and/or US export regulations. Any export requiring approval is therefore subject to authorization by the relevant authorities.

Errors excepted and subject to change without prior notice.

¹⁾ The text of the Terms and Conditions of Siemens AG can be downloaded at www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf

Industry Automation, Drive Technologies and Low-Voltage Power Distribution

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Drive Systems <u>Variable-Speed Drives</u> SINAMICS G130 Drive Converter Chassis Units SINAMICS G150 Drive Converter Cabinet Units SINAMICS GM150, SINAMICS SM150 Medium-Voltage Converters ROBICON Perfect Harmony Medium-Voltage Air-Cooled Drives Germany Edition SINAMICS S120 Chassis Format Units and Cabinet Modules SINAMICS S150 Converter Cabinet Units SINAMICS DCM Converter Units SINAMICS and Motors for Single-Axis Drives Three-Phase Induction Motors SIMOTICS HV, SIMOTICS TN • Series H-compact • Series H-compact PLUS Asynchronous Motors Standardline Synchronous Motors with Permanent-Magnet Technology, HT-direct DC Motors SIMOREG DC MASTER 6RA70 Digital Chassis Converters SIMOREG K 6RA22 Analog Chassis Converters <i>Digital: SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units</i> SIMOVERT PM Modular Converter Systems SIEMOSYN Motors MICROMASTER 420/430/440 Inverters MICROMASTER 411/COMBIMASTER 411 SIMOVERT MASTERDRIVES Vector Control SIMOVERT MASTERDRIVES Motion Control Synchronous and asynchronous servomotors for SIMOVERT MASTERDRIVES SIMODRIVE 611 universal and POSMO <i>Note: Additional catalogs on SIMODRIVE or SINAMICS drive systems and SIMOTICS motors with SINUMERIK and SIMOTION can be found under Motion Control</i> <u>Low-Voltage Three-Phase-Motors</u> SIMOTICS Low-Voltage Motors MOTOX Geared Motors SIMOGEAR Geared Motors <u>Mechanical Driving Machines</u> FLENDER Standard Couplings FLENDER SIG Standard industrial gear unit FLENDER SIP Standard industrial planetary gear units	D 11 D 12 D 15.1 D 21.3 D 23.1 D 31 D 84.1 D 86.1 D 86.2 DA 12 DA 21.1 DA 21.2 DA 22 DA 45 DA 48 DA 51.2 DA 51.3 DA 65.10 DA 65.11 DA 65.3 DA 65.4	Motion Control SINUMERIK & SIMODRIVE Automation Systems for Machine Tools SINUMERIK & SINAMICS Equipment for Machine Tools SINUMERIK 840D sl Type 1B Equipment for Machine Tools SINUMERIK 808D, SINAMICS V60 and G120, SIMOTICS 1FL5 and 1LE1 SINUMERIK 828D BASIC T/BASIC M, SINAMICS S120 Combi, 1FK7 and 1PH8 motors SIMOTION, SINAMICS S120 & SIMOTICS Equipment for Production Machines Drive and Control Components for Cranes	NC 60 NC 61 NC 62 NC 81.1 NC 82 PM 21 CR 1
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		Process Instrumentation and Analytics Field Instruments for Process Automation <i>Digital: SIPART Controllers and Software</i> Products for Weighing Technology <i>Digital: Process Analytical Instruments</i> <i>Digital: Process Analytics, Components for the System Integration</i>	FI 01 MP 31 WT 10 PA 01 PA 11
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