SIEMENS

MOTION CONTROL DRIVES

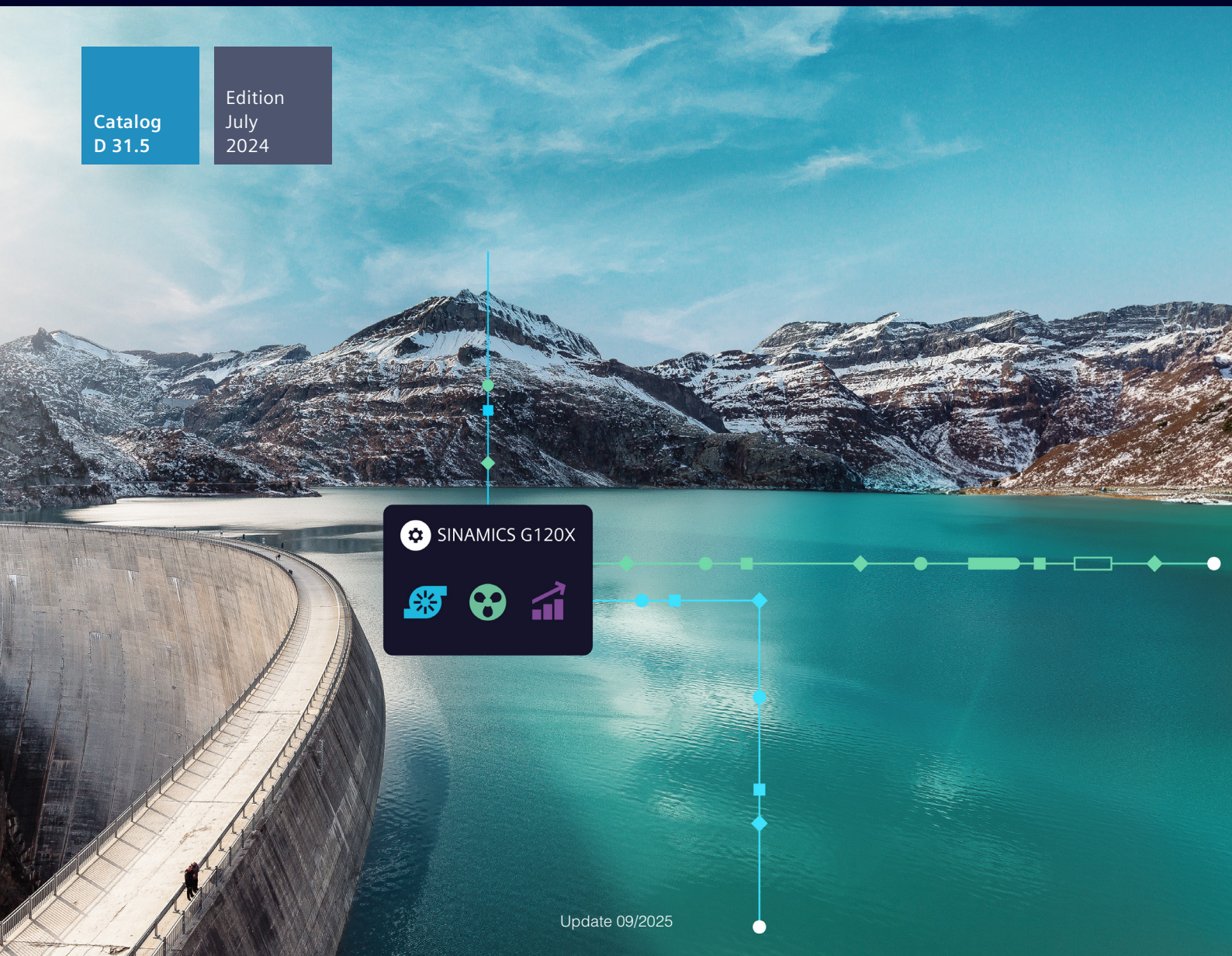
SINAMICS Converters for Single-Axis Drives

SINAMICS G120X infrastructure converters for HVAC/Water/Wastewater

siemens.com/sinamics-g120x

Catalog
D 31.5

Edition
July
2024



Update 09/2025

Related catalogs

Motion Control Drives D 31.1
SINAMICS Converters for Single-Axis Drives
Built-In Units

PDF (E86060-K5531-A111-A5-7600)

Motion Control Drives D 31.2
SINAMICS Converters for Single-Axis Drives
Distributed Converters

PDF (E86060-K5531-A121-A4-7600)

Motion Control Drives D 32
SINAMICS S210 Servo Drive System

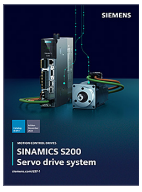
PDF (E86060-K5532-A101-B1-7600)

Motion Control Drives D 36.1
SINAMICS Converters for Single-Axis Drives
SINAMICS G220 built-in and wall-mounted units

PDF (E86060-K5536-A111-A5-7600)

Motion Control Drives D 37.1
SINAMICS S200 Servo drive system

PDF (E86060-K5537-A111-A2-7600)



SINAMICS S120 D 21.3
Chassis Format Converter Units
Chassis-2 Format Converter Units
Cabinet Modules, Cabinet Modules-2
SINAMICS S150
Converter Cabinet Units
PDF (E86060-K5521-A131-A9-7600)

Motion Control Drives D 21.4
SINAMICS S120, SINAMICS S220 and SIMOTICS

PDF (E86060-K5521-A141-A2-7600)

Motion Control Drives D 23.1
SINAMICS DCM series of converters
DC Converter, Control Module

PDF (E86060-K5523-A111-A4-7600)

SIMOTICS S-1FG1 D 41
Servo geared motors
Helical, Parallel shaft, Bevel and Helical worm geared motors

PDF (E86060-K5541-A101-A6-7600)

Motion Control Drives D 60
SIMOTICS E
Drive system for extra low voltage

PDF (E86060-K5560-A101-A1)

Motion Control System PM 21
SIMOTION
Equipment for Production Machines

PDF (E86060-K4921-A101-A4-7600)

Industrial Controls IC 10
SIRIUS

PDF (E86060-K1010-A101-B7-7600)

Low-Voltage Power Distribution and Electrical Installation Technology LV 10
SENTRON • SIVACON • ALPHA

PDF (E86060-K8280-A101-B9-7600)

SIMATIC ST 70
Products for
Totally Integrated Automation

PDF (E86060-K4670-A101-C1-7600)

SIMATIC HMI / PC-based Automation ST 80/ST PC
Human Machine Interface Systems
PC-based Automation

PDF (E86060-K4680-A101-D3-7600)

SITRAIN
Digital Industry Academy

www.siemens.com/sitrain

SiePortal
Information and Ordering Platform
on the Internet

sieportal.siemens.com

SIEMENS

Combining the real and digital worlds ...
Transformation

Catalog
D 31.5

Edition
July 2024

MOTION CONTROL DRIVES

SINAMICS Converters for Single-Axis Drives

SINAMICS G120X infrastructure converters for HVAC/Water/Wastewater

siemens.com/d31-5

Dear Customer,

We are happy to present you with the new PDF version of the catalog D 31.5 · July 2024.

The catalog provides a comprehensive overview of the SINAMICS G120X converter system for HVAC, water and wastewater applications in the infrastructure sector. With an available power range from 0.75 kW to 630 kW (1 hp to 700 hp), the series masters every challenge here. The new edition of the catalog mainly contains updates and technical adjustments.

The products listed in this catalog are also included in SiePortal. Please contact your local Siemens office for additional information.

Up-to-date information about SINAMICS G120X is available online at www.siemens.com/sinamics-g120x

You can access SiePortal on the internet at https://sieportal.siemens.com

Your personal contact will be glad to receive your suggestions and recommendations for improvement. You can find your representative in our personal contacts database at www.siemens.com/automation-contact

We hope that you will often enjoy using Catalog D 31.5 · July 2024 as a selection and ordering reference document and wish you every success with our products and solutions.

With kind regards

Frank Golüke
Vice President
General Motion Control
Siemens AG, Digital Industries, Motion Control

SINAMICS Converters for Single-Axis Drives

SINAMICS G120X infrastructure converters for HVAC/Water/Wastewater

Motion Control Drives

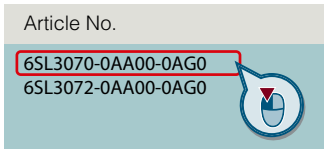
Catalog D 31.5 · July 2024

Supersedes:
Catalog D 31.5 · May 2022

Refer to SiePortal for current updates of this catalog:
https://sieportal.siemens.com

Please contact your local Siemens branch.

Click on an Article No. in the catalog PDF to call it up in SiePortal and to obtain all the information.



Or directly on the internet, e.g.
www.siemens.com/product_catalog_DIMC?6SL3070-0AA00-0AG0

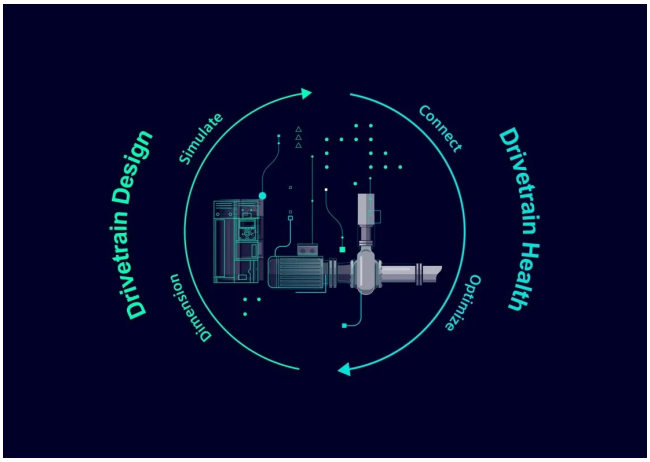
The products and systems described in this catalog are manufactured/distributed under application of a certified quality management system in accordance with EN ISO 9001. The certificate is recognized by all IQNet countries.

Motion beyond expectations

Drives move the industries. But how can they make them more efficient, more reliable and more sustainable – and exceed all expectations while they are doing it? Our answer: Siemens Xcelerator for Digital Drivetrain.

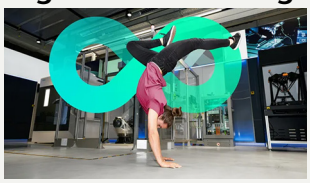
Digital solutions for Drivetrain Design and Drivetrain Health

Combine the real and the digital world to reach the next level of efficiency and sustainability in your drivetrain value chain: with suitable digital solutions for drivetrain design and drivetrain health.
Drivetrain Design:
Simplify and shorten the engineering steps to get faster and more efficiently from concept to the commissioned drive-train.
Drivetrain Health:
Reduce total cost of ownership for your equipment and machine park – energy, maintenance, downtime.



siemens.com/digital-drivetrain

Digitalization along the drivetrain value chain



Dimension

Accurate in motion: Dimension your motors, gearboxes, and complete drivetrains digitally with greater precision – for greater reliability and energy efficiency.

Simulate

Faster in motion: Add the digital twin of the drivetrain to your machine simulation to speed up your design and engineering phases and to accelerate your time-to-market!

Connect

Data in motion: Acquire high-quality raw data and connect your entire drive-trains or machines to cloud or on-premise platforms – for a consistent and secure data flow.

Optimize

Better in motion: Analyze and visualize drivetrain and machine data in digital solutions and apps to identify optimization potentials and concrete actionable measures how to tap it.

Use cases for digital drivetrain technology

Condition monitoring for drivetrains

Healthy in motion: Gain valuable insights into your drivetrain to optimize maintenance, system availability, cost efficiency, and sustainability: Discover intelligent digital condition monitoring for your drivetrains!

Are your drivetrains fit enough for tough times?

The industries are expected to produce ever more efficiently, ever more sustainably and ever more cost-effectively. And if you can't do that, it's easier to be left behind by the competition. Use digitalization and the data from your motors and converters to optimize your competitiveness – and to keep your production in motion.

What if you consume too much electricity?

With digital solutions and digital drive technology, you can significantly reduce your share of this!

What if you waste too much energy?

Digitalization enables you to detect energy waste and impending system down-times at an early stage so that you can take counter-measures in due time!

What if your motors are incorrectly designed?

Digital tools make it quicker and easier to correctly design your drive components!

What if your drives fail unexpectedly?

With digital solutions, you can identify risks in your drivetrain at an early stage and react before a failure occurs.

"Our digital solutions transform your drivetrain value chain to the next level of efficiency and sustainability."

siemens.com/digital-drivetrain

SINAMICS frequency converters

SINAMICS frequency converters – the ultimate solution for all drive applications. From low voltage to medium voltage to direct current (DC), our frequency converters meet your needs. With increased efficiency and versatility, take your applications to the next generation for a digital and sustainable future.

Driving next generation applications

When it comes to driving industry advancements, look no further than our SINAMICS frequency converters. They fuel the creation of innovative, next-generation applications that meet the unique needs of every industry.

From pumping and ventilating to moving, positioning, processing, and machining, our converters have you covered. Get ready to take your applications to new heights.

siemens.com/sinamics

Low voltage converters

Low voltage frequency converters are suitable for a huge range of applications. For example, if materials must be moved, processed, positioned, pumped or compressed. Variable-speed operation saves energy and also increases process quality and process availability.

Servo converters

These servo converters meet the highest dynamic requirements for single and multi-axis applications. The perfect solution for machine tools, packaging machines, continuous material handling, cranes, rolling mills, test stands, material handling, robotics and many other applications requiring high-precision, dynamic motion control.

DC converters

The dynamic performance, ruggedness, and cost-effectiveness of DC technology continue to make it the most cost-effective and proven drive solution for many applications today – with numerous advantages in terms of reliability, ease of use, and operational performance.

Accelerating the digital and sustainable transformation of industry

How can you make production more efficient? Accelerate your digital transformation? And become more sustainable?

The answer is our SINAMICS frequency converters. They are energy efficient, offer the versatility you need for any application, and drive your digital transformation by providing the data to continuously improve production efficiency and sustainability. Our converters offer you integrated safety and security features, efficient engineering and software tools as well as comprehensive lifecycle services. In other words: Everything you need to address the next generation of applications – today and tomorrow.

EFFICIENT

Implement energy-efficient applications easily, quickly, and safely with efficient motion control.

- Sustainable drive systems
- Efficient Motion Control solutions
- Drive System Services

VERSATILE

Drives equipped with tailored safety features to ensure optimal machine safety in a wide range of industrial applications.

- Safety and Security Integrated
- Drive applications
- Drives for any industry

FUTURE-PROOF

Efficient engineering, powerful software tools, and cloud and edge connectivity for greater transparency.

- Digitalization in drive technology
- Efficient drive engineering
- Drive Software for all applications

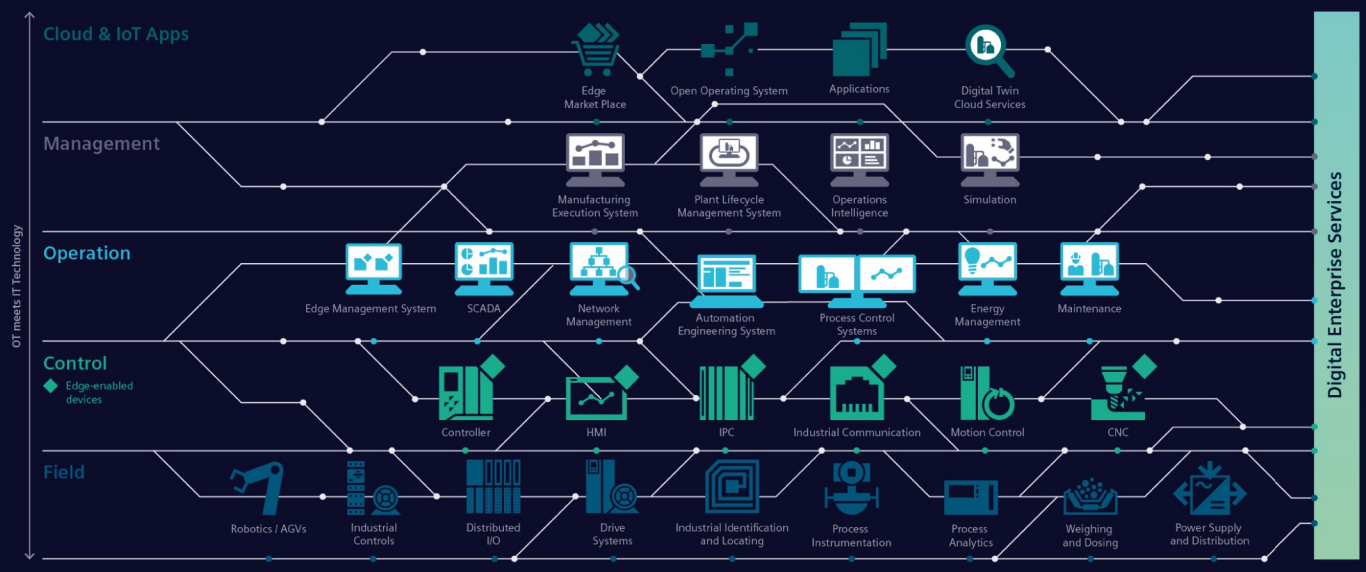
siemens.com/sinamics

Totally Integrated Automation

Totally Integrated Automation (TIA) offers smart automation development, flexible machine concepts, transparent operation, and sustainable solutions that enable access to data to calculate and optimize the product carbon footprint. We are constantly improving and expanding TIA to be future-proof and adaptive to existing and upcoming challenges.

A comprehensive portfolio for the challenges of today and tomorrow

The TIA offering is integrated seamlessly and it's so comprehensive that it provides the right automation solutions for every industry. We will continue to improve and expand our proven automation portfolio and are constantly including innovative technologies and solutions that pave the way towards the factory of the future.



Real added value for the automation of your production

From the development of innovative machine concepts to engineering and optimized production:
TIA offers real added value along the entire value chain.

Smart Automation Development

Innovative machine concepts made easy: When you use standardized library concepts and preconfigured expertise, you can count on efficient engineering. Thanks to the integration of safety features, diagnostic functions, and cybersecurity, you also save valuable time.

Flexible Machine Concepts

No matter what new requirements emerge in the market, TIA supports modular machine concepts and the simple integration of new machines into existing lines – thanks to standardized hardware interfaces and engineering libraries. As a machine builder, this enables you to meet any challenge quickly and reliably.

Transparent Operation

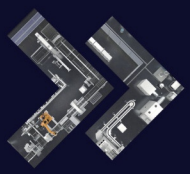
Integrated interfaces let you achieve a new level of transparency for the essential performance indicators in your processes and plants. The connection between IT and OT along with efficient data management lay the foundation for new service models such as predictive maintenance.

Future-proof Automation

Our TIA portfolio is constantly being refined with a view to integrating automation technologies more and more efficiently. The components can then interact with modern IT capabilities, which are becoming increasingly important for specific applications in automation. TIA provides a solid foundation, whether for working with our Industrial Operations X portfolio or for everything the future has in store.

Sustainable Solutions

Sustainability starts with the acquisition of data. With the TIA portfolio, you can measure energy and resource data and make it transparent, providing a solid foundation for calculating the Product Carbon Footprint. This is crucial for drawing the right conclusions and responding to sudden changes in order to lastingly reduce CO_2 emissions and save more resources in production.

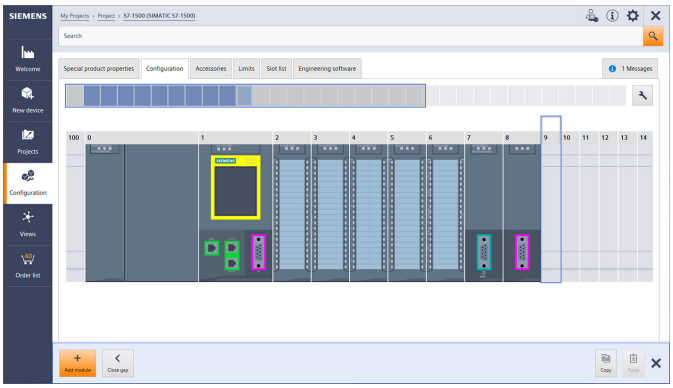


www.siemens.com/tia

TIA Selection Tool – quick, easy, smart configuration

For you to get the most out of our portfolio quickly and easily.

Do you always need the optimum configuration for planning your project?
For your application we offer the TIA Selection Tool to support all project planners, beginners and experts alike.
No detailed portfolio knowledge is necessary.
TIA Selection Tool is available for download as a free desktop version or a cloud variant.



Your Advantages

Quick

- Configure a complete project with just a few entries – without a manual, without special knowledge
- Import and export of hardware configuration to TIA Portal or other systems
- Ideal visualization of the projects to be configured

Easy

- Tool download either as desktop version or web-based cloud version
- Technically always up-to-date about product portfolio and innovative approaches
- Highly flexible, secure, cross-team work in the cloud
- Direct ordering in SiePortal

Smart

- Smart selection wizard for error-free configuration and ordering
- Configuration options can be tested and simulated in advance
- Library for archiving sample configurations

The TIA Selection Tool is a completely paperless solution.
Download it now:
www.siemens.com/tst

For more information, scan the QR code

Sustainability @Siemens

Transforming the everyday to create a better tomorrow.

For more information, see www.siemens.com/sustainabililty-figures

As a company, Siemens considers environmental, social and governance (ESG) criteria from all angles with its DEGREE framework (decarbonization, ethics, governance, resource efficiency, equity and employability). We are not only committed to reducing the carbon footprint in our own operations to net zero by 2030, but also helping our customers achieve their decarbonization and sustainability goals.

Mission & strategy

As a focused technology company, Siemens is committed to addressing the world's most profound challenges by leveraging the synergies between digitalization and sustainability.

Technology with aim and purpose

We develop technologies that connect the real and digital worlds and enable our customers to positively transform the industries that form the backbone of our economy: industry, infrastructure, transportation and healthcare.

Our contribution

Siemens makes an impact every day by providing innovative solutions in response to challenges relating to environmental protection, decarbonization, health and safety. Innovative solutions that have a clear goal: to make the world more sustainable, more integrative and a better place to live.

Sustainability facts

For almost 175 years, Siemens has been driven by the desire to improve the lives of people around the world with our technologies.

Siemens EcoTech

Siemens EcoTech is an environmental product performance label designed to drive the sustainable transformation of industry and infrastructure. The label gives you transparency on the performance of our certified products across environmental relevant criteria, enabling you to make informed choices to support your sustainability goals, see www.siemens.com/SiemensEcoTech.

System overview

Further information about SINAMICS and SIMOTICS can be found on the internet at
www.siemens.com/sinamics
www.siemens.com/simotics

Overview

SINAMICS frequency converters

SINAMICS frequency converters are the ultimate solution for all drive applications. From low voltage to medium voltage to direct current (DC), our frequency converters meet your needs.

With increased efficiency and versatility, take your drive applications to the next generation for a digital and sustainable future.
www.siemens.com/sinamics

Low voltage											Direct voltage
Standard performance frequency converters		Distributed frequency converters	Industry-specific frequency converters		Servo converters			High performance frequency converters			DC converters
											
SINAMICS V20 G120C G120	SINAMICS G130 G150	SINAMICS G115D G120D SIMATIC ET 200pro FC-2	SINAMICS G120X	SINAMICS G180	SINAMICS V90 S200	SINAMICS S110	SINAMICS S210 (6SL5...)	SINAMICS G220	SINAMICS S120 S120M	SINAMICS S150	SINAMICS DCM DCP [1]
0.12 kW to 250 kW	75 kW to 2700 kW	0.37 kW to 7.5 kW	0.75 kW to 630 kW	2.2 kW to 6600 kW	0.05 kW to 7 kW	0.55 kW to 132 kW	0.05 kW to 7 kW	0.55 kW to 110 kW	0.55 kW to 5700 kW	75 kW to 1200 kW	6 kW to 30 MW
Pumps, fans, compressors, conveyor belts, mixers, mills, spinning machines, textile machines, refrigerated display counters, fitness equipment, ventilation systems, single-axis positioning applications in machine and plant engineering	Pumps, fans, compressors, conveyor belts, mixers, mills, extruders	Conveyor technology, single-axis positioning applications (G120D)	Pumps, fans, compressors, building management systems, process industry, HVAC, water/waste water industries	Pumps, fans, compressors, conveyor belts, extruders, mixers, mills, kneaders, centrifuges, separators	Handling machines, packaging machines, automatic assembly machines, metal forming machines, printing machines, winding and unwinding units	Single-axis positioning applications in machine and plant engineering	Packaging machines, handling equipment, feed and withdrawal devices, stacking units, automatic assembly machines, laboratory automation, wood, glass and ceramics industry, digital printing machines	Pumps, fans, compressors, conveyor belts, mixers, mills, spinning machines, textile machines, refrigerated display counters, fitness equipment, ventilation systems, single-axis positioning applications in machine and plant engineering	Production machines (packaging, textile and printing machines, paper machines, plastic processing machines), machine tools, plants, process lines and rolling mills, marine drives, test bays	Test bays, cross cutters, centrifuges	Rolling mill drives, wire-drawing machines, extruders and kneaders, cableways and lifts, test bay drives
Catalog D 31.1	Catalog D 11	Catalog D 31.2	Catalog D 31.5	Catalog D 18.1	Catalog D 33 D 37.1	Catalog D 31.1	Catalog D 32	Catalog D 36.1	Catalogs D 21.3, D 21.4 NC 62	Catalog D 21.3	Catalog D 23.1, SiePortal
Engineering tools (e.g. Siemens Product Configurator, TIA Selection Tool, DriveSim Designer/Engineer, STARTER and SINAMICS Startdrive)											

[1] DC/DC controllers, see SiePortal.

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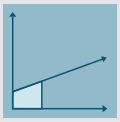
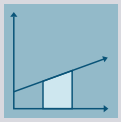
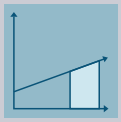
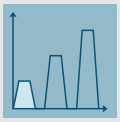
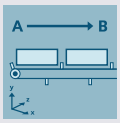
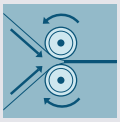
Overview

SINAMICS selection guide – typical applications

Use	Requirements for torque accuracy/speed accuracy/position accuracy/coordination of axes/functionality					
	Continuous motion			Non-continuous motion		
	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
	V20 G120C **G120X**	**G120X** G130/G150 G180 [1] DCM	G220 S120	G120/G220	S110	S120
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
	V20 G115D G120C ET 200pro FC-2 [2]	G120/G220 G120D G130/G150 G180 [1]	G220 S120 S150 DCM	V90 S200 G120/G220 G120D	S110 S210 DCM	S120 S210 DCM
Processing 	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	V20 G120C	G120/G220 G130/G150 G180 [1]	G220 S120 S150 DCM	V90 S200 G120/G220	S110 S210	S120 S210 DCM
Machining 	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	Axis drives for • Turning • Milling • Drilling	Axis drives for • Drilling • Sawing	Axis drives for • Turning • Milling • Drilling • Lasering • Gear cutting • Grinding • Nibbling and punching
	S110	S110 S120	S120	S110	S110 S120	S120

Using the SINAMICS selection guide

The varying range of demands on modern variable frequency drives requires a large number of different types. Selecting the optimum drive has become a significantly more complex process. The application matrix shown simplifies this selection process considerably, by suggesting the ideal SINAMICS drive for examples of typical applications and requirements.

- The application type is selected from the vertical column
  - Pumping, ventilating, compressing
  - Moving
  - Processing
  - Machining
- The quality of the motion type is selected from the horizontal row
  - Basic
  - Medium
  - High

More information

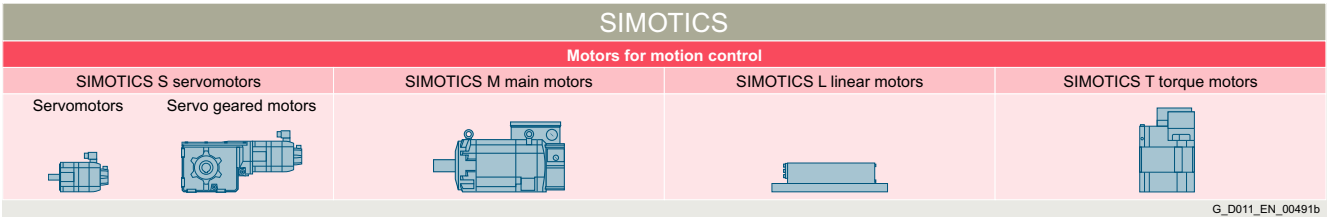
Further information about SINAMICS is available on the internet at www.siemens.com/sinamics

Practical application examples and descriptions are available on the internet at www.siemens.com/sinamics-applications

[1] Industry-specific converters.

[2] Information on the SIMATIC ET 200pro FC-2 frequency converter is available in Catalog D 31.2 and at www.siemens.com/et200pro-fc

Overview



SIMOTICS stands for

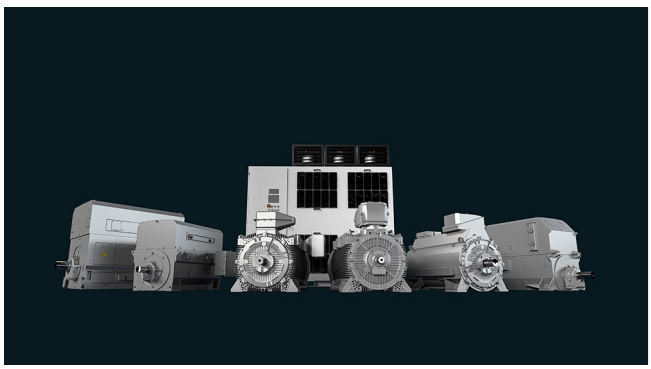
- 150 years of experience in building electric motors
- The most comprehensive range of motors for motion control applications
- Optimum solutions in all industries, regions and power/performance classes
- Innovative motor technologies of the highest quality and reliability
- Highest dynamic performance, precision and efficiency together with the optimum degree of compactness
- Our motors can be integrated into the drive train as part of the overall system
- 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.

Whatever it is that you want to move – we can supply the right motor for the task.
www.siemens.com/simotics

Motors from Innomotics



You can also find suitable motors from our product partner Innomotics
www.innomotics.com

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 which feeds through in tangible terms to 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.

Overview

Step by step to more efficiency

One of the core objectives of the European Union is a sustainable power industry. In industrial plants today, around 70 % of the power demand is from electrically driven systems. This high percentage contains huge potential for saving energy in electrical drives. For that reason, the European Union introduced minimum requirements for the energy efficiency of electric motors in the form of a statutory motor regulation as early as 2011.

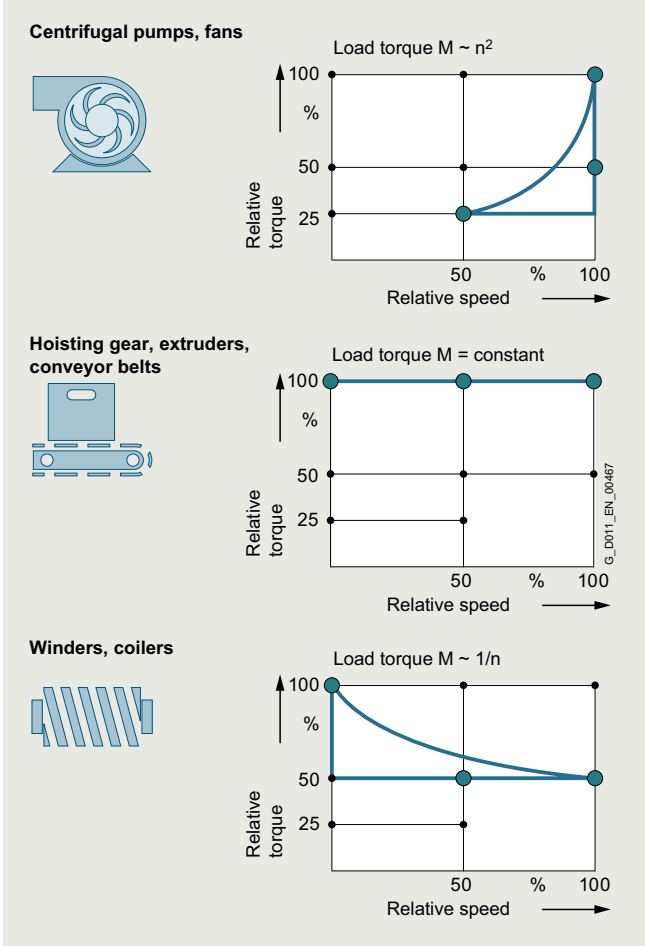
These activities are extended by the 2019/1781 EU regulation dealing with stricter requirements for DOL (Direct On Line) motors and defining efficiency limits for frequency converters. The regulation provides a legal basis for technical content regarding the efficiency of specific products and services. Standardization, however, has played a leading role in determining the field and the available market technology.

Energy efficiency improvement is supported through a systematic selection of the most efficient converter and drive system technology via the IEC 61800-9 series of standards. Part 1 specifies the methodology to determine the energy efficiency index of an application based on the extended product approach (EPA) and semi analytical models (SAMs), while Part 2 provides indicators for assessing the energy efficiency performance and the classification of converters and drive systems.
To take account of the different use cases, consideration of eight application-relevant operating points has been introduced as mandatory for the first time. Determination of loss values at these eight points and definition of efficiency classes are laid down by the standard in a uniform way. This enables data relevant to operation, such as application-specific load profiles, to now be taken into account more easily in the energy efficiency analysis.

The standard is especially important for variable-speed drives of the following types:

- for AC/AC converters without energy recovery functionality
- for motors with integrated converters
- for supply voltages of 100 V to 1000 V
- for power ratings of 0.12 kW to 1000 kW

To cover all applications of driven machines, the IEC 61800-9-2 standard defines operating points in full-load and partial-load operation, at which the losses of the motor and drive systems have to be determined. Based on the loss data at the operating points in partial-load operation, variable-speed drives can be explicitly considered in more detail. This makes their advantages especially clear.



Duty cycles for different driven machines

Moreover, frequency converters and motor systems are classified in efficiency classes, which permit an initial rough estimate of the potential saving. Definition of reference systems is a key aspect of this because they provide standard reference values. The positioning of these reference systems defines the efficiency class. The relative distance from the reference system can be used as an absolute measure of the efficiency at the operating point in question.

Overview

Advantages of the detailed loss consideration of IEC 61800-9-2 over the previous consideration of efficiencies and maximum loss values

For motors, the efficiency consideration was previously only defined for operation without a converter at 50/60 Hz. It provides a good way of comparing the energy efficiency of motors from different manufacturers for this use case.

The more detailed loss analysis of IEC 61800-9-2, on the other hand, is aimed at speed-controlled operation and therefore now also includes motors especially designed for converter operation in the energy analysis. These were previously not covered by the applicable standards.
Moreover, a loss analysis over the entire setting and load range of the motor is possible. This is done in accordance with the standard IEC 61800-9-2 with typical values.

For holistic consideration, it is essential to include all the relevant components of a drive system. The IEC 61800-9-2 standard defines this in detail. The standardized expression of power loss data as a percentage makes comparison considerably easier and more transparent.

The method also makes it possible to consider a motor that produces a holding torque at speed zero, for example. In this case, the efficiency is zero, but a power loss from current producing magnetization and holding torque does occur. In summary, the key advantage of standard IEC 61800-9-2 is the ability to perform the energy analysis of an electrical drive system based on standardized load profiles in all operating ranges due to uniform general conditions. This provides the user with complete transparency irrespective of the manufacturer.

Establishing efficiency classes of frequency converters (Complete Drive Modules CDM)

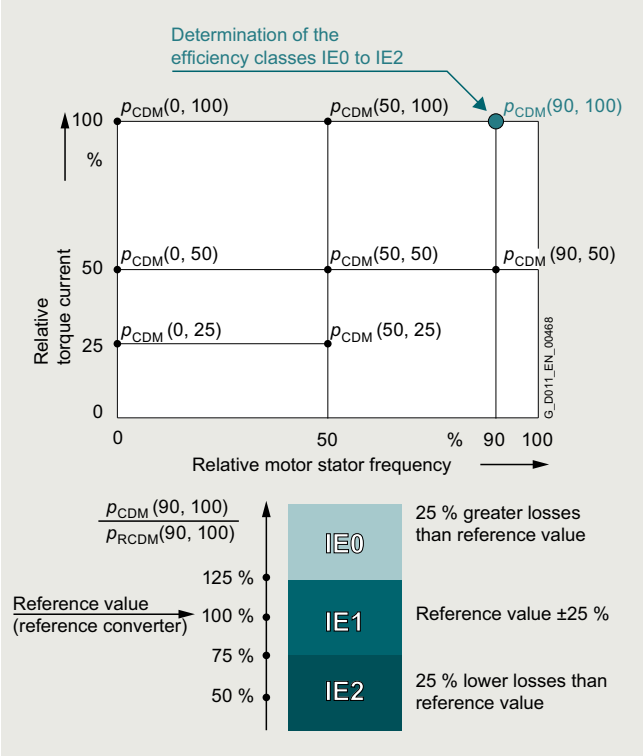
To avoid overmodulation and to ensure comparability between makes, which cannot be achieved otherwise, the efficiency classes of CDMs refer to the 90/100 operating point (90 % motor stator frequency, 100 % torque current).

Standard IEC 61800-9-2 defines the relative losses of a CDM in efficiency classes IE0 to IE2. With reference to the value of a CDM of efficiency class IE1 (reference converter), a CDM of efficiency class IE2 has 25 % lower losses and a CDM of efficiency class IE0 has 25 % higher losses.

The publication of the 2019/1781 EU regulation has made mandatory the fulfillment of the ecodesign requirements for the declaration of product conformity.

AC/AC converters belonging to the aforementioned categories (specific voltage and power level without regenerative capability) have to fulfill efficiency class IE2 in order to be approved for installation/utilization within EU.

Operating points for CDMs



Complete Drive Module (CDM) – determining the efficiency class

Establishing the efficiency classes of drive systems (Power Drive Systems PDS)

What is possible for the individual systems, of course, also applies to the entire electrical PDS (frequency converter plus motor). Detailed comparisons are now possible at this level, too. The reference values for the reference system provide clear indications of the energy performance of the PDS.

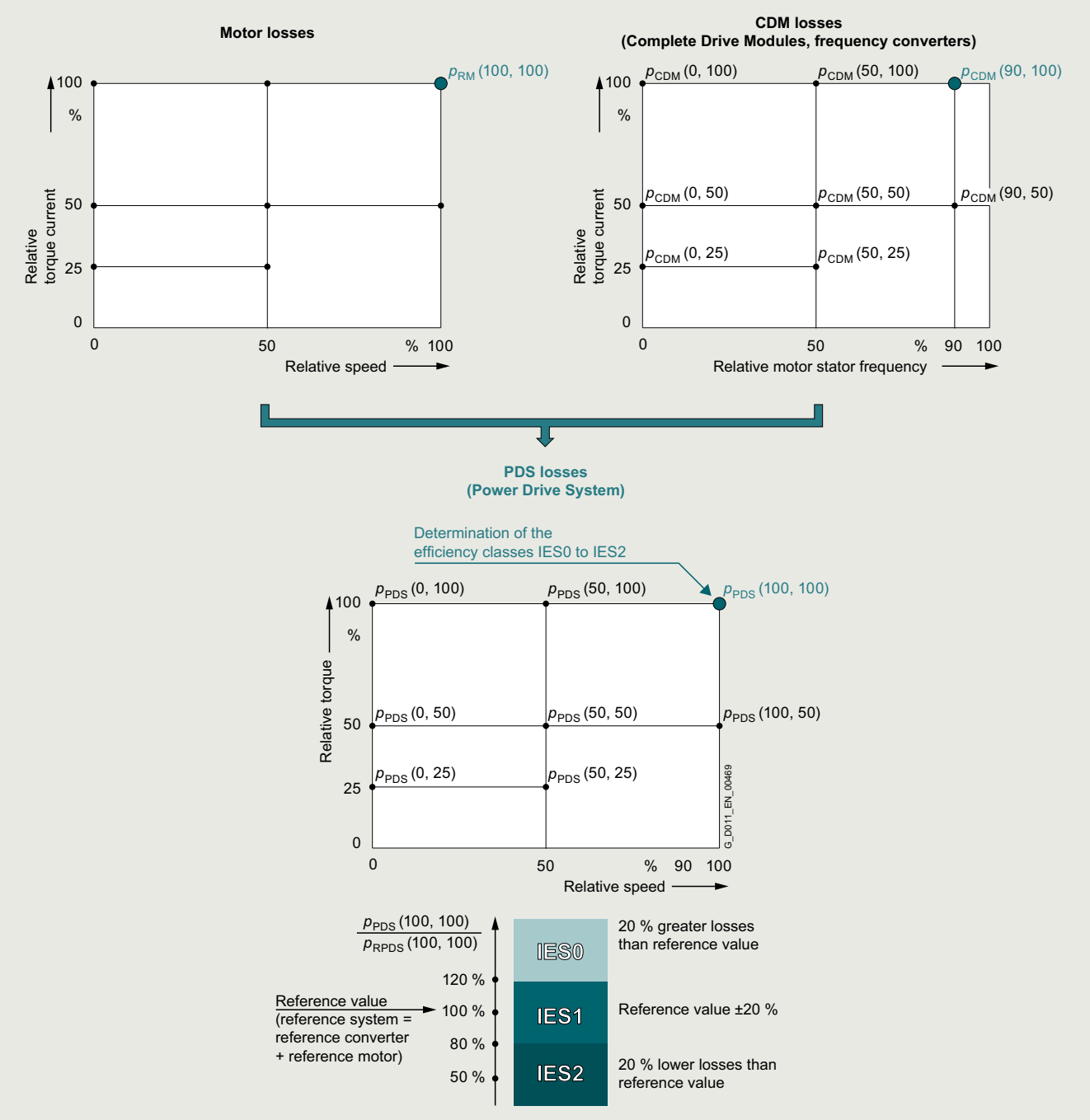
Because targeted matching of the motor and CDM provides additional potential for optimization in electrical drive systems, it is especially important for the user to consider the entire drive system.

For the efficiency class of a PDS, too, a specific load point is defined. In this case, the reference point used is the 100/100 operating point (100 % motor stator frequency, 100 % torque).

Standard IEC 61800-9-2 defines the relative losses of a PDS in efficiency classes IES0 to IES2. With reference to the value of a PDS of efficiency class IES1 (reference drive), a PDS of efficiency class IES2 has 20 % lower losses and a PDS of efficiency class IES0 has 20 % higher losses.

Overview

Operating points for PDS



Power Drive System (PDS) – determining the efficiency class

More information

Power loss data of SINAMICS converters for single-axis drives are available

- for SINAMICS V20, SINAMICS G115D/G120/G120C/G120D/G120P/G120X/G130/G150/G180 and SINAMICS S110/S120/S150 on the internet at https://support.industry.siemens.com/cs/document/94059311
- for SINAMICS G220 via ID-Link or Siemens Product Configurator in SiePortal at www.siemens.com/sinamics-g220/configuration

More information on current laws and standards, new standards, and mandatory guidelines is available on the internet at www.siemens.com/legislation-and-standards

Overview

SINAMICS G120X, frame sizes FSA to FSJ, degree of protection IP20, with IOP-2 Intelligent Operator Panel

Easy handling, utmost reliability, superior efficiency and advanced digitalization - Siemens offers an answer to these trends with the SINAMICS G120X converter series. SINAMICS G120X is an innovative and user-friendly converter series that has been specifically developed for applications performed in infrastructure environments such as water/wastewater, but also for tasks in building automation. In this context, the converter supports, for example, pump, fan and compressor applications through numerous integrated functionalities and combines these in one device for the target sectors.

The SINAMICS G120X converter series is intended for driving pumps and fans or comparable passive load with low dynamic requirements.
With this converter series, regenerative energy can neither be regenerated to the supply system nor dissipated via braking chopper and braking resistor.

The SINAMICS G120X converter is an integrated and efficient drive solution for a wide range of tasks. The system allows convenient handling through optimized user interfaces: IOP-2 Intelligent Operator Panel with graphic color display and the optional web server module SINAMICS G120 Smart Access - a Wi-Fi-based web server solution. Thus, the SINAMICS G120X fulfils the request for an easy and fast setup of the devices during the commissioning phase. Further, experienced users can use the full flexibility of a SINAMICS converter and adjust the relevant application to their requirements.

Totally integrated operation - this approach is also supported from ordering through to delivery. For example, all the major features of the converter are configured and displayed in the article number. The delivery includes the complete device - as configured - that means, the converter and the selected operator panel.

In addition, SINAMICS G120X has an extremely rugged and reliable construction. The integrated DC link reactor with a maximum output of 250 kW and optional resistance to harmful gases up to environmental class 3C3 ensure a reliable, stable and largely robust operation.

Further, the SINAMICS G120X converter series provides innovative hardware and software functions, e.g. for controlling synchronous reluctance drive systems. In this way, the SINAMICS G120X converter series makes a substantial contribution towards saving energy and makes more careful use of our natural resources.

Portfolio range

The SINAMICS G120X converter series with degree of protection IP20/UL Open Type offers a seamless system approach in three different voltage ranges with wide options of built-in communication interfaces including PROFINET, EtherNet/IP, USS, Modbus RTU, BACnet MS/TP and PROFIBUS DP:

- 200 V to 240 V 3 AC: 0.75 kW to 55 kW (1 hp to 75 hp)
- 380 V to 480 V 3 AC: 0.75 kW to 560 kW (1 hp to 700 hp)
- 500 V to 690 V 3 AC: 3 kW to 630 kW (4 hp to 700 hp)

User-friendliness

A high degree of user-friendliness is one of the main characteristics of the SINAMICS G120X:

- Operator panel with color display and extensive diagnostics functions (IOP-2 Intelligent Operator Panel)
- Two different setup options are available: Standard and quick start with graphical user guidance
- Optimized setups for pumps and fans in the web server module SINAMICS G120 Smart Access
- SINAMICS SD card for storing parameter settings, cloning and local commissioning

Integrated functionalities for the start/operational/stop phases of the application

SINAMICS G120X is always preset, depending on the selected converter performance. Further, the following functions can be easily selected and parameterized:

Start phase

During the start phase, the following functions are supported by default:

- Deragging mode for pumps for cleaning the pump system, improving efficiency and reducing wear
- Pipe filling mode for preventing pressure shocks in pipeline systems
- Two acceleration ramps for shorter start/stop times
- Flying restart of the running motor for fast hot restart
- Automatic restart function after power failure during short downtimes

Operating phase

During the operating phase, the following functions are supported by default:

- Continued run mode with autonomous reduction of output and pulse frequency
- PID controller for autonomous closed-loop control mode, operated according to analog input values
- Up to 16 variable-speed setpoints as fixed frequencies
- Speed monitoring via sensor (pulse input)
- Multi-pump control of up to four pumps
- Protection against blocking, leakage, dry running and cavitation
- Fire response mode for extended operation in case of emergency
- Skip frequencies for skipping critical frequencies and avoiding vibration
- Real time clock for switching over setpoints or controlling releases

Overview

Stop phase

During the stop phase, the following functions are supported by default:

- STO (Safe Torque Off) according to IEC 61508 SIL 3 and EN ISO 13489-1 PL e and Category 3.
  External components (e.g. safety relays) are necessary for using the STO safety function.
- ON/OFF2 for an optimized braking
- Condensation protection for the motor
- Frost protection function for the pump

A detailed description of the functions and connection diagrams are included in the device documentation.

Commissioning of complex applications

Sample applications, which include the description and device setting, are provided for SINAMICS G120X.

The following application descriptions are available:

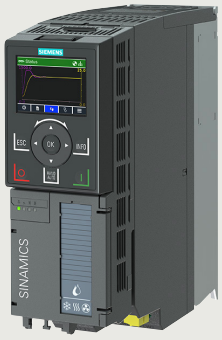
- Fan for exhaust air with closed-loop control of pressure and air quality
- Fan for cooling tower with closed-loop control of the cooling water temperature
- Fan for tunnel/parking garage with closed-loop control of air quality and essential service mode
- Fan for supply air with closed-loop control of pressure, temperature, air quality and flowrate
- Pumps with closed-loop control of the pressure
- Pumps with closed-loop control of the filling level
- Pumps for cooling circuits with closed-loop control of the temperature
- Compressor with closed-loop control of the pressure
- Vacuum pump with closed-loop control of the pressure

Practical application examples and descriptions are available on the internet at
www.siemens.com/sinamics-applications

Further information

The converter is also available as SINAMICS G120X Cabinet version for more demanding projects. For more information, please contact your regional sales representative.

Overview



SINAMICS G120X
FSA with IOP-2
(Intelligent Operator Panel)

SINAMICS G120
Smart Access
(web server module)

G_D011_EN_00566

Example: SINAMICS G120X Starter Kit, frame size FSA, 0.75 kW, with IOP-2 Intelligent Operator Panel and SINAMICS G120 Smart Access

A SINAMICS G120X Starter Kit comprises a SINAMICS G120X converter (380 ... 480 V 3 AC; PROFINET) with an IOP-2 Intelligent Operator Panel and a SINAMICS G120 Smart Access web server module.

The delivery quantity is limited to three units per customer.

Selection and ordering data

Description	Article No.
SINAMICS G120X Starter Kits Converter (380 ... 480 V 3 AC, PROFINET) with IOP-2 and SINAMICS G120 Smart Access	
• 0.75 kW, FSA, without integrated line filter	**6SL3200-0AE70-0AA0**
• 0.75 kW, FSA, with integrated line filter Category C2	**6SL3200-0AE72-0AA0**
• 3 kW, FSA, with integrated line filter Category C2	**6SL3200-0AE73-0AA0**
• 7.5 kW, FSB, with integrated line filter Category C2	**6SL3200-0AE74-0AA0**

SINAMICS G120X infrastructure converters for HVAC/Water/Wastewater
0.75 kW to 630 kW (1 hp to 700 hp)

Further information about SINAMICS G120X can be found on the internet at www.siemens.com/sinamics-g120x

2

Overview

SINAMICS G120X, frame sizes FSA to FSJ, degree of protection IP20, with IOP-2 Intelligent Operator Panel

Easy handling, utmost reliability, superior efficiency and advanced digitalization - Siemens offers an answer to these trends with the SINAMICS G120X converter series. SINAMICS G120X is an innovative and user-friendly converter series that has been specifically developed for applications performed in infrastructure environments such as water/wastewater, but also for tasks in building automation. In this context, the converter supports, for example, pump, fan and compressor applications through numerous integrated functionalities and combines these in one device for the target sectors.

The SINAMICS G120X converter series is intended for driving pumps and fans or comparable passive load with low dynamic requirements.
With this converter series, regenerative energy can neither be regenerated to the supply system nor dissipated via braking chopper and braking resistor.

The SINAMICS G120X converter is an integrated and efficient drive solution for a wide range of tasks. The system allows convenient handling through optimized user interfaces: IOP-2 Intelligent Operator Panel with graphic color display and the optional web server module SINAMICS G120 Smart Access - a Wi-Fi-based web server solution. Thus, the SINAMICS G120X fulfils the request for an easy and fast setup of the devices during the commissioning phase. Further, experienced users can use the full flexibility of a SINAMICS converter and adjust the relevant application to their requirements.

Totally integrated operation - this approach is also supported from ordering through to delivery.

For example, all the major features of the converter are configured and displayed in the article number. The delivery includes the complete device - as configured - that means, the converter and the selected operator panel.

In addition, SINAMICS G120X has an extremely rugged and reliable construction. The integrated DC link reactor with a maximum output of 250 kW and optional resistance to harmful gases up to environmental class 3C3 ensure a reliable, stable and largely robust operation.

Further, the SINAMICS G120X converter series provides innovative hardware and software functions, e.g. for controlling synchronous reluctance drive systems. In this way, the SINAMICS G120X converter series makes a substantial contribution towards saving energy and makes more careful use of our natural resources.

Portfolio range

The SINAMICS G120X converter series with degree of protection IP20/UL Open Type offers a seamless system approach in three different voltage ranges with wide options of built-in communication interfaces including PROFINET, EtherNet/IP, USS, Modbus RTU, BACnet MS/TP and PROFIBUS DP:

- 200 V to 240 V 3 AC: 0.75 kW to 55 kW (1 hp to 75 hp)
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User-friendliness

A high degree of user-friendliness is one of the main characteristics of the SINAMICS G120X:

- Operator panel with color display and extensive diagnostics functions (IOP-2 Intelligent Operator Panel)
- Two different setup options are available: Standard and quick start with graphical user guidance
- Optimized setups for pumps and fans in the web server module SINAMICS G120 Smart Access
- SINAMICS SD card for storing parameter settings, cloning and local commissioning

Integrated functionalities for the start/operational/stop phases of the application

SINAMICS G120X is always preset, depending on the selected converter performance. Further, the following functions can be easily selected and parameterized:

Start phase

During the start phase, the following functions are supported by default:

- Deragging mode for pumps for cleaning the pump system, improving efficiency and reducing wear
- Pipe filling mode for preventing pressure shocks in pipeline systems
- Two acceleration ramps for shorter start/stop times
- Flying restart of the running motor for fast hot restart
- Automatic restart function after power failure during short downtimes

Operating phase

During the operating phase, the following functions are supported by default:

- Continued run mode with autonomous reduction of output and pulse frequency
- PID controller for autonomous closed-loop control mode, operated according to analog input values
- Up to 16 variable-speed setpoints as fixed frequencies
- Speed monitoring via sensor (pulse input)
- Multi-pump control of up to four pumps
- Protection against blocking, leakage, dry running and cavitation
- Fire response mode for extended operation in case of emergency
- Skip frequencies for skipping critical frequencies and avoiding vibration
- Real time clock for switching over setpoints or controlling releases

Overview

Stop phase

During the stop phase, the following functions are supported by default:

- STO (Safe Torque Off) according to IEC 61508 SIL 3 and EN ISO 13489-1 PL e and Category 3.
  External components (e.g. safety relays) are necessary for using the STO safety function.
- ON/OFF2 for an optimized braking
- Condensation protection for the motor
- Frost protection function for the pump

A detailed description of the functions and connection diagrams are included in the device documentation.

Commissioning of complex applications

Sample applications, which include the description and device setting, are provided for SINAMICS G120X.

The following application descriptions are available:

- Fan for exhaust air with closed-loop control of pressure and air quality
- Fan for cooling tower with closed-loop control of the cooling water temperature
- Fan for tunnel/parking garage with closed-loop control of air quality and essential service mode
- Fan for supply air with closed-loop control of pressure, temperature, air quality and flowrate
- Pumps with closed-loop control of the pressure
- Pumps with closed-loop control of the filling level
- Pumps for cooling circuits with closed-loop control of the temperature
- Compressor with closed-loop control of the pressure
- Vacuum pump with closed-loop control of the pressure

Practical application examples and descriptions are available on the internet at
www.siemens.com/sinamics-applications

Further information

The converter is also available as SINAMICS G120X Cabinet version for more demanding projects. For more information, please contact your regional sales representative.

Benefits

Energy efficiency

SINAMICS G120X increases the efficiency and minimizes energy consumption in the complete process chain. The converter has integrated hardware as well as software functions as standard. The main features are:

- Power units with DC link reactor for extremely high active power component thanks to efficient converter topology - for the same drive power, the converter requires a lower line current than comparable converters
- Flux reduction through automatic adaptation of the motor current to the prevailing load conditions with closed-loop control modes V/f (ECO) and vector without sensor (SLVC) and savings of up to 5 % under partial load conditions
- Hibernation mode dependent on setpoints in the process
- High efficiency $\eta \geq 95$ %

Application-specific commissioning and operation using operator panel

- Local commissioning without specialized knowledge of converters thanks to default settings and graphical user interface
- Unique: SINAMICS SD memory card for pre-parameterization and cloning of converter data sets
- Data backup for easy replacement
- Commissioning/diagnostics and controlling of converters

Flexible deployment of integrated functions

- PLC functions for local control tasks for frame sizes FSA to FSG
  Flexible use of integrated function blocks
  → No need for additional, external components
- Four integrated PID controllers
  Distributed closed-loop control for motor-independent process control without higher-level controller (PLC)
- Three 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
- Direct connection of Pt1000/Ni1000 temperature sensors with optional SINAMICS G120X I/O Extension Module
- Connection and evaluation of a recommended, optional Pt100 temperature sensor by using a free analog input and output
- 2/3-wire control for static/pulsed signals for universal control via digital inputs
- 230 V AC relay
  - Direct control for auxiliary equipment, e.g. reactor or valve actuators
- Safety functions
  - Terminals for controlling the STO (Safe Torque Off) Safety function according to IEC 61508 SIL 3 and EN ISO 13489-1 PL e and Category 3.
    External components (e.g. safety relays) are necessary for using the STO safety function.
- X9 terminal strip for devices in frame sizes FSH and FSJ (315 kW to 630 kW)
  - Input for external 24 V DC supply
  - Input for external alarm/fault
  - Input for EMERGENCY OFF/EMERGENCY STOP
  - Output for 24 V DC
  - Control of the main contactor
  - Feedback message "DC link charged"
- Use of the communication versions at ambient temperatures of
  - -20 °C to +55 °C: PROFINET, EtherNet/IP
  - -20 °C to +60 °C: PROFIBUS DP, USS, Modbus RTU, BACnet MS/TP
- Removable operator panel
  - Protection against unauthorized access
  - Color-coded signaling of operating states
- Replacement of individual components without the need for reinstallation
  - Plug-in version of control terminals (for replacement without removing wiring)
- Version for harsh environmental conditions
  - Coated modules for increased resistance to humidity and dust (Class 3C2)
  - PCB coating for environmental class/harmful chemical substances Class 3C3 acc. to IEC 60721-3-3: 2002

Extended warranty

For SINAMICS G120X, Siemens offers an optional extension of warranty up to 5½ years via **Service Protect**:

- Free for the first 6 months after registering the product at:
  www.siemens.com/serviceprotect
- Subject to a charge for a further 3 or 5 years

For further information, go to:
https://support.industry.siemens.com/cs/ww/en/sc/4842

Concerning standard warranty please ask your partner at Siemens. Your partner can be found in our Personal Contacts Database at:
www.siemens.com/automation-contact

Application

The specialist for pump, fan and compressor applications

SINAMICS G120X is ideally suited to pump applications (centrifugal pumps, oscillating and rotating pumps), fan applications (axial and radial fans) and compressor applications (cooling compressors, air and gas compressors). They are deployed in the water/waste water industries, in industrial environments, and in building automation.

SINAMICS G120X 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-story car parks
- Fans for stairwells
- Compressors for cooling units

The SINAMICS G120X converter series is intended for driving pumps and fans or comparable passive load with low dynamic requirements.
With this converter series, regenerative energy can neither be regenerated to the supply system nor dissipated via braking chopper and braking resistor.

Reliable operation in harsh environments

SINAMICS G120X is suitable for use under harsh environmental conditions:

- Degree of protection IP20/UL Open Type for use in the control cabinet
- Degree of protection IP21 with optional IP21 top cover for use in lockable control rooms, including outside a control cabinet
- Degree of protection IP20 with optional push-through mounting frame for space-saving design when installed in the control cabinet; power losses are dissipated using an external heat sink, separate internal air circulation
- Use of the communication versions at ambient temperatures of
  - -20 °C to +55 °C: PROFINET, EtherNet/IP
  - -20 °C to +60 °C: PROFIBUS DP, USS, Modbus RTU, BACnet MS/TP
- Coated modules for increased resistance to humidity and dust (Class 3C2)
- Optional for environmental class/harmful chemical substances Class 3C3 acc. to IEC 60721-3-3: 2002

Design

SINAMICS G120X is a converter system that comprises a power output module and a control module with or without an operator panel.

The converter is configured on the basis of the power requirement and the application. 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 converter and motor.

The SINAMICS G120X converters in degree of protection IP20 are intended for installation in a control cabinet.

- Selection of the line filter for line voltage 200 V to 240 V 3 AC
  - Without integrated line filter, 0.75 kW to 55 kW
- Selection of the line filter for line voltage 380 V to 480 V 3 AC
  - Without integrated line filter, 0.75 kW to 132 kW
  - With integrated line filter Category C2, 0.75 kW to 250 kW
  - With integrated line filter Category C3, 160 kW to 560 kW
  - With additional line filter Category C1 for unfiltered devices, 0.75 kW to 110 kW
  - With additional line filter Category C2 for filtered devices, 315 kW to 560 kW
- Selection of the line filter for line voltage 500 V to 690 V 3 AC
  - Without integrated line filter, 3 kW to 132 kW
  - With integrated line filter Category C2, 3 kW to 55 kW
  - With integrated line filter Category C3, 75 kW to 630 kW
  - With additional line filter Category C2 for filtered devices, 315 kW to 630 kW
- Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002
  - Class 3C2
  - Class 3C3
- Selection of communication
  - PROFINET, EtherNet/IP
  - PROFIBUS
  - USS, Modbus RTU, BACnet MS/TP
- Selection of the operator panel
  The operator panels support user-friendly local commissioning, control and diagnostics and enable complete converter data sets to be pre-parameterized and cloned.
  - Without operator panel
  - BOP-2 Basic Operator Panel
    The menu prompting and the 2-line display allow for simple commissioning of the converter. 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.
  - IOP-2 Intelligent Operator Panel
    Supports entry-level personnel as well as drive experts. Thanks to the color display, a user-friendly menu structure and wizards, it is much easier to commission, diagnose and locally control standard drives.

Line-side power components

The following line-side power components are available for the SINAMICS G120X converters:

- Line filters for categories C1, C2 and C3, see above
  With an additional line filter, the converter complies with a higher radio interference class.
- Line harmonics filters for frame sizes FSB from 5.5 kW to FSG up to 250 kW
  The use of a line harmonics filter enables a significant reduction in unwanted harmonics. This means that a THD (I) value of less than 5 % can be achieved and compliance with the limit values according to IEC 61000-3-12, IEC 61000-2-2 and IEEE 519 is possible regardless of the network impedance.
- Line reactors for devices from 315 kW and for frame sizes FSH and FSJ
  Line reactors smooth the current drawn by the converter and thus reduce harmonic components in the line current. Through the reduction of the current harmonics, the thermal load on the power components in the rectifier and in the DC link capacitors is reduced as well as the harmonic effects on the supply. The use of a line reactor increases the service life of the converter.
  SINAMICS G120X frame sizes FSA to FSG feature an integrated DC link reactor as standard. The use of an additional line reactor is not necessary for this.

Recommended line-side overcurrent protection devices and power components

This section contains recommendations for additional line-side components, such as Siemens fuses and circuit breakers (line-side components must be dimensioned in accordance with IEC standards).

Additional information about the listed fuses and circuit breakers is available in the Catalogs LV 10, IC 10 and IC 10 AO as well as in SiePortal.

Design

Load-side power components

Various load-side power components are available for the SINAMICS G120X converters. These allow the use of longer shielded motor cables and increase the motor service life:

- Output reactors for frame sizes FSD to FSJ
  Output reactors reduce the rate of voltage rise (dv/dt) and the height of the current peaks, and can allow longer motor cables to be connected.
- Sine-wave filters for frame sizes FSA to FSF
  Sine-wave filters limit the rate of voltage rise (dv/dt) and the peak voltages on the motor winding. Similar to an output reactor, they enable the connection of longer motor cables.
- dv/dt filters plus VPL for frame sizes FSD to FSJ
  dv/dt filters plus VPL (Voltage Peak Limiter) limit the voltage rate-of-rise dv/dt to values of <500 V/µs and the typical voltage peaks to values according to the limit value curve according to IEC/TS 60034-17: 2006.
  Standard motors with standard insulation and without insulated bearings can be used for converter operation if a dv/dt filter plus VPL is used.

Optional accessories

- SINAMICS memory card (SD card)
- SINAMICS G120 Smart Access for simple setup via Wi-Fi
- SINAMICS G120X I/O Extension Module for direct connection of Pt1000/Ni1000 temperature sensors [1)]
- Push-through mounting frame for frame sizes FSA to FSG
- Increase in degree of protection to IP21 with IP21 top covers for frame sizes FSA to FSG
- Wiring adapter for frame size FSG for optimal and space-saving wiring
- Installation kit for line-side cable connection, left, for frame size FSH

Note:

Shield connection kits are an integral component of the delivery.

Spare parts

- FPI (freely programmable interface) board for frame sizes FSH and FSJ
- PSB (power supply board) board for frame sizes FSH and FSJ
- Current transformers for frame sizes FSH and FSJ
- Spare parts kit for Control Unit for frame sizes FSA and FSJ
- Shield connection kit for Control Unit for frame sizes FSD to FSG
- Shield connection kits for Power Module for frame sizes FSA to FSG
- Small parts assembly set for frame sizes FSD to FSG
- Terminal cover kits for covering the connecting terminals for frame sizes FSD to FSG
- Fan units
  - External for frame sizes FSA to FSJ
  - Internal for frame sizes FSH and FSJ
- Control Units for frame sizes FSD to FSJ

Function

Technology function

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

- Specific firmware functions such as deragging or pipe fill mode
- Automatic restart
  Application restart after a power failure or fault occurrence
- Flying restart
  Connection of the converter when the motor is running
- Flux reduction
  Automatic adaptation of the motor current to the prevailing load conditions in V/f control mode (ECO mode) as well as in sensorless vector control mode
- Cascade connection
  Load-dependent connection and disconnection of a maximum of three additional motors by the converter in order to provide a largely constant output power (implemented by means of an additional external circuit)
- Hibernation mode
  Startup or shutdown of the drive when the relevant value drops below an external setpoint or the internal PID controller setpoint
- Real-time clock
  For time-dependent process controls, e.g. to reduce the temperature of a heating control at night and with automatic daylight saving/standard time switchover
- Freely programmable logical function blocks for frame sizes FSA to FSG
  For simulating simple PLC functions

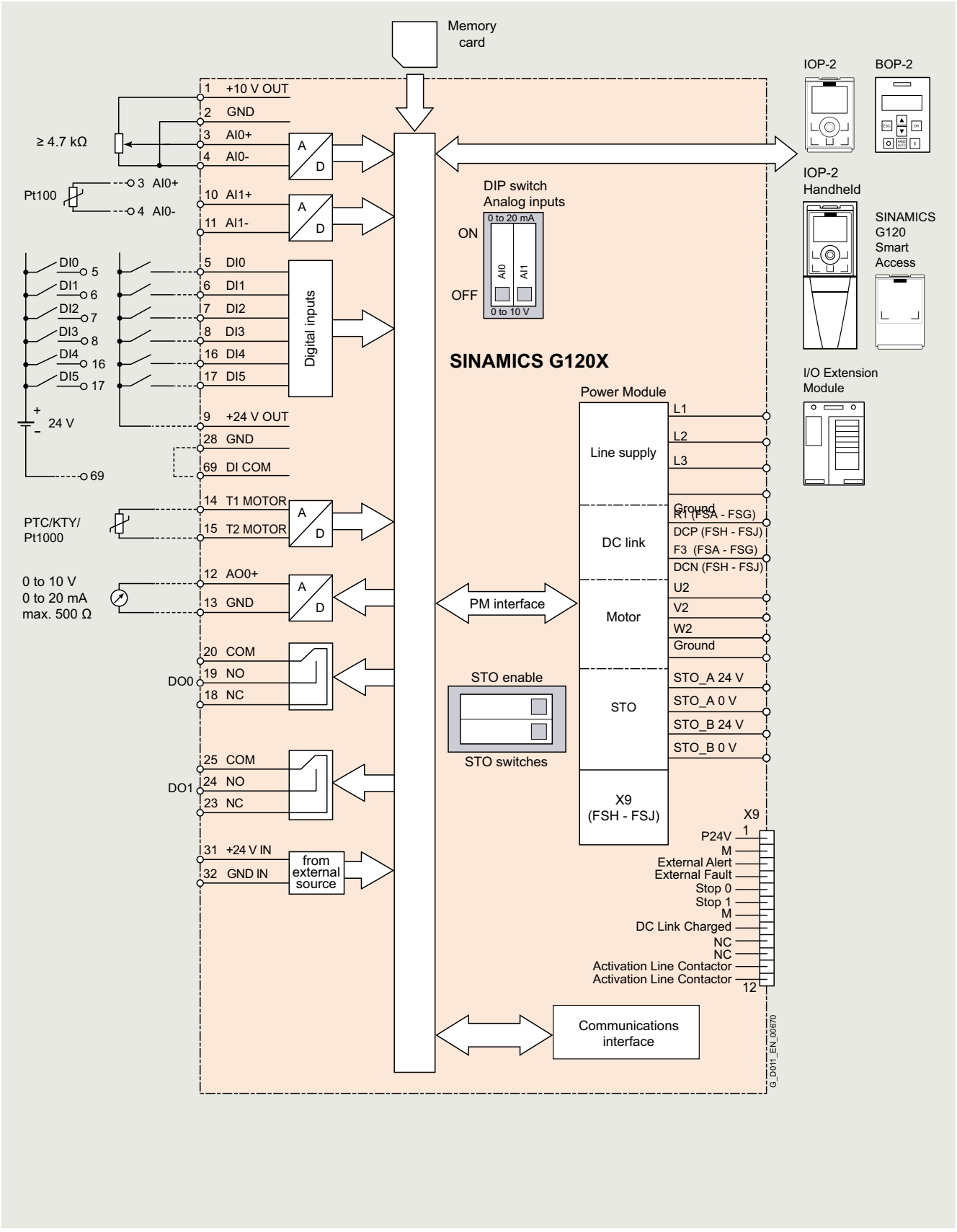
Functions especially for building technology as well as heating/air conditioning/ventilation applications

- Four integrated PID controllers
  One PID controller for controlling the drive speed as a function of pressure, temperature, flowrate, fill level, air quality and other process variables; a further three PID controllers with freely configurable outputs, e.g. for controlling valves (heating, cooling) or flaps
- Emergency mode
  Special converter operating mode that enhances the availability of the drive system in the event of a fire
- Bypass mode
  When the setpoint is reached or a fault occurs, the system changes over to line operation (implemented by means of an additional external circuit)
- Programmable time switches

[1)] The SINAMICS G120X I/O Extension Module (article number: **6SL3255-0BE00-0AA0**) is only supported on the SINAMICS G120X converters with hardware version ≥ 02 02 (FSA to FSG) / 02 (FSH/FSJ) and firmware ≥ V1.01.
The hardware version of the converter is on the rating plate.
For more information please refer to the documentation on the internet at:
www.siemens.com/sinamics-g120x/documentation

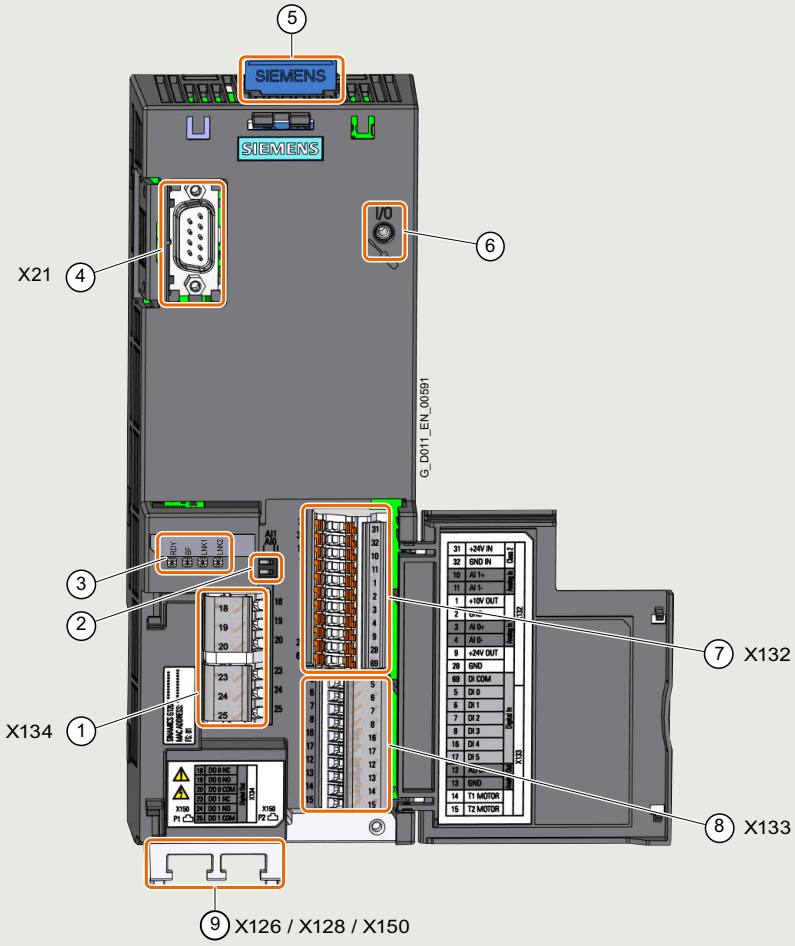
2

Integration



SINAMICS G120X connection diagram

Integration



1. Terminal strip
2. Switch for AI 0 and AI 1 (I/V)
3. Status LED
4. Connection to Operator Panel, Smart Access or I/O Extension Module
5. Memory card slot
6. For mounting the I/O Extension Module
7. 8. Terminal strips
9. Fieldbus interfaces on the bottom

SINAMICS G120X interface overview

Configuration

The following electronic configuring guides and engineering tools are available for SINAMICS G120X converters:

SINAMICS Selector app

Mobile selection guide for frequency converters

Siemens has developed the SINAMICS Selector app as a practical tool for finding article numbers for your SINAMICS converters in the power range from 0.1 kW to 630 kW quickly and easily. Whether for SINAMICS V20, SINAMICS V90, SINAMICS G120C, SINAMICS G120P, SINAMICS G120X, SINAMICS G120, SINAMICS G220, SINAMICS S200 or SINAMICS S210: The app will provide you with the correct article numbers conveniently.

How does it work? Simply select your application, the frequency converter you require, the rated power and device options as well as the necessary accessories.

Then you can save your selection and send it by email. Your preselection is the basis for an order specification with the dealer/Siemens.

You will find the free downloads for Android and for iOS at the following link:
www.siemens.com/sinamics-selector

SINAMICS DriveSim Designer (firmware V1.03.00 or higher)

SINAMICS DriveSim Designer provides easy-to-use models for PROFIdrive-enabled SINAMICS converters, so you can create a digital twin of your drive.

More information is provided on the internet at:
www.siemens.com/drive-virtualization

Siemens Product Configurator

The Siemens Product Configurator helps you to configure the optimum drive technology products for a number of applications – starting with gear units, motors, converters as well as the associated options and components and ending with controllers, software licenses and connection systems.

The Siemens Product Configurator can be used on the internet without requiring any installation. The Siemens Product Configurator can be found in SiePortal at the following address:
www.siemens.com/spc

You can find further information on the Siemens Product Configurator in the Engineering tools section.

TIA Selection Tool

Selection tool and configurator for automation technology

Flawless configuration without expert knowledge through intelligent configurators and selection wizards. Desktop and cloud versions enable cross-team work with maximum flexibility.

There are two versions of the TIA Selection Tool:

- One for downloading and executing on Microsoft Windows PCs (from Microsoft Windows 10)
- One for running from the cloud, which is launched from mobile devices directly in the browser
  (we recommend Safari, Chrome and Firefox)

Projects stored in the cloud can be edited with both tools. This makes it possible to work on-the-go using a tablet, at home on a PC – and vice versa, or together with colleagues and customers.

In order to use the full functionality, we recommended setting up a SiePortal account for both cases. This gives you access to prices and enables you to save your projects to our cloud.

You can find more information on the TIA Selection Tool at
www.siemens.com/tia-selection-tool

SIMARIS planning tools for plants with SINAMICS drives

Electrical planning: Even easier with software!

Electrical planning for power distribution in non-residential and industrial buildings has never been more complex. To ensure you, as a specialist planner, have the best hand when it comes to electrical planning with SINAMICS drives, we provide support with the following efficient software tools: SIMARIS design for dimensioning and SIMARIS project for calculating the space requirements of the distribution boards.

You can find more information on the SIMARIS planning tools for plants with SINAMICS drives in the Engineering tools section.

SinaSave energy efficiency tool

Use SinaSave to calculate potential energy savings

The web-based tool SinaSave can be used to estimate the potential savings which can be achieved over the entire lifecycle, e.g. for pump and fan applications, thanks to SINAMICS. The tool takes into consideration all important plant-specific quantities, such as the power and load data of the application, the relevant control mode and the operation profile for the application in question. The result delivered by the tool specifies the potential energy savings which can be achieved with the specific application in conjunction with all drive components. The tool also provides a monetary evaluation of the potential savings and estimates the payback period.

You can find more information about the amortization calculator for energy-efficient drive systems at
www.siemens.com/sinasave

You can find further information on the SinaSave energy efficiency tool in the Engineering tools section.

Configuration

SIZER for Siemens Drives engineering tool (integrated into TIA Selection Tool)

The SIZER for Siemens Drives engineering tool makes it easy to configure the SINAMICS converter family. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER for Siemens Drives is designed to support configuring of the entire drive system.

The SIZER for Siemens Drives engineering tool is available free on the internet at
www.siemens.com/sizer

You can find further information on the SIZER for Siemens Drives engineering tool in the Engineering tools section.

Drive ES PCS 7 engineering system

Drive ES PCS 7 integrates drives into the SIMATIC PCS 7 process control system. Drive ES PCS 7 provides a block library with blocks for the drives and the corresponding faceplates for the operator station.

More information about the Drive ES engineering system is available on the internet at
www.siemens.com/drive-es

SINAMICS web server for SINAMICS G120X via SINAMICS G120 Smart Access

Web server for efficient commissioning, diagnostics and maintenance

The optionally available SINAMICS G120 Smart Access provides the SINAMICS G120X drive system with a web server for efficient commissioning, diagnostics and maintenance. The web server provides access to a multi-faceted range of new options for parameter assignment and drive diagnostics for laptops, tablets and smartphones.

You can find further information on the SINAMICS web server for SINAMICS G120X via SINAMICS G120 Smart Access in the Engineering tools section.

Selection and ordering data

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 200 ... 240 V 3 AC ➡ Configuration with line-side components (see right page)

Rated power [1]		Rated output current [2]		Base-load current I_H [3]		Rated input current [4]	Frame size	SINAMICS G120X Degree of protection IP20/UL Open Type without integrated line filter
200 V	240 V	200 V	240 V	200 V	240 V	200 V		
kW	hp	A	A	A	A	A		Article No.
200 ... 240 V 3 AC · Rated pulse frequency 4 kHz · Input frequency 47 ... 63 Hz								
0.75	1	4.2	4.2	3.2	3.2	3.8	FSA	**6SL32 ■ 0- ■ YC10- ■ U ■ 0**
1.1	1.5	6	6	4.2	4.2	5.4	FSA	**6SL32 ■ 0- ■ YC12- ■ U ■ 0**
1.5	2	7.4	7.4	6	6	6.7	FSA	**6SL32 ■ 0- ■ YC14- ■ U ■ 0**
2.2	3	10.4	10.4	7.4	7.4	9.6	FSB	**6SL32 ■ 0- ■ YC16- ■ U ■ 0**
3	4	13.6	13.6	10.4	10.4	12.7	FSB	**6SL32 ■ 0- ■ YC18- ■ U ■ 0**
4	5	17.5	17.5	13.6	13.6	16.3	FSB	**6SL32 ■ 0- ■ YC20- ■ U ■ 0**
5.5	7.5	22	22	17.5	17.5	20.8	FSC	**6SL32 ■ 0- ■ YC22- ■ U ■ 0**
7.5	10	28	28	22	22	26.3	FSC	**6SL32 ■ 0- ■ YC24- ■ U ■ 0**
11	15	42	42	28	28	40	FSD	**6SL32 ■ 0- ■ YC26- ■ U ■ 0**
15	20	54	54	42	42	51	FSD	**6SL32 ■ 0- ■ YC28- ■ U ■ 0**
18.5	25	68	68	54	54	64	FSD	**6SL32 ■ 0- ■ YC30- ■ U ■ 0**
22	30	80	80	68	68	76	FSE	**6SL32 ■ 0- ■ YC32- ■ U ■ 0**
30	40	104	104	80	80	98	FSE	**6SL32 ■ 0- ■ YC34- ■ U ■ 0**
37	50	130	130	104	104	126	FSF	**6SL32 ■ 0- ■ YC36- ■ U ■ 0**
45	60	154	154	130	130	149	FSF	**6SL32 ■ 0- ■ YC38- ■ U ■ 0**
55	75	192	192	154	154	172	FSF	**6SL32 ■ 0- ■ YC40- ■ U ■ 0**

Article No. supplements

Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002	
Class 3C2	**2**
Class 3C3	**3**
Operator Panel	
Without Operator Panel	**1**
With BOP-2 Basic Operator Panel (numeric 2-line display)	**2**
With IOP-2 Intelligent Operator Panel (graphic color display)	**3**
Extension with SINAMICS G120X I/O Extension Module	
Without extension	**0**
With SINAMICS G120X I/O Extension Module	**1**
Line filter	
Without integrated line filter (for IT systems [5])	**U**
Communication	
USS, Modbus RTU, BACnet MS/TP	**B**
PROFINET, EtherNet/IP	**F**
PROFIBUS DP	**P**

[1] Rated power based on the base-load current I_L. The base-load current I_L is based on the duty cycle for low overload (LO).

[2] The rated output current is based on the duty cycle for low overload (LO). These current values are valid for 200 V or 240 V.

[3] The base-load current I_H is based on the duty cycle for high overload (HO). These current values are valid for 200 V or 240 V.

[4] The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_L) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the converter.

[5] Non-filtered devices are designed for operation in IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3.

Line-side components (Configuration with load-side power components see next double page)

Line filters		Line harmonics filters	Line reactors	Recommended line-side overcurrent protection devices [1]			
Category C2	Category C1			Fuses IEC-compliant		Fuses UL/cUL-compliant Rated voltage 600 V AC [2]	
				Current		Fuse type	Current
Article No.	Article No.		Article No.	A	Article No.	Class/Article No.	A
–	–	–	A DC line reactor is integrated for frame sizes FSA to FSF – therefore no line reactor is required.	16	**3NA3805**	J	15
–	–	–		16	**3NA3805**	J	15
–	–	–		16	**3NA3805**	J	15
–	–	–		32	**3NA3812**	J	35
–	–	–		32	**3NA3812**	J	35
–	–	–		32	**3NA3812**	J	35
–	–	–		50	**3NA3820**	J	50
–	–	–		50	**3NA3820**	J	50
–	–	–		63	**3NA3822**	J	60
–	–	–		80	**3NA3824**	J	70
–	–	–		100	**3NA3830**	J	90
–	–	–		100	**3NA3830**	J	110
–	–	–		160	**3NA3836**	J	150
–	–	–		200	**3NA3140**	J	175
–	–	–		200	**3NA3140**	J	200
–	–	–		224	**3NA3142**	J	250

[1] Further information at https://support.industry.siemens.com/cs/document/109762895

[2] The Short Circuit Current Rating (SCCR) according to UL for industrial control panel installations to NEC Article 409 or UL 508A/508C or UL 61800-5-1 is 100 kA for SINAMICS G120X.

Selection and ordering data

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 200 ... 240 V 3 AC ➡ Configuration with load-side power components (see right page)

Rated power [1]		Rated output current [2]		Base-load current I_H [3]		Rated input current [4]	Frame size	SINAMICS G120X Degree of protection IP20/UL Open Type without integrated line filter
200 V	240 V	200 V	240 V	200 V	240 V	200 V		
kW	hp	A	A	A	A	A		Article No.
200 ... 240 V 3 AC · Rated pulse frequency 4 kHz · Input frequency 47 ... 63 Hz								
0.75	1	4.2	4.2	3.2	3.2	3.8	FSA	**6SL32 ■ 0- ■ YC10- ■ U ■ 0**
1.1	1.5	6	6	4.2	4.2	5.4	FSA	**6SL32 ■ 0- ■ YC12- ■ U ■ 0**
1.5	2	7.4	7.4	6	6	6.7	FSA	**6SL32 ■ 0- ■ YC14- ■ U ■ 0**
2.2	3	10.4	10.4	7.4	7.4	9.6	FSB	**6SL32 ■ 0- ■ YC16- ■ U ■ 0**
3	4	13.6	13.6	10.4	10.4	12.7	FSB	**6SL32 ■ 0- ■ YC18- ■ U ■ 0**
4	5	17.5	17.5	13.6	13.6	16.3	FSB	**6SL32 ■ 0- ■ YC20- ■ U ■ 0**
5.5	7.5	22	22	17.5	17.5	20.8	FSC	**6SL32 ■ 0- ■ YC22- ■ U ■ 0**
7.5	10	28	28	22	22	26.3	FSC	**6SL32 ■ 0- ■ YC24- ■ U ■ 0**
11	15	42	42	28	28	40	FSD	**6SL32 ■ 0- ■ YC26- ■ U ■ 0**
15	20	54	54	42	42	51	FSD	**6SL32 ■ 0- ■ YC28- ■ U ■ 0**
18.5	25	68	68	54	54	64	FSD	**6SL32 ■ 0- ■ YC30- ■ U ■ 0**
22	30	80	80	68	68	76	FSE	**6SL32 ■ 0- ■ YC32- ■ U ■ 0**
30	40	104	104	80	80	98	FSE	**6SL32 ■ 0- ■ YC34- ■ U ■ 0**
37	50	130	130	104	104	126	FSF	**6SL32 ■ 0- ■ YC36- ■ U ■ 0**
45	60	154	154	130	130	149	FSF	**6SL32 ■ 0- ■ YC38- ■ U ■ 0**
55	75	192	192	154	154	172	FSF	**6SL32 ■ 0- ■ YC40- ■ U ■ 0**

Article No. supplements

Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002	
Class 3C2	**2**
Class 3C3	**3**
Operator Panel	
Without Operator Panel	**1**
With BOP-2 Basic Operator Panel (numeric 2-line display)	**2**
With IOP-2 Intelligent Operator Panel (graphic color display)	**3**
Extension with SINAMICS G120X I/O Extension Module	
Without extension	**0**
With SINAMICS G120X I/O Extension Module	**1**
Line filter	
Without integrated line filter (for IT systems [5]))	**U**
Communication	
USS, Modbus RTU, BACnet MS/TP	**B**
PROFINET, EtherNet/IP	**F**
PROFIBUS DP	**P**

[1] Rated power based on the base-load current I_L. The base-load current I_L is based on the duty cycle for low overload (LO).

[2] The rated output current is based on the duty cycle for low overload (LO). These current values are valid for 200 V or 240 V.

[3] The base-load current I_H is based on the duty cycle for high overload (HO). These current values are valid for 200 V or 240 V.

[4] The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_L) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the converter.

[5] Non-filtered devices are designed for operation in IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3.

Load-side power components (Configuration with line-side components see double page before)

Output reactors	Sine-wave filters	dv/dt filters plus VPL
Article No.	Article No.	Article No.
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–

Ordering examples

Basic selection	Example 1	Example 2
SINAMICS G120X converters · degree of protection IP20/UL Open Type · 200 ... 240 V 3 AC, 15 kW · without integrated line filter	**6SL32 ■ 0- ■ YC28- ■ U ■ 0**	**6SL32 ■ 0- ■ YC28- ■ U ■ 0**
Article No. supplements		
Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002		
Class 3C2	**2**	
Class 3C3		**3**
Operator Panel		
With BOP-2 Basic Operator Panel (numeric 2-line display)		**2**
With IOP-2 Intelligent Operator Panel (graphic color display)	**3**	
Extension with SINAMICS G120X I/O Extension Module		
Without extension	**0**	**0**
With SINAMICS G120X I/O Extension Module		
Line filter		
Without integrated line filter (for IT systems [1])	**U**	**U**
Communication		
USS, Modbus RTU, BACnet MS/TP		
PROFINET, EtherNet/IP	**F**	**F**
PROFIBUS DP		
Complete Article No.	**6SL32 2 0- 3 YC28- 0 U F 0**	**6SL32 3 0- 2 YC28- 0 U F 0**

[1] Non-filtered devices are designed for operation in IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3.

Clicking to SiePortal

6SL3255-0AA00-5AA0

Selection and ordering data

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 380 ... 480 V 3 AC ➡ Configuration with line-side components (see right page)

Rated power 1)		Rated output current 2)		Base-load current I_H 3)		Rated input current 4)	Frame size	SINAMICS G120X Degree of protection IP20/UL Open Type **without** integrated line filter Converters up to 132 kW delivery ex stock 10 ... 48	SINAMICS G120X Degree of protection IP20/UL Open Type **with** integrated line filter Converters up to 132 kW delivery ex stock 10 ... 48
400 V	480 V	400 V	480 V	400 V	480 V	400 V			
kW	hp	A	A	A	A	A		Article No. ↓↓	Article No. ↓↓
380 ... 480 V 3 AC · Rated pulse frequency 4 kHz ≤ 90 kW, 2 kHz for 110 kW to 250 kW and 4 kHz > 250 kW · Input frequency 47 ... 63 Hz									
0.75	1	2.2	2.1	1.7	1.6	2.1	FSA	6SL32 ■ 0- ■ YE10- ■ U ■ 0	6SL32 ■ 0- ■ YE10- ■ A ■ 0
1.1	1.5	3.1	3	2.2	2.1	2.8	FSA	6SL32 ■ 0- ■ YE12- ■ U ■ 0	6SL32 ■ 0- ■ YE12- ■ A ■ 0
1.5	2	4.1	3.4	3.1	3	3.6	FSA	6SL32 ■ 0- ■ YE14- ■ U ■ 0	6SL32 ■ 0- ■ YE14- ■ A ■ 0
2.2	3	5.9	4.8	4.1	3.4	5.5	FSA	6SL32 ■ 0- ■ YE16- ■ U ■ 0	6SL32 ■ 0- ■ YE16- ■ A ■ 0
3	4	7.7	6.2	5.9	4.8	6.9	FSA	6SL32 ■ 0- ■ YE18- ■ U ■ 0	6SL32 ■ 0- ■ YE18- ■ A ■ 0
4	5	10.2	7.6	7.7	6.2	9.8	FSB	6SL32 ■ 0- ■ YE20- ■ U ■ 0	6SL32 ■ 0- ■ YE20- ■ A ■ 0
5.5	7.5	13.2	11	10.2	7.6	12	FSB	6SL32 ■ 0- ■ YE22- ■ U ■ 0	6SL32 ■ 0- ■ YE22- ■ A ■ 0
7.5	10	18	14	13.2	11	17	FSB	6SL32 ■ 0- ■ YE24- ■ U ■ 0	6SL32 ■ 0- ■ YE24- ■ A ■ 0
11	15	26	21	18	14	24.5	FSC	6SL32 ■ 0- ■ YE26- ■ U ■ 0	6SL32 ■ 0- ■ YE26- ■ A ■ 0
15	20	32	27	26	21	29.5	FSC	6SL32 ■ 0- ■ YE28- ■ U ■ 0	6SL32 ■ 0- ■ YE28- ■ A ■ 0
18.5	25	38	34	32	27	36	FSD	6SL32 ■ 0- ■ YE30- ■ U ■ 0	6SL32 ■ 0- ■ YE30- ■ A ■ 0
22	30	45	40	38	34	42	FSD	6SL32 ■ 0- ■ YE32- ■ U ■ 0	6SL32 ■ 0- ■ YE32- ■ A ■ 0
30	40	60	52	45	40	57	FSD	6SL32 ■ 0- ■ YE34- ■ U ■ 0	6SL32 ■ 0- ■ YE34- ■ A ■ 0
37	50	75	65	60	52	70	FSD	6SL32 ■ 0- ■ YE36- ■ U ■ 0	6SL32 ■ 0- ■ YE36- ■ A ■ 0
45	60	90	77	75	65	86	FSE	6SL32 ■ 0- ■ YE38- ■ U ■ 0	6SL32 ■ 0- ■ YE38- ■ A ■ 0
55	75	110	96	90	77	104	FSE	6SL32 ■ 0- ■ YE40- ■ U ■ 0	6SL32 ■ 0- ■ YE40- ■ A ■ 0
75	100	145	124	110	96	140	FSF	6SL32 ■ 0- ■ YE42- ■ U ■ 0	6SL32 ■ 0- ■ YE42- ■ A ■ 0
90	125	178	156	145	124	172	FSF	6SL32 ■ 0- ■ YE44- ■ U ■ 0	6SL32 ■ 0- ■ YE44- ■ A ■ 0
110	150	205	180	178	156	198	FSF	6SL32 ■ 0- ■ YE46- ■ U ■ 0	6SL32 ■ 0- ■ YE46- ■ A ■ 0
132	200	250	240	205	180	242	FSF	6SL32 ■ 0- ■ YE48- ■ U ■ 0	6SL32 ■ 0- ■ YE48- ■ A ■ 0
160	250	302	302	250	240	301	FSG	–	6SL32 ■ 0- ■ YE50- ■ ■ ■ 0
200	300	370	361	302	302	365	FSG	–	6SL32 ■ 0- ■ YE52- ■ ■ ■ 0
250	400	477	477	370	361	471	FSG	–	6SL32 ■ 0- ■ YE54- ■ ■ ■ 0
315	400	570	477	468	390	585	FSH	–	6SL32 2 0- ■ YE56- ■ C ■ 0
355	450	640	515	491	394	654	FSH	–	6SL32 2 0- ■ YE58- ■ C ■ 0
400	500	720	590	551	452	735	FSH	–	6SL32 2 0- ■ YE60- ■ C ■ 0
450	500	820	663	672	542	850	FSJ	–	6SL32 2 0- ■ YE62- ■ C ■ 0
500	600	890	724	728	591	924	FSJ	–	6SL32 2 0- ■ YE64- ■ C ■ 0
560	700	1000	830	786	652	1038	FSJ	–	6SL32 2 0- ■ YE66- ■ C ■ 0

Article No. supplements

	Without integrated line filter	With integrated line filter
Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002		
Class 3C2 – **delivery ex stock**	2	2
Class 3C3 *	3	3
Operator Panel		
Without Operator Panel *	1	1
With BOP-2 Basic Operator Panel (numeric 2-line display) *	2	2
With IOP-2 Intelligent Operator Panel (graphic color display) – **delivery ex stock**	3	3
Extension with SINAMICS G120X I/O Extension Module		
Without extension – **delivery ex stock**	0	0
With SINAMICS G120X I/O Extension Module *	1	1
Line filter		
Without integrated line filter (for IT systems 5)) – **delivery ex stock**	U	
With integrated line filter Category C2 – **delivery ex stock**		A
With integrated line filter Category C3 *		C
Communication		
USS, Modbus RTU, BACnet MS/TP *	B	B
PROFINET, EtherNet/IP – **delivery ex stock**	F	F
PROFIBUS DP *	P	P

***** If you select one of these supplements, the delivery time for converters up to 132 kW will change from "**delivery ex stock**" to "**standard delivery time**".

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

2) The rated output current is based on the duty cycle for low overload (LO). These current values are valid for 400 V or 480 V.

3) The base-load current I_H is based on the duty cycle for high overload (HO). These current values are valid for 400 V or 480 V.

4) The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_L) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the converter.

5) Non-filtered devices are designed for operation in IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3.

Line-side components (Configuration with load-side power components see next double page)

Line filters		**Line harmonics filters** [1]	**Line reactors**	**Recommended line-side overcurrent protection devices** [4]			
Category C2	Category C1	(THD(I) < 5 %)	For frame sizes FSH and FSJ mandatory when using an external line filter Category C2	Fuses IEC-compliant		Fuses UL/cUL-compliant Rated voltage 600 V AC [5]	
Mandatory for • FSA to FSF ≤ 90 kW: Converter without integrated line filter • FSF 110 kW: Converter with integrated line filter		The prefix "**UAC:**" is part of a Siemens internal order code that does not belong to the product number of the original manufacturer Schaffner EMV AG.					
				Current		Fuse type	Current
Article No.	Article No.		Article No.	A	Article No.	Class/Article No.	A
SINAMICS G120X available with integrated line filter Category C2	**6SL3203-0BE17-7BA1** [6]	–	A DC line reactor is integrated for frame sizes FSA to FSG – therefore no line reactor is required.	16	**3NA3805**	J	15
		–		16	**3NA3805**	J	15
		–		16	**3NA3805**	J	15
		–		16	**3NA3805**	J	15
		–		16	**3NA3805**	J	15
	6SL3203-0BE21-8BA0 [6]	–		32	**3NA3812**	J	35
		UAC:FN34406112E2XXJRX		32	**3NA3812**	J	35
		UAC:FN34408112E2XXJRX		32	**3NA3812**	J	35
	6SL3203-0BE23-8BA0 [6]	**UAC:FN344011113E2FAJRX**		50	**3NA3820**	J	50
		UAC:FN344015113E2FAJRX		50	**3NA3820**	J	50
	6SL3203-0BE23-8BA0	**UAC:FN344019113E2FAJRX**		63	**3NA3822**	J	60
		UAC:FN344022115E2FAJRX		80	**3NA3824**	J	70
	6SL3203-0BE27-5BA0	**UAC:FN344030115E2FAJRX**		100	**3NA3830**	J	90
		UAC:FN344037115E2FAJRX		100	**3NA3830**	J	100
	6SL3203-0BE31-1BA0	**UAC:FN344045115E2FAJRX**		125	**3NA3832**	J	125
		UAC:FN344055115E2FAJRX		160	**3NA3836**	J	150
	6SL3000-0BE31-2DA0	**UAC:FN344075116E2FAJRX**		200	**3NA3140**	J	200
		UAC:FN344090116E2FAJRX		224	**3NA3142**	J	250
	6SL3203-0BE31-8BA0	**UAC:FN3440110118E2FAJRX**		300	**3NA3250**	J	300
	–	**UAC:FN3440132118E2FAJXX**		315	**3NA3252**	J	350
	–	**UAC:FN3440160118E2FAJXX** [2]		355	**3NA3254**	J	400
	–	**UAC:FN3440200118E2FAJXX** [2]		400	**3NA3260**	J	500
	–	**UAC:FN3440132118E2FAJXX** (2×) [2] [3]		630	**3NA3372**	J	600
6SL3760-0MR00-0AA0	–	–	**6SL3000-0CE36-3AA0**	710	**3NE1437-2**		710
	–	–	**6SL3000-0CE37-7AA0**	800	**3NE1438-2**		800
	–	–		850	**3NE1448-2**		850
	–	–	**6SL3000-0CE38-7AA0**	1000	**3NB3350-1KK26**		1000
	–	–	**6SL3000-0CE41-0AA0**	1100	**3NB3351-1KK26**		1100
	–	–		1250	**3NB3352-1KK26**		1250

[1] Voltage 380 V to 415 V, frequency 50 Hz.

[2] For 160 kW, 200 kW and 250 kW, only operation in Vector Control is permitted. V/f must not be used.

[3] 250 kW with parallel connection of 2x 132 kW.

[4] Further information at https://support.industry.siemens.com/cs/document/109762895

[5] The Short Circuit Current Rating (SCCR) according to UL for industrial control panel installations to NEC Article 409 or UL 508A/508C or UL 61800-5-1 is 100 kA for SINAMICS G120X.

[6] The line filters are suitable for base mounting for SINAMICS G120X frame sizes FSA to FSC. Further information especially to achieve EMC Category C1 is available in the documentation on the internet at: www.siemens.com/sinamics-g120x/documentation

Clicking to SiePortal
6SL3255-0AA00-5AA0

Selection and ordering data

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 380 ... 480 V 3 AC ➡ Configuration with load-side power components (see right page)

Rated power [1]		Rated output current [2]		Base-load current I_H [3]		Rated input current [4]	Frame size	SINAMICS G120X Degree of protection IP20/UL Open Type **without** integrated line filter – Converters up to 132 kW delivery ex stock	SINAMICS G120X Degree of protection IP20/UL Open Type **with** integrated line filter – Converters up to 132 kW delivery ex stock
400 V	480 V	400 V	480 V	400 V	480 V	400 V		10 ... 48 ↓↓	10 ... 48 ↓↓
kW	hp	A	A	A	A	A		Article No.	Article No.
380 ... 480 V 3 AC · Rated pulse frequency 4 kHz ≤ 90 kW, 2 kHz for 110 kW to 250 kW and 4 kHz > 250 kW · Input frequency 47 ... 63 Hz									
0.75	1	2.2	2.1	1.7	1.6	2.1	FSA	6SL32 ■0-■ YE10-■ U■ 0	6SL32 ■0-■ YE10-■ A■ 0
1.1	1.5	3.1	3	2.2	2.1	2.8	FSA	6SL32 ■0-■ YE12-■ U■ 0	6SL32 ■0-■ YE12-■ A■ 0
1.5	2	4.1	3.4	3.1	3	3.6	FSA	6SL32 ■0-■ YE14-■ U■ 0	6SL32 ■0-■ YE14-■ A■ 0
2.2	3	5.9	4.8	4.1	3.4	5.5	FSA	6SL32 ■0-■ YE16-■ U■ 0	6SL32 ■0-■ YE16-■ A■ 0
3	4	7.7	6.2	5.9	4.8	6.9	FSA	6SL32 ■0-■ YE18-■ U■ 0	6SL32 ■0-■ YE18-■ A■ 0
4	5	10.2	7.6	7.7	6.2	9.8	FSB	6SL32 ■0-■ YE20-■ U■ 0	6SL32 ■0-■ YE20-■ A■ 0
5.5	7.5	13.2	11	10.2	7.6	12	FSB	6SL32 ■0-■ YE22-■ U■ 0	6SL32 ■0-■ YE22-■ A■ 0
7.5	10	18	14	13.2	11	17	FSB	6SL32 ■0-■ YE24-■ U■ 0	6SL32 ■0-■ YE24-■ A■ 0
11	15	26	21	18	14	24.5	FSC	6SL32 ■0-■ YE26-■ U■ 0	6SL32 ■0-■ YE26-■ A■ 0
15	20	32	27	26	21	29.5	FSC	6SL32 ■0-■ YE28-■ U■ 0	6SL32 ■0-■ YE28-■ A■ 0
18.5	25	38	34	32	27	36	FSD	6SL32 ■0-■ YE30-■ U■ 0	6SL32 ■0-■ YE30-■ A■ 0
22	30	45	40	38	34	42	FSD	6SL32 ■0-■ YE32-■ U■ 0	6SL32 ■0-■ YE32-■ A■ 0
30	40	60	52	45	40	57	FSD	6SL32 ■0-■ YE34-■ U■ 0	6SL32 ■0-■ YE34-■ A■ 0
37	50	75	65	60	52	70	FSD	6SL32 ■0-■ YE36-■ U■ 0	6SL32 ■0-■ YE36-■ A■ 0
45	60	90	77	75	65	86	FSE	6SL32 ■0-■ YE38-■ U■ 0	6SL32 ■0-■ YE38-■ A■ 0
55	75	110	96	90	77	104	FSE	6SL32 ■0-■ YE40-■ U■ 0	6SL32 ■0-■ YE40-■ A■ 0
75	100	145	124	110	96	140	FSF	6SL32 ■0-■ YE42-■ U■ 0	6SL32 ■0-■ YE42-■ A■ 0
90	125	178	156	145	124	172	FSF	6SL32 ■0-■ YE44-■ U■ 0	6SL32 ■0-■ YE44-■ A■ 0
110	150	205	180	178	156	198	FSF	6SL32 ■0-■ YE46-■ U■ 0	6SL32 ■0-■ YE46-■ A■ 0
132	200	250	240	205	180	242	FSF	6SL32 ■0-■ YE48-■ U■ 0	6SL32 ■0-■ YE48-■ A■ 0
160	250	302	302	250	240	301	FSG	–	6SL32 ■0-■ YE50-■■■ 0
200	300	370	361	302	302	365	FSG	–	6SL32 ■0-■ YE52-■■■ 0
250	400	477	477	370	361	471	FSG	–	6SL32 ■0-■ YE54-■■■ 0
315	400	570	477	468	390	585	FSH	–	6SL32 2 0-■ YE56-■ C■ 0
355	450	640	515	491	394	654	FSH	–	6SL32 2 0-■ YE58-■ C■ 0
400	500	720	590	551	452	735	FSH	–	6SL32 2 0-■ YE60-■ C■ 0
450	500	820	663	672	542	850	FSJ	–	6SL32 2 0-■ YE62-■ C■ 0
500	600	890	724	728	591	924	FSJ	–	6SL32 2 0-■ YE64-■ C■ 0
560	700	1000	830	786	652	1038	FSJ	–	6SL32 2 0-■ YE66-■ C■ 0

Article No. supplements

Supplement	Without integrated line filter	With integrated line filter
Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002		
Class 3C2 – **delivery ex stock**	2	2
Class 3C3 *	3	3
Operator Panel		
Without Operator Panel *	1	1
With BOP-2 Basic Operator Panel (numeric 2-line display) *	2	2
With IOP-2 Intelligent Operator Panel (graphic color display) – **delivery ex stock**	3	3
Extension with SINAMICS G120X I/O Extension Module		
Without extension – **delivery ex stock**	0	0
With SINAMICS G120X I/O Extension Module *	1	1
Line filter		
Without integrated line filter (for IT systems [5]) – **delivery ex stock**	U	
With integrated line filter Category C2 – **delivery ex stock**		A
With integrated line filter Category C3 *		C
Communication		
USS, Modbus RTU, BACnet MS/TP *	B	B
PROFINET, EtherNet/IP – **delivery ex stock**	F	F
PROFIBUS DP *	P	P

***** If you select one of these supplements, the delivery time for converters up to 132 kW will change from "**delivery ex stock**" to "**standard delivery time**".

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

2) The rated output current is based on the duty cycle for low overload (LO). These current values are valid for 400 V or 480 V.

3) The base-load current I_H is based on the duty cycle for high overload (HO). These current values are valid for 400 V or 480 V.

4) The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_L) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the converter.

5) Non-filtered devices are designed for operation in IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3.

Load-side power components (Configuration with line-side components see double page before)

Output reactors Article No.	**Sine-wave filters** When using sine-wave filters, please note for the pulse frequency of the converter: • ≤ 90 kW: 4 kHz up to 8 kHz • ≥ 110 kW: 4 kHz Article No.	**dv/dt filters plus VPL** The prefix "**JTA:**" is part of a Siemens internal order code that does not belong to the product number of the original manufacturer Mdexx Magnetronic Devices s. r. o.. Article No.
–	**6SL3202-0AE20-3SA0**	–
–	**6SL3202-0AE20-6SA0**	–
–		–
–	**6SL3202-0AE21-1SA0**	–
–		–
–	**6SL3202-0AE21-4SA0**	–
–	**6SL3202-0AE22-0SA0**	–
–		–
–	**6SL3202-0AE23-3SA0**	–
–		–
6SL3202-0AE23-8CA0	**6SL3202-0AE24-6SA0**	**JTA:TEF1203-0HB**
6SE6400-3TC07-5ED0		**JTA:TEF1203-0JB**
	6SL3202-0AE26-2SA0	
	6SL3202-0AE28-8SA0	**JTA:TEF1203-0KB**
6SE6400-3TC14-5FD0		
	6SL3202-0AE31-5SA0	**JTA:TEF1203-0LB**
	6SL3202-0AE31-8SA0	**JTA:TEF1203-0MB**
6SL3000-2BE32-1AA0	**6SL3000-2CE32-3AA0** [1]	
6SL3000-2BE32-6AA0		
6SL3000-2BE33-2AA0	**6SL3000-2CE32-8AA0** [1] [2]	**6SL3000-2DE35-0AA0**
6SL3000-2BE33-8AA0	**6SL3000-2CE33-3AA0** [1] [2]	
6SL3000-2BE35-0AA0	**6SL3000-2CE34-1AA0** [1] [2]	
6SL3000-2AE36-1AA0	–	**6SL3000-2DE38-4AA0**
6SL3000-2AE38-4AA0	–	
	–	
6SL3000-2AE41-0AA0	–	**6SL3000-2DE41-4AA0**
	–	
6SL3000-2AE41-4AA0	–	

Ordering examples

Basic selection	Example 1	Example 2
SINAMICS G120X converters · degree of protection IP20/UL Open Type · 380 ... 480 V 3 AC, 15 kW · with integrated line filter – converters up to 132 kW delivery ex stock	**6SL32 ■ 0- ■ YE28- ■ A ■ 0**	**6SL32 ■ 0- ■ YE28- ■ A ■ 0**
Article No. supplements		
Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002		
Class 3C2 – **delivery ex stock**	**2**	
Class 3C3 *		**3**
Operator Panel		
With BOP-2 Basic Operator Panel (numeric 2-line display) *		**2**
With IOP-2 Intelligent Operator Panel (graphic color display) – **delivery ex stock**	**3**	
Extension with SINAMICS G120X I/O Extension Module		
Without extension – **delivery ex stock**	**0**	**0**
With SINAMICS G120X I/O Extension Module *		
Line filter		
With integrated line filter Category C2 – **delivery ex stock**	**A**	**A**
Communication		
USS, Modbus RTU, BACnet MS/TP *		
PROFINET, EtherNet/IP – **delivery ex stock**	**F**	**F**
PROFIBUS DP *		
Complete Article No.	**6SL32 2 0- 3 YE28- 0 A F 0**	**6SL32 3 0- 2 YE28- 0 A F 0**
	Delivery ex stock	**Standard delivery time**

***** If you select one of these supplements, the delivery time for converters up to 132 kW will change from "**delivery ex stock**" to "**standard delivery time**".

[1] For converters with a rated power ≥ 110 kW, around 70 % of the current and power is still available when using sine-wave filters due to current derating of the converter.

[2] For 160 kW, 200 kW and 250 kW, only operation in Vector Control is permitted. V/f must not be used.

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6SL3255-0AA00-5AA0

Selection and ordering data

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 500 ... 690 V 3 AC ➡ Configuration with line-side components (see right page)

Rated power [1]		Rated output current [2]		Base-load current I_H [3]		Rated input current [4]	Frame size	SINAMICS G120X Degree of protection IP20/UL Open Type without integrated line filter	SINAMICS G120X Degree of protection IP20/UL Open Type with integrated line filter
690 V	600 V	690 V	600 V	690 V	600 V	690 V			
kW	hp	A	A	A	A	A		Article No.	Article No.
500 ... 690 V 3 AC · Rated pulse frequency 2 kHz · Input frequency 47 ... 63 Hz									
3	4	5	5	4	4	5	FSD	**6SL32 ■0-■YH18-■U■0**	**6SL32 ■0-■YH18-■A■0**
4	5	6.3	6.3	5	5	6	FSD	**6SL32 ■0-■YH20-■U■0**	**6SL32 ■0-■YH20-■A■0**
5.5	7.5	9	9	6.3	6.3	9	FSD	**6SL32 ■0-■YH22-■U■0**	**6SL32 ■0-■YH22-■A■0**
7.5	10	11	11	9	9	11	FSD	**6SL32 ■0-■YH24-■U■0**	**6SL32 ■0-■YH24-■A■0**
11	10	14	14	11	11	14	FSD	**6SL32 ■0-■YH26-■U■0**	**6SL32 ■0-■YH26-■A■0**
15	15	19	19	14	14	18	FSD	**6SL32 ■0-■YH28-■U■0**	**6SL32 ■0-■YH28-■A■0**
18.5	20	23	23	19	19	22	FSD	**6SL32 ■0-■YH30-■U■0**	**6SL32 ■0-■YH30-■A■0**
22	25	27	27	23	23	25	FSD	**6SL32 ■0-■YH32-■U■0**	**6SL32 ■0-■YH32-■A■0**
30	30	35	35	27	27	33	FSD	**6SL32 ■0-■YH34-■U■0**	**6SL32 ■0-■YH34-■A■0**
37	40	42	42	35	35	40	FSD	**6SL32 ■0-■YH36-■U■0**	**6SL32 ■0-■YH36-■A■0**
45	50	52	52	42	42	50	FSE	**6SL32 ■0-■YH38-■U■0**	**6SL32 ■0-■YH38-■A■0**
55	60	62	62	52	52	59	FSE	**6SL32 ■0-■YH40-■U■0**	**6SL32 ■0-■YH40-■A■0**
75	75	80	80	62	62	78	FSF	**6SL32 ■0-■YH42-■U■0**	**6SL32 ■0-■YH42-■C■0**
90	100	100	100	80	80	97	FSF	**6SL32 ■0-■YH44-■U■0**	**6SL32 ■0-■YH44-■C■0**
110	125	125	125	100	100	121	FSF	**6SL32 ■0-■YH46-■U■0**	**6SL32 ■0-■YH46-■C■0**
132	150	144	144	125	125	138	FSF	**6SL32 ■0-■YH48-■U■0**	**6SL32 ■0-■YH48-■C■0**
160	150	171	171	144	144	171	FSG [5]	–	**6SL32 ■0-■YH50-■C■0**
200	200	208	208	171	171	205	FSG [5]	–	**6SL32 ■0-■YH52-■C■0**
250	250	250	250	208	208	249	FSG [5]	–	**6SL32 ■0-■YH54-■C■0**
315	350	330	345	272	282	343	FSH	–	**6SL32 2 0-■YH56-■C■0**
355	400	385	388	314	317	401	FSH	–	**6SL32 2 0-■YH58-■C■0**
400	450	420	432	348	357	437	FSH	–	**6SL32 2 0-■YH60-■C■0**
450	500	470	487	394	408	489	FSH	–	**6SL32 2 0-■YH62-■C■0**
500	500	520	546	444	462	540	FSJ	–	**6SL32 2 0-■YH64-■C■0**
560	600	580	610	476	498	602	FSJ	–	**6SL32 2 0-■YH66-■C■0**
630	700	650	679	532	554	675	FSJ	–	**6SL32 2 0-■YH68-■C■0**

Article No. supplements

Option	Without integrated line filter	With integrated line filter
Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002		
Class 3C2	2	2
Class 3C3	3	3
Operator Panel		
Without Operator Panel	1	1
With BOP-2 Basic Operator Panel (numeric 2-line display)	2	2
With IOP-2 Intelligent Operator Panel (graphic color display)	3	3
Extension with SINAMICS G120X I/O Extension Module		
Without extension	0	0
With SINAMICS G120X I/O Extension Module	1	1
Line filter		
Without integrated line filter (for IT systems [6])	U	
With integrated line filter Category C2		A
With integrated line filter Category C3		C
Communication		
USS, Modbus RTU, BACnet MS/TP	B	B
PROFINET, EtherNet/IP	F	F
PROFIBUS DP	P	P

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

2) The rated output current is based on the duty cycle for low overload (LO). These current values are valid for 690 V or 600 V.

3) The base-load current I_H is based on the duty cycle for high overload (HO). These current values are valid for 690 V or 600 V.

4) The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_L) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the converter.

5) The 690 V versions of frame size FSG are only available with an integrated line filter Category C3. To operate the converters also within TN systems with grounded outer conductor, you must remove the grounding screw.

6) Non-filtered devices are designed for operation in IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3.

Line-side components (Configuration with load-side power components see next double page)

Line filters		Line reactors	Recommended line-side overcurrent protection devices [1]			
Category C2	Category C1	For frame sizes FSH and FSJ mandatory when using an external line filter Category C2	Fuses IEC-compliant		Fuses UL/cUL-compliant Rated voltage 600 V AC [2]	
	Article No.	Article No.	Current A	Article No.	Fuse type Class/Article No.	Current A
SINAMICS G120X available with integrated line filter Category C2	–	A DC link reactor is integrated for frame sizes FSA to FSG – therefore no line reactor is required.	16	**3NA3805-6**	J	8
	–		16	**3NA3805-6**	J	10
	–		16	**3NA3805-6**	J	15
	–		16	**3NA3805-6**	J	15
	–		20	**3NA3807-6**	J	20
	–		25	**3NA3810-6**	J	25
	–		32	**3NA3812-6**	J	30
	–		40	**3NA3817-6KJ**	J	35
	–		50	**3NA3820-6KJ**	J	50
	–		63	**3NA3822-6**	J	60
	–		80	**3NA3824-6**	J	80
	–		80	**3NA3824-6**	J	80
–	–		100	**3NA3830-6**	J	110
–	–		125	**3NA3132-6**	J	150
–	–		160	**3NA3136-6**	J	150
–	–		200	**3NA3140-6**	J	200
–	–		250	**3NE1227-0**		250
–	–		315	**3NE1230-0**		315
–	–		350	**3NE1331-0**		350
6SL3760-0MS00-0AA0	–	**6SL3000-0CH34-8AA0**	450	**3NE1333-2**		450
	–		500	**3NE1334-2**		500
	–		560	**3NE1435-2**		560
	–	**6SL3000-0CH36-0AA0**	630	**3NE1436-2**		630
	–		710	**3NE1437-2**		710
	–	**6SL3000-0CH38-4AA0**	800	**3NE1438-2**		800
	–		850	**3NE1448-2**		850

[1] Further information at https://support.industry.siemens.com/cs/document/109762895

[2] The Short Circuit Current Rating (SCCR) according to UL for industrial control panel installations to NEC Article 409 or UL 508A/508C or UL 61800-5-1 is 100 kA for SINAMICS G120X.

Clicking to SiePortal

6SL3255-0AA00-5AA0

Selection and ordering data

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 500 ... 690 V 3 AC ➡ Configuration with load-side power components (see right page)

Rated power [1]		Rated output current [2]		Base-load current I_H [3]		Rated input current [4]	Frame size	SINAMICS G120X Degree of protection IP20/UL Open Type without integrated line filter	SINAMICS G120X Degree of protection IP20/UL Open Type with integrated line filter
690 V	600 V	690 V	600 V	690 V	600 V	690 V			
kW	hp	A	A	A	A	A		Article No.	Article No.
500 ... 690 V 3 AC · Rated pulse frequency 2 kHz · Input frequency 47 ... 63 Hz									
3	4	5	5	4	4	5	FSD	**6SL32 ■0-■YH18-■U■0**	**6SL32 ■0-■YH18-■A■0**
4	5	6.3	6.3	5	5	6	FSD	**6SL32 ■0-■YH20-■U■0**	**6SL32 ■0-■YH20-■A■0**
5.5	7.5	9	9	6.3	6.3	9	FSD	**6SL32 ■0-■YH22-■U■0**	**6SL32 ■0-■YH22-■A■0**
7.5	10	11	11	9	9	11	FSD	**6SL32 ■0-■YH24-■U■0**	**6SL32 ■0-■YH24-■A■0**
11	10	14	14	11	11	14	FSD	**6SL32 ■0-■YH26-■U■0**	**6SL32 ■0-■YH26-■A■0**
15	15	19	19	14	14	18	FSD	**6SL32 ■0-■YH28-■U■0**	**6SL32 ■0-■YH28-■A■0**
18.5	20	23	23	19	19	22	FSD	**6SL32 ■0-■YH30-■U■0**	**6SL32 ■0-■YH30-■A■0**
22	25	27	27	23	23	25	FSD	**6SL32 ■0-■YH32-■U■0**	**6SL32 ■0-■YH32-■A■0**
30	30	35	35	27	27	33	FSD	**6SL32 ■0-■YH34-■U■0**	**6SL32 ■0-■YH34-■A■0**
37	40	42	42	35	35	40	FSD	**6SL32 ■0-■YH36-■U■0**	**6SL32 ■0-■YH36-■A■0**
45	50	52	52	42	42	50	FSE	**6SL32 ■0-■YH38-■U■0**	**6SL32 ■0-■YH38-■A■0**
55	60	62	62	52	52	59	FSE	**6SL32 ■0-■YH40-■U■0**	**6SL32 ■0-■YH40-■A■0**
75	75	80	80	62	62	78	FSF	**6SL32 ■0-■YH42-■U■0**	**6SL32 ■0-■YH42-■C■0**
90	100	100	100	80	80	97	FSF	**6SL32 ■0-■YH44-■U■0**	**6SL32 ■0-■YH44-■C■0**
110	125	125	125	100	100	121	FSF	**6SL32 ■0-■YH46-■U■0**	**6SL32 ■0-■YH46-■C■0**
132	150	144	144	125	125	138	FSF	**6SL32 ■0-■YH48-■U■0**	**6SL32 ■0-■YH48-■C■0**
160	150	171	171	144	144	171	FSG [5]	–	**6SL32 ■0-■YH50-■C■0**
200	200	208	208	171	171	205	FSG [5]	–	**6SL32 ■0-■YH52-■C■0**
250	250	250	250	208	208	249	FSG [5]	–	**6SL32 ■0-■YH54-■C■0**
315	350	330	345	272	282	343	FSH	–	**6SL32 2 0-■YH56-■C■0**
355	400	385	388	314	317	401	FSH	–	**6SL32 2 0-■YH58-■C■0**
400	450	420	432	348	357	437	FSH	–	**6SL32 2 0-■YH60-■C■0**
450	500	470	487	394	408	489	FSH	–	**6SL32 2 0-■YH62-■C■0**
500	500	520	546	444	462	540	FSJ	–	**6SL32 2 0-■YH64-■C■0**
560	600	580	610	476	498	602	FSJ	–	**6SL32 2 0-■YH66-■C■0**
630	700	650	679	532	554	675	FSJ	–	**6SL32 2 0-■YH68-■C■0**

Article No. supplements

Supplement	Without integrated line filter	With integrated line filter
Environmental class/harmful chemical substances acc. to IEC 60721-3-3: 2002		
Class 3C2	2	2
Class 3C3	3	3
Operator Panel		
Without Operator Panel	1	1
With BOP-2 Basic Operator Panel (numeric 2-line display)	2	2
With IOP-2 Intelligent Operator Panel (graphic color display)	3	3
Extension with SINAMICS G120X I/O Extension Module		
Without extension	0	0
With SINAMICS G120X I/O Extension Module	1	1
Line filter		
Without integrated line filter (for IT systems [6])	U	
With integrated line filter Category C2		A
With integrated line filter Category C3		C
Communication		
USS, Modbus RTU, BACnet MS/TP	B	B
PROFINET, EtherNet/IP	F	F
PROFIBUS DP	P	P

[1] Rated power based on the base-load current I_L. The base-load current I_L is based on the duty cycle for low overload (LO).

[2] The rated output current is based on the duty cycle for low overload (LO). These current values are valid for 690 V or 600 V.

[3] The base-load current I_H is based on the duty cycle for high overload (HO). These current values are valid for 690 V or 600 V.

[4] The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_L) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the converter.

[5] The 690 V versions of frame size FSG are only available with an integrated line filter Category C3. To operate the converters also within TN systems with grounded outer conductor, you must remove the grounding screw.

[6] Non-filtered devices are designed for operation in IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3.

Load-side power components (Configuration with line-side components see double page before)

Output reactors The prefix "**JTA:**" is part of a Siemens internal order code that does not belong to the product number of the original manufacturer Mdexx Magnetronic Devices s. r. o.. Article No.	Sine-wave filters Article No.	dv/dt filters plus VPL The prefix "**JTA:**" is part of a Siemens internal order code that does not belong to the product number of the original manufacturer Mdexx Magnetronic Devices s. r. o.. Article No.
JTA:TEU2532-0FP00-4EA0	–	**JTA:TEF1203-0GB**
	–	
	–	
	–	
	–	
	–	
	–	
JTA:TEU9932-0FP00-4EA0	–	**JTA:TEF1203-0HB**
	–	
	–	
JTA:TEU9932-0FS00-0EA0	–	**JTA:TEF1203-0JB**
	–	
JTA:TEU9932-1FC00-1BA0	–	**JTA:TEF1203-0KB**
	–	
JTA:TEU9932-0FV00-1BA0	–	**JTA:TEF1203-0LB**
	–	
JTA:TEU4732-0FA00-0BA0	–	**JTA:TEF1203-0MB**
	–	
	–	
6SL3000-2AH34-7AA0	–	**6SL3000-2DH35-8AA0**
	–	
6SL3000-2AH35-8AA0	–	
6SL3000-2AH38-1AA0	–	**6SL3000-2DH38-1AA0**
	–	
	–	
	–	

Selection and ordering data

Supplementary system components for SINAMICS G120X

Description	Article No.
IOP-2 Intelligent Operator Panel Operating languages: English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified	**6SL3255-0AA00-4JA2**
IOP-2 Handheld	**6SL3255-0AA00-4HA1**
BOP-2 Basic Operator Panel	**6SL3255-0AA00-4CA1**
Door mounting kit for IOP-2/BOP-2	**6SL3256-0AP00-0JA0**
SINAMICS SD card 512 MB, empty	**6SL3054-4AG00-2AA0**
SINAMICS G120 Smart Access for wireless commissioning, operation and diagnostics of the following converters using a smartphone, tablet or laptop	**6SL3255-0AA00-5AA0**
SINAMICS G120X I/O Extension Module for direct connection of Pt1000/Ni1000 temperature sensors [1]	**6SL3255-0BE00-0AA0**
Shield connection kits for Power Module for SINAMICS G120X	
• Frame sizes FSA to FSG	Included in the scope of delivery of the converters, can be ordered as spare part
• Frame sizes FSH to FSJ	Please observe the notes included in the operating instructions
Push-through mounting frames for SINAMICS G120X	
• Frame size FSA	**6SL3261-6GA00-0BA0**
• Frame size FSB	**6SL3261-6GB00-0BA0**
• Frame size FSC	**6SL3261-6GC00-0BA0**
• Frame size FSD	**6SL3261-6GD00-0BA0**
• Frame size FSE	**6SL3261-6GE00-0BA0**
• Frame size FSF	**6SL3261-6GF00-0BA0**
• Frame size FSG	**6SL3261-6GG00-0BA0**
Installation handles for SINAMICS G120X	
• Frame sizes FSD to FSF	**6SL3200-0SM22-0AA0**
IP21 top covers for SINAMICS G120X	
• Frame size FSA	**6SL3266-1PA00-0BA0**
• Frame size FSB	**6SL3266-1PB00-0BA0**
• Frame sizes FSC and FSD	**6SL3266-1PD00-0BA0**
• Frame size FSE	**6SL3266-1PE00-0BA0**
• Frame sizes FSF and FSG	**6SL3266-1PF00-0BA0**
Wiring adapter for optimal and space-saving wiring for SINAMICS G120X • Frame size FSG	**6SL3266-2HG00-0BA0**
Installation kit for line-side cable connection, left for SINAMICS G120X	
• Frame size FSH	**6SL3366-1LH00-0PA0**
SINAMICS G120X Starter Kits Converter (380 ... 480 V 3 AC, PROFINET) with IOP-2 and SINAMICS G120 Smart Access	
• 0.75 kW, FSA, without integrated line filter	**6SL3200-0AE70-0AA0**
• 0.75 kW, FSA, with integrated line filter Category C2	**6SL3200-0AE72-0AA0**
• 3 kW, FSA, with integrated line filter Category C2	**6SL3200-0AE73-0AA0**
• 7.5 kW, FSB, with integrated line filter Category C2	**6SL3200-0AE74-0AA0**
SINAMICS G120X training case	**6AG1067-2AA00-0AC1**

Spare parts for SINAMICS G120X

Description	Article No.
FPI board (freely-programmable interface board) for SINAMICS G120X	
• Frame sizes FSH and FSJ	**6SL3200-0SP05-0AA0**
PSB board (power supply board) for SINAMICS G120X	
• Frame sizes FSH and FSJ	**6SL3200-0SP06-0AA0**
Current transformers for SINAMICS G120X	
• 2000 A for frame size FSJ	**6SL3200-0SE01-0AA0**
• 1000 A for frame sizes FSH and FSJ	**6SL3200-0SE02-0AA0**
Spare parts kit for Control Unit for SINAMICS G120X	
• Frame sizes FSA to FSJ	**6SL3200-0SK10-0AA0**
Shield connection kit for Control Unit for SINAMICS G120X	
• Frame sizes FSD to FSG	**6SL3264-1EA00-0YA0**
Shield connection kits for Power Module for SINAMICS G120X	
• Frame size FSA	**6SL3262-1AA01-0DA0**
• Frame size FSB	**6SL3262-1AB01-0DA0**
• Frame size FSC	**6SL3262-1AC01-0DA0**
• Frame size FSD	**6SL3262-1AD01-0DA0**
• Frame size FSE	**6SL3262-1AE01-0DA0**
• Frame size FSF	**6SL3262-1AF01-0DA0**
• Frame size FSG	**6SL3262-1AG01-0DA0**
Small parts assembly set for SINAMICS G120X	
• Frame sizes FSD to FSG	**6SL3200-0SK08-0AA0**
Terminal cover kits for SINAMICS G120X	
• Frame size FSD	**6SL3200-0SM13-0AA0**
• Frame size FSE	**6SL3200-0SM14-0AA0**
• Frame size FSF	**6SL3200-0SM15-0AA0**
• Frame size FSG	**6SL3200-0SM16-0AA0**
External fan units for SINAMICS G120X	
• Frame size FSA	**6SL3200-0SF52-0AA0**
• Frame size FSB	**6SL3200-0SF53-0AA0**
• Frame size FSC	**6SL3200-0SF54-0AA0**
• Frame size FSD	**6SL3200-0SF15-0AA0**
• Frame size FSE	**6SL3200-0SF16-0AA0**
• Frame size FSF	**6SL3200-0SF17-0AA0**
• Frame size FSG	**6SL3200-0SF18-0AA0**
• Frame sizes FSH and FSJ	**6SL3300-0SF01-0AA0**
Internal fan unit for SINAMICS G120X	
• Frame sizes FSH and FSJ	**6SL3200-0SF50-0AA0**
Control Units for SINAMICS G120X frame sizes FSD to FSJ	
• USS, Modbus RTU, BACnet MS/TP	**6SL3200-0SC10-0BA0**
• PROFINET, EtherNet/IP	**6SL3200-0SC10-0FA0**
• PROFIBUS DP	**6SL3200-0SC10-0PA0**

Further technical specifications and documentation are available on the internet at:
www.siemens.com/sinamics-g120x/documentation
and via the Siemens Product Configurator in SiePortal:
www.siemens.com/spc

[1] The SINAMICS G120X I/O Extension Module (article number: 6SL3255-0BE00-0AA0) is only supported on the SINAMICS G120X converters with hardware version ≥ 02 02 (FSA to FSG) / 02 (FSH/FSJ) and firmware ≥ V1.01.
The hardware version of the converter is on the rating plate.
For more information please refer to the documentation on the internet at:
www.siemens.com/sinamics-g120x/documentation

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all SINAMICS G120X converters.

General technical specifications	
Mechanical specifications	
Shock and vibration load	
• Frame sizes FSA to FSG	
- Transport in transport packaging acc. to EN 61800-5-1 and EN 60068-2-6	Class 2M3
- Vibration during operation acc. to IEC 60721-3-3: 2002	Class 3M1
• Frame sizes FSH and FSJ	
- Vibration in transport packaging: Test Fc acc. to EN 60068-2-64	±1.5 mm for 5 ... 9 Hz 0.5 × *g* at 9 ... 200 Hz
- Shock in product packaging: Test Fc acc. to EN 60068-2-6	±1.5 mm for 5 ... 9 Hz 0.5 × *g* at 9 ... 200 Hz
- Vibration during operation: Test Fc acc. to EN 60068-2-6	0.075 mm at 10 ... 58 Hz 9.81 m/s² (1 × *g*) at > 58 ... 200 Hz
- Shock during operation: Test acc. to EN 60068-2-27	Shock type EA 49 m/s² (5 × *g*)/30 ms 147 m/s² (15 × *g*)/11 ms
Degree of protection	
• Frame sizes FSA ... FSJ	IP20/ UL Open Type
• Frame sizes FSA ... FSG	Optional IP21/ UL Open Type with IP21 top covers
Permissible mounting position	Vertical wall mounting
Ambient conditions	
External 24 V supply according to IEC 60204-1	Touch-proof SELV or PELV power supply. The supply voltage must not exceed 60 V DC under single-fault conditions. [1]
Protection class according to IEC 61800-5-1	Class I (with protective grounding conductor)
Humidity, max.	<95 % at 40 °C (104 °F), condensation and icing not permissible
Ambient temperature	
• Storage acc. to EN 60068-2-1	
- Frame sizes FSA to FSG	-40 ... +70 °C (-40 ... +158 °F)
- Frame sizes FSH and FSJ	-25 ... +55 °C (-13 ... +131 °F)
• Transport acc. to EN 60068-2-1	-40 ... +70 °C (-40 ... +158 °F)
• Operation acc. to EN 60068-2-2	
- Frame sizes FSA to FSG	Variant PROFINET, EthernNet/IP: -20 °C ... +55 °C (-4 ... +131 °F) with a side clearance of 5 cm or -20 °C ... +50 °C (-4 ... +122 °F) for side-by-side mounting, >45 °C (113 °F) with derating Variants PROFIBUS DP and USS, Modbus RTU, BACnet MS/TP: -20 °C ... +60 °C (-4 ... +140 °F) with a side clearance of 5 cm or -20 °C ... +50 °C (-4 ... +122 °F) for side-by-side mounting, >45 °C (113 °F) with derating
- Frame sizes FSH and FSJ	0 ... 55 °C (32 ... 131 °F) , >45 °C (113 °F) with derating
- All frame sizes with operator panel	0 ... 50 °C (32 ... 122 °F) see also derating characteristics
Environmental class in operation	
• Harmful chemical substances	
- Frame sizes FSA to FSG	Class 3C2 acc. to IEC 60721-3-3: 2002 Optional: Class 3C3 acc. to IEC 60721-3-3: 2002 [2]
- Frame sizes FSH and FSJ	Class 3C2 acc. to IEC 60721-3-3: 2002
• Organic/biological pollutants	Class 3B1 acc. to IEC 60721-3-3: 2002
• Degree of pollution	2 acc. to EN 61800

[1] Only supported for SINAMICS G120X converters with hardware version ≥ 02 02 (FSA to FSG) / 02 (FSH/FSJ).
The hardware version of the converter is on the rating plate.

[2] Only supported for SINAMICS G120X converters with hardware version ≥ 02 02. The hardware version of the converter is on the rating plate.

Technical specifications

General technical specifications (continued)

Standards

Compliance with standards [1]	
• Frame sizes FSA to FSG	CE, UKCA, UL, cUL, RCM, SEMI F47, RoHS II, EAC, KCC, REACH
• Frame sizes FSH and FSJ	CE, UKCA, UL, cUL, RCM, SEMI F47, RoHS II, EAC, REACH
Fail-safe certification	Function: Safe Torque Off (STO)
• According to IEC 61508	SIL 3
• According to ISO 13849-1	PL e and Category 3

External components (e.g. **SIRIUS 3SK1** safety relays) are necessary for using the STO safety function according to IEC 61508 SIL 2/SIL 3. [1]

SINAMICS G120X	**SIL 2** Forced checking procedure (test stop) once per year		**SIL 3** Forced checking procedure (test stop) once per 3 months	
	SIRIUS 3SK1 safety relay with		**SIRIUS 3SK1** safety relay with	
	Screw terminal	Spring-loaded terminal (push-in)	Screw terminal	Spring-loaded terminal (push-in)
Frame size	Type	Type	Type	Type
FSA to FSG	3SK1111-1AB30	3SK1111-2AB30	3SK2112-1AA10	3SK2112-2AA10
FSH and FSJ	3SK1111-1AB30	3SK1111-2AB30	3SK1111-1AB30	3SK1111-2AB30

CE marking, according to	EMC Directive 2014/30/EU Low Voltage Directive 2014/35/EU Eco-design requirements of EU Directive 2019/1781
EMC Directive [1] acc. to EN 61800-3	
• Interference immunity	The SINAMICS G120X converters are tested according to the interference immunity requirements for environments according to Category C3.
• Interference emissions	
- Frame sizes FSA to FSF without integrated line filter	[2]
- Frame sizes FSA to FSG with integrated line filter Category C2	Observance of the limit values according for conducted RF emissions according to IEC 61800-3 Category C2 / EN 55011:2016 Class A
- Frame sizes FSG to FSJ with integrated line filter Category C3	Observance of the limit values according for conducted RF emissions according to IEC 61800-3 Category C3
- Frame sizes FSH and FSJ with integrated line filter Category C3 with optional line filter Category C2 and optional line reactor	Observance of the limit values according for conducted RF emissions according to IEC 61800-3 Category C2 / EN 55011:2016 Class A
- Frame sizes FSA to FSF ≤ 90 kW without integrated line filter with optional line filter Category C1	Observance of the limit values according for conducted RF emissions according to IEC 61800-3 Category C1 / EN 55011:2016 Class B
- Frame size FSF 110 kW with integrated line filter Category C2 with optional line filter Category C1	Observance of the limit values according for conducted RF emissions according to IEC 61800-3 Category C1 / EN 55011:2016 Class B
	Note: The EMC product standard EN 61800-3 does not apply directly to a frequency converter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the converter. The frequency converters on their own do not generally require identification according to the EMC Directive.

Environmental Product Declaration (EPD)

Environmental Product Declarations (EPD) are available as PDFs for this product. The EPD PDF provides brief and concise information about the ecological properties of a product. You can find more information on the internet at:
https://support.industry.siemens.com/cs/ww/en/ps/25454/cert?ci=5690

[1] Additional information is available in the operating instructions on the internet at: www.siemens.com/sinamics-g120x/documentation

[2] Non-filtered devices are designed for operation in IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3.

Technical specifications

SINAMICS G120X converters			
Integrated bus interface	Variant PROFINET, EtherNet/IP	Variant PROFIBUS DP	Variant USS, Modbus RTU, BACnet MS/TP
Fieldbus protocols	• PROFINET • EtherNet/IP	• PROFIBUS DP	• USS • Modbus RTU • BACnet MS/TP
Hardware	2 × RJ45, device name can be stored on the device, max. 100 Mbit/s (full duplex)	9-pin SUB-D socket, isolated, max. 12 Mbit/s	RS485 connected at a terminal, isolated, bus terminating resistor can be switched in, USS: max. 187.5 kBaud Modbus RTU:19.2 kBaud BACnet MS/TP: max. 187.5 kBaud
I/O interfaces			
Signal cable cross-section	0.15 ... 1.5 mm^2 (28 ... 16 AWG)		
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		
Digital inputs – fail-safe	1 isolated input Max. input voltage 60 V Safety function: Safe Torque Off (STO) External components (e.g. safety relays) are necessary for using the STO safety function.		
Digital outputs	2 relay changeover contacts 250 V AC, 2 A (inductive load), 30 V DC, 2 A (ohmic load)		
Analog inputs	2 analog inputs Differential input Switchable between voltage (-10 ... +10 V) and current (0/4 ... 20 mA) using a DIP switch 12-bit resolution Can be used as additional digital input		
• Switching threshold: 0 → 1	4 V		
• Switching threshold: 1 → 0	1.6 V		
Analog outputs	1 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/Pt100/Pt1000 interface	1 motor temperature sensor input Connectable sensors PTC, Pt1000, KTY and bimetal Note: Connection and evaluation of a recommended, optional Pt100 temperature sensor possible by using a free analog input and output		
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 Typical input current: 500 mA at 24 V DC		
Tool interfaces			
Memory card	Optional SINAMICS SD card		
Operator panels	Optional BOP-2 Basic Operator Panel or IOP-2 Intelligent Operator Panel or SINAMICS G120 Smart Access		

Technical specifications

SINAMICS G120X converters	
Open-loop/closed-loop control techniques	
V/f linear/quadratic/parameterizable	✓
V/f with flux current control (FCC)	✓
V/f ECO linear/quadratic	✓
Vector control, sensorless	✓
Software functions	
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	✓
Switchable drive data sets (DDS)	✓ (4)
Switchable command data sets (CDS)	✓ (2)
Free function blocks (FFB) for logical and arithmetic operations	✓ (for frame sizes FSA to FSG)
Flying restart	✓
Automatic restart after line supply failure or operating fault (AR)	✓
Technology controller (internal PID)	✓
Energy saving display	✓
3 additional, free PID controllers	✓
Hibernation mode with internal/ external PID controller	✓
Belt monitoring with and without sensor (load torque monitoring)	✓
Dry-running/overload protection monitoring (load torque monitoring)	✓
Deragging	✓
Thermal motor protection	✓ (I^2t, sensor: PTC, Pt100, Pt1000, KTY and bimetal)
Thermal converter protection	✓
Motor identification	✓
Auto-ramping (V_{dc_max} controller)	✓
Kinetic buffering (V_{dc_min} controller)	✓
Braking functions	
• DC braking	✓
• Compound braking	✓

Technical specifications

General technical specifications of the power electronics	
System operating voltage	
• Frame sizes FSA to FSG	For systems complying with IEC: 200 ... 240 V 3 AC +10 % -20 % 380 ... 480 V 3 AC +10 % -20 % 500 ... 690 V 3 AC +10 % -20 % For systems complying with UL: 200 ... 240 V 3 AC 380 ... 480 V 3 AC 500 ... 600 V 3 AC
• Frame sizes FSH and FSJ	380 ... 480 V 3 AC +10 % -15 % 500 ... 690 V 3 AC +10 % -15 %
Line supply requirements **Line impedance u_K**	
• Frame sizes FSA to FSG	4 %
• Frame sizes FSH and FSJ	A line reactor (u_K = 2 %) must be connected in series, if the short-circuit power ratio R_{SC} > 33 (315 ... 500 kW) or R_{SC} > 20 (560 kW)
Input frequency	47 ... 63 Hz
Output frequency	
• Frame sizes FSA to FSG	Control mode V/f: 0 ... 550 Hz Control mode Vector: 0 ... 240 Hz
• Frame sizes FSH and FSJ	Control mode V/f: 0 ... 150 Hz Control mode Vector: 0 ... 150 Hz
Pulse frequency	
• Frame sizes FSA to FSG	200 V: 4 kHz Higher pulse frequencies up to 16 kHz see derating data 400 V: 4 kHz for converters with a rated power ≤ 90 kW 2 kHz for converters with a rated power ≥ 110 kW Higher pulse frequencies up to 16 kHz see derating data 690 V: 2 kHz Higher pulse frequencies up to 4 kHz see derating data
• Frame sizes FSH and FSJ	2 kHz Self-adjusting up to 4 kHz see derating data
Power factor λ	
• Frame sizes FSA to FSC	0.70 ... 0.85
• Frame sizes FSD to FSG	0.90 ... 0.95
• Frame sizes FSH and FSJ	0.75 ... 0.93 (with line reactor u_K = 2 %)
Displacement factor cos φ	
• Frame sizes FSA to FSC	0.96
• Frame sizes FSD to FSG	0.99
• Frame sizes FSH and FSJ	0.96
Converter efficiency acc. to IEC 61800-9-2	200 V: 95,3 ... 96,7 % 400 V: 96,2 ... 97,9 % 690 V: 96,5 ... 98,2 %
Efficiency class acc. to IEC 61800-9-2	IE2
Output voltage, max. as % of line voltage	97 %
Overload capability	
• Low overload (LO)	1.1 × base-load current I_L (i. e. 110 % overload) for 60 s within a cycle time of 300 s
• High overload (HO)	1.5 × base-load current I_H (i. e. 150 % overload) for 60 s within a cycle time of 600 s
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
Short Circuit Current Rating (SCCR) max.	100 kA see Recommended line-side overcurrent protection devices – the value depends on the fuses and circuit breakers used For more information, see: https://support.industry.siemens.com/cs/document/109762895
Protection functions	• Undervoltage • Overvoltage • Overcurrent/overload • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Converter overtemperature • Parameter locking

2

Technical specifications

Maximum permissible motor cable lengths SINAMICS G120X

The values specified in the table below apply with low-capacitance CY cables and with pulse frequencies set in the factory.

	Maximum permissible motor cable lengths (shielded/unshielded) in m (ft)			
	FSA to FSC	**FSD and FSE**	**FSF and FSG**	**FSH and FSJ**
Without compliance to the EMC category				
Converters without optional power components				
• 200 V versions	150/300 (492/984)	200/300 (656/984)	FSF: 300/450 (984/1476)	–
• 400 V versions	150/300 (492/984)	200/300 (656/984)	300/450 (984/1476)	150/200 (492/656)
• 690 V versions	–	FSD ≤ 30 kW: 200/300 (656/984) FSD 37 kW, FSE: 300/450 (984/1476)	300/450 (984/1476)	150/200 (492/656)
Converters with one optional output reactor				
• 200 V versions	–	–	–	–
• 400 V versions	–	200/300 (656/984) [1]	300/450 (984/1476) [1]	300/450 (984/1476)
• 690 V versions	–	350/525 (1148/1723)	525/800 (1723/2625)	300/450 (984/1476)
Converters with two in series connected optional output reactors [1]				
• 200 V versions	–	–	–	–
• 400 V versions	–	350/525 (1148/1723)	525/800 (1723/2625)	–
• 690 V versions	–	–	–	–
Converters with optional sine-wave filter				
• 200 V versions	–	–	–	–
• 400 V versions	200/300 (656/984)	200/300 (656/984)	FSF: 200/300 (656/984) FSG: 300/450 (984/1476)	–
• 690 V versions	–	–	–	–
Converters with optional dv/dt filter plus VPL				
• 200 V versions	–	–	–	–
• 400 V versions	–	350/525 (1148/1723)	650/800 (2133/2625)	300/450 (984/1476)
• 690 V versions	–	FSD ≤ 30 kW: 350/525 (1148/1723) FSD 37 kW, FSE: 450/625 (1476/2051) [2]	450/625 (1476/2051) [2]	300/450 (984/1476)
With compliance to the EMC category [3]				
Converters with integrated line filter for observance of the limit values for conducted RF emissions according to IEC 61800-3 Category C3				
• 200 V versions	–	–	–	–
• 400 V versions	150/– (492/–)	200/– (656/–)	200/– (656/–)	150/– (492/–) [4]
• 690 V versions	–	150/– (492/–)	150/– (492/–)	150/– (492/–) [4]
Converters with integrated line filter with external line filter Category C2 for observance of the limit values for conducted RF emissions according to IEC 61800-3 Category C2 / EN 55011:2016 Class A				
• 200 V versions	–	–	–	–
• 400 V versions	–	–	–	150/– (492/–)
• 690 V versions	–	–	–	150/– (492/–)
Converters with integrated line filter for observance of the limit values for conducted RF emissions according to IEC 61800-3 Category C2 / EN 55011:2016 Class A				
• 200 V versions	–	–	–	–
• 400 V versions	150/– (492/–)	150/– (492/–)	150/– (492/–)	–
• 690 V versions	–	100/– (328/–)	–	–
Converters with integrated line filter with external sine-wave filter for observance of the limit values for conducted RF emissions according to IEC 61800-3 Category C2 / EN 55011:2016 Class A or according to IEC 61800-3 Category C3				
• 200 V versions	–	–	–	–
• 400 V versions	Category C2 FSA: 100/– (328/–) FSB: 200/– (656/–) Category C3 FSC: 200/– (656/–)	Category C2 150/– (492/–)	Category C2 150/– (492/–)	–
• 690 V versions	–	–	–	–
Converters without/with integrated line filter with external line filter Category C1 for observance of the limit values for conducted RF emissions according to IEC 61800-3 Category C1 / EN 55011:2016 Class B				
• 200 V versions	–	–	–	–
• 400 V versions	Without integrated line filter 50/– (164/–) [3]	Without integrated line filter 50/– (164/–) [3]	Without integrated line filter FSF ≤ 90 kW: 50/– (164/–) [3] With integrated line filter FSF 110 kW: 10/– (23.8/–) [3]	–
• 690 V versions	–	–	–	–

[1] For frame sizes FSD to FSG the maximum permissible cable lengths are not increased with one output reactor. By means of the output reactor, the loading of the motor windings is reduced by lower rates of voltage rise *(dv/dt)*. By means of two output reactors connected in series, the maximum permissible cable lengths for frame sizes FSD to FSG are increased.

[2] Maximum overvoltage at the motor terminals <1350 V.

[3] Further information especially to achieve EMC Category C1 is available in the manual on the internet at:
www.siemens.com/sinamics-g120x/documentation

[4] For motor cable lengths of 100 m (328 ft) up to 150 m (492 ft) with an additional basic interference suppression module (available on request).

Technical specifications

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 200 ... 240 V 3 AC

		6SL32.0-.YC10-.U.0	6SL32.0-.YC12-.U.0	6SL32.0-.YC14-.U.0	6SL32.0-.YC16-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	200 ... 240	200 ... 240	200 ... 240	200 ... 240
Output current at line voltage 200 V					
• without overload rated value	A	4.4	6.1	7.7	10.8
• with low overload rated value	A	4.2	6.0	7.4	10.4
• with high overload rated value	A	3.2	4.2	6.0	7.4
• maximum	A	5.7	8.1	10.0	14.1
Supplied active power at rated value of output voltage and at line voltage 200 V					
• with low overload	kW	0.75	1.1	1.5	2.2
• with high overload	kW	0.55	0.75	1.1	1.5
Supplied active power [hp] at rated value of output voltage and at line voltage 240 V					
• with low overload	hp	1	1.5	2	3
• with high overload	hp	0.75	1	1.5	2
Pulse frequency	kHz	4	4	4	4
Efficiency		0.956	0.955	0.953	0.962
Power loss [1]	kW	0.058	0.084	0.109	0.123
Cooling air flow	m^3/s (ft^3/h)	0.005 (0.177)	0.0092 (0.325)	0.0092 (0.325)	0.0092 (0.325)
1 m measuring surface sound pressure level maximum	dB	55	55	55	63
Input current at line voltage 200 V					
• with low overload rated value	A	3.8	5.4	6.7	9.6
• with high overload rated value	A	2.8	3.8	5.4	6.7
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 6
• as coded connectable conductor cross section		AWG 16 ... AWG 14	AWG 16 ... AWG 14	AWG 16 ... AWG 14	AWG 16 ... AWG 10
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 6
• as coded connectable conductor cross section		AWG 16 ... AWG 14	AWG 16 ... AWG 14	AWG 16 ... AWG 14	AWG 16 ... AWG 10
Type of electrical connection for PE conductor		On housing with M4 screw	On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Cable length for motor					
• shielded maximum [2]	m (ft)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	73 (2.87402)	73 (2.87402)	73 (2.87402)	100 (3.93701)
• Height	mm (in)	232 (9.13386)	232 (9.13386)	232 (9.13386)	275 (10.82677)
• Depth	mm (in)	209 (8.22835)	209 (8.22835)	209 (8.22835)	209 (8.22835)
• Depth, with operator panel	mm (in)	218 (8.58268)	218 (8.58268)	218 (8.58268)	218 (8.58268)
Frame size		FSA	FSA	FSA	FSB
Weight, approx.	kg (lb)	3.3 (7.275246)	3.3 (7.275246)	3.3 (7.275246)	5.8 (12.786796)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YC18-.U.0	6SL32.0-.YC20-.U.0	6SL32.0-.YC22-.U.0	6SL32.0-.YC24-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	200 ... 240	200 ... 240	200 ... 240	200 ... 240
Output current at line voltage 200 V					
• without overload rated value	A	14.1	18.1	22.8	29.0
• with low overload rated value	A	13.6	17.5	22.0	28.0
• with high overload rated value	A	10.4	13.6	17.5	22.0
• maximum	A	18.4	23.7	29.7	37.8
Supplied active power at rated value of output voltage and at line voltage 200 V					
• with low overload	kW	3	4	5.5	7.5
• with high overload	kW	2.2	3	4	5.5
Supplied active power [hp] at rated value of output voltage and at line voltage 240 V					
• with low overload	hp	4	5	7.5	10
• with high overload	hp	3	4	5	7.5
Pulse frequency	kHz	4	4	4	4
Efficiency		0.961	0.959	0.964	0.961
Power loss [1]	kW	0.165	0.223	0.269	0.365
Cooling air flow	m^3/s (ft^3/h)	0.0185 (0.653)	0.0185 (0.653)	0.0185 (0.653)	0.0185 (0.653)
1 m measuring surface sound pressure level maximum	dB	63	63	67	67
Input current at line voltage 200 V					
• with low overload rated value	A	12.7	16.3	20.8	26.3
• with high overload rated value	A	9.6	12.7	16.3	20.8
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 6	1.5 ... 6	1.5 ... 16	1.5 ... 16
• as coded connectable conductor cross section		AWG 16 ... AWG 10	AWG 16 ... AWG 10	AWG 16 ... AWG 6	AWG 16 ... AWG 6
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 6	1.5 ... 6	1.5 ... 16	1.5 ... 16
• as coded connectable conductor cross section		AWG 16 ... AWG 10	AWG 16 ... AWG 10	AWG 16 ... AWG 6	AWG 16 ... AWG 6
Type of electrical connection for PE conductor		On housing with M4 screw	On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Cable length for motor					
• shielded maximum [2]	m (ft)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	100 (3.93701)	100 (3.93701)	140 (5.51181)	140 (5.51181)
• Height	mm (in)	275 (10.82677)	275 (10.82677)	295 (11.61417)	295 (11.61417)
• Depth	mm (in)	209 (8.22835)	209 (8.22835)	209 (8.22835)	209 (8.22835)
• Depth, with operator panel	mm (in)	218 (8.58268)	218 (8.58268)	218 (8.58268)	218 (8.58268)
Frame size		FSB	FSB	FSC	FSC
Weight, approx.	kg (lb)	5.8 (12.786796)	5.8 (12.786796)	7.1 (15.652802)	7.1 (15.652802)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YC26-.U.0	6SL32.0-.YC28-.U.0	6SL32.0-.YC30-.U.0	6SL32.0-.YC32-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	200 ... 240	200 ... 240	200 ... 240	200 ... 240
Output current at line voltage 200 V					
• without overload rated value	A	43	56	70	82
• with low overload rated value	A	42	54	68	80
• with high overload rated value	A	28	42	54	68
• maximum	A	57	73	92	108
Supplied active power at rated value of output voltage and at line voltage 200 V					
• with low overload	kW	11	15	18.5	22
• with high overload	kW	7.5	11	15	18.5
Supplied active power [hp] at rated value of output voltage and at line voltage 240 V					
• with low overload	hp	15	20	25	30
• with high overload	hp	10	15	20	25
Pulse frequency	kHz	4	4	4	4
Efficiency		0.967	0.965	0.963	0.965
Power loss [1]	kW	0.463	0.626	0.843	0.937
Cooling air flow	m^3/s (ft^3/h)	0.055 (1.942)	0.055 (1.942)	0.055 (1.942)	0.083 (2.931)
1 m measuring surface sound pressure level maximum	dB	70	70	70	70
Input current at line voltage 200 V					
• with low overload rated value	A	40	51	64	76
• with high overload rated value	A	26.3	40	51	64
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	25 ... 70
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 6 ... AWG 3/0
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	25 ... 70
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 6 ... AWG 3/0
Type of electrical connection for PE conductor		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
Cable length for motor					
• shielded maximum [2]	m (ft)	200 (656.16798)	200 (656.16798)	200 (656.16798)	200 (656.16798)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	200 (7.87402)	200 (7.87402)	200 (7.87402)	275 (10.82677)
• Height	mm (in)	472 (18.58268)	472 (18.58268)	472 (18.58268)	551 (21.69291)
• Depth	mm (in)	239 (9.40945)	239 (9.40945)	239 (9.40945)	239 (9.40945)
• Depth, with operator panel	mm (in)	248 (9.76378)	248 (9.76378)	248 (9.76378)	248 (9.76378)
Frame size		FSD	FSD	FSD	FSE
Weight, approx.	kg (lb)	16.6 (36.596692)	16.6 (36.596692)	16.6 (36.596692)	16.6 (36.596692)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YC34-.U.0	6SL32.0-.YC36-.U.0	6SL32.0-.YC38-.U.0	6SL32.0-.YC40-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	200 ... 240	200 ... 240	200 ... 240	200 ... 240
Output current at line voltage 200 V					
• without overload rated value	A	107	133	158	197
• with low overload rated value	A	104	130	154	192
• with high overload rated value	A	80	104	130	154
• maximum	A	141	176	208	260
Supplied active power at rated value of output voltage and at line voltage 200 V					
• with low overload	kW	30	37	45	55
• with high overload	kW	22	30	37	45
Supplied active power [hp] at rated value of output voltage and at line voltage 240 V					
• with low overload	hp	40	50	60	75
• with high overload	hp	30	40	50	60
Pulse frequency	kHz	4	4	4	4
Efficiency		0.962	0.967	0.965	0.963
Power loss [1]	kW	1.31	1.45	1.81	2.43
Cooling air flow	m^3/s (ft^3/h)	0.083 (2.931)	0.153 (5.403)	0.153 (5.403)	0.153 (5.403)
1 m measuring surface sound pressure level maximum	dB	70	72	72	72
Input current at line voltage 200 V					
• with low overload rated value	A	98	126	149	172
• with high overload rated value	A	76	98	126	149
for mains supply line					
• Type of electrical connection		Screw-type terminals	M10 screw	M10 screw	M10 screw
• Number of connections		1	2	2	2
• Connectable conductor cross-section	mm^2	25 ... 70	35 ... 120	35 ... 120	35 ... 120
• as coded connectable conductor cross section		AWG 6 ... AWG 3/0	AWG 1 ... AWG 2 ×4/0	AWG 1 ... AWG 2 ×4/0	AWG 1 ... AWG 2 ×4/0
for motor supply line					
• Type of electrical connection		Screw-type terminals	M10 screw	M10 screw	M10 screw
• Number of connections		1	2	2	2
• Connectable conductor cross-section	mm^2	25 ... 70	35 ... 120	35 ... 120	35 ... 120
• as coded connectable conductor cross section		AWG 6 ... AWG 3/0	AWG 1 ... AWG 2 ×4/0	AWG 1 ... AWG 2 ×4/0	AWG 1 ... AWG 2 ×4/0
Type of electrical connection for PE conductor		Screw-type terminals	M10 screw	M10 screw	M10 screw
Cable length for motor					
• shielded maximum [2]	m (ft)	200 (656.16798)	300 (984.25197)	300 (984.25197)	300 (984.25197)
• unshielded maximum [2]	m (ft)	300 (984.25197)	450 (1476.37795)	450 (1476.37795)	450 (1476.37795)
Dimensions					
• Width	mm (in)	275 (10.82677)	305 (12.00787)	305 (12.00787)	305 (12.00787)
• Height	mm (in)	551 (21.69291)	709 (27.91339)	709 (27.91339)	709 (27.91339)
• Depth	mm (in)	239 (9.40945)	360 (14.17323)	360 (14.17323)	360 (14.17323)
• Depth, with operator panel	mm (in)	248 (9.76378)	369 (14.52756)	369 (14.52756)	369 (14.52756)
Frame size		FSE	FSF	FSF	FSF
Weight, approx.	kg (lb)	16.6 (36.596692)	18.8 (41.446856)	17.6 (38.801312)	26.7 (58.863354)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 380 ... 480 V 3 AC

		6SL32.0-.YE10-.A.0 6SL32.0-.YE10-.U.0	6SL32.0-.YE12-.A.0 6SL32.0-.YE12-.U.0	6SL32.0-.YE14-.A.0 6SL32.0-.YE14-.U.0	6SL32.0-.YE16-.A.0 6SL32.0-.YE16-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	380 ... 480	380 ... 480	380 ... 480	380 ... 480
Output current at line voltage 400 V					
• without overload rated value	A	2.3	3.2	4.3	6.1
• with low overload rated value	A	2.2	3.1	4.1	5.9
• with high overload rated value	A	1.7	2.2	3.1	4.1
• maximum	A	2.7	3.4	4.8	6.4
Supplied active power at rated value of output voltage and at line voltage 400 V					
• with low overload	kW	0.75	1.1	1.5	2.2
• with high overload	kW	0.55	0.75	1.1	1.5
Supplied active power [hp] at rated value of output voltage and at line voltage 480 V					
• with low overload	hp	1	1.5	2	3
• with high overload	hp	0.75	1	1.5	2
Pulse frequency	kHz	4	4	4	4
Efficiency		0.962	0.966	0.966	0.970
Power loss [1]	kW	0.043	0.055	0.071	0.090
Cooling air flow	m^3/s (ft^3/h)	0.005 (635.66406)	0.005 (635.66406)	0.005 (635.66406)	0.005 (635.66406)
1 m measuring surface sound pressure level maximum	dB	55	55	55	55
Input current at line voltage 400 V					
• with low overload rated value	A	2.1	2.8	3.6	5.5
• with high overload rated value	A	1.62	1.99	2.72	3.82
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 2.5
• as coded connectable conductor cross section		AWG 16 ... AWG 14	AWG 16 ... AWG 14	AWG 16 ... AWG 14	AWG 16 ... AWG 14
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 2.5
• as coded connectable conductor cross section		AWG 16 ... AWG 14	AWG 16 ... AWG 14	AWG 16 ... AWG 14	AWG 16 ... AWG 14
Type of electrical connection for PE conductor		On housing with M4 screw	On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Cable length for motor					
• shielded maximum [2]	m (ft)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	73 (2.87402)	73 (2.87402)	73 (2.87402)	73 (2.87402)
• Height	mm (in)	232 (9.13386)	232 (9.13386)	232 (9.13386)	232 (9.13386)
• Depth	mm (in)	209 (8.22835)	209 (8.22835)	209 (8.22835)	209 (8.22835)
• Depth, with operator panel	mm (in)	218 (8.58268)	218 (8.58268)	218 (8.58268)	218 (8.58268)
Frame size		FSA	FSA	FSA	FSA
Weight, approx. [3]	kg (lb)	3.2 (7.05478)	3.2 (7.05478)	3.2 (7.05478)	3.2 (7.05478)

[1] Typical values acc. to IEC 61800-9-2. More information can be found on the internet at https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category. For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at www.siemens.com/sinamics-g120x/documentation

[3] The values apply for converters without integrated line filter. For more information, see on the internet at www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YE18-.A.0 6SL32.0-.YE18-.U.0	6SL32.0-.YE20-.A.0 6SL32.0-.YE20-.U.0	6SL32.0-.YE22-.A.0 6SL32.0-.YE22-.U.0	6SL32.0-.YE24-.A.0 6SL32.0-.YE24-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	380 ... 480	380 ... 480	380 ... 480	380 ... 480
Output current at line voltage 400 V					
• without overload rated value	A	8	10.5	13.6	18.5
• with low overload rated value	A	7.7	10.2	13.2	18
• with high overload rated value	A	5.9	7.7	10.2	13.2
• maximum	A	9.1	14	18	24
Supplied active power at rated value of output voltage and at line voltage 400 V					
• with low overload	kW	3	4	5.5	7.5
• with high overload	kW	2.2	3	4	5.5
Supplied active power [hp] at rated value of output voltage and at line voltage 480 V					
• with low overload	hp	4	5	7.5	10
• with high overload	hp	3	4	5	7.5
Pulse frequency	kHz	4	4	4	4
Efficiency		0.969	0.973	0.974	0.974
Power loss [1]	kW	0.123	0.140	0.187	0.253
Cooling air flow	m^3/s (ft^3/h)	0.005 (635.66406)	0.005 (635.66406)	0.0092 (1169.62187)	0.0092 (1169.62187)
1 m measuring surface sound pressure level maximum	dB	55	63	63	63
Input current at line voltage 400 V					
• with low overload rated value	A	6.9	9.75	12	17
• with high overload rated value	A	5.29	7.36	9.27	12.47
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 6	1.5 ... 6	1.5 ... 6
• as coded connectable conductor cross section		18 ... 14	10 ... 6	10 ... 6	10 ... 6
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 6	1.5 ... 6	1.5 ... 6
• as coded connectable conductor cross section		18 ... 14	10 ... 6	10 ... 6	10 ... 6
Type of electrical connection for PE conductor		On housing with M4 screw	On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Cable length for motor					
• shielded maximum [2]	m (ft)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	73 (2.87402)	100 (3.93701)	100 (3.93701)	100 (3.93701)
• Height	mm (in)	232 (9.13386)	275 (10.82677)	275 (10.82677)	275 (10.82677)
• Depth	mm (in)	209 (8.22835)	209 (8.22835)	209 (8.22835)	209 (8.22835)
• Depth, with operator panel	mm (in)	218 (8.58268)	218 (8.58268)	218 (8.58268)	218 (8.58268)
Frame size		FSA	FSB	FSB	FSB
Weight, approx. [3]	kg (lb)	3.2 (7.05478)	5.83 (12.85293)	5.83 (12.85293)	5.83 (12.85293)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

[3] The values apply for converters without integrated line filter.
For more information, see on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YE26-.A.0 6SL32.0-.YE26-.U.0	6SL32.0-.YE28-.A.0 6SL32.0-.YE28-.U.0	6SL32.0-.YE30-.A.0 6SL32.0-.YE30-.U.0	6SL32.0-.YE32-.A.0 6SL32.0-.YE32-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	380 ... 480	380 ... 480	380 ... 480	380 ... 480
Output current at line voltage 400 V					
• without overload rated value	A	27	33	39	47
• with low overload rated value	A	26	32	38	45
• with high overload rated value	A	18	26	32	38
• maximum	A	35	43	51.3	61
Supplied active power at rated value of output voltage and at line voltage 400 V					
• with low overload	kW	11	15	18.5	22
• with high overload	kW	7.5	11	15	18.5
Supplied active power [hp] at rated value of output voltage and at line voltage 480 V					
• with low overload	hp	15	20	25	30
• with high overload	hp	10	15	20	25
Pulse frequency	kHz	4	4	4	4
Efficiency		0.976	0.976	0.972	0.971
Power loss [1]	kW	0.340	0.432	0.591	0.723
Cooling air flow	m^3/s (ft^3/h)	0.0185 (2351,95680)	0.0185 (2351,95680)	0.055 (6992.30465)	0.055 (6992.30465)
1 m measuring surface sound pressure level maximum	dB	67	67	70	70
Input current at line voltage 400 V					
• with low overload rated value	A	24.5	29.5	36	42
• with high overload rated value	A	16.96	23.97	33	38
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 16	1.5 ... 16	10 ... 35	10 ... 35
• as coded connectable conductor cross section		AWG 16 ... AWG 6	AWG 16 ... AWG 6	AWG 8 ... AWG 2	AWG 8 ... AWG 2
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	1.5 ... 16	1.5 ... 16	10 ... 35	10 ... 35
• as coded connectable conductor cross section		AWG 16 ... AWG 6	AWG 16 ... AWG 6	AWG 8 ... AWG 2	AWG 8 ... AWG 2
Type of electrical connection for PE conductor		On housing with M4 screw	On housing with M4 screw	Screw-type terminals	Screw-type terminals
Cable length for motor					
• shielded maximum [2]	m (ft)	150 (492.12598)	150 (492.12598)	200 (656.16798)	200 (656.16798)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	140 (5.51181)	140 (5.51181)	200 (7.87402)	200 (7.87402)
• Height	mm (in)	295 (11.61417)	295 (11.61417)	472 (18.58268)	472 (18.58268)
• Depth	mm (in)	209 (8.22835)	209 (8.22835)	239 (9.40945)	239 (9.40945)
• Depth, with operator panel	mm (in)	218 (8.58268)	218 (8.58268)	248 (9.76378)	248 (9.76378)
Frame size		FSC	FSC	FSD	FSD
Weight, approx. [3]	kg (lb)	7.14 (15.74099)	7.14 (15.74099)	17 (37.47854)	17 (37.47854)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

[3] The values apply for converters without integrated line filter.
For more information, see on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YE34-.A.0 6SL32.0-.YE34-.U.0	6SL32.0-.YE36-.A.0 6SL32.0-.YE36-.U.0	6SL32.0-.YE38-.A.0 6SL32.0-.YE38-.U.0	6SL32.0-.YE40-.A.0 6SL32.0-.YE40-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	380 ... 480	380 ... 480	380 ... 480	380 ... 480
Output current at line voltage 400 V					
• without overload rated value	A	62	77	93	113
• with low overload rated value	A	60	75	90	110
• with high overload rated value	A	45	60	75	90
• maximum	A	81	102	122	149
Supplied active power at rated value of output voltage and at line voltage 400 V					
• with low overload	kW	30	37	45	55
• with high overload	kW	22	30	37	45
Supplied active power [hp] at rated value of output voltage and at line voltage 480 V					
• with low overload	hp	40	50	60	75
• with high overload	hp	30	40	50	60
Pulse frequency	kHz	4	4	4	4
Efficiency		0.975	0.974	0.974	0.972
Power loss [1]	kW	0.834	1.10	1.33	1.71
Cooling air flow	m^3/s (ft^3/h)	0.055 (6992.30465)	0.055 (6992.30465)	0.083 (10552.02338)	0.083 (10552.02338)
1 m measuring surface sound pressure level maximum	dB	70	70	70	70
Input current at line voltage 400 V					
• with low overload rated value	A	57	70	86	104
• with high overload rated value	A	47	62	78	94
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	25 ... 70	25 ... 70
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 6 ... AWG 3/0	AWG 6 ... AWG 3/0
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	25 ... 70	25 ... 70
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 6 ... AWG 3/0	AWG 6 ... AWG 3/0
Type of electrical connection for PE conductor		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
Cable length for motor					
• shielded maximum [2]	m (ft)	200 (656.16798)	200 (656.16798)	200 (656.16798)	200 (656.16798)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	200 (7.87402)	200 (7.87402)	275 (10.82677)	275 (10.82677)
• Height	mm (in)	472 (18.58268)	472 (18.58268)	551 (21.69291)	551 (21.69291)
• Depth	mm (in)	239 (9.40945)	239 (9.40945)	239 (9.40945)	239 (9.40945)
• Depth, with operator panel	mm (in)	248 (9.76378)	248 (9.76378)	248 (9.76378)	248 (9.76378)
Frame size		FSD	FSD	FSE	FSE
Weight, approx. [3]	kg (lb)	17 (37.47854)	19 (41.88778)	27 (59.52474)	27 (59.52474)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

[3] The values apply for converters without integrated line filter.
For more information, see on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YE42-.A.0 6SL32.0-.YE42-.U.0	6SL32.0-.YE44-.A.0 6SL32.0-.YE44-.U.0	6SL32.0-.YE46-.A.0 6SL32.0-.YE46-.U.0	6SL32.0-.YE48-.A.0 6SL32.0-.YE48-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	380 ... 480	380 ... 480	380 ... 480	380 ... 480
Output current at line voltage 400 V					
• without overload rated value	A	149	183	210	256
• with low overload rated value	A	145	178	205	250
• with high overload rated value	A	110	145	178	205
• maximum	A	196	241	277	338
Supplied active power at rated value of output voltage and at line voltage 400 V					
• with low overload	kW	75	90	110	132
• with high overload	kW	55	75	90	110
Supplied active power [hp] at rated value of output voltage and at line voltage 480 V					
• with low overload	hp	100	125	150	200
• with high overload	hp	75	100	125	150
Pulse frequency	kHz	4	4	2	2
Efficiency		0.976	0.974	0.979	0.978
Power loss [1]	kW	1.97	2.57	2.37	3.10
Cooling air flow	m^3/s (ft^3/h)	0.153 (19451.32021)	0.153 (19451.32021)	0.153 (19451.32021)	0.153 (19451.32021)
1 m measuring surface sound pressure level maximum	dB	72	72	72	72
Input current at line voltage 400 V					
• with low overload rated value	A	140	172	198	242
• with high overload rated value	A	117	154	189	218
for mains supply line					
• Type of electrical connection		M10 screw	M10 screw	M10 screw	M10 screw
• Number of connections		2	2	2	2
• Connectable conductor cross-section	mm^2	35 ... 120	35 ... 120	35 ... 120	35 ... 120
• as coded connectable conductor cross section		AWG 2 ... AWG 2 × 4/0	AWG 2 ... AWG 2 × 4/0	AWG 2 ... AWG 2 × 4/0	AWG 2 ... AWG 2 × 4/0
for motor supply line					
• Type of electrical connection		M10 screw	M10 screw	M10 screw	M10 screw
• Number of connections		2	2	2	2
• Connectable conductor cross-section	mm^2	35 ... 120	35 ... 120	35 ... 120	35 ... 120
• as coded connectable conductor cross section		AWG 2 ... AWG 2 × 4/0	AWG 2 ... AWG 2 × 4/0	AWG 2 ... AWG 2 × 4/0	AWG 2 ... AWG 2 × 4/0
Type of electrical connection for PE conductor		M10 screw	M10 screw	M10 screw	M10 screw
Cable length for motor					
• shielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
• unshielded maximum [2]	m (ft)	450 (1476.37795)	450 (1476.37795)	450 (1476.37795)	450 (1476.37795)
Dimensions					
• Width	mm (in)	305 (12.00787)	305 (12.00787)	305 (12.00787)	305 (12.00787)
• Height	mm (in)	709 (27.91339)	709 (27.91339)	709 (27.91339)	709 (27.91339)
• Depth	mm (in)	360 (14.17323)	360 (14.17323)	360 (14.17323)	360 (14.17323)
• Depth, with operator panel	mm (in)	369 (14.52756)	369 (14.52756)	369 (14.52756)	369 (14.52756)
Frame size		FSF	FSF	FSF	FSF
Weight, approx. [3]	kg (lb)	61 (134.48182)	61 (134.48182)	67 (147.70954)	67 (147.70954)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

[3] The values apply for converters without integrated line filter.
For more information, see on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YE50-.A.0 6SL32.0-.YE50-.C.0	6SL32.0-.YE52-.A.0 6SL32.0-.YE52-.C.0	6SL32.0-.YE54-.A.0 6SL32.0-.YE54-.C.0	6SL3220-.YE56-.C.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	380 ... 480	380 ... 480	380 ... 480	380 ... 480
Output current at line voltage 400 V					
• without overload rated value	A	309	379	488	585
• with low overload rated value	A	302	370	477	570
• with high overload rated value	A	250	302	370	468
• maximum	A	408	500	644	770
Supplied active power at rated value of output voltage and at line voltage 400 V					
• with low overload	kW	160	200	250	315
• with high overload	kW	132	160	200	250
Supplied active power [hp] at rated value of output voltage and at line voltage 480 V					
• with low overload	hp	250	300	400	400
• with high overload	hp	200	250	300	300
Pulse frequency	kHz	2	2	2	4
Efficiency		0.979	0.978	0.977	0.979
Power loss [1]	kW	3.66	4.61	6.17	6.83
Cooling air flow	m^3/s (ft^3/h)	0.21 (26697.89049)	0.21 (26697.89049)	0.21 (26697.89049)	0.362 (46022.07788)
1 m measuring surface sound pressure level maximum	dB	74	74	74	74
Input current at line voltage 400 V					
• with low overload rated value	A	301	365	471	585
• with high overload rated value	A	275	330	400	477
for mains supply line					
• Type of electrical connection		M10 screw	M10 screw	M10 screw	M12 screw
• Number of connections		2	2	2	4
• Connectable conductor cross-section	mm^2	35 ... 185	35 ... 185	35 ... 185	240 ... 240
• as coded connectable conductor cross section		AWG 1 ... MCM 2 × 350	AWG 1 ... MCM 2 × 350	AWG 1 ... MCM 2 × 350	MCM 2 × 500 ... MCM 4 × 500
for motor supply line					
• Type of electrical connection		M10 screw	M10 screw	M10 screw	M12 screw
• Number of connections		2	2	2	4
• Connectable conductor cross-section	mm^2	35 ... 185	35 ... 185	35 ... 185	240 ... 240
• as coded connectable conductor cross section		AWG 1 ... MCM 2 × 350	AWG 1 ... MCM 2 × 350	AWG 1 ... MCM 2 × 350	MCM 2 × 500 ... MCM 4 × 500
Type of electrical connection for PE conductor		M10 screw	M10 screw	M10 screw	M12 screw
Cable length for motor					
• shielded maximum [2]	m (ft)	200 (656.16798)	200 (656.16798)	200 (656.16798)	150 (492.12598)
Dimensions					
• Width	mm (in)	305 (12.00787)	305 (12.00787)	305 (12.00787)	548 (21.5748)
• Height	mm (in)	999 (39.33071)	999 (39.33071)	999 (39.33071)	1695 (66.73228)
• Depth	mm (in)	360 (14.17323)	360 (14.17323)	360 (14.17323)	393 (15.47244)
• Depth, with operator panel	mm (in)	369 (14.52756)	369 (14.52756)	369 (14.52756)	393 (15.47244)
Frame size		FSG	FSG	FSG	FSH
Weight, approx.	kg (lb)	105 (231.48536)	113 (249.12234)	120 (264.5547)	151 (332.89799)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply with compliance to the EMC category C3.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL3220-.YE58-.C.0	6SL3220-.YE60-.C.0	6SL3220-.YE62-.C.0	6SL3220-.YE64-.C.0	6SL3220-.YE66-.C.0
Type of voltage		3 AC	3 AC	3 AC	3 AC	3 AC
Line voltage	V	380 ... 480	380 ... 480	380 ... 480	380 ... 480	380 ... 480
Output current at line voltage 400 V						
• without overload rated value	A	655	735	840	910	1021
• with low overload rated value	A	640	720	820	890	1000
• with high overload rated value	A	491	551	672	728	786
• maximum	A	864	972	1107	1202	1350
Supplied active power at rated value of output voltage and at line voltage 400 V						
• with low overload	kW	355	400	450	500	560
• with high overload	kW	250	315	355	400	450
Supplied active power [hp] at rated value of output voltage and at line voltage 480 V						
• with low overload	hp	450	500	500	600	700
• with high overload	hp	300	350	450	500	500
Pulse frequency	kHz	4	4	4	4	4
Efficiency		0.978	0.979	0.978	0.979	0.979
Power loss [1]	kW	8.02	8.83	10.2	10.5	12.2
Cooling air flow	m^3/s (ft^3/h)	0.362 (46022.07788)	0.362 (46022.07788)	0.45 (57209.76533)	0.45 (57209.76533)	0.45 (57209.76533)
1 m measuring surface sound pressure level maximum	dB	74	74	74	74	74
Input current at line voltage 400 V						
• with low overload rated value	A	654	735	850	924	1038
• with high overload rated value	A	501	562	696	756	816
for mains supply line						
• Type of electrical connection		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Number of connections		4	4	6	6	6
• Connectable conductor cross-section	mm^2	240 ... 240	240 ... 240	240 ... 240	240 ... 240	240 ... 240
• as coded connectable conductor cross section		MCM 2 × 500 ... MCM 4 × 500	MCM 2 × 500 ... MCM 4 × 500	MCM 4 × 500 ... MCM 6 × 500	MCM 4 × 500 ... MCM 6 × 500	MCM 4 × 500 ... MCM 6 × 500
for motor supply line						
• Type of electrical connection		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Number of connections		4	4	6	6	6
• Connectable conductor cross-section	mm^2	240 ... 240	240 ... 240	240 ... 240	240 ... 240	240 ... 240
• as coded connectable conductor cross section		MCM 2 × 500 ... MCM 4 × 500	MCM 2 × 500 ... MCM 4 × 500	MCM 4 × 500 ... MCM 8 × 500	MCM 4 × 500 ... MCM 8 × 500	MCM 4 × 500 ... MCM 8 × 500
Type of electrical connection for PE conductor		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
Cable length for motor						
• shielded maximum [2]	m (ft)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)
Dimensions						
• Width	mm (in)	548 (21.5748)	548 (21.5748)	801 (31.53543)	801 (31.53543)	801 (31.53543)
• Height	mm (in)	1695 (66.73228)	1695 (66.73228)	1621 (63.8189)	1621 (63.8189)	1621 (63.8189)
• Depth	mm (in)	393 (15.47244)	393 (15.47244)	393 (15.47244)	393 (15.47244)	393 (15.47244)
• Depth, with operator panel	mm (in)	393 (15.47244)	393 (15.47244)	393 (15.47244)	393 (15.47244)	393 (15.47244)
Frame size		FSH	FSH	FSJ	FSJ	FSJ
Weight, approx.	kg (lb)	157 (346.12573)	159 (350.53497)	236 (520.2909)	250 (551.15562)	250 (551.15562)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply with compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

SINAMICS G120X converters · Degree of protection IP20/UL Open Type · 500 ... 690 V 3 AC

		6SL32.0-.YH18-.A.0 6SL32.0-.YH18-.U.0	6SL32.0-.YH20-.A.0 6SL32.0-.YH20-.U.0	6SL32.0-.YH22-.A.0 6SL32.0-.YH22-.U.0	6SL32.0-.YH24-.A.0 6SL32.0-.YH24-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	500 ... 690	500 ... 690	500 ... 690	500 ... 690
Output current at line voltage 690 V					
• without overload rated value	A	6	7	10	12
• with low overload rated value	A	5	6.3	9	11
• with high overload rated value	A	4	5	6.3	9
• maximum	A	7	9	13	15
Supplied active power at rated value of output voltage and at line voltage 690 V					
• with low overload	kW	3	4	5.5	7.5
• with high overload	kW	2.2	3	4	5.5
Supplied active power [hp] at rated value of output voltage and at line voltage 600 V					
• with low overload	hp	4	5	7.5	10
• with high overload	hp	3	4	5	7.5
Pulse frequency	kHz	2	2	2	2
Efficiency		0.965	0.966	0.970	0.971
Power loss [1]	kW	0.158	0.191	0.262	0.306
Cooling air flow	m^3/s (ft^3/h)	0.055 (6992.30465)	0.055 (6992.30465)	0.055 (6992.30465)	0.055 (6992.30465)
1 m measuring surface sound pressure level maximum	dB	70	70	70	70
Input current at line voltage 690 V					
• with low overload rated value	A	5	6	9	11
• with high overload rated value	A	4.4	5.2	6.9	9.9
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	10 ... 35
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	10 ... 35
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2
Type of electrical connection for PE conductor		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
Cable length for motor					
• shielded maximum [2]	m (ft)	200 (656.16798)	200 (656.16798)	200 (656.16798)	200 (656.16798)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	200 (7.87402)	200 (7.87402)	200 (7.87402)	200 (7.87402)
• Height	mm (in)	472 (18.58268)	472 (18.58268)	472 (18.58268)	472 (18.58268)
• Depth	mm (in)	239 (9.40945)	239 (9.40945)	239 (9.40945)	239 (9.40945)
• Depth, with operator panel	mm (in)	248 (9.76378)	248 (9.76378)	248 (9.76378)	248 (9.76378)
Frame size		FSD	FSD	FSD	FSD
Weight, approx. [3]	kg (lb)	16.6 (36.59669)	16.6 (36.59669)	16.6 (36.59669)	16.6 (36.59669)

1) Typical values acc. to IEC 61800-9-2. More information can be found on the internet at https://support.industry.siemens.com/cs/document/94059311

2) The values apply without compliance to the EMC category. For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at www.siemens.com/sinamics-g120x/documentation

3) The values apply for converters without integrated line filter. For more information, see on the internet at www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YH26-.A.0 6SL32.0-.YH26-.U.0	6SL32.0-.YH28-.A.0 6SL32.0-.YH28-.U.0	6SL32.0-.YH30-.A.0 6SL32.0-.YH30-.U.0	6SL32.0-.YH32-.A.0 6SL32.0-.YH32-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	500 ... 690	500 ... 690	500 ... 690	500 ... 690
Output current at line voltage 690 V					
• without overload rated value	A	15	20	24	28
• with low overload rated value	A	14	19	23	27
• with high overload rated value	A	11	14	19	23
• maximum	A	19	26	32	37
Supplied active power at rated value of output voltage and at line voltage 690 V					
• with low overload	kW	11	15	18.5	22
• with high overload	kW	7.5	11	15	18.5
Supplied active power [hp] at rated value of output voltage and at line voltage 600 V					
• with low overload	hp	10	15	20	25
• with high overload	hp	10	10	15	20
Pulse frequency	kHz	2	2	2	2
Efficiency		0.973	0.975	0.976	0.976
Power loss [1]	kW	0.359	0.452	0.533	0.614
Cooling air flow	m^3/s (ft^3/h)	0.055 (6992.30465)	0.055 (6992.30465)	0.055 (6992.30465)	0.055 (6992.30465)
1 m measuring surface sound pressure level maximum	dB	70	70	70	70
Input current at line voltage 690 V					
• with low overload rated value	A	14	18	22	25
• with high overload rated value	A	12.1	14.6	20	23.4
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	10 ... 35
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	10 ... 35
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 8 ... AWG 2
Type of electrical connection for PE conductor		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
Cable length for motor					
• shielded maximum [2]	m (ft)	200 (656.16798)	200 (656.16798)	200 (656.16798)	200 (656.16798)
• unshielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
Dimensions					
• Width	mm (in)	200 (7.87402)	200 (7.87402)	200 (7.87402)	200 (7.87402)
• Height	mm (in)	472 (18.58268)	472 (18.58268)	472 (18.58268)	472 (18.58268)
• Depth	mm (in)	239 (9.40945)	239 (9.40945)	239 (9.40945)	239 (9.40945)
• Depth, with operator panel	mm (in)	248 (9.76378)	248 (9.76378)	248 (9.76378)	248 (9.76378)
Frame size		FSD	FSD	FSD	FSD
Weight, approx. [3]	kg (lb)	16.6 (36.59669)	16.6 (36.59669)	16.6 (36.59669)	16.6 (36.59669)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

[3] The values apply for converters without integrated line filter.
For more information, see on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YH34-.A.0 6SL32.0-.YH34-.U.0	6SL32.0-.YH36-.A.0 6SL32.0-.YH36-.U.0	6SL32.0-.YH38-.U.0 6SL32.0-.YH38-.A.0	6SL32.0-.YH40-.A.0 6SL32.0-.YH40-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	500 ... 690	500 ... 690	500 ... 690	500 ... 690
Output current at line voltage 690 V					
• without overload rated value	A	36	43	54	64
• with low overload rated value	A	35	42	52	62
• with high overload rated value	A	27	35	42	52
• maximum	A	48	57	71	84
Supplied active power at rated value of output voltage and at line voltage 690 V					
• with low overload	kW	30	37	45	55
• with high overload	kW	22	30	37	45
Supplied active power [hp] at rated value of output voltage and at line voltage 600 V					
• with low overload	hp	30	40	50	60
• with high overload	hp	25	30	40	50
Pulse frequency	kHz	2	2	2	2
Efficiency		0.976	0.976	0.978	0.978
Power loss [1]	kW	0.797	0.971	1.11	1.35
Cooling air flow	m^3/s (ft^3/h)	0.055 (6992.30465)	0.055 (6992.30465)	0.083 (10552.02338)	0.083 (10552.02338)
1 m measuring surface sound pressure level maximum	dB	70	70	70	70
Input current at line voltage 690 V					
• with low overload rated value	A	33	40	50	59
• with high overload rated value	A	28	36.6	44.4	54.4
for mains supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	25 ... 70	25 ... 70
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 6 ... AWG 3/0	AWG 6 ... AWG 3/0
for motor supply line					
• Type of electrical connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Number of connections		1	1	1	1
• Connectable conductor cross-section	mm^2	10 ... 35	10 ... 35	25 ... 70	25 ... 70
• as coded connectable conductor cross section		AWG 8 ... AWG 2	AWG 8 ... AWG 2	AWG 6 ... AWG 3/0	AWG 6 ... AWG 3/0
Type of electrical connection for PE conductor		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
Cable length for motor					
• shielded maximum [2]	m (ft)	200 (656.16798)	300 (984.25197)	300 (984.25197)	300 (984.25197)
• unshielded maximum [2]	m (ft)	300 (984.25197)	450 (1476.37795)	450 (1476.37795)	450 (1476.37795)
Dimensions					
• Width	mm (in)	200 (7.87402)	200 (7.87402)	275 (10.82677)	275 (10.82677)
• Height	mm (in)	472 (18.58268)	472 (18.58268)	551 (21.69291)	551 (21.69291)
• Depth	mm (in)	239 (9.40945)	239 (9.40945)	239 (9.40945)	239 (9.40945)
• Depth, with operator panel	mm (in)	248 (9.76378)	248 (9.76378)	248 (9.76378)	248 (9.76378)
Frame size		FSD	FSD	FSE	FSE
Weight, approx. [3]	kg (lb)	16.6 (36.59669)	18.8 (41.44686)	26.7 (58.86342)	26.7 (58.86342)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

[3] The values apply for converters without integrated line filter.
For more information, see on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YH42-.C.0 6SL32.0-.YH42-.U.0	6SL32.0-.YH44-.C.0 6SL32.0-.YH44-.U.0	6SL32.0-.YH46-.C.0 6SL32.0-.YH46-.U.0	6SL32.0-.YH48-.C.0 6SL32.0-.YH48-.U.0
Type of voltage		3 AC	3 AC	3 AC	3 AC
Line voltage	V	500 ... 690	500 ... 690	500 ... 690	500 ... 690
Output current at line voltage 690 V					
• without overload rated value	A	82	103	128	148
• with low overload rated value	A	80	100	125	144
• with high overload rated value	A	62	80	100	125
• maximum	A	108	135	169	195
Supplied active power at rated value of output voltage and at line voltage 690 V					
• with low overload	kW	75	90	110	132
• with high overload	kW	55	75	90	110
Supplied active power [hp] at rated value of output voltage and at line voltage 600 V					
• with low overload	hp	75	100	125	150
• with high overload	hp	60	75	100	125
Pulse frequency	kHz	2	2	2	2
Efficiency		0.982	0.981	0.982	0.981
Power loss [1]	kW	1.41	1.80	2.22	2.64
Cooling air flow	m^3/s (ft^3/h)	0.153 (19451.32021)	0.153 (19451.32021)	0.153 (19451.32021)	0.153 (19451.32021)
1 m measuring surface sound pressure level maximum	dB	72	72	72	72
Input current at line voltage 690 V					
• with low overload rated value	A	78	97	121	138
• with high overload rated value	A	66.4	85.2	106.3	131.6
for mains supply line					
• Type of electrical connection		M10 screw	M10 screw	M10 screw	M10 screw
• Number of connections		2	2	2	2
• Connectable conductor cross-section	mm^2	35 ... 120	35 ... 120	35 ... 120	35 ... 120
• as coded connectable conductor cross section		AWG 1 ... AWG 2 × 4/0	AWG 1 ... AWG 2 × 4/0	AWG 1 ... AWG 2 × 4/0	AWG 1 ... AWG 2 × 4/0
for motor supply line					
• Type of electrical connection		M10 screw	M10 screw	M10 screw	M10 screw
• Number of connections		2	2	2	2
• Connectable conductor cross-section	mm^2	35 ... 120	35 ... 120	35 ... 120	35 ... 120
• as coded connectable conductor cross section		AWG 1 ... AWG 2 × 4/0	AWG 1 ... AWG 2 × 4/0	AWG 1 ... AWG 2 × 4/0	AWG 1 ... AWG 2 × 4/0
Type of electrical connection for PE conductor		M10 screw	M10 screw	M10 screw	M10 screw
Cable length for motor					
• shielded maximum [2]	m (ft)	300 (984.25197)	300 (984.25197)	300 (984.25197)	300 (984.25197)
• unshielded maximum [2]	m (ft)	450 (1476.37795)	450 (1476.37795)	450 (1476.37795)	450 (1476.37795)
Dimensions					
• Width	mm (in)	305 (12.00787)	305 (12.00787)	305 (12.00787)	305 (12.00787)
• Height	mm (in)	709 (27.91339)	709 (27.91339)	709 (27.91339)	709 (27.91339)
• Depth	mm (in)	360 (14.17323)	360 (14.17323)	360 (14.17323)	360 (14.17323)
• Depth, with operator panel	mm (in)	369 (14.52756)	369 (14.52756)	369 (14.52756)	369 (14.52756)
Frame size		FSF	FSF	FSF	FSF
Weight, approx. [3]	kg (lb)	61 (134.48182)	61 (134.48182)	66.5 (146.60723)	66.5 (146.60723)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply without compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

[3] The values apply for converters without integrated line filter.
For more information, see on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL32.0-.YH50-.C.0	6SL32.0-.YH52-.C.0	6SL32.0-.YH54-.C.0	6SL3220-.YH56-.C.0	6SL3220-.YH58-.C.0
Type of voltage		3 AC	3 AC	3 AC	3 AC	3 AC
Line voltage	V	500 ... 690	500 ... 690	500 ... 690	500 ... 690	500 ... 690
Output current at line voltage 690 V						
• without overload rated value	A	175	213	256	368	400
• with low overload rated value	A	171	208	250	330	385
• with high overload rated value	A	144	171	208	272	314
• maximum	A	231	281	338	487	529
Supplied active power at rated value of output voltage and at line voltage 690 V						
• with low overload	kW	160	200	250	315	355
• with high overload	kW	132	160	200	250	315
Supplied active power [hp] at rated value of output voltage and at line voltage 600 V						
• with low overload	hp	150	200	250	350	400
• with high overload	hp	150	150	200	250	300
Pulse frequency	kHz	2	2	2	2	2
Efficiency		0.982	0.982	0.981	0.982	0.982
Power loss [1]	kW	2.93	3.70	4.63	5.88	6.91
Cooling air flow	m^3/s (ft^3/h)	0.21 (26697.89049)	0.21 (26697.89049)	0.21 (26697.89049)	0.362 (46022.07788)	0.362 (46022.07788)
1 m measuring surface sound pressure level maximum	dB	74	74	74	74	74
Input current at line voltage 690 V						
• with low overload rated value	A	171	205	249	343	401
• with high overload rated value	A	158.2	185.1	227.5	283	327
for mains supply line						
• Type of electrical connection		M10 screw	M10 screw	M10 screw	M12 screw	M12 screw
• Number of connections		2	2	2	4	4
• Connectable conductor cross-section	mm^2	35 ... 185	35 ... 185	35 ... 185	240 ... 240	240 ... 240
• as coded connectable conductor cross section		AWG 1 ... MCM 2 × 350	AWG 1 ... MCM 2 × 350	AWG 1 ... MCM 2 × 350	MCM 2 × 500 ... MCM 4 × 500	MCM 2 × 500 ... MCM 4 × 500
for motor supply line						
• Type of electrical connection		M10 screw	M10 screw	M10 screw	M12 screw	M12 screw
• Number of connections		2	2	2	4	4
• Connectable conductor cross-section	mm^2	35 ... 185	35 ... 185	35 ... 185	240 ... 240	240 ... 240
• as coded connectable conductor cross section		AWG 1 ... MCM 2 × 350	AWG 1 ... MCM 2 × 350	AWG 1 ... MCM 2 × 350	MCM 2 × 500 ... MCM 4 × 500	MCM 2 × 500 ... MCM 4 × 500
Type of electrical connection for PE conductor		M10 screw	M10 screw	M10 screw	M12 screw	M12 screw
Cable length for motor						
• shielded maximum [2]	m (ft)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)
Dimensions						
• Width	mm (in)	305 (12.00787)	305 (12.00787)	305 (12.00787)	548 (21.5748)	548 (21.5748)
• Height	mm (in)	999 (39.33071)	999 (39.33071)	999 (39.33071)	1695 (66.73228)	1695 (66.73228)
• Depth	mm (in)	360 (14.17323)	360 (14.17323)	360 (14.17323)	393 (15.47244)	393 (15.47244)
• Depth, with operator panel	mm (in)	369 (14.52756)	369 (14.52756)	369 (14.52756)	393 (15.47244)	393 (15.47244)
Frame size		FSG	FSG	FSG	FSH	FSH
Weight, approx.	kg (lb)	105 (231.48536)	113 (249.12234)	120 (264.5547)	158 (348.33035)	158 (348.33035)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply with compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

Technical specifications

		6SL3220-.YH60-.C.0	6SL3220-.YH62-.C.0	6SL3220-.YH64-.C.0	6SL3220-.YH66-.C.0	6SL3220-.YH68-.C.0
Type of voltage		3 AC	3 AC	3 AC	3 AC	3 AC
Line voltage	V	500 ... 690	500 ... 690	500 ... 690	500 ... 690	500 ... 690
Output current at line voltage 690 V						
• without overload rated value	A	453	516	581	654	725
• with low overload rated value	A	420	470	520	580	650
• with high overload rated value	A	348	394	444	476	532
• maximum	A	598	682	768	864	959
Supplied active power at rated value of output voltage and at line voltage 690 V						
• with low overload	kW	400	450	500	560	630
• with high overload	kW	355	400	450	500	560
Supplied active power [hp] at rated value of output voltage and at line voltage 600 V						
• with low overload	hp	450	500	500	600	700
• with high overload	hp	350	450	450	500	500
Pulse frequency	kHz	2	2	2	2	2
Efficiency		0.982	0.981	0.982	0.982	0.982
Power loss [1]	kW	7.67	8.84	9.18	10.4	11.4
Cooling air flow	m^3/s (ft^3/h)	0.362 (46022.07788)	0.362 (46022.07788)	0.45 (57209.76533)	0.45 (57209.76533)	0.45 (57209.76533)
1 m measuring surface sound pressure level maximum	dB	74	74	74	74	74
Input current at line voltage 690 V						
• with low overload rated value	A	437	489	540	602	675
• with high overload rated value	A	362	410	461	494	552
for mains supply line						
• Type of electrical connection		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Number of connections		4	4	6	6	6
• Connectable conductor cross-section	mm^2	240 ... 240	240 ... 240	240 ... 240	240 ... 240	240 ... 240
• as coded connectable conductor cross section		MCM 2 × 500 ... MCM 4 × 500	MCM 2 × 500 ... MCM 4 × 500	MCM 4 × 500 ... MCM 6 × 500	MCM 4 × 500 ... MCM 6 × 500	MCM 4 × 500 ... MCM 6 × 500
for motor supply line						
• Type of electrical connection		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Number of connections		4	4	6	6	6
• Connectable conductor cross-section	mm^2	240 ... 240	240 ... 240	240 ... 240	240 ... 240	240 ... 240
• as coded connectable conductor cross section		MCM 2 × 500 ... MCM 4 × 500	MCM 2 × 500 ... MCM 4 × 500	MCM 4 × 500 ... MCM 8 × 500	MCM 4 × 500 ... MCM 8 × 500	MCM 4 × 500 ... MCM 8 × 500
Type of electrical connection for PE conductor		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
Cable length for motor						
• shielded maximum [2]	m (ft)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)	150 (492.12598)
Dimensions						
• Width	mm (in)	548 (21.5748)	548 (21.5748)	801 (31.53543)	801 (31.53543)	801 (31.53543)
• Height	mm (in)	1695 (66.73228)	1695 (66.73228)	1621 (63.8189)	1621 (63.8189)	1621 (63.8189)
• Depth	mm (in)	393 (15.47244)	393 (15.47244)	393 (15.47244)	393 (15.47244)	393 (15.47244)
• Depth, with operator panel	mm (in)	393 (15.47244)	393 (15.47244)	393 (15.47244)	393 (15.47244)	393 (15.47244)
Frame size		FSH	FSH	FSJ	FSJ	FSJ
Weight, approx.	kg (lb)	162 (357.14884)	162 (357.14884)	236 (520.2909)	236 (520.2909)	246 (542.33713)

[1] Typical values acc. to IEC 61800-9-2.
More information can be found on the internet at
https://support.industry.siemens.com/cs/document/94059311

[2] The values apply with compliance to the EMC category.
For more information, see Maximum permissible motor cable lengths SINAMICS G120X and on the internet at
www.siemens.com/sinamics-g120x/documentation

Characteristic curves

Derating data

Pulse frequency

Frame size	Rated power [1] at 50 Hz 200 V 3 AC		**Rated output current [2] in A** (at an ambient temperature of 45 °C (113 °F)) for a pulse frequency of							
	kW	hp	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
FSA	0.75	1	4.2	**4.2**	3.5	2.9	2.5	2.1	1.8	1.6
	1.1	1.5	6	**6**	5.1	4.2	3.6	3	2.7	2.4
	1.5	2	7.4	**7.4**	6.2	5.1	4.4	3.7	3.3	2.9
FSB	2.2	3	10.4	**10.4**	8.8	7.2	6.2	5.2	4.6	4.1
	3	4	13.6	**13.6**	11.5	9.5	8.1	6.8	6.1	5.4
	4	5	17.5	**17.5**	14.8	12.2	10.4	8.7	7.8	7
FSC	5.5	7.5	22	**22**	18.7	15.4	13.2	11	9.9	8.8
	7.5	10	28	**28**	23.8	19.6	16.8	14	12.6	11.2
FSD	11	15	42	**42**	35.7	29.4	25.2	21	18.9	16.8
	15	20	54	**54**	45.9	37.8	32.4	27	24.3	21.6
	18.5	25	68	**68**	57.8	47.6	40.8	34	30.6	27.2
FSE	22	30	80	**80**	68	56	48	40	36	32
	30	40	104	**104**	88.4	72.8	62.4	52	46.8	41.6
FSF	37	50	130	**130**	110.5	91	78	65	58.5	52
	45	60	154	**154**	130.8	107.8	92.4	77	69.3	61.6
	55	75	192	**192**	163.2	134.4	115.2	96	86.4	76.8

The rated output currents in **bold** apply for the standard pulse frequency.

[1] Rated power based on the base-load current I_L.
The base-load current I_L is based on the duty cycle for low overload (LO).

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

Characteristic curves

Frame size	Rated power [1] at 50 Hz 400 V 3 AC		**Rated output current [2] in A** (at an ambient temperature of 45 °C (113 °F)) for a pulse frequency of							
	kW	hp	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
FSA	0.75	1	2.2	**2.2**	1.87	1.54	1.32	1.1	0.99	0.88
	1.1	1.5	3.1	**3.1**	2.635	2.17	1.86	1.55	1.395	1.24
	1.5	2	4.1	**4.1**	3.485	2.87	2.46	2.05	1.895	1.64
	2.2	3	5.9	**5.9**	5.015	4.13	3.54	2.95	2.655	2.36
	3	4	7.7	**7.7**	6.545	5.39	4.62	3.85	3.465	3.08
FSB	4	5	10.2	**10.2**	8.67	7.14	6.12	5.1	4.59	4.08
	5.5	7.5	13.2	**13.2**	11.22	9.24	7.92	6.6	5.94	5.28
	7.5	10	18	**18**	15.3	12.6	10.8	9	8.1	7.2
FSC	11	15	26	**26**	22.1	18.2	15.6	13	11.7	10.4
	15	20	32	**32**	27.2	22.4	19	18	14.4	12.8
FSD	18.5	25	38	**38**	32.3	26.6	22.8	19	17.1	15.2
	22	30	45	**45**	38.2	31.5	27	22.5	20.2	18
	30	40	60	**60**	51	42	36	30	27	24
	37	50	75	**75**	63.7	52.5	45	37.5	33.7	30
FSE	45	60	90	**90**	76.5	63	54	45	40.5	36
	55	75	110	**110**	93.5	77	66	55	49.5	44
FSF	75	100	145	**145**	123.2	101.5	87	72.5	65.2	58
	90	125	178	**178**	151	124.6	107	89	80.1	71.2
	110	150	**205**	143.5	103	82	–	–	–	–
	132	200	**250**	175	125	100	–	–	–	–
FSG	160	250	**302**	211.4	151	121	–	–	–	–
	200	300	**370**	259	185	148	–	–	–	–
	250	400	**477**	334	239	191	–	–	–	–
FSH [3]	315	400	**585**	468	–	–	–	–	–	–
	355	450	**655**	524	–	–	–	–	–	–
	400	500	**735**	588	–	–	–	–	–	–
FSJ [3]	450	500	**840**	672	–	–	–	–	–	–
	500	600	**910**	728	–	–	–	–	–	–
	560	700	**1021**	817	–	–	–	–	–	–

The rated output currents in **bold** apply for the standard pulse frequency.

[1] Rated power based on the base-load current I_L.
The base-load current I_L is based on the duty cycle for low overload (LO).

[2] Frame sizes FSA to FSG:
Output current based on the base-load current I_L. The base-load current I_L is based on the duty cycle for low overload (LO). Frame sizes FSH and FSJ:
Output current based on the rated output current I_N. The rated output current I_N can be used up to 100 %; however, without overload.

[3] In the factory setting, these converters start at a pulse frequency of 4 kHz and reduce it automatically under load to the associated required frequencies. As the load decreases, the pulse frequency increases automatically up to 4 kHz.

Characteristic curves

Frame size	Rated power [1] at 50 Hz 690 V 3 AC		**Rated output current in A** (at an ambient temperature of 45 °C (113 °F)) for a pulse frequency of							
	kW	hp	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
FSD	3	4	**6**	3.6	–	–	–	–	–	–
	4	5	**7**	4.2	–	–	–	–	–	–
	5.5	7.5	**10**	6	–	–	–	–	–	–
	7.5	10	**13**	7.8	–	–	–	–	–	–
	11	10	**16**	9.6	–	–	–	–	–	–
	15	15	**21**	12.6	–	–	–	–	–	–
	18.5	20	**25**	15	–	–	–	–	–	–
	22	25	**29**	17.4	–	–	–	–	–	–
	30	30	**38**	22.8	–	–	–	–	–	–
	37	40	**46**	27.6	–	–	–	–	–	–
FSE	45	50	**58**	34.8	–	–	–	–	–	–
	55	60	**68**	40.8	–	–	–	–	–	–
FSF	75	75	**90**	54	–	–	–	–	–	–
	90	100	**112**	67.2	–	–	–	–	–	–
	110	125	**128**	76.8	–	–	–	–	–	–
	132	150	**158**	94.8	–	–	–	–	–	–
FSG	160	150	**196**	118	–	–	–	–	–	–
	200	200	**236**	142	–	–	–	–	–	–
	250	250	**288**	173	–	–	–	–	–	–
FSH [2]	315	350	**330**	215	–	–	–	–	–	–
	355	400	**385**	250	–	–	–	–	–	–
	400	450	**420**	273	–	–	–	–	–	–
	450	500	**470**	306	–	–	–	–	–	–
FSJ [2]	500	500	**520**	338	–	–	–	–	–	–
	560	600	**580**	377	–	–	–	–	–	–
	630	700	**650**	423	–	–	–	–	–	–

The rated output currents in **bold** apply for the standard pulse frequency.

[1] Rated power based on the base-load current I_L.
The base-load current I_L is based on the duty cycle for low overload (LO).

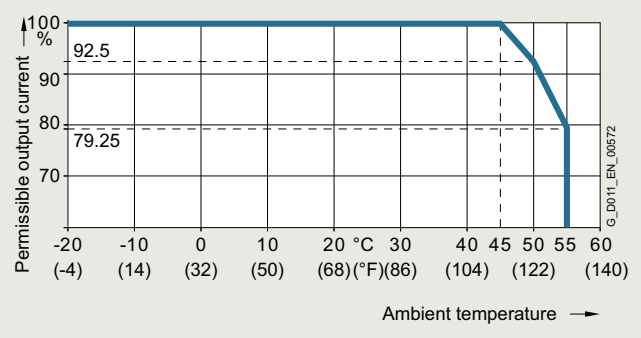
[2] In the factory setting, these converters start at a pulse frequency of 4 kHz and reduce it automatically under load to the associated required frequencies. As the load decreases, the pulse frequency increases automatically up to 4 kHz. The values of the rated currents apply to a pulse frequency of 2 kHz and are reached at any time by automatic adaptation of the output pulse frequency.

Characteristic curves

Ambient temperature

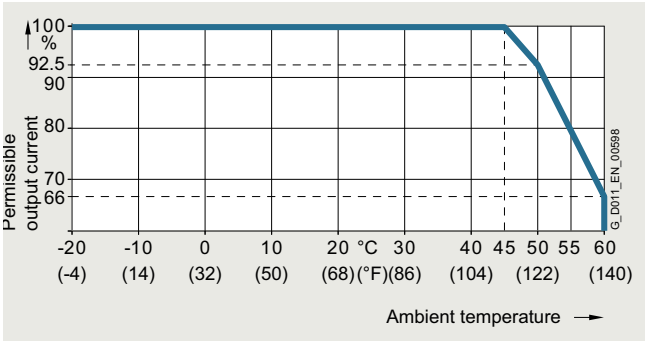
Frame sizes FSA to FSG:

- Variant PROFINET, EthernNet/IP:



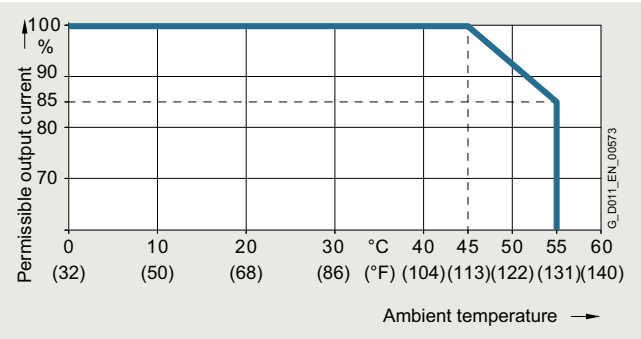
Permissible output current as a function of ambient temperature for SINAMICS G120X, frame sizes FSA to FSG, at low overload (LO)

- Variants PROFIBUS DP and USS, Modbus RTU, BACnet MS/TP:



Permissible output current as a function of ambient temperature for SINAMICS G120X, frame sizes FSA to FSG, at low overload (LO)

Frame sizes FSH and FSJ:

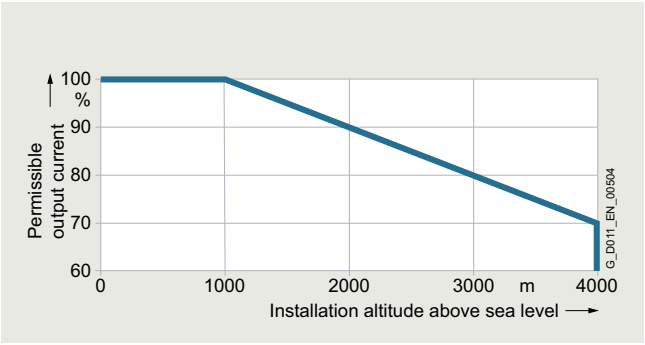


Permissible output current as a function of ambient temperature for SINAMICS G120X, frame sizes FSH and FSJ, at low overload (LO)

The operating temperature ranges of the operator panels should be taken into account. The temperature ranges are specified in the Technical specifications section under Operator panels.

Installation altitude

Frame sizes FSA to FSJ:



Permissible output current as a function of installation altitude for SINAMICS G120X at low overload (LO) at an ambient temperature of 45 °C (113 °F), derating 70 % at 4000 m (13124 ft)

The connected motors, power elements and components must be considered separately.
Permissible line supplies as a function of the installation altitude

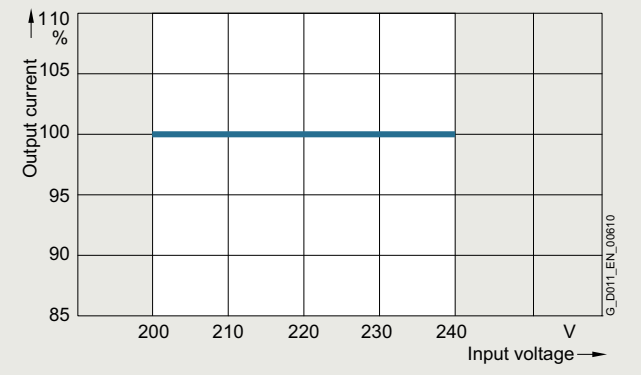
- Installation altitude up to 2000 m (6562 ft) above sea level
  - Connection to every supply system permitted for the converter
- Installation altitudes between 2000 m (6562 ft) and 4000 m (13124 ft) above sea level
  - Connection only to a TN system with grounded neutral point
  - TN systems with grounded line conductor are not permitted
  - The TN line system with grounded neutral point can also be supplied using an isolation transformer
  - The phase-to-phase voltage does not have to be reduced

When using converters on TN systems with voltages ≥ 600 V and at installation altitudes of 2000 m to 4000 m, the TN line supply must have a grounded neutral point established using an isolation transformer.

Characteristic curves

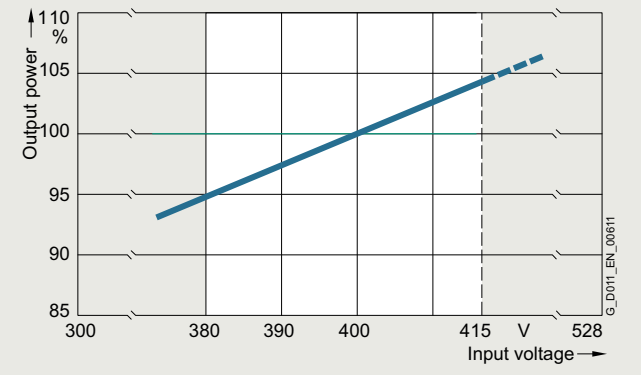
System operating voltage

200 V converters frame sizes FSA to FSF:

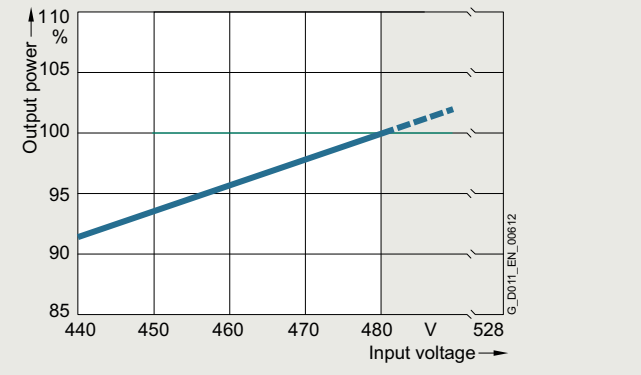


Permissible output current as a function of the input voltage for 200 V SINAMICS G120X converters, frame sizes FSA to FSF

400 V converters frame sizes FSA to FSG:



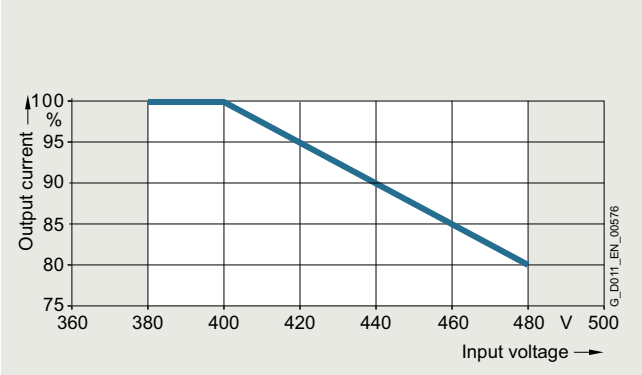
Permissible output power as a function of the input voltage for 400 V SINAMICS G120X converters, frame sizes FSA to FSG, at 100% output current in the range of 380 V to 415 V
(the temperature protection of the converter can reduce the current or pulse frequency above 415 V)



Permissible output power as a function of the input voltage for 400 V SINAMICS G120X converters, frame sizes FSA to FSG, at 100% output current in the range of 440 V to 480 V
(the temperature protection of the converter can reduce the current or pulse frequency above 480 V)

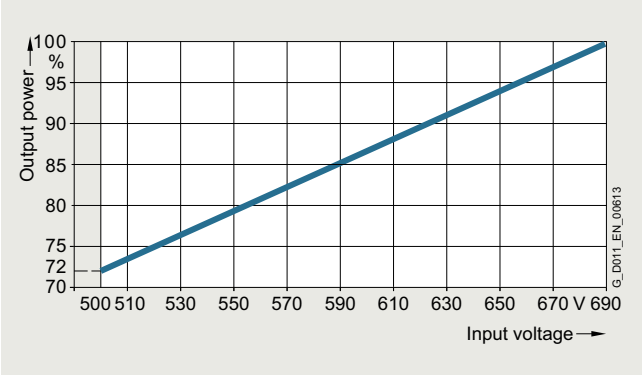
Further information is available in the manual on the internet at:
www.siemens.com/sinamics-g120x/documentation

400 V converters frame sizes FSH and FSJ:



Permissible output current as a function of input voltage for 400 V SINAMICS G120X converters, frame sizes FSH and FSJ, at low overload (LO)

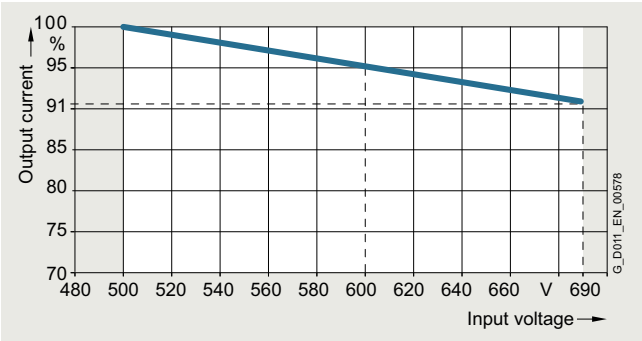
600 V converters frame sizes FSA to FSG:



Permissible output power as a function of input voltage for 600 V SINAMICS G120X converters, frame sizes FSA to FSG, at 100% output current in the range of 500 V to 690 V

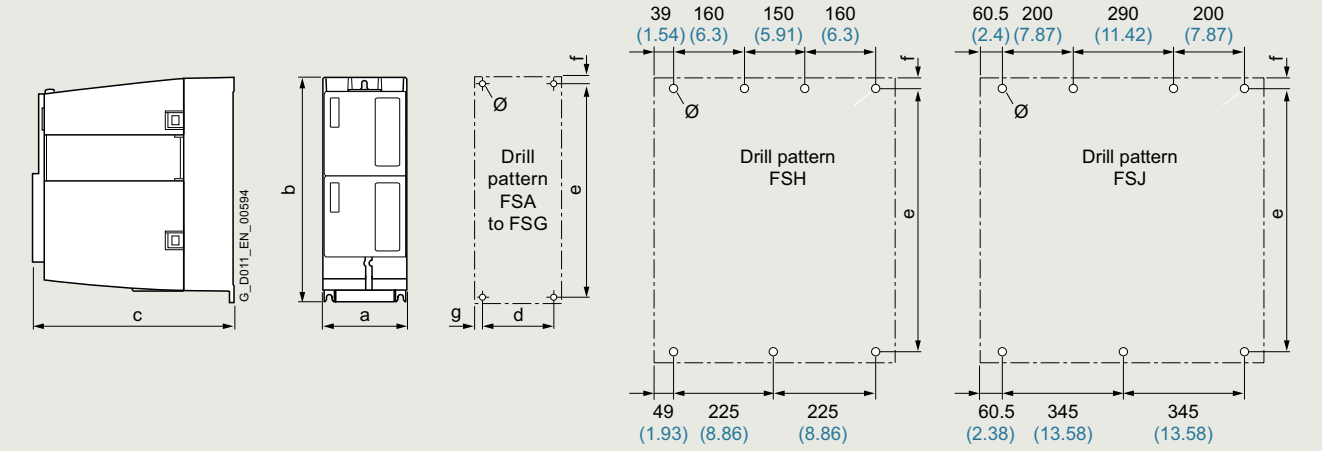
Further information is available in the manual on the internet at:
www.siemens.com/sinamics-g120x/documentation

600 V converters frame sizes FSH and FSJ:



Permissible output current as a function of input voltage for 600 V SINAMICS G120X converters, frame sizes FSH and FSJ, at low overload (LO)

Dimensional drawings



Principle dimension drawing and drill pattern for SINAMICS G120X

Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)					Mounting	Cooling clearance [2] in mm (inches)		
	a (width)	b (height)	c (depth) [1]	d	e	f	g	Ø	With screws (plus washers and nuts)	top	bottom	front
FSA	73 (2.87)	232 (9.13)	209 (8.23)	55 (2.17)	221.5 (8.72)	5.5 (0.22)	9 (0.35)	5 (0.2)	4 × M4	80 (3.15)	100 (3.94)	0 (0)
FSB	100 (3.94)	275 (10.83)	209 (8.23)	80 (3.15)	265 (10.43)	7 (0.28)	10 (0.39)	5 (0.2)	4 × M4	80 (3.15)	100 (3.94)	0 (0)
FSC	140 (5.51)	295 (11.61)	209 (8.23)	118 (4.65)	283 (11.14)	7 (0.28)	11 (0.43)	5.5 (0.22)	4 × M5	80 (3.15)	100 (3.94)	0 (0)
FSD	200 (7.87)	472 (18.58)	239 (9.41)	170 (6.69)	430 (16.93)	15 (0.59)	15 (0.59)	6 (0.24)	4 × M5	300 (11.81)	350 (13.78)	0 (0)
FSE	275 (10.83)	551 (21.69)	239 (9.41)	230 (9.06)	509 (20.04)	11 (0.43)	22.5 (0.89)	6.5 (0.26)	4 × M6	300 (11.81)	350 (13.78)	0 (0)
FSF	305 (12.01)	709 (27.91)	360 (14.17)	270 (10.63)	680 (26.77)	16.6 (0.65)	17.5 (0.69)	8.5 (0.33)	4 × M8	300 (11.81)	350 (13.78)	0 (0)
FSG	305 (12.01)	999 (39.33)	360 (14.17)	265 (10.43)	970.5 (38.21)	18.5 (0.73)	20 (0.79)	12 (0.47)	4 × M10	300 (11.81)	350 (13.78)	0 (0)
FSH	548 (21.57)	1695 (66.73)	393 (15.47)	see above	1419 (55.87)	21 (0.83)	see above	20 (0.79)	7 × M8	0 (0)	250 (9.84)	100 (3.94)
FSJ	801 (31.54)	1621 (63.82)	393 (15.47)	see above	1399 (55.08)	21 (0.83)	see above	20 (0.79)	7 × M8	0 (0)	250 (9.84)	100 (3.94)

More information

Further documentation, such as the operating instructions, is available free on the internet at:
www.siemens.com/sinamics-g120x/documentation

Detailed information on the SINAMICS G120X infrastructure converters for HVAC/Water/Wastewater, including the latest technical documentation (brochures, tutorials, dimensional drawings, certificates and operating instructions), is available on the internet at:
www.siemens.com/sinamics-g120x
and is also available via the Siemens Product Configurator on the internet.

The Siemens Product Configurator can be found in SiePortal at the following address:
www.siemens.com/spc

[1] Increased depth for frame sizes FSA to FSG:
- When the operator panel is plugged on, the depth increases by 9 mm (0.35 in)
- When SINAMICS G120 Smart Access is plugged on, the depth increases by 7 mm (0.28 in)
- When the I/O Extension Module is plugged on, the depth increases by 27 mm (1.06 in)
  - when, in addition, the operator panel is plugged on, the depth increases by a further 11.8 mm (0.46 in)
  - when, in addition, SINAMICS G120 Smart Access is plugged on, the depth increases by a further 9.8 mm (0.39 in)

[2] The converters in frame sizes FSA to FSG can be mounted side by side. A side clearance of 1 mm (0.04 in) is recommended for tolerance-related reasons. A side clearance of 30 mm (1.18 in) is required between the converters for frame sizes FSH and FSJ.

Overview

Operator panel	IOP-2 and IOP-2 Handheld Intelligent Operator Panel	BOP-2 Basic Operator Panel
Description	 	
	Thanks to the high-contrast color display, menu-based operation and the wizards, commissioning of the standard drives is easy. Application wizards guide the user through the commissioning of important applications such as pumps, fans, compressors, or conveyor systems.	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.
Possible applications	• Can be mounted directly on the converter • Can be mounted in a control cabinet door using a door mounting kit (achievable degree of protection is IP55/ UL Type 12 enclosure) • Environmental class/harmful chemical substances Class 3C3 acc. to IEC 60721-3-3: 2002 • Available as handheld version • The following languages are integrated in the IOP-2: English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified	• Can be mounted directly on the converter • Can be mounted in the control cabinet door using a door mounting kit (achievable degree of protection is IP55/UL Type 12) • Environmental class/harmful chemical substances Class 3C3 acc. to IEC 60721-3-3: 2002
Quick commissioning without expert knowledge	• Standard commissioning using the clone function • For quicker access, the parameter block names can be directly entered respectively changed on the IOP-2 using the virtual keyboard. • User-defined parameter list with a reduced number of self-selected parameters • Simple commissioning of standard applications using Quick Startup and Advanced Startup; it is not necessary to know the parameter structure • Simple local commissioning using the handheld version • Commissioning is possible largely without documentation	• Standard commissioning using the clone function
High degree of operator friendliness and intuitive operation	• Intuitive navigation by operating with a sensor control field • Graphic color display to show status values such as pressure or flow rate in the form of scalar values, bar-type diagrams, or trend displays • Status display with freely selectable units to specify physical values • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes • Simple cloning of specific settings of the IOP-2 user interface.	• 2-line display for showing up to 2 process values with text • Status display of predefined units • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes
Minimization of maintenance times	• Diagnostics using plain text display, can be used locally on-site without documentation • The support function is used to determine the drive data for the Power Module, Control Unit and IOP-2 and makes this available as a two-dimensional code (data matrix/QR code) • Easily upgradable to new functional status via USB interface	• Diagnostics with menu prompting with 7-segment display

Overview

IOP-2 Intelligent Operator Panel

IOP-2 Intelligent Operator Panel

The Intelligent Operator Panel IOP-2 is a very user-friendly and powerful operator panel for the SINAMICS G120, SINAMICS G120C, SINAMICS G120P, SINAMICS G120X, SINAMICS G120D and SIMATIC ET 200pro FC-2.

The IOP-2 supports both newcomers and drive experts. Thanks to the membrane keyboard with a central sensor control field, high-contrast color displays, menu-based operation and simple setup processes, which do not require special drive know-how, it is easy to commission drives. The updated IOP-2 (from V2.3) offers a new concept, which allows faster and easier commissioning of the drive.
The Quick Startup provides with an overview of the basic parameters required to commission and operate the drive in a few minutes.
Advanced Startup supports easier commissioning of more complex applications and provides the parameters on one screen, thus eliminating the need to switch between different areas within the IOP-2.

Advanced Setup provides with a list of categories that needs to be checked and that guides the user by highlighting the status icons of categories, which have been altered by the user. Furthermore, 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 functions are provided.

The status screen allows the graphical visualization of two process values and the numerical visualization of four process values. Process values can also be displayed in technological units.

The IOP-2 supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from a converter into the IOP-2 and downloaded into other drive units of the same type as required.

The IOP-2 can also use a text editor to create a user-defined parameter list and download it directly to the frequency converter using the IOP-2 download process.

The IOP-2 can be installed in control cabinet doors using the optionally available door mounting kit.

Updating the IOP-2

The IOP-2 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-2. Further, the USB interface allows user languages and simple setup processes that will become available in the future to be subsequently downloaded and the firmware to be updated for the IOP-2 [1].

The IOP-2 is supplied with power via the USB interface during an update.

IOP-2 Handheld

IOP-2 Handheld

A handheld version of the IOP-2 can be ordered for mobile use. In addition to the IOP-2, it includes a housing with rechargeable batteries, a charging unit, an RS232 connecting cable, and a USB 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 10 hours.

To connect the IOP-2 Handheld to SINAMICS G120D and SIMATIC ET 200pro FC-2, the RS232 connecting cable with optical interface is required in addition.

[1] Information on updates for the IOP-2 is available at https://support.industry.siemens.com/cs/document/67273266

2

Selection and ordering data

Description	Article No.
IOP-2 Intelligent Operator Panel For use with SINAMICS G120 SINAMICS G120C SINAMICS G120P SINAMICS G120X SINAMICS G120D SIMATIC ET 200pro FC-2 Operating languages: English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified	**6SL3255-0AA00-4JA2**
IOP-2 Handheld For use with SINAMICS G120 SINAMICS G120C SINAMICS G120P SINAMICS G120X SINAMICS G120D SIMATIC ET 200pro FC-2 Included in the scope of delivery: • IOP-2 • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable [1] 3 m (9.84 ft) long, can be used in combination with SINAMICS G120 SINAMICS G120C SINAMICS G120P SINAMICS G120X • USB cable 1 m (3.28 ft) long	**6SL3255-0AA00-4HA1**
Accessories	
Door mounting kit For mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 in ... 0.12 in) Degree of protection IP55 Included in the scope of delivery: • Seal • Mounting material • Connecting cable 5 m (16.4 ft) long, also supplies voltage to the IOP-2 directly via the converter	**6SL3256-0AP00-0JA0**
RS232 connecting cable 2.5 m (8.20 ft) long, with optical interface for connecting the IOP-2 Handheld to SINAMICS G120D SIMATIC ET 200pro FC-2	**3RK1922-2BP00**

Benefits

- New device design
  - Intuitive user interface – membrane keyboard with central sensor control field
  - High-contrast color display with a range of display options
  - IOP-2 device design open for future functional expansions (e.g. device functions, commissioning setups, languages)
  - Easily upgradable to new functional status via USB interface
- Commissioning
  - Simple commissioning via Quick Startup and Advanced Startup
  - Quick Startup allows easy and fast access to all basic parameters required for the commissioning of simple applications
  - Advanced Startup provides the parameters necessary for the commissioning of more complex applications and eliminates the need to switch between different areas of the IOP-2
  - I/O Setup supports quick and easy configuration of the digital and analog inputs and outputs
  - Fieldbus Setup allows easy configuration of the Ethernet/IP and PROFINET interface protocols
  - Fast standard commissioning of converters thanks to the cloning function
  - For quicker access, the parameter data set names can be directly entered respectively changed on the IOP-2 using the virtual keyboard. Extended help functions support the user during commissioning.
  - Simple local commissioning on-site using the handheld version
- Operator control and monitoring
  - Simple, individual local drive control (start/stop, setpoint value specification, change in direction of rotation)
  - Application-specific scenarios such as operator concepts with additional external operating elements can be implemented easily
  - Simple cloning of specific settings of the IOP-2 user interface, such as status screen, language settings, lighting duration, date/time settings, parameter backup mode and “My Parameters” – settings made once can such be easily transferred to many further IOP-2 Intelligent Operator Panels
  - Easy creation of a user-defined parameter list and direct download to the frequency converter using the IOP-2 download process
- Diagnostics
  - Rapid diagnostics thanks to on-site plain text display
  - Integrated plain text help function for local display and resolution of fault messages
- Support function
  - Used to determine the drive data for the Power Module, Control Unit and IOP-2 (article number, serial number, firmware version, error statuses) and makes this available as a two-dimensional code (data matrix/QR code)
  - Allows easy contact with Customer Support via a data matrix/QR code generated on the IOP-2
  - Quick access via mobile devices (e.g. smartphones, tablets) to product information, documentation, FAQs, contact persons via a two-dimensional code generated on the IOP-2 (data matrix/QR code)
  - Scanning and evaluating of the two-dimensional data matrix code using the Industry Online Support app (https://support.industry.siemens.com/cs/ww/en/sc/2067), see also: https://support.industry.siemens.com/cs/document/109748340

[1] For use in conjunction with SSINAMICS G120D and SIMATIC ET 200pro FC-2, the RS232 connecting cable with optical interface is required (Article No.: **3RK1922-2BP00**). The cable must be ordered separately.

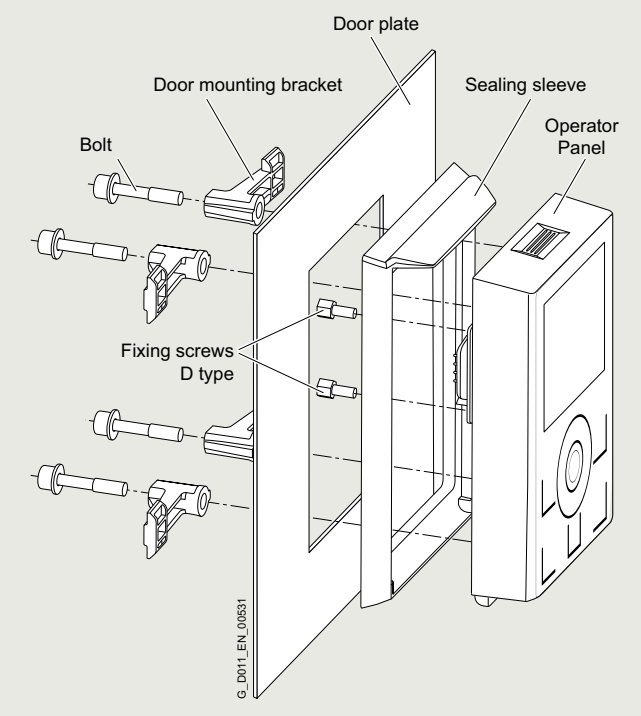
Integration

Using the IOP-2 with the converters

	• SINAMICS G120 with CU230P-2, CU240E-2 or CU250S-2 • SINAMICS G120C • SINAMICS G120P with CU230P-2 • SINAMICS G120X	• SINAMICS G120D • SIMATIC ET 200pro FC-2
Plugging the IOP-2 onto the converter (Voltage supply via converter)	✓	–
Door mounting of the IOP-2 with the door mounting kit (Voltage supply via converter. For this purpose, the IOP-2 must be connected up by means of the connecting cable supplied with the door mounting kit.)	✓	–
Mobile use of the IOP-2 Handheld (supplied from rechargeable batteries)	✓	✓ (RS232 connecting cable with optical interface required, article number 3RK1922-2BP00)

Door mounting

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. In the case of door mounting, the IOP-2 Operator Panel achieves degree of protection IP55/UL Type 12 enclosure.



Door mounting kit with plugged-on IOP-2

Technical specifications

	IOP-2 6SL3255-0AA00-4JA2	IOP-2 Handheld 6SL3255-0AA00-4HA1
Display	High-contrast color display, a variety of display options	
• Resolution	320 × 240 pixels	
Operator panel	Membrane keyboard with central sensor control field	
Operating languages	English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified	
Ambient temperature		
• During transport and storage	-40 ... +70 °C (-40 ... +158 °F)	-20 ... +55 °C (-4 ... +131 °F)
• During operation	For direct mounting on the converter: 0 ... 50 °C (32 ... 122 °F) For installation with door mounting kit: 0 ... 55 °C (32 ... 131 °F)	0 ... 40 °C (32 ... 104 °F)
Humidity	Relative humidity < 95 %, non-condensing	
Degree of protection	For direct mounting on the converter: IP20 For installation with door mounting kit: IP55, UL Type 12 enclosure	IP20
Dimensions (H × W × D)	106.86 × 70 × 19.65 mm (4.21 × 2.76 × 0.77 in)	195.04 × 70 × 37.58 mm (7.68 × 2.76 × 1.48 in)
Weight, approx.	0.134 kg (0.3 lb)	0.724 kg (1.6 lb)
Compliance with standards	CE, UKCA, RCM, cULus, EAC, KC-REM-S49-SINAMICS	
Environmental class in operation		
• Harmful chemical substances	Class 3C3 acc. to IEC 60721-3-3: 2002	

Overview

BOP-2 Basic Operator Panel

The BOP-2 Basic Operator Panel 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 converter 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 a converter 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 °C ... 50 °C (32 °F ... 122 °F).

The environmental class/harmful chemical substances of BOP-2 is class 3C3 acc. to IEC 60721-3-3: 2002.

Selection and ordering data

Description	Article No.
BOP-2 Basic Operator Panel	**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) Degree of protection IP55 Included in the scope of delivery: • Seal • Mounting material • Connecting cable 5 m/16.4 ft long, also supplies voltage to the operator panel directly via the converter	**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 faults (Diagnostics)
- Greater transparency in the process – The status display of the BOP-2 makes process variable monitoring easy (Monitoring)
- Direct mounting on the converter
- User-friendly user interface:
  - Easy navigation using clear menu structure and clearly assigned control keys
  - Two-line display

Overview

SINAMICS SD memory card

The parameter settings for a converter can be stored on the SINAMICS SD memory card. When service is required, e.g. after the converter 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 converter or saved from the converter 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 IOP-2 or BOP-2.
- If firmware is stored on the memory card, the firmware can be upgraded/downgraded during power-up.

Note:

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

Selection and ordering data

Description	Article No.
SINAMICS SD card 512 MB, empty	**6SL3054-4AG00-2AA0**

Overview

SINAMICS G120 Smart Access

It is also easy and convenient to commission and operate the SINAMICS G115D, SINAMICS G120, SINAMICS G120C and SINAMICS G120X converters of firmware V4.7 SP6 and higher using the web server module SINAMICS G120 Smart Access and a connected smartphone, tablet or laptop.

Benefits

- Wireless commissioning, operation and diagnostics via mobile device or laptop thanks to the optional SINAMICS G120 Smart Access
- Intuitive user interface and commissioning wizard
- Free choice of terminal devices as the web server works with all common web browsers, such as iOS, Android, Microsoft Windows, Linux and Mac OS

Function

- Commissioning using commissioning wizard
- Setting and saving parameters
- Testing motor in JOG mode
- Monitoring of converter data
- Quick diagnostics
- Saving the settings and restoring to factory settings

Selection and ordering data

Description	Article No.
SINAMICS G120 Smart Access For wireless commissioning, operation and diagnostics of the following converters using a smartphone, tablet or laptop • SINAMICS G115D together with the interface kit for SINAMICS G120 Smart Access • SINAMICS G120C • SINAMICS G120 together with the CU230P-2 and CU240E-2 Control Units (without fail-safe versions) • SINAMICS G120P together with the CU230P-2 Control Unit • SINAMICS G120X	**6SL3255-0AA00-5AA0**

Technical specifications

	SINAMICS G120 Smart Access 6SL3255-0AA00-5AA0
Operating system	iOS, Android, Microsoft Windows, Linux, Mac OS
Languages	Support of six languages: English, French, German, Italian, Spanish, Chinese
Ambient temperature	
• During storage and transport	-40 ... +70 °C (-40 ... +158 °F)
• During operation	0 ... 50 °C (32 ... 122 °F), if the Smart Access is plugged directly into the converter
Humidity	< 95 %, non-condensing
Degree of protection	Depending on the degree of protection of the converter, max. IP55/UL Type 12 enclosure
Dimensions	
• Width	70 mm (2.76 in)
• Height	108.9 mm (4.29 in)
• Depth	17.3 mm (0.68 in)
Weight, approx.	0.08 kg (0.18 lb)
Compliance with standards	CE, UKCA, FCC, SRRC, WPC, ANATEL, BTK

Integration

SINAMICS G120X frame size FSD with plugged-on SINAMICS G120 Smart Access

The optional SINAMICS G120 Smart Access is simply plugged onto the converter and is available for the following converters of firmware V4.7 SP6 and higher.

- SINAMICS G115D together with the interface kit for SINAMICS G120 Smart Access
- SINAMICS G120C
- SINAMICS G120 together with the CU230P-2 and CU240E-2 Control Units (without fail-safe versions)
- SINAMICS G120P together with the CU230P-2 Control Unit
- SINAMICS G120X

Overview

SINAMICS G120X I/O Extension Module

The SINAMICS G120X I/O Extension Module increases the number of I/O terminals of the converter and therefore allows for additional converter control functionalities. It also allows for the connection to an operator panel or the SINAMICS G120 Smart Access.

The optional SINAMICS G120X I/O Extension Module has 2 DI, 2 AO, 4 DO (relay), and up to 2 Pt1000/Ni1000 temperature sensors can be directly connected.

Notes:

The SINAMICS G120X I/O Extension Module is only supported for SINAMICS G120X converters with hardware versions ≥ 02 02 (FSA to FSG) / 02 (FSH and FSJ) and firmware ≥ V1.01.
The hardware version can be found on the rating plate of the converter.

Selection and ordering data

Description	Article No.
SINAMICS G120X I/O Extension Module for the direct connection of Pt1000/Ni1000 temperature sensors	**6SL3255-0BE00-0AA0**

More information

Further information and documentation is available on the internet at:
www.siemens.com/sinamics-g120x/documentation

Technical specifications

Article No.	6SL3255-0BE00-0AA0
Analog inputs	
Number of analog inputs	2
Design of the sensor to detect the ambient temperature connectable	2 analog inputs for connecting temperature sensors Pt1000/Ni1000. One of them can be used as an analog input.
Connectable conductor cross-section at the analog input	0.5 ... 1.5 mm²
AWG number as coded connectable conductor cross-section at the analog input	21 ... 16
Input current	0 ... 20 mA
Analog outputs	
Number of analog outputs	2
Analog outputs Type	Non-isolated output
Connectable conductor cross-section at the analog output	0.5 ... 1.5 mm²
AWG number as coded connectable conductor cross-section at the analog output	21 ... 16
Output voltage at analog output	0 ... 10 V
Output current at analog output	0 ... 20 mA
Digital inputs	
Number of digital inputs	2
Connectable conductor cross-section at the digital inputs	0.5 ... 1.5 mm²
AWG number as coded connectable conductor cross-section at the digital inputs	21 ... 16
Digital inputs Input voltage for signal "0" → "1"	11 V
Digital inputs Input voltage for signal "1" → "0"	5 V
Input voltage at digital input maximum	30 V
Digital outputs	
Number of digital outputs	4
Connectable conductor cross-section at the digital outputs maximum	1.5 mm²
AWG number as coded connectable conductor cross section at the digital outputs maximum	16
Output current at digital output	2 A
Mechanical data	
Width	71 mm
Depth	27 mm
Height	117 mm

Supplementary system components > Push-through mounting frames for frame sizes FSA to FSG

Overview

SINAMICS G120X frame size FSC with IOP-2 Intelligent Operator Panel and push-through mounting frame

The optional push-through mounting frame is used to install a SINAMICS G120X converter, frame sizes FSA to FSG, in a control cabinet with the heat sink outside the control cabinet. The converter achieves degree of protection IP20/UL Open Type with push-through installation.

For push-through installation of frame sizes FSD to FSG, installation handles are available for insertion without the need for a lifting device.

Selection and ordering data

Description	Article No.
Push-through mounting frames for SINAMICS G120X	
• Frame size FSA	**6SL3261-6GA00-0BA0**
• Frame size FSB	**6SL3261-6GB00-0BA0**
• Frame size FSC	**6SL3261-6GC00-0BA0**
• Frame size FSD	**6SL3261-6GD00-0BA0**
• Frame size FSE	**6SL3261-6GE00-0BA0**
• Frame size FSF	**6SL3261-6GF00-0BA0**
• Frame size FSG	**6SL3261-6GG00-0BA0**
Accessories	
Installation handles for SINAMICS G120X frame sizes FSD to FSF	**6SL3200-0SM22-0AA0**

Supplementary system components > IP21 top covers for frame sizes FSA to FSG

Overview

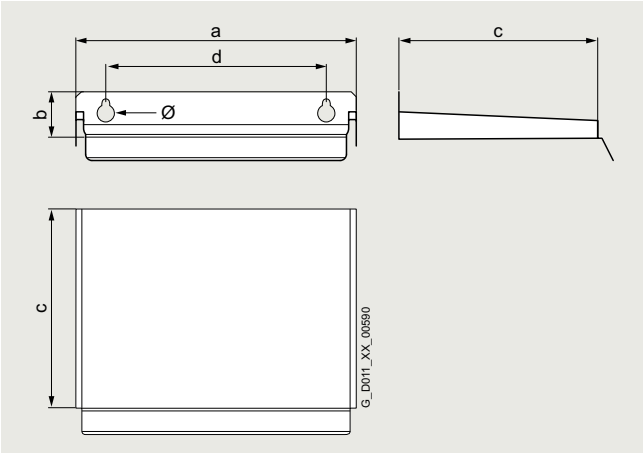
SINAMICS G120X frame size FSC with IOP-2 Intelligent Operator Panel and IP21 top cover

Using the optional IP21 top cover, SINAMICS G120X converters in frame sizes FSA to FSG achieve degree of protection 21. With wall mounting, the IP21 top cover has to be installed above the converter.

Selection and ordering data

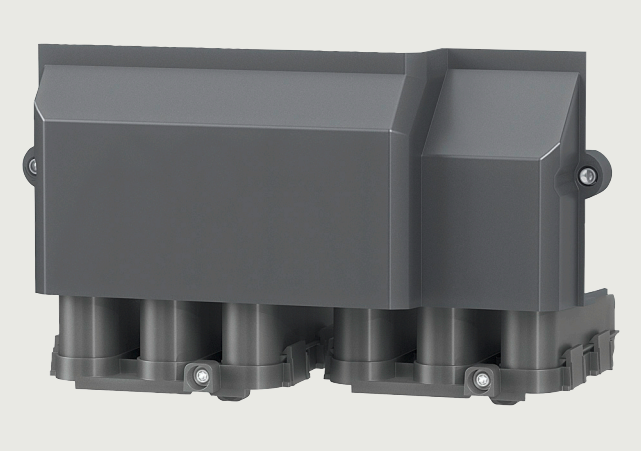
Description	Article No.
IP21 top covers for SINAMICS G120X	
• Frame size FSA	**6SL3266-1PA00-0BA0**
• Frame size FSB	**6SL3266-1PB00-0BA0**
• Frame sizes FSC and FSD	**6SL3266-1PD00-0BA0**
• Frame size FSE	**6SL3266-1PE00-0BA0**
• Frame sizes FSF and FSG	**6SL3266-1PF00-0BA0**

Dimensional drawings



Frame size	Dimensions in mm (inches)			Drilling dimensions in mm (inches)		Cooling clearance
	a (width)	b (height)	c (depth)	d	Ø	between converter and IP21 top cover
FSA	120 (4.72)	25 (0.98)	306 (12.05)	80 (3.15)	4.5 (0.18)	100 (3.94)
FSB	160 (6.3)	25 (0.98)	306 (12.05)	118 (4.65)	5.5 (0.22)	100 (3.94)
FSC	260 (10.24)	29 (1.14)	323 (12.72)	170 (6.69)	6 (0.24)	100 (3.94)
FSD	260 (10.24)	29 (1.14)	323 (12.72)	170 (6.69)	6 (0.24)	300 (11.81)
FSE	335 (13.19)	29 (1.14)	323 (12.72)	230 (9.06)	6 (0.24)	300 (11.81)
FSF, FSG	365 (14.37)	29 (1.14)	443 (17.44)	270 (10.63)	6 (0.24)	300 (11.81)

Overview



Wiring adapter for frame size FSG

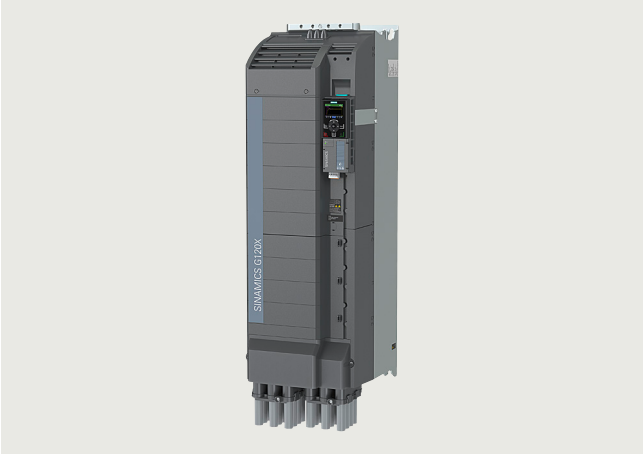
The wiring adapter enables optimal and space-saving wiring of frame size FSG for SINAMICS G120 PM240-2 Power Modules and SINAMICS G120X.

Smaller bending radii help where mounting space is constricted: Up to four smaller cables (with a cross section of 120 mm^2 each) can be routed with the adapter for connection to the line supply and to the motor. All cables can be connected on the underside of the adapter, which allows for easy and space-saving wiring.

The scope of delivery of the wiring adapter includes contacts, nuts, a cover and various small components.

Integration

SINAMICS G120 frame size FSG with wiring adapter (and cable outlet)



SINAMICS G120X frame size FSG with wiring adapter (and cable outlet)

Further documentation on SINAMICS G120 is available free on the internet at:
www.siemens.com/sinamics-g120/documentation

Further documentation on SINAMICS G120X is available free on the internet at:
www.siemens.com/sinamics-g120x/documentation

Selection and ordering data

Description	Article No.
Wiring adapter for frame size FSG for optimal and space-saving wiring of SINAMICS G120 PM240-2 Power Modules and SINAMICS G120X	**6SL3266-2HG00-0BA0**

Supplementary system components > Installation kit for line-side cable connection, left, for frame size FSH

Overview

Installation kit for line-side cable connection, left, for SINAMICS G120X, frame size FSH

This installation kit allows supply cables of the SINAMICS G120X converter, frame size FSH, to be connected alternatively on the left-hand side of the converter. The converter can thus be installed higher in the control cabinet, allowing more efficient use of the available cabinet space. In many cases, use of this installation kit also helps in the implementation of effective cabinet cooling.

Selection and ordering data

Description	Article No.
Installation kit for line-side cable connection, left for SINAMICS G120X frame size FSH	**6SL3366-1LH00-0PA0**

Spare parts > FPI board for frame sizes FSH and FSJ

Overview

The FPI board (freely-programmable interface board) is available as a spare part for the SINAMICS G120X converter, frame sizes FSH and FSJ. This is an interface board between Control Unit and Power Module with additional customer terminals (X9, X41).

Selection and ordering data

Description	Article No.
FPI board for SINAMICS G120X frame sizes FSH and FSJ	**6SL3200-0SP05-0AA0**

Spare parts > PSB board for frame sizes FSH and FSJ

Overview

The PSB board (power supply board) is available as a spare part for the SINAMICS G120X converter, frame sizes FSH and FSJ. This is an internal power supply with ±24 V for the electronics and 56 V for a power unit fan.

Selection and ordering data

Description	Article No.
PSB board for SINAMICS G120X frame sizes FSH and FSJ	**6SL3200-0SP06-0AA0**

Spare parts > Current transformers for frame sizes FSH and FSJ

Overview

Current transformers are available as spare parts for the SINAMICS G120X converter, frame sizes FSH and FSJ. These are 2000 A or 1000 A current transformers for measuring the motor current at the device output. The current transformers are used for motor control and converter protection.

Selection and ordering data

Description	Article No.
Current transformers for SINAMICS G120X	
• 2000 A for frame size FSJ	**6SL3200-0SE01-0AA0**
• 1000 A for frame sizes FSH and FSJ	**6SL3200-0SE02-0AA0**

Spare parts > Spare parts kit for Control Unit

Overview

The spare parts kit contains small parts for the SINAMICS G120X Control Unit:

Included in the scope of delivery:

- 1× STO connecting plug for frame sizes FSA to FSC
- 3× replacement doors for the Control Unit
- 4× I/O terminals
- 1× screw for RS485 terminal
- 1× blanking cover
- Label set

Selection and ordering data

Description	Article No.
Spare parts kit for Control Unit for SINAMICS G120X	**6SL3200-0SK10-0AA0**

Spare parts > Shield connection kit for Control Unit

Overview

A shield connection kit for the Control Unit is supplied with the SINAMICS G120X converters, frame sizes FSD to FSG. It is advisable to install the supplied shield connection kit for EMC-compliant configuration of the converter. This shield connection kit can be ordered as a spare part.

The shield connection kit offers optimum shield connection and strain relief for all signal and communication cables.

The kit contains the following:

- a matching shield connection plate
- all of the necessary connecting and retaining elements for mounting

Selection and ordering data

Description	Article No.
Shield connection kit for Control Unit for SINAMICS G120X frame sizes FSD to FSG	**6SL3264-1EA00-0YA0**

Spare parts > Shield connection kits for Power Module

Overview

A shield connection kit is supplied with the SINAMICS G120X converters, frame sizes FSA to FSG. It is advisable to install the supplied shield connection kit for EMC-compliant configuration of the converter. These shield connection kits can be ordered as spare parts.

Please observe the notes included in the operating instructions for the SINAMICS G120X converters, frame sizes FSH and FSJ.

www.siemens.com/sinamics-g120x/documentation

Selection and ordering data

Description	Article No.
Shield connection kits for Power Module for SINAMICS G120X	
• Frame size FSA	**6SL3262-1AA01-0DA0**
• Frame size FSB	**6SL3262-1AB01-0DA0**
• Frame size FSC	**6SL3262-1AC01-0DA0**
• Frame size FSD	**6SL3262-1AD01-0DA0**
• Frame size FSE	**6SL3262-1AE01-0DA0**
• Frame size FSF	**6SL3262-1AF01-0DA0**
• Frame size FSG	**6SL3262-1AG01-0DA0**

Spare parts > Small parts assembly set for frame sizes FSD to FSG

Overview

A **small parts assembly set** can be ordered for SINAMICS G120 Power Modules PM240-2, SINAMICS G120C and SINAMICS G120X, degree of protection IP20. It contains the following parts:

- Cable entries for frame sizes FSD to FSG
- 2 × 2 pin STO mating connector
- 1 set of warning labels in 30 languages

Selection and ordering data

Description	Article No.
Small parts assembly set for SINAMICS G120 Power Modules PM240-2, SINAMICS G120C and SINAMICS G120X degree of protection IP20, frame sizes FSD to FSG	**6SL3200-0SK08-0AA0**

Spare parts > Terminal cover kits for frame sizes FSD to FSG

Overview

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

Terminal cover kits, which are suitable for the following converters in frame sizes FSD to FSG, are available:

- SINAMICS G120 PM240-2 Power Modules
- SINAMICS G120 PM250 Power Modules
- SINAMICS G120C
- SINAMICS G120X

Selection and ordering data

Description	Article No.
Terminal cover kits for SINAMICS G120 PM240-2 Power Modules	
• for frame size FSD	**6SL3200-0SM13-0AA0**
• for frame size FSE	**6SL3200-0SM14-0AA0**
• for frame size FSF	**6SL3200-0SM15-0AA0**
• for frame size FSG	**6SL3200-0SM16-0AA0**
Terminal cover kits for SINAMICS G120 PM250 Power Modules	
• for frame sizes FSD and FSE	**6SL3200-0SM11-0AA0**
• for frame size FSF	**6SL3200-0SM12-0AA0**
Terminal cover kits for SINAMICS G120C	
• for frame size FSD	**6SL3200-0SM13-0AA0**
• for frame size FSE	**6SL3200-0SM14-0AA0**
• for frame size FSF	**6SL3200-0SM15-0AA0**
Terminal cover kits for SINAMICS G120X	
• for frame size FSD	**6SL3200-0SM13-0AA0**
• for frame size FSE	**6SL3200-0SM14-0AA0**
• for frame size FSF	**6SL3200-0SM15-0AA0**
• for frame size FSG	**6SL3200-0SM16-0AA0**

Spare parts > Fan units

Overview

The fans of the SINAMICS G120X converters are designed for extra long service life. For special requirements, replacement fans are available that can be exchanged quickly and easily.

Selection and ordering data

Description	Article No.
External fan units for SINAMICS G120X	
• Frame size FSA	**6SL3200-0SF52-0AA0**
• Frame size FSB	**6SL3200-0SF53-0AA0**
• Frame size FSC	**6SL3200-0SF54-0AA0**
• Frame size FSD	**6SL3200-0SF15-0AA0**
• Frame size FSE	**6SL3200-0SF16-0AA0**
• Frame size FSF	**6SL3200-0SF17-0AA0**
• Frame size FSG	**6SL3200-0SF18-0AA0**
• Frame sizes FSH and FSJ	**6SL3300-0SF01-0AA0**
Internal fan unit for SINAMICS G120X	
• Frame sizes FSH and FSJ	**6SL3200-0SF50-0AA0**

Spare parts > Control Units

Overview

Control units are available as spare parts for the SINAMICS G120X convertes frame sizes FSD to FSJ.

Selection and ordering data

Description	Article No.
Control Units for SINAMICS G120X frame sizes FSD to FSJ	
• USS, Modbus RTU, BACnet MS/TP	**6SL3200-0SC10-0BA0**
• PROFINET, EtherNet/IP	**6SL3200-0SC10-0FA0**
• PROFIBUS DP	**6SL3200-0SC10-0PA0**

Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

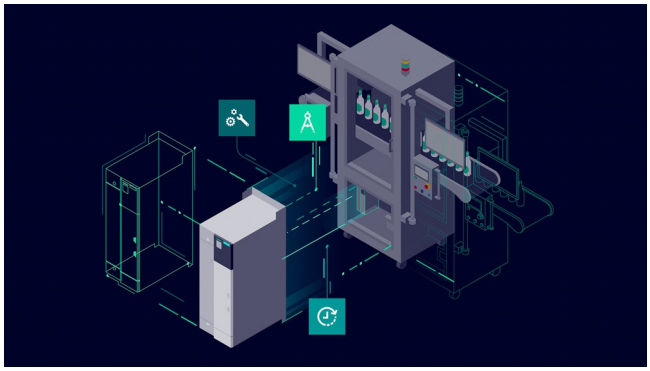
For additional information on industrial cybersecurity measures that may be implemented, please visit
www.siemens.com/cybersecurity-industry

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under
www.siemens.com/cert

DriveSim Designer

Overview



DriveSim Designer provides easy-to-use models for PROFIdrive-enabled SINAMICS converters, so you can create a digital twin of your drive.

The models are validated and tested against real SINAMICS converters and are available in the form of a standardized FMU (Functional Mockup Unit). Therefore, they are compatible with various standard time-based simulation programs such as SIMIT, Simcenter Amesim, ANSYS Twin Builder, MATLAB Simulink or Hopsan.

DriveSim Designer is another element in your engineering toolbox. Together with other virtual Siemens solutions, e.g. SIMATIC S7-PLCSIM Advanced or NX Mechatronics Concept Designer, a consistent model-based development process can be implemented.

Benefits

- Speed up time-to-market for OEMs
- Test validated SINAMICS models under real conditions already at the design or planning stage and make needed adjustments
- Identify issues and improvement capabilities early in the design stage and reduce testing effort to save time and cost
- Download the free-of-charge test version for 1 month to try the suitability of our solution before buying it
- DriveSim Designer offers a wide range of additional functionalities to improve the SINAMICS simulation model, e. g. safety or position telegrams
- Valid for the most used Siemens drives

Advantages of DriveSim Designer compared to SIMIT PROFIdrive blocks:

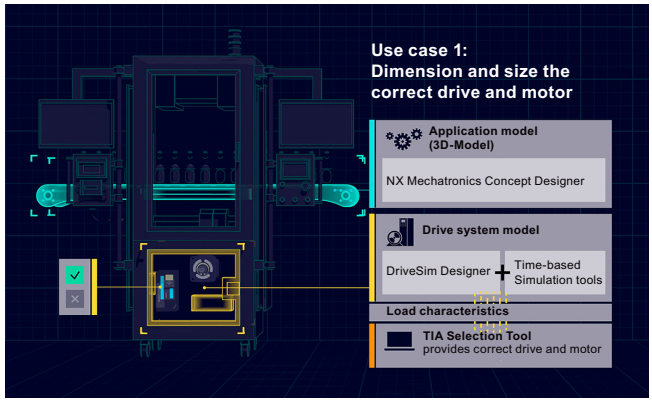
- Increased level of detail due to speed controller, current setpoint filters and internal load model
- Identical parameter values and meaning as in the real SINAMICS device
- Direct reference to SINAMICS documentation
- Basic Safety functions
- Brake control functions for lifting applications
- Validated against the real SINAMICS drive
- No wiring effort to represent functional configurations
- Significant reduction of SIMIT simulation tags (even more is possible if unused in-/ outputs are deselected within the Component Type Editor (CTE)
- Enables simulation of an (internal) two-mass oscillator as application with realistic SINAMICS parameter settings, besides the known limitations by the minimum sample time in SIMIT
- Compatible with every FMU Co-Simulation 2.0 compatible simulation too

Application

With DriveSim Designer, you can implement three major use cases:

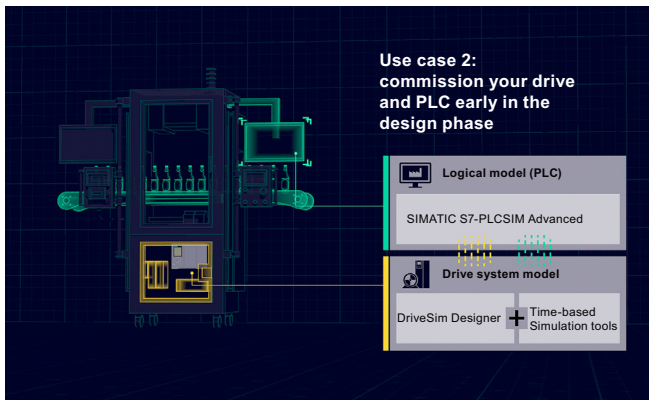
- Providing load characteristics for drive selection and dimensioning
- Virtual commission your PLC already in the design phase
- Test and improve interaction between PLC, drives and application virtually

Use case 1: Dimension and size the correct drive and motor for your application



If you are designing a machine, you want to make sure that you select the SINAMICS converter and SIMOTICS motor most suitable for your drive application. As DriveSim Designer is control-unit-agnostic and thus represents a generic drive, you can parametrize it according to the functionality of your application. Running the simulation results in load characteristics, i.e. torque or speed curves over time. You can import these load profiles into TIA Selection Tool to select the suitable Control Unit and dimension the drive to best fit to the demand. So as a result, you have well selected SINAMICS converters and SIMOTICS motors with the help of the digital twin.

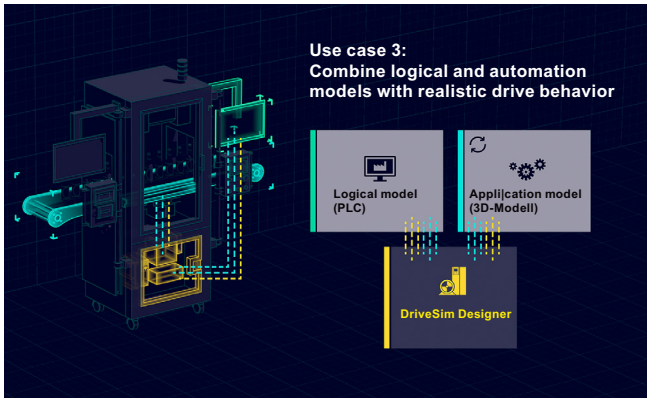
Use case 2: Virtual commission your drive and PLC early in the design phase



If you are designing a machine, you want to make sure the PLC code works with your SINAMICS drive. After writing the PLC code in TIA Portal, you can connect it via SIMATIC S7-PLCSIM Advanced to any time-based simulation tool (e.g. SIMIT). Integrated into the simulation tool, DriveSim Designer acts as a realistic communication partner for the PLC. Next, you can commission the virtual PLC in TIA Portal as you would do with a real PLC connected to a real drive. Without simulation, you would need to do that on-site. With simulation, you not only save time, but also have the freedom to try out various configurations and optimize your PLC code early in the process.

Application

Use case 3: Combine the application model and automation model with realistic drive system behavior



With the third Use case, you can connect a simulation tool such as NX Mechatronic Concept Designer to visualize the mechanical movements of your application. This way, you ensure that the drive behaves according to the desired machine performance. You can test several fault scenarios and optimize the interaction between PLC, application and drive virtually so overall, you can avoid unplanned machine behavior and increase the performance of your setup.

Integration

DriveSim Designer can be run in tools that support FMU 2.0 Co-Simulation Import (https://fmi-standard.org/tools/).

The FMU has been tested in the following simulation environments and is available in the attached application examples.

Tool	Manufacturer	DriveSim*** variant	SIMATIC S7-PLCSIM Advanced interface	Notes
SIMIT	Siemens	***.fmu	Yes	• Permissible configuration: ExternalLoad = 1 & . Speed-Controller = 0 or ExternalLoad = 0 & . Speed-Controller = 1 • Simulation with external load can provide wrong results because the minimum possible time step is 1 ms
Simcenter Amesim	Siemens	***_double.fmu	Yes	
MATLAB Simulink	MathWorks	< 2019a ***_unstruct.fmu ≥ 2019a ***.fmu	Yes	
ANSYS Twin Builder	ANSYS	***.fmu	No	
Hopsan	Linköping University	***_double.fmu	No	• Open Source • Install "win64-with_compiler-installer.exe" package

Selection and ordering data

Description	Article No.
DriveSim Designer	**9SV1110-3AA00-0AA0**

More information

More information is provided on the internet at:
www.siemens.com/drive-virtualization
https://support.industry.siemens.com/cs/document/109812859

You can find more videos on the topic at:

- Simulation of drive systems - Quick, Easy and Validated
- Simulation of drive systems - An introduction to SINAMICS
- Getting started with DriveSim Designer
- How to import DriveSim Designer into SIMIT, Matlab Simulink, Amesim and ANSYS TwinBuilder
- How to connect DriveSim Designer via SIMATIC S7-PLCSIM Advanced to TIA Portal
- How to use DriveSim Designer for drive sizing with TIA Selection Tool
- How to visualize drive system behavior in NX Mechatronics Concept Designer

Siemens Product Configurator

Overview

The Siemens Product Configurator helps you to configure the optimum drive technology products for a number of applications. The product portfolio comprises the full drive technology range of gearbox, motor, converter and connection system as well as corresponding controller with suitable software license. The intuitive user interface in conjunction with product-specific preliminary selectors makes it simple, fast and efficient to configure products. The result is a bill of materials with extensive documentation consisting of technical data sheets, motor characteristic curves, 2D dimensional drawings / 3D CAD models, EPLAN macros and much more. You can order the products directly by transferring the bill of materials to the shopping cart of SiePortal.

Siemens Product Configurator at a glance

- Quick and easy configuration of drive products and associated components – gearboxes, motors, converters, controllers, connection systems
- Extensive documentation for all products and components, such as
  - Data sheets in up to 12 languages
  - Motor characteristic curves
  - 2D dimensional drawings / 3D CAD models in different formats
  - Terminal box drawing and terminal connection diagram
  - Certificates
  - EPLAN macros
- Ability to order products directly through SiePortal

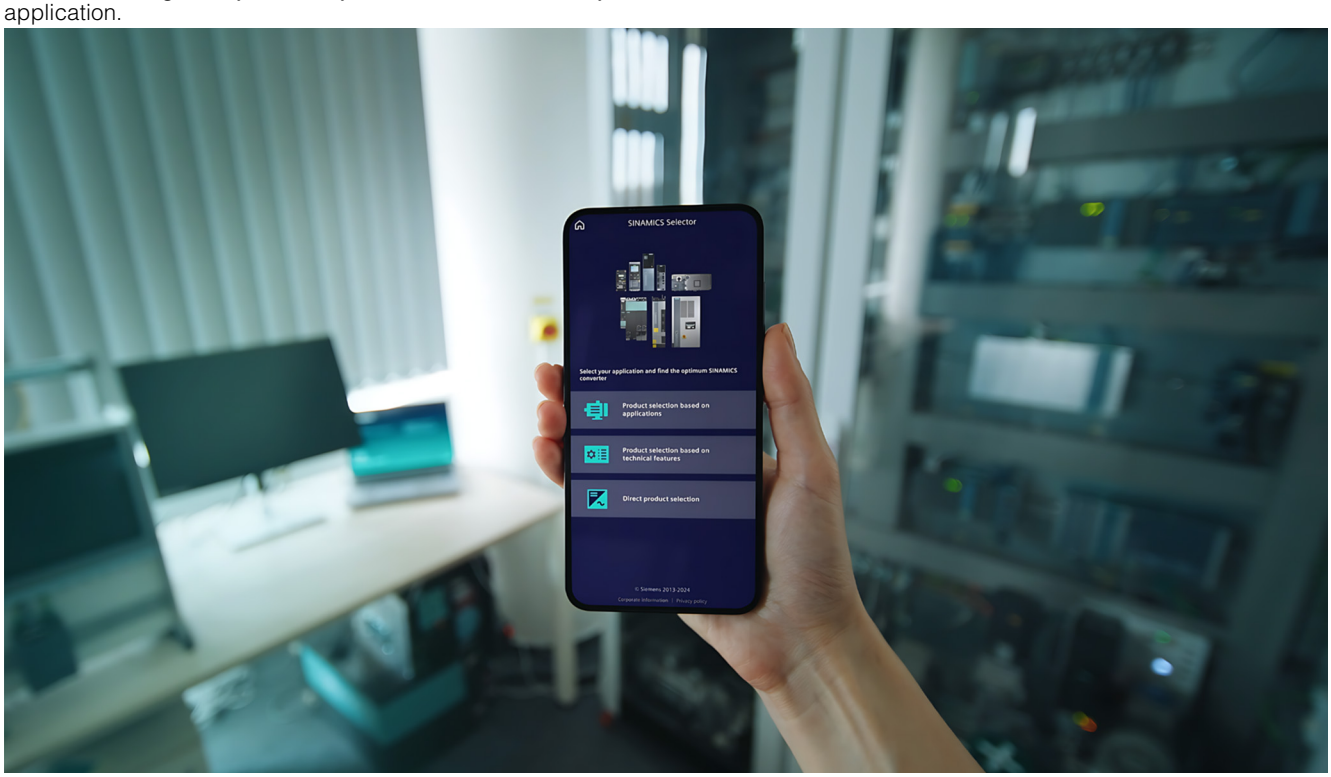
Access to the Siemens Product Configurator

The Siemens Product Configurator can be accessed without the need for registration or logging in:
www.siemens.com/spc

Overview

SINAMICS Selector app: Your guide to frequency converters

Finding the right frequency converter for your application can be a challenge. But SINAMICS Selector app makes your selection process quick and easy – reducing it to just a few clicks. As an app, the digital guide is accessible even on the go. It helps you navigate the comprehensive range of SINAMICS converters and guides you reliably to the one that matches your application.



Drive selection on the go: benefits at a glance

SINAMICS Selector app is designed to help you find the right frequency converter easily and quickly. To ensure that the app is accessible to everyone, we prioritized a clear structure and functional design. In addition, the selection process consists of only five steps. In this way, SINAMICS Selector app offers a smart, swift and smooth path to select and purchase your converter.

You will find free downloads for Android and iOS here:
www.siemens.com/sinamics-selector

SIMARIS planning tools for systems with SINAMICS drives

Overview

Electrical Planning: Simplified by Electrical Design Software!

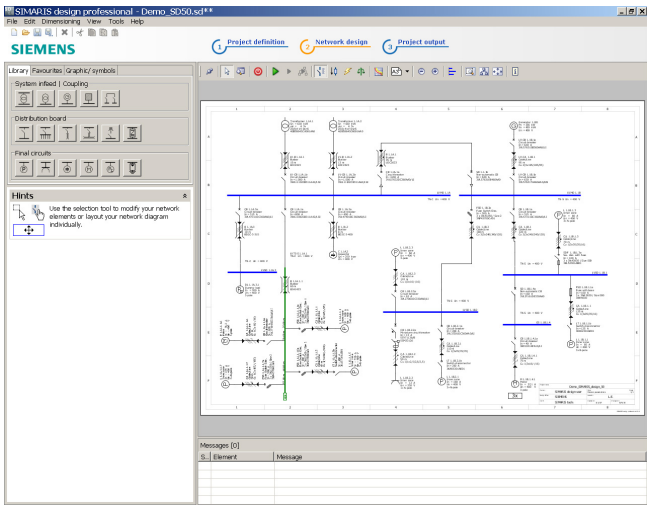
Electrical planning of power distribution systems in functional and industrial buildings has never been easy and is now more complex than ever. The electrical calculation software tools SIMARIS design for dimensioning and SIMARIS project for determination of the distribution boards' space requirements support technical planners with the electrical planning process with SINAMICS drives.

Supported SINAMICS drives:

- SINAMICS G220
- SINAMICS G120, SINAMICS G120D, SINAMICS G120X
- SINAMICS G115D
- SINAMICS G130, SINAMICS G150

SIMARIS planning tools for systems with SINAMICS drives > SIMARIS design

Overview



SIMARIS design is a planning tool for quick and effective network calculation and dimensioning of power distribution for non-residential and industrial buildings.

Starting in the planning phase, the entire electrical circuit required for the project can be structured and dimensioned on the basis of real products. For this purpose, the network structure is initially set up based on the stored modules for infeeds, couplings, distributors and branch circuits. It is also possible to reuse stored favorites, such as those processed for previous similar projects. Suitable components and distribution systems are then automatically selected from the product database stored in SIMARIS design based on the selected project-specific parameters and technical data. This precludes the extra costs so often incurred in the implementation phase as a result of systems that have not been correctly coordinated.

Any configuration of electric power distribution is subject to frequent change and adaptation, not only in the planning phase, but also in the implementation phase. SIMARIS design makes it easy to incorporate such changes in the supply concept and to automatically check their reliability in terms of sound engineering practice and the currently applicable standards.

SIMARIS design professional, a program version available for a fee, offers additional useful functions. It can be used to carry out and also document selectivity analyses, essential for safety power supply systems. There is also the option of analyzing and optimizing the energy efficiency of the planned network.

The versatile output variants enable precise documentation of the project structure and of the calculated data suitable for every phase of a project.

There is also the option of exporting the project data. This enables further processing of the planned project in SIMARIS project, and thus also supports and facilitates system planning.

Benefits

- Reduction in processing overhead for projects
- Dimensioning of electrical networks on the basis of real products according to sound engineering practice and the currently applicable standards (VDE, IEC)
- Automatic selection of the correct components from medium voltage through to interfacing of the load from the stored product database, i.e. no detailed knowledge of products and systems required
- Open definition of the types of mains operation and switching states
- Calculation of the short circuit current, load flow, voltage drop and energy balance
- Incorporation of the required person, short circuit and overload protection
- Option of factoring in any necessary functional endurance
- Display and dimensioning of cable and busbar trunking systems for power conveyance and distribution
- High planning reliability coupled with flexibility in the planning and implementation process
- Tracking changes via change index possible
- Simple adaptation in the case of application changes or expansions
- Option for saving frequently required modules in the favorites library
- Output of the created network diagram, as well as detailed parts lists and data lists
- Incorporation of country-specific product portfolios
- Comprehensive documentation of planning results with simple data transfer (Office, CAD etc.)

Application

SIMARIS design is a software tool for the network calculation and dimensioning of power distribution for non-residential and industrial buildings. Whether for a shopping center, a hospital or production facilities - with SIMARIS design you can reduce the overhead required for the overall planning of power distribution systems and hence the time spent on the selection and dimensioning of equipment.

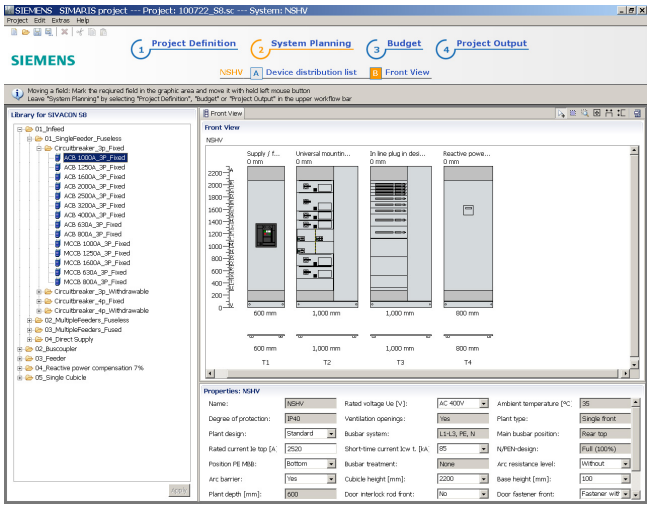
More information

For further information and available downloads, please go to:
www.siemens.com/simarisdesign

If you have any other questions, please do not hesitate to contact our Customer Support Center:

Phone: +49 70 00 7 46 27 47
Email: technical-assistance@siemens.com

Overview



SIMARIS project is a planning tool for fast calculation of space requirements and electrical power distribution system budgets for non-residential and industrial buildings, and for generating specifications automatically.

The following is determined in SIMARIS project based on the pre-defined project structure and the basic technical specifications selected:

- For medium-voltage switchboards: selection of the required system and the required fields, then presentation of a front view with dimensions.
- Following selection of the system for transformers, the required quantity must be selected. Selected transformers are presented as a parts list.
- For low-voltage switchboards and distribution boards: selection of the required protection devices and switching devices per system. The most suitable distribution system is determined automatically based on the list of distribution devices thus created. It is then equipped with the devices and presented graphically in an automatically generated front view that includes dimensions.
- Following selection of the system for busbar trunking systems the length is specified and the additionally required components are selected, e.g. infeeds, junction units and tap-off units. All the resulting components are listed in a parts list.

Detailed information about Siemens devices or their article numbers is not needed because SIMARIS project makes the selection automatically on the basis of the parameters entered. For each item of switchboard or each distribution board, SIMARIS project takes the wiring, control and measurement etc. into account.

A system plan drawn up in SIMARIS design can also be imported into SIMARIS project, which means that selecting devices becomes redundant and SIMARIS project builds up the project structure automatically.

Convenient output versions are available to document the results, including the automatic generation of specifications for the planned systems.

Typical versions of a system planned in SIMARIS project can be saved and repeatedly integrated in new projects from the favorites library. Automatically created systems can also be subsequently optimized or changed. This is particularly relevant if planning becomes more detailed and the budget needs to be reinforced as a result.

For detailed calculation of costs - on an up-to-date and regional basis - and for more project support, please contact your Siemens representative.

Benefits

- Intuitive and easy to operate
- Automatic selection and placement of matching distribution systems
- Fast determination of the space requirements and cost of power distribution plants
- End-to-end planning, from medium-voltage switchgear assemblies, transformers, low-voltage switchgear and busbar trunking systems right through to the distribution boards
- Simple adaptation of project planning with increasing clarification of implementation requirements, but also in the event of application changes or expansions
- Saving planned systems for similar projects individually in the favorites library and importing them from there into new projects
- Option of factoring in functional endurance for busbar systems
- Convenient output versions for documentation, such as graphic views, lists and specifications
- Projects created in SIMARIS design can also be imported

Application

SIMARIS project is suitable for the fast determination of the space requirements and cost of electrical power distribution in all industrial and non-residential buildings and for the automatic generation of specifications. From shopping centers to hospitals and production buildings – with SIMARIS project it is possible to reduce the amount of work required for the overall planning of power distribution systems and hence the time spent on selecting and dimensioning the necessary equipment.

More information

For further information and available downloads, please go to:
www.siemens.com/simarisproject

If you have any other questions, please do not hesitate to contact our Customer Support Center:

Phone: +49 70 00 7 46 27 47
Email: technical-assistance@siemens.com

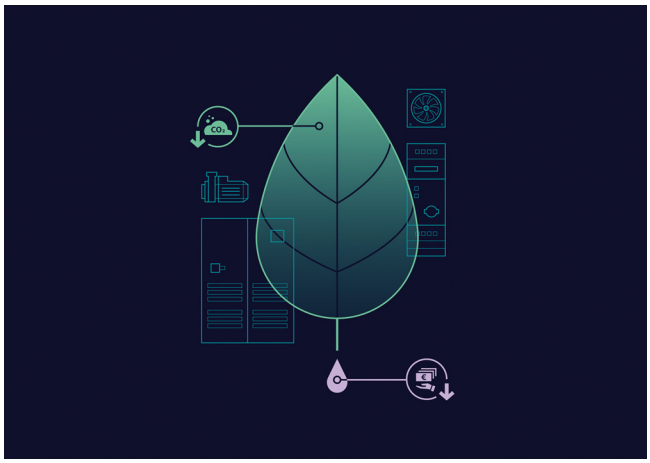
SinaSave energy efficiency tool

Overview

SinaSave determines the energy saving potential and payback time based on your application setup. SinaSave is a web tool which is intuitive to operate and supports you in an investment decision:

- Is it worthwhile to use more energy efficient systems?
- When will my investment pay off?

SinaSave supports you to find the optimum solution: technically, economically, and ecologically.



In which cases can SinaSave support you?

- Pump systems
  - Calculate your potential energy and CO2 savings with our pump drive systems
- Fan systems
  - Calculate your potential energy and CO2 savings with our fan drive systems

For standard motors, calculate your potential energy and CO2 savings with the Tool "Evaluate" from our product partner Innomotics (https://evaluate.innomotics.com)

SinaSave can be accessed without the need for registration or logging in:
www.siemens.com/sinasave

Benefits

- **Transparency of overall savings potential and individual amortization plan**
  - SinaSave calculates the expected energy consumption and resulting savings based on your individual energy prices, operating times and loads to find the optimum solution to make easy decisions.
- **Ease of use and self-explanatory user guidance to calculate savings potential on overall system level**
  - SinaSave compares different drive system configurations for pumps or fan applications, in addition to direct online (DOL) and variable-speed drive (VSD) systems for greenfield and brownfield projects.
- **Maximizing efficiency to reach sustainable energy and cost savings**
  - SinaSave identifies potential savings in energy, costs and CO2 to reduce your environmental footprint, making your operations more efficient and sustainable.

Functions

- Determine savings potential for energy, power costs, and CO2
- Estimate expected amortization and Total Costs of Ownership (TCO)
- Output of system power losses for motor inverter systems as per IEC 61800-9-2
- Simple design with intuitive usability
- Results presented in graphic form
- Storage and charging, export of a handout, for example for customers or decision-makers
- Multiple languages, 14 currencies, IEC and NEMA standards
- Direct transfer to next processes, e.g. product configuration

More information

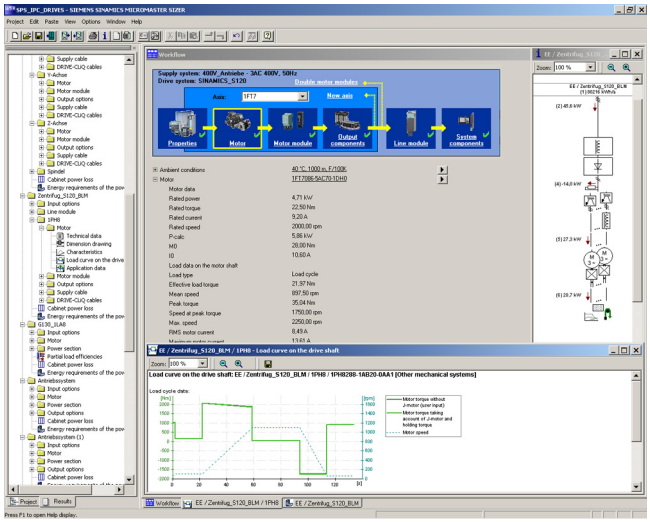
Further information about the amortization calculator for energy-efficient drive systems is available on the Internet at:
www.siemens.com/tools-sinasave

Further information about services for energy saving is available on the Internet at:
www.siemens.com/energy-saving

www.siemens.com/energy-efficiency

SIZER for Siemens Drives engineering tool (integrated in the TIA Selection Tool)

Overview



The following drives and controls can be engineered in a user-friendly way using the SIZER for Siemens Drives engineering tool:

- SIMOTICS motors, including servo geared motors
- SINAMICS low-voltage drive systems
- Motor starters
- SINUMERIK CNC
- SIMOTION Motion Control controller
- SIMATIC controller

It provides support when selecting the technologies involved in the hardware and firmware components required for 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.

SIZER for Siemens Drives supports all of the engineering steps in one workflow:

- Configuring the power supply
- Designing the motor and gearbox, including calculation of mechanical transmission elements
- Configuring the drive components
- Compiling the required accessories
- Selecting the line-side and motor-side power options, e.g. cables, filters, and reactors

When SIZER for Siemens Drives was being designed, particular importance was placed on a high degree of usability and a universal, function-based approach to the drive application. The extensive user guidance makes it easy to use the tool. Status information keeps you continually informed about the progress of the configuration process.

The drive configuration is saved in a project. In the project, the components and functions used are displayed in a hierarchical tree structure.

The project view permits the configuration of drive systems and the copying/inserting/modifying of drives already configured.

The configuration process produces the following results:

- A parts list of the required components (export to Excel, use of the Excel data sheet for import to SAP)
- Technical specifications of the system
- Characteristic curves
- Comments on line harmonic distortions
- Mounting arrangement of drive and control components and dimensional drawings of motors
- Energy requirements of the configured application

These results are displayed in a results tree and can be reused for documentation purposes.

Support is provided by the technological online help menu:

- Detailed technical specifications
- Information about the drive systems and their components
- Decision-making criteria for the selection of components
- Online help in English, French, German, Italian, Chinese and Japanese

System requirements

- PG or PC, with Pentium III min. 800 MHz (recommended > 1 GHz)
- 512 MB RAM (1 GB RAM recommended)
- At least 2 GB of free hard disk space
- An additional 100 MB of free hard disk space on Microsoft Windows system drive
- Screen resolution 1024 × 768 pixels
- Operating system:
  - Microsoft Windows 7 (32/64-bit) Professional, Enterprise, Ultimate, Home
  - Microsoft Windows 8.1 (32/64-bit) Professional, Enterprise, Ultimate, Home
  - Microsoft Windows 365
  - Microsoft Windows 10 (64-bit) Professional, Enterprise
- Microsoft Office 2003/2007/2010/2013/2016/365
- Microsoft Internet Explorer V8.0
- Microsoft .NET Framework 2.0
- OpenGL 2.1

More information

Drive dimensioning in the TIA Selection Tool

Application-specific requirements can be determined using drive technology dimensioning in the TIA Selection Tool. This can include motors, gearboxes and converters. The tool supports the configuration and dimensioning of control functions with an open and closed control loop. The technical documentation with features of the technical drive system, as well as a product list for ordering via SiePortal can also be compiled.

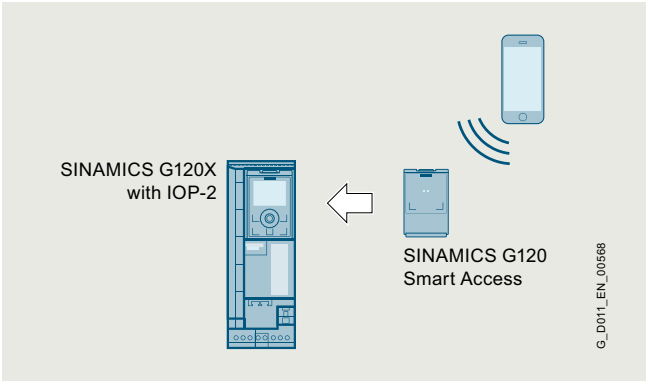
You can find more information on the SIZER for Siemens Drives engineering tool at
https://support.industry.siemens.com/cs/ww/en/ps/13434/dl

You can find more information about the TIA Selection Tool at:
www.siemens.com/tia-selection-tool

SINAMICS web server for SINAMICS G120X via SINAMICS G120 Smart Access

Overview

Web server for efficient commissioning, diagnostics and maintenance



SINAMICS G120X with IOP-2 and SINAMICS G120 Smart Access

Thanks to the optionally available SINAMICS G120 Smart Access, the SINAMICS G120X drive system offers a web server for efficient commissioning, diagnostics and maintenance options. The web server provides access to a multi-faceted range of new options for parameter assignment and drive diagnostics for laptops, tablets and smartphones, including:

- Simple and fast commissioning
- Drive traversing via the control panel
- Downloading/uploading a configuration
- Providing a status overview of the drive
- Evaluating warnings and fault messages
- Monitoring and adapting parameter settings

Benefits

Simple and fast commissioning

- No installation of additional commissioning software
- Standard pages for limit values and settings
- Comprehensive fault diagnosis

Direct language selection

- English, German, French, Italian, Spanish, Chinese

Accessibility

- Free choice of terminal devices as the web server works with all common web browsers, such as iOS, Android, Microsoft Windows, Linux and Mac OS

Diagnostic functions

- Quick overview of the current configuration and the state of the drive
- Understandable diagnostic information and messages, including the causes of issues and possible remedies, are displayed in plain text in multiple languages

Freely configurable parameter lists

- Monitoring parameters for diagnostic purposes, for example for operating personnel
- Adjustment of the parameter lists using filters, parameter groups and the configuration of personal lists

Access security

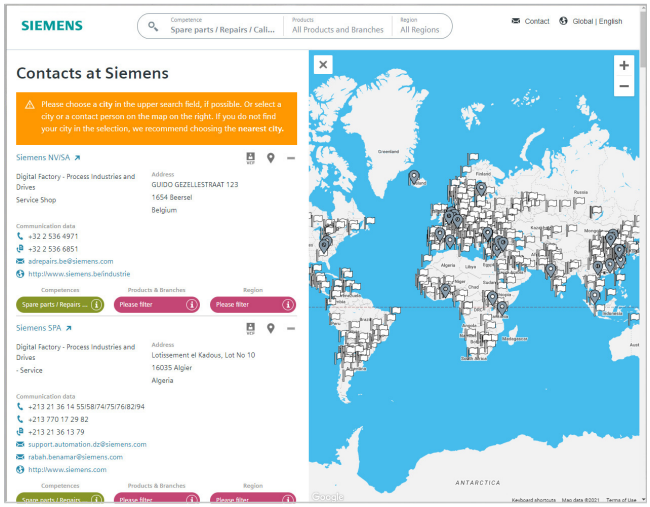
- Protection against unauthorized access to the drive information

Application

The web server is ideal for applications in which special commissioning software or version dependencies are not desired. Easy commissioning, diagnostics and maintenance are possible locally, provided appropriate security measures are applied.

Overview

Partner at Siemens



At your service locally, around the globe for consulting, sales, training, service, support, spare parts on the entire portfolio of Siemens.

Your partner can be found in our Personal Contacts Database at:
www.siemens.com/automation-contact

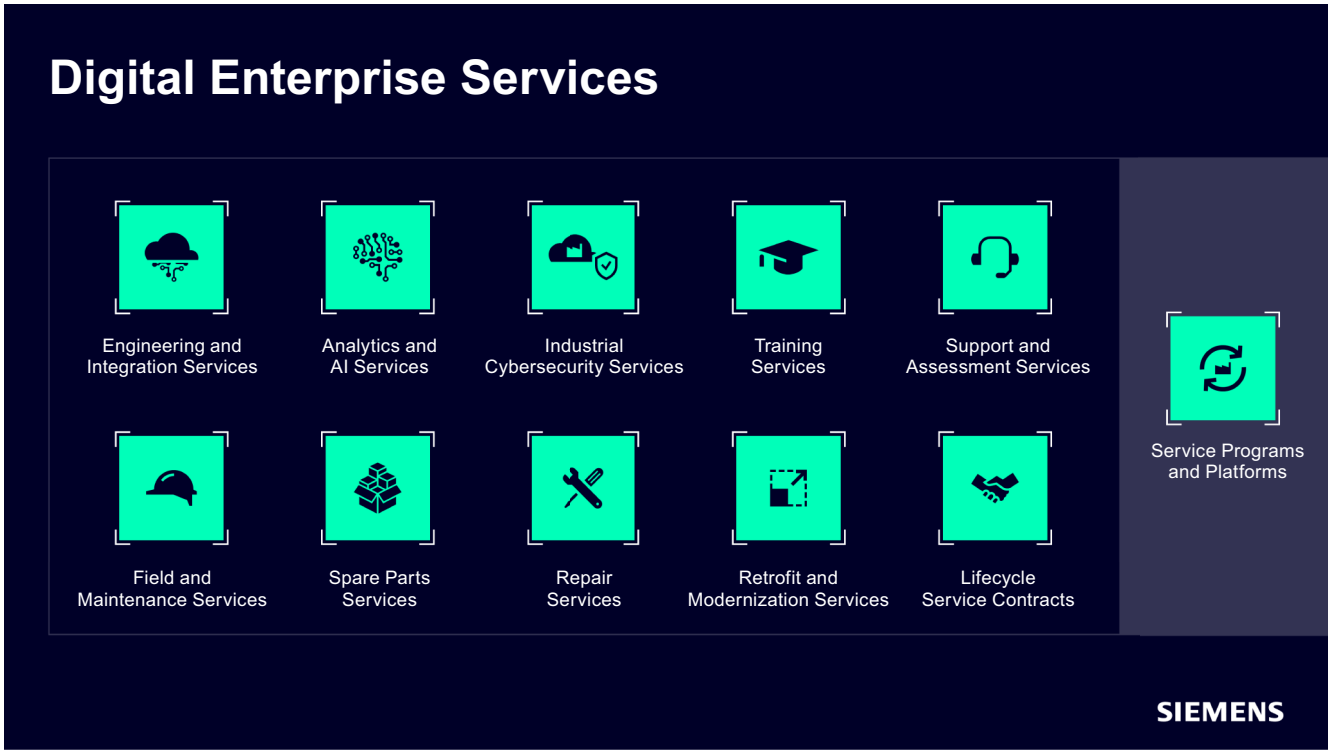
You start by selecting

- the required competence,
- products and branches,
- a country and a city

or by a

location search or free text search.

Overview



At Digital Enterprise Services, we provide you with comprehensive services throughout the entire lifecycle. From a fully digital factory to a reliable spare parts supply and quick support in the event of outages, we work with our partners to ensure your plant operates optimally – improving availability, productivity, and efficiency.

Our services take industry to the next level and give you a competitive edge:

- **Services for Digital Transformation:**
  Our innovative and scalable services streamline operations by optimizing your Overall Equipment Effectiveness (OEE), increasing productivity, preventing outages and improving business continuity – all while supporting IT/OT convergence.
- **Services for Sustainability:**
  Our optimization and lifetime extension services help make your sustainability goals a reality by providing data-driven insights into energy use, enabling you to reduce your carbon footprint and costs. By enabling a circular economy and focusing on product safety, cybersecurity, and supply chain visibility, we extend asset life, save resources, and improve operational efficiency.
- **Lifecycle Services:**
  Our innovative Lifecycle Services provide reliable support worldwide, offering tailored solutions throughout their entire lifecycle. By optimizing maintenance processes, we improve asset performance, efficiency, reliability, and productivity – from machines to entire plants or factories.

For more information, please visit us at:

www.siemens.com/digital-enterprise-services

www.siemens.com/find-your-service

SITRAIN – Digital Industry Academy

Introduction

Learn the way you like it – with SITRAIN

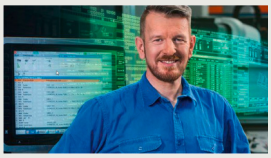
SITRAIN imparts a wide range of technical knowledge for all industries and applications. Our offering is oriented toward the needs of learners and the demands of innovative companies. Get pleasure out of learning - thanks to innovative learning methods, personal support, and knowledge that will help you in your work and further development. For successful, flexible, and continuous learning.

Education and training directly from the manufacturer

SITRAIN provides you with training from the industrial product and solution portfolio from Siemens and benefits from 30 years of expertise in technical training. Take a look at the many options for expanding your knowledge with SITRAIN and find the course that meets your needs! The following training and further education units are available to you for your individual knowledge building:

Industrial Automation Systems SIMATIC
Training available for:
SIMATIC S7-1500. TIA Portal, SIMATIC S7-300/400, SIMATIC S7-1200

Drive Technology
Training available for:
SINAMICS S120 and SINAMICS G120 low-voltage converters, SINAMICS G130 / G150 / G180 / S150



SINUMERIK CNC automation system
Training available for:
SINUMERIK 840D, SINUMERIK 840D sl and SINUMERIK ONE

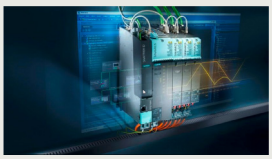
Process Control Systems
Training available for:
SIMATIC PCS 7, SIMATIC PCS neo

Digital Enterprise
Training available for:
Openness, SIMIT, OPC UA, Industrial Edge, Virtual commissioning

Industrial Communications
Training available for:
PROFINET, SCALANCE, R UGGEDOM, Industrial Ethernet, Fieldbus communication, Industrial Security, Remote communication

Identification and Locating
Training available for:
RFID, RTLS-Systems

Operator Control and Monitoring Systems
Training available for:
SIMATIC WinCC Unified in TIA Portal, SIMATIC WinCC in TIA Portal, SIMATIC WinCC V7x



Motion Control System SIMOTION
Training available for:
SIMOTION (Programming, Commissioning, Diagnostics, Service)

Smart Infrastructure
Training available for:
SIRIUS, SENTRON, SIVACON, ALPHA, SIMOCODE, Circuit breakers

Process Analytics & I nstrumentation
Training is available for process analytics and instrumentation, explosion protection, process gas chromatographs

Additional training offer
SIMOVE with Automated Guided Vehicles (AGV), SIPLUS CMS, Guidelines and standards for control cabinets

Introduction

Different learning formats and methods for maximum learning success

With our SITRAIN training formats, you learn in the way that best suits your preferences and routine. You decide whether you would rather take online training or face-to-face training. It is up to you whether you would like to study on demand or at fixed times.

With a personal learning consultant, in the team, or on your own – you can explore all the possibilities.

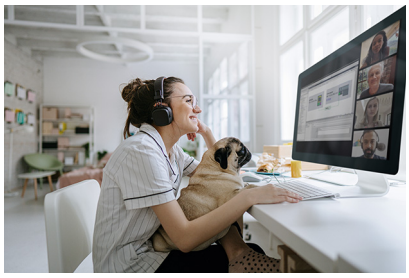
Discover our three learning formats:

Learning Event

SITRAIN Learning Events are the perfect choice when you want to achieve a defined learning goal in the shortest possible time. You learn in a protected learning environment outside of the daily work routine under the guidance of a learning consultant - virtually, in the training center, or at your company.

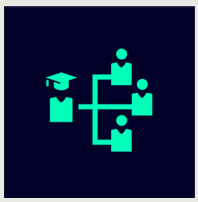
Learning Membership SITRAIN Access

With SITRAIN access, you enter a world of extensive and constantly expanding self-study units on our digital learning platform for industry. With SITRAIN access, you can implement a modern learning culture in your team or company with independent and continuous learning.



Learning Journey

The Learning Journey is the perfect combination of units taken live and self-study units for sustainable learning success. The modular approach enables simple integration into your daily work. This also includes one-year membership for using the SITRAIN access digital learning platform.

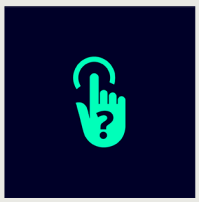


Live

Learn together with others, simultaneously and guided by a learning consultant. Online, in the SITRAIN training center or at your company.

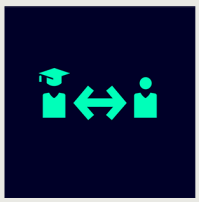
Self-reliant

Expand your knowledge self-determined with industry learning and work on your learning units at your own pace and according to your own schedule.



On demand

Get the knowledge you need, exactly when you need it. Be it to answer a current question or to work on a special topic.



Individual

Talk directly with the learning consultant, clarify detailed questions and get personal coaching for transferring the learned topics to your own application.

Training cases catalog

www.siemens.com/
sitrain-catalog-training-cases

www.siemens.com/sitrain

Find
your local
offer here

Training courses for SINAMICS low-voltage converters

Overview

Training courses for SINAMICS drive system

This provides an overview of the training courses available for the SINAMICS drive system.

The courses are modular in design and are directed at a variety of target groups as well as individual customer requirements.

The system overview will acquaint decision-makers and sales personnel with the system very quickly.

The engineering course provides all the information you need to configure the drive system.

The courses dedicated to diagnostics and servicing, parameterization and commissioning, communication as well as extended functions such as Safety Integrated are sure to provide all the technical knowledge service engineers will need.

All courses contain as many practical exercises as possible to enable intensive and direct training on the drive system and with the tools in small groups.

Please also take note of the training options available for SIMOTICS motors. You will find more information about course contents and dates on the internet.

Title (all courses are available in English and German)	**Target group** Planners, decision-makers, sales personnel	 Commissioning engineers, configuring engineers	 Service personnel, maintenance technicians	**Duration**	**Order code**
Course Fundamentals and overview					
SINAMICS and SIMOTICS - Basics of Drive Technology	✓	✓	✓	5 days	DR-BASIC
Courses SINAMICS S120					
SINAMICS S120 Parameterizing and Commissioning with STARTER	–	✓	–	5 days	DR-S12-PM
SINAMICS S120 Parameterizing and Commissioning in the TIA Portal	–	✓	–	5 days	DR-S12-PMT
SINAMICS S120 Parameterizing Safety Integrated	–	✓	–	4 days	DR-S12-SAF
SINAMICS S120 Parameterizing and Optimization	–	✓	–	5 days	DR-S12-OPT
SINAMICS S120 Diagnostics and Service	–	–	✓	5 days	DR-S12-DG
SINAMICS S120 Diagnostics and Service in the TIA Portal	–	–	✓	5 days	DR-S12-DGT
SINAMICS S120 Diagnostics on Chassis and Cabinet Units	–	✓	✓	3 days	DR-S12-CHA
Course SINAMICS S210					
SINAMICS S210 Commissioning and Service	–	✓	✓	2 days	DR-S210
Course SINAMICS G120 (including SINAMICS G120X, SINAMICS G120D and SINAMICS G115D)					
Parameterizing and Commissioning	–	✓	–	2 days	DR-G12-PM
Courses SINAMICS G130/G150/G180/S150					
SINAMICS G150/G130/S150 - Diagnostics and Service	–	✓	✓	5 days	DR-G15-DG

Overview

SINAMICS G120X training case

The SINAMICS G120X training case is a convincing demonstration system thanks to its compact design. It is suitable for direct customer presentations as well as for tests in technical departments. It enables the functions of SINAMICS G120X to be demonstrated and tested quickly and easily.

It contains the following components:

- SINAMICS G120X frequency converter, PROFINET, EtherNet/IP, 0.75 kW
- Operator panels IOP-2
- SINAMICS G120 Smart Access
- Asynchronous (induction) motor

The SINAMICS G120X training case is supplied as a trolley with a hood.

Technical specifications

	SINAMICS G120X training case 6AG1067-2AA00-0AC1
Supply voltage	230 V 1 AC
Dimensions	
• Width	290 mm (11.42 in)
• Height	470 mm (18.50 in)
• Depth	300 mm (11.81 in)
Weight, approx.	16.9 kg (37.26 lb)

Selection and ordering data

Description	Article No.
SINAMICS G120X training case	**6AG1067-2AA00-0AC1**

Overview

Systems Engineering Plant Chemnitz (WKC) - Electrical equipment for machines and plants

The Siemens Systems Engineering Plant Chemnitz (WKC) is the European market leader in control cabinet construction for machine tools and manufactures equipment for numerous segments the machine and plant construction industry, as well as for project business in the logistics and automotive sectors.

WKC - Control cabinet wiring

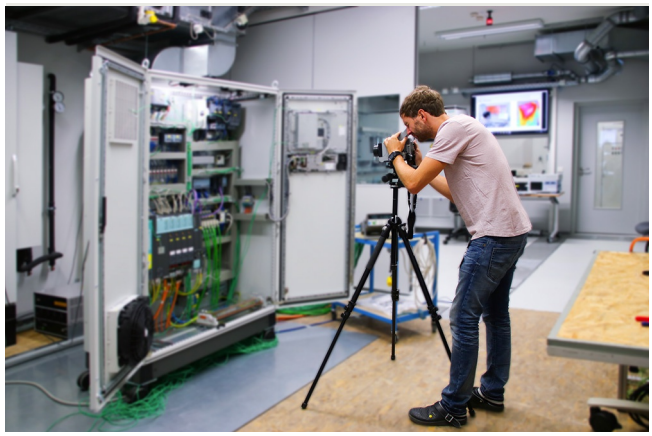
Scope of services offered

The WKC offers a complete portfolio of services for development and production: From concept support and hardware engineering, construction including complete material procurement to testing, advance commissioning support and worldwide inbound delivery. Each customer decides individually what extent of these services the WKC is to provide.

WKC - Engineering - SSB

Competence center for standardization and air conditioning

The WKC is also competence center for the air conditioning of switchgear, has its own test laboratory, and is a certified UL Panels shop. Siemens WKC therefore is happy to support you with advice on design in accordance with standards and concepts for your drive systems, control, operation and safety. In addition, our engineers configure for you in EPLAN and other CAD systems, execute Design-To-Cost projects, and adapt your documents where necessary to UL or new automation and digitalization technologies.



WKC - Test laboratory - Heat measurement

Overview

Individual support and maximum flexibility

Our technical consultants for complete equipment support customers and sales departments in the various regions. Our customers are supported by job centers and permanently assigned manufacturing teams. As a customer, you will benefit from individual logistics models, flexible production capacities and production areas, change management in all process phases, as well as maximum flexibility for your orders..

Distance is no problem: For coordination with our customers, we use various digital communication and business applications with user-friendly and powerful functions for screensharing, videoconferencing, file transfer, as we all options for a customer acceptance via webcam (mobile circuit meeting room).

WKC - Automated testing SICAT

Your advantages

We offer complete services from a single source with Siemens quality and stability, extensive specialist support, and flexible resources. We will be glad to accompany you into international markets as well. With us you have a strong partner at your side - from the design stage to final delivery. Whether for series or individual units, Siemens WKC works together with you to implement your projects according to your requirements.

Overview of the portfolio of services

Order coordination

- Project manager with permanent customer assignment
- Complete material purchasing
- Change management in all process phases

Manufacturing

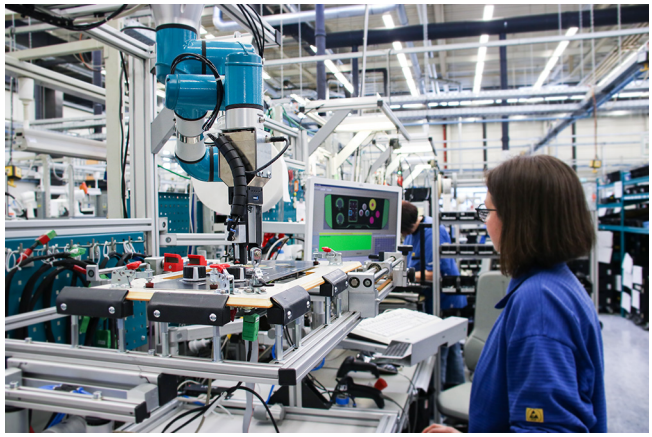
- Creation of a digital twin
- CNC processing of enclosure parts and mounting plates
- In-house painting
- Auto-routing of the wiring
- Automated prefabrication of cables
- Production teams with permanent customer assignment
- Batch or flow production

Automated test (standard)

- Current path test
- Function of switching, operating and signaling devices
- Observance of protective measures and safety

Optional test services / pre-commissioning

- Error-free function of the programmable controllers / I/O devices
- Parameterization and checking of bus systems
- First commissioning of Siemens NC and PLC
- Installation of customer software



WKC - Collaborative robotics

Overview

Additional services for different project phases

Our portfolio is supplemented by a host of additional services for many different project phases.

Planning

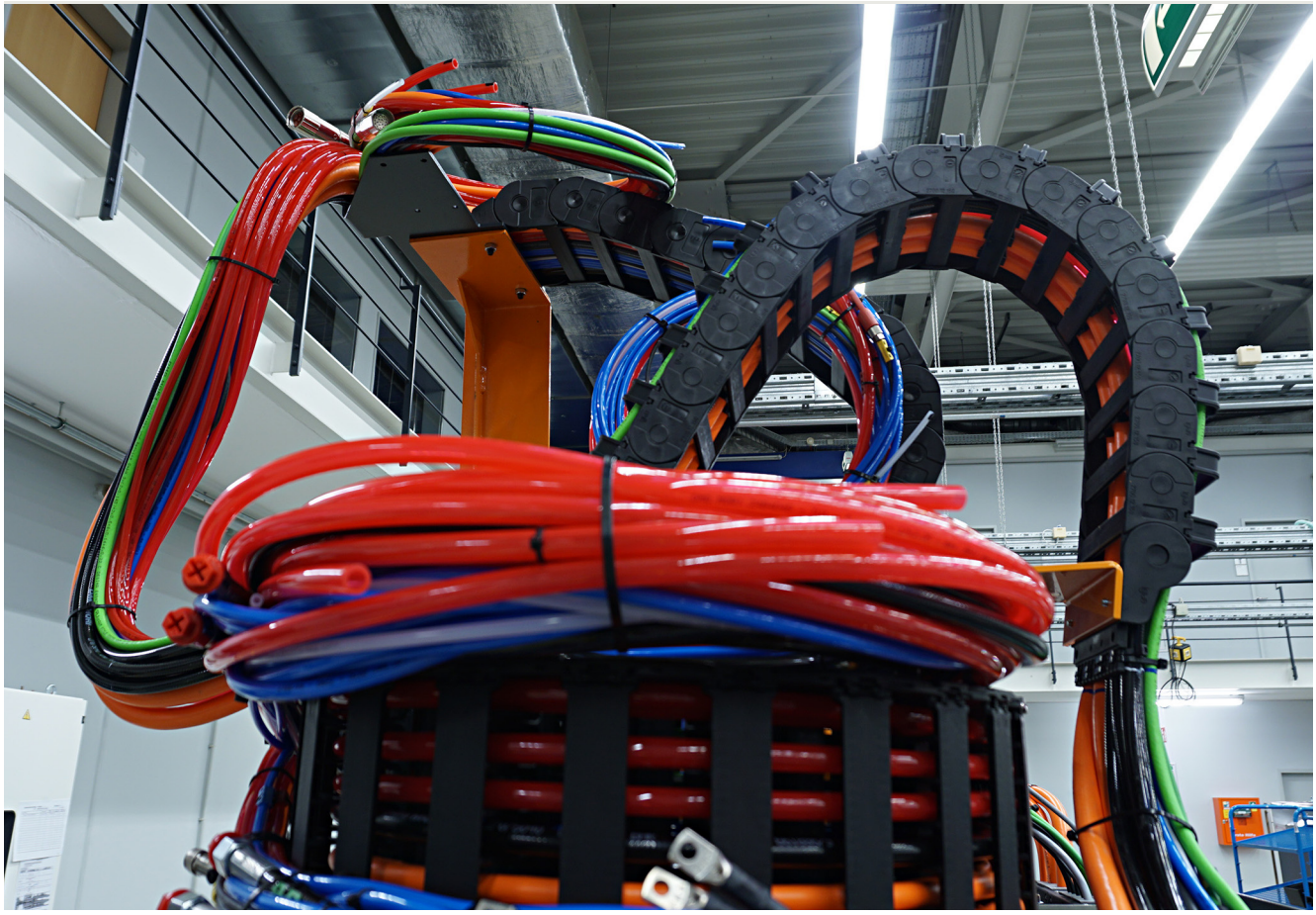
- Evaluation of requirement specifications, requirements
- Advice regarding standard applications and certifications (conformity)
- Advice regarding EMC, air conditioning, and electrical safety
- Design-To-Cost analyses
- Special rated conditions

Implementation/realization

- Creation of an electrical design in various CAE systems
- Creation of an air conditioning design through calculation and simulation
- CAE revision of production documents

Validation/certification

- International standard and certification know-how, e.g.: IEC 60204-1, IEC 61439, UL or cULus
- Checking of air conditioning / EMC designs in own Siemens laboratory or at customer premises
- Execution of EMC precompliance measurements in own laboratory or at your plant location



WKC - Additional service - Festoon cable system

More information

You can find additional information on the internet at:

www.siemens.com/panelbuilding

Or contact us by

email: info.wkc.industry@siemens.com

Overview

Our understanding of an application is the customer-specific solution of an automation task based on standard hardware and software components. In this respect, industry knowledge and technological expertise are just as important as expert knowledge about how our products and systems work. We are setting ourselves this challenge with more than 280 application engineers in 20 countries.

Application centers

We currently have application centers in:

- Germany:
  Head Office in Erlangen and in other German regions, e.g. in Munich, Nuremberg, Stuttgart, Mannheim, Frankfurt, Chemnitz, Cologne, Bielefeld, Bremen, Hanover, Hamburg
- Belgium: Brussels
- Brazil: Sao Paulo
- China: Beijing and 12 regions
- Denmark: Ballerup
- France: Paris
- Great Britain: Manchester
- India: Mumbai
- Italy: Bologna, Milan
- Japan: Tokyo, Osaka
- The Netherlands: The Hague
- Austria: Vienna
- Poland: Warsaw
- Sweden: Göteborg
- Switzerland: Zurich, Lausanne
- Spain: Madrid
- South Korea: Seoul
- Taiwan: Taipei
- Turkey: Istanbul
- USA: Atlanta

These application centers specialize in the use of SIMATIC/SIMOTION/SINAMICS. You therefore can rely on automation and drive specialists for implementing successful applications. By involving your personnel at an early stage in the process, we can provide a solid basis for rapid knowledge transfer, maintenance and further development of your automation solution.

Advice on applications and implementation

We offer a variety of consultation services to help you find the optimum solution for the SIMATIC/SIMOTION/SINAMICS application you want to implement:

The quotation phase includes

- clarification of technical questions,
- discussion of machine concepts and customer-specific solutions,
- selection of suitable technology and
- suggestions for implementation.

A technical feasibility study is also performed at the outset. In this way, difficult points of the application can be identified and solved early on. We can also configure and implement your application as a complete solution from a single source.

A large number of proven standard applications are available for use during the implementation phase. This saves engineering costs.

The system can be commissioned by experienced, competent personnel, if required. This saves time and trouble.

If servicing is required, we can support you on site or remotely. For further information about servicing, please see the section "Industry Services".

On-site application training

Training for the implemented applications can also be organized and carried out on site. This training for machine manufacturers and their customers does not deal with individual products, but the entire hardware and software system (for example, automation, drives and visualization).

From an initial concept to successful installation and commissioning: We provide complete support for SIMATIC/SIMOTION/SINAMICS! Contact your Siemens representative.

You can find further information at
www.siemens.com/machinebuilding

Overview

Siemens Product Partners for Drives Options

Individual options for our drives

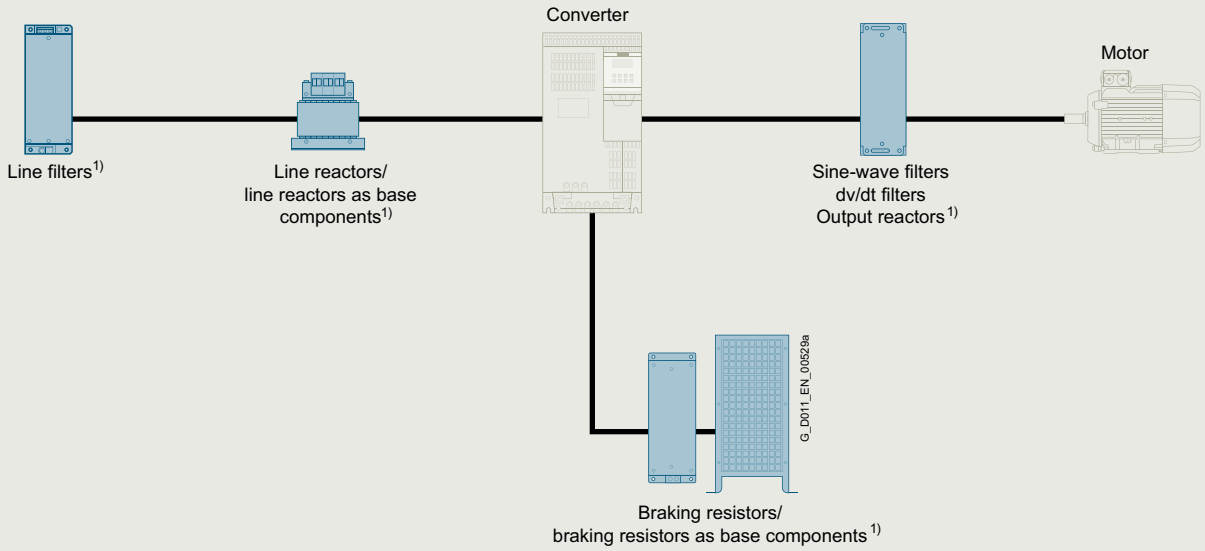
In order to meet as many customer requirements as possible in the field of drive technology, in addition to its own products, Siemens also relies on the individual and complementary services of selected partners.

We are increasingly focusing on the standard drive options, and our Siemens Product Partners for Drives Options supplement our drives with individual drive options.

This gives Siemens a unique flexibility to meet all application requirements. Naturally, we support our Siemens Product Partners for Drives Options in tailoring their options perfectly to our drives.

For you as our customer, there are multiple benefits:

- The Siemens Product Partners for Drives Options meet the same high standards of quality and performance that we place on our own products
- Drive options can be adapted to individual requirements/ designs
- The Siemens Product Partners for Drives Options know our Siemens converter portfolio and can advise you individually and quickly



1) Options that can be supplied from Siemens as well as from Product Partners for Drives Options.

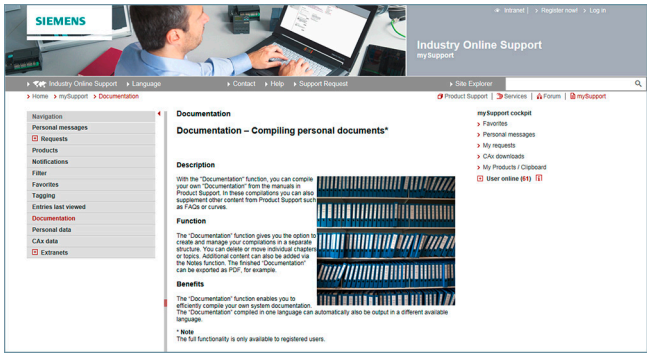
Schematic circuit diagram

More information

You can find more information on the internet at
www.siemens.com/drives-options-partner

Overview

mySupport documentation – Compiling personal documents



mySupport documentation is a web-based system for generating personalized documentation based on standard documents and is part of the Siemens Industry Online Support portal.

In mySupport, a personal document library can be created in the "Documentation" category. This library can be accessed online in mySupport or also be generated in various formats for offline use.

Previously, this functionality was available in the My Documentation Manager for configurable manuals. Due to the integration in mySupport, all entries of the Industry Online Support can now be imported into the personal document library, including FAQs or product notifications.

If you have already worked with the My Documentation Manager, all of the previously created libraries will continue to be available without restrictions in mySupport.

In addition, the personal library in mySupport can be shared with other mySupport users. In this way, a collection of relevant documents can be created very effectively and used together with other mySupport users all over the world.

You must register/log in for configuring and generating/ managing.

Benefits

- Display
  View, print or download standard documents or personalized documents
- Configure
  Transfer standard documents or parts of them to personalized documents
- Generate/Manage
  Generate and manage personalized documents in the formats PDF, RTF or XML in all available languages

Function

Opening mySupport documentation in the Industry Online Support portal

- About the product support, entry type "Manual":
  https://support.industry.siemens.com/cs/ww/en/ps/man
  By clicking on the required version of the manual and then "Show and configure", the manual opens in a modular view, where you can navigate from topic to topic. Here the direct link to a topic can be used and made available to other users. The selected document can be added to the personal library via "mySupport Cockpit" > "Add to mySupport documentation".
- Via the direct link
  https://support.industry.siemens.com/my/ww/en/documentation/advanced
  After logon/registration, the online help is displayed as the current document.

More information

You can find additional information on the internet at

- https://support.industry.siemens.com/my/ww/en/documentation
- https://support.industry.siemens.com/cs/helpcenter/en/index.htm?#persoenliche_bibliothek_aufbauen.htm

General documentation

Overview

A high-quality programmable control or drive system can be used to maximum effect only if the user is aware of the performance of the products used as a result of intensive training and good technical documentation.

This is becoming more important due to the shorter innovation cycles of modern automation products and the convergence of electronics and mechanical engineering.

A comprehensive range of documentation is available which includes a Getting Started guide, operating instructions, installation manuals and a list manual.

In addition to technical information for SINUMERIK, SINAMICS, SIMOTION and SIMOTICS, the documentation is available for downloading as a PDF file from the internet:

• SINUMERIK
https://support.industry.siemens.com/cs/document/108464614

• SINAMICS
https://support.industry.siemens.com/cs/document/109807358

• SIMOTION
https://support.industry.siemens.com/cs/document/109479653

• SIMOTICS
https://support.industry.siemens.com/cs/document/109813641

Application

Explanations of the manuals:

- **Operating Instructions**
  contain all the information needed to install the device and make electrical connections, information about commissioning and a description of the converter functions.
  Phases of use: Control cabinet construction, commissioning, operation, maintenance and servicing.
- **Hardware Installation Manual**
  contains all relevant information about the intended use of the components of a system (technical specifications, interfaces, dimensional drawings, characteristics, or possible applications), information about installation and electrical connections and information about maintenance and servicing.
  Phases of use: Control cabinet configuration/construction, maintenance and servicing.
- **Operating and Installation Instructions**
  (for converter and accessories)
  contain all relevant information about the intended use of the components, such as technical specifications, interfaces, dimensional drawings, characteristics, or possible applications.
  Phases of use: Control cabinet configuration/construction.
- **Manual/Configuration Manual**
  contains all necessary information about the intended use of the components of a system, e.g. technical specifications, interfaces, dimensional drawings, characteristics, or possible applications.
  Phases of use: Cabinet configuration/setup, circuit diagram configuration/drawing.
- **Commissioning Manual**
  contains all information relevant to commissioning after installation and wiring. It also contains all safety and warning notices relevant to commissioning in addition to overview drawings.
  Phases of use: Commissioning of components that have already been connected, configuration of system functions.
- **List Manual**
  contains all parameters, function diagrams, and faults/alarms for the product/system as well as their meanings and setting options. It contains parameter data and fault/alarm descriptions with functional correlations.
  Phases of use: Commissioning of components that have already been connected, configuration of system functions, fault cause/diagnosis.
- **Getting Started**
  provides information about getting started for the first-time user as well as references to additional information. It contains information about the basic steps to be taken during commissioning. The information in the other documentation should be carefully observed for all of the other work required.
  Phases of use: Commissioning of components that have already been connected.
- **Function Manual Drive Functions**
  contains all the relevant information about individual drive functions: Description, commissioning and integration in the drive system.
  Phases of use: Commissioning of components that have already been connected, configuration of system functions.

Selection and ordering data

Description	Article No.
Automating with PROFINET: Industrial Communication Based on Industrial Ethernet	Via bookstore
• German	**ISBN 978-3-89578-293-0**
• English	**ISBN 978-3-89578-294-7**

SINAMICS G120X documentation

Overview

Identification link according to IEC 61406 for SINAMICS G120X

The ID link contains the article and serial number of the product. As a QR code, it replaces the previous data matrix code on the nameplate and takes you with the URL directly to a product information page on the internet with access to the technical documentation, data sheet, certificates, FAQs, product notifications, and catalogs. Paper package inserts become superfluous since the information is available electronically directly via the QR code, even years later. In this way, we are making a valuable contribution to the preservation of our environment. You don't need an additional app. Simply scan the QR code with your smartphone or tablet. According to IEC 61406, the QR code of an ID link is marked with a frame and a triangle at the bottom right.

With their globally unique identifiers, Siemens products are ready for Industry 4.0.

The ID serves as a connection to the administration shell with which modules of the digital twin can be provided.

Further documentation, such as the operating instructions, is available free on the internet at:

www.siemens.com/sinamics-120x/documentation

Detailed information on the SINAMICS G120X infrastructure converters for HVAC/Water/Wastewater, including the latest technical documentation (brochures, tutorials, dimensional drawings, certificates and operating instructions), is available on the internet at:
www.siemens.com/sinamics-g120x

and is also available via the Siemens Product Configurator on the internet.
The Siemens Product Configurator can be found in SiePortal at the following address:
www.siemens.com/spc

Notes

Appendix

5

Certificates of suitability (approvals)

Overview

Many of the products in this catalog fulfill requirements, e.g. for UL, CSA or FM and are labeled with the corresponding approval designation.

All of the certificates of suitability, approvals, certificates, declarations of conformity, test certificates, e.g. CE, UL, Safety Integrated etc. 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 used for their intended purpose.

In other cases, the vendor of these products is responsible for arranging for the issue of new certificates.

Test code	Tested by	Device series/ Component	Test standard	Product category/ File No.
UL: Underwriters Laboratories Independent public testing body in North America				
	UL according to UL standard	SINUMERIK	Standard UL 508, CSA C22.2 No. 142	NRAQ/7.E164110 NRAQ/7.E217227
		SIMOTION	Standard UL 508, CSA C22.2 No. 142	NRAQ/7.E164110
	UL according to CSA standard	SINAMICS	Standard UL 508, 508C, 61800-5-1 CSA C22.2 No. 142, 274	NRAQ/7.E164110, NMMS/2/7/8.E192450, NMMS/2/7/8.E203250, NMMS/7.E214113, NMMS/7.E253831
	UL according to UL and CSA standards			NMMS/2/7/8.E121068 NMMS/7.E355661 NMMS/7.E323473
	UL according to UL standard	SIMODRIVE	Standard UL 508C, CSA C22.2 No. 274	NMMS/2/7/8.E192450 NMMS/7.E214113
	UL according to CSA standard	SIMOTICS	Standard UL 1004-1, 1004-6, 1004-8, CSA C22.2 No. 100	PRGY2/8.E227215 PRHZ2/8.E93429
	UL according to UL and CSA standards			PRHJ2/8.E342747 PRGY2/8.E253922 PRHZ2/8.E342746
		Line/motor reactors	Standard UL 508, 506, 5085-1, 5085-2, 1561, CSA C22.2 No. 14, 47, 66.1-06, 66.2-06	XQNX2/8.E257859 NMTR2/8.E219022 NMMS2/8.E333628 XPTQ2/8.E257852 XPTQ2/8.E103521 NMMS2/8.E224872 XPTQ2/8.E354316 XPTQ2/8.E198309 XQNX2/8.E475972
		Line filters, dv/dt filters, sine-wave filters	UL 1283, CSA C22.2 No. 8	FOKY2/8.E70122
		Resistors	UL 508, 508C, CSA C22.2 No. 14, 274	NMTR2/8.E224314 NMMS2/8.E192450 NMTR2/8.E221095 NMTR2/8.E226619
TUV: TUV Rheinland of North America Inc. Independent public testing body in North America, Nationally Recognized Testing Laboratory (NRTL) TÜV: TÜV SÜD Product Service Independent public testing body in Germany, Nationally Recognized Testing Laboratory (NRTL) for North America				
	TUV according to UL and CSA standards	SINAMICS	NRTL listing according to standard UL 508C	U7V 12 06 20078 013 U7 11 04 20078 009 U7 11 04 20078 010 U7 11 04 20078 011
		SIMOTION	NRTL listing according to standard UL 508	U7V 13 03 20078 01
		SIMODRIVE	NRTL listing according to standard UL 508C, CSA C22.2. No. 14	CU 72090702
		Motion Control Encoder	NRTL listing according to UL 61010-1 CSA C22.2 No. 61010-1	U8V 10 06 20196 024

Overview

Test code	Tested by	Device series/ Component	Test standard	Product category/ File No.
CSA: Canadian Standards Association Independent public testing body in Canada				
	CSA according to CSA standard	SINUMERIK	Standard CSA C22.2 No. 142	2252-01 : LR 102527
FMRC: Factory Mutual Research Corporation Independent public testing body in North America				
	FM according to FM standard	SINUMERIK	Standard FMRC 3600, FMRC 3611, FMRC 3810, ANSI/ISA S82.02.1	–
EAC: Independent public testing body within the Eurasian Conformity Area				
	EAC in accordance with the EAC Directive	SINAMICS SINUMERIK SIMOTION	Standard IEC 61800-5-1/-2, IEC 61800-3	–
RCM: Australian Communications and Media Authority Independent public testing body in Australia				
	RCM according to EMC standard	SINAMICS SINUMERIK SIMOTION	Standard IEC AS 61800-3, EN 61800-3	–
KC: National Radio Research Agency Independent public testing body in South Korea				
	KC according to EMC standard	SINAMICS SINUMERIK SIMOTION	Standard KN 11	–
BIA Federal Institute for Occupational Safety				
–	Functional safety	SINAMICS SINUMERIK SIMOTION	Standard EN 61800-5-2	–
TÜV SÜD Rail				
–	Functional safety	SINAMICS SINUMERIK SIMOTION	Standard EN 61800-5-2	–

More information about certificates can be found online at:
https://support.industry.siemens.com/cs/ww/en/ps/cert

Software licenses

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 supply can be found in the readme file supplied with the relevant product(s).

License types

Siemens Digital Industries and Smart Infrastructure 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.

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 Digital Industries and Smart Infrastructure 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 https://mall.industry.siemens.com/legal/ww/en/terms_of_trade_en.pdf

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

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) (r/min)	1.587×10^{-5}	1.183×10^{-2}
(lb-ft) (deg./s)	3.173×10^{-5}	2.366×10^{-2}
(lb-ft) (r/min)	1.904×10^{-4}	0.1420
Watts	1.341×10^{-3}	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

Rotation (to convert from A to B, multiply by entry in table)

A \ B	r/min	rad/s	degrees/s
r/min	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 $^5/_9$		multiply by $^9/_5$ 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 Gauges[1)]

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.

Explanation of the raw material/metal surcharges[1)]

Surcharge calculation

To compensate for variations in the price of the raw materials silver, copper, aluminum, lead, gold, dysprosium[2)] and/or neodym[2)], surcharges are calculated on a daily basis using the so-called metal factor. These apply to products containing these raw materials and are calculated per raw material. These surcharges are added to the price of a product if the basic official price (BOP) of the raw material in question is exceeded.

Surcharges are calculated in accordance with the following criteria:

Basic official price (BOP) of the raw material

- BOP of the workday prior to receipt of the order or prior to release order (Daily Price) for:
  - Silver (processed) [3)]
  - Gold (processed) [3)]
  - Aluminum per 100 kg (LME-notation/10, converted from USD to EUR using LME-FX-Rate [MTLE] +1.2%) [4)]
  - Copper per 100 kg (LME-notation/10, converted from USD to EUR using LME-FX-Rate [MTLE] +1.2%) + 1% [4)]
  - Lead (constant 199.50 EUR per 100 kg)
- If BOP is suspended, the last one is used.

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

Metal factor consists of several digits; the first digit indicates whether the percentage method of calculation refers to the list price or a 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 BOP, the daily price and the raw material weight. In order to calculate the surcharge, the BOP must be subtracted from the daily price. The difference is then multiplied by the raw material weight.

The BOP 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 BOP - 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

L E A – – – – –	
	Basis for % surcharge: List price
	Silver Basis 150 €, Step 50 €, 0.5 %
	Copper Basis 150 €, Step 50 €, 0.1 %
	No surcharge for aluminum
	No surcharge for lead
	No surcharge for gold
	No surcharge for dysprosium
	No surcharge for neodym
N – A 6 – – – –	
	Basis for % surcharge: Customer net price
	No surcharge for silver
	Copper Basis 150 €, Step 50 €, 0.1 %
	Aluminum acc. to weight, basic offic. price 225 €
	No surcharge for lead
	No surcharge for gold
	No surcharge for dysprosium
	No surcharge for neodym
– – 3 – – – – –	
	No basis necessary
	No surcharge for silver
	Copper acc. to weight, basic official price 150 €
	No surcharge for aluminum
	No surcharge for lead
	No surcharge for gold
	No surcharge for dysprosium
	No surcharge for neodym

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 (https://pmm.umicore.com/en).

4) Source: The London Metal Exchange – an HKEX Company (https://www.lme.com/).
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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 silver[1], copper[1], aluminum[1], lead[1], gold[1], dysprosium and/or neodym, surcharges are calculated on a daily basis using the so-called metal factor. This applies to products containing at least one of 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 (BOP) of the raw material in question is exceeded.

The surcharge is calculated in accordance with the following criteria:

- Basic official price (BOP) of the raw material[2]
  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 BOP 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.

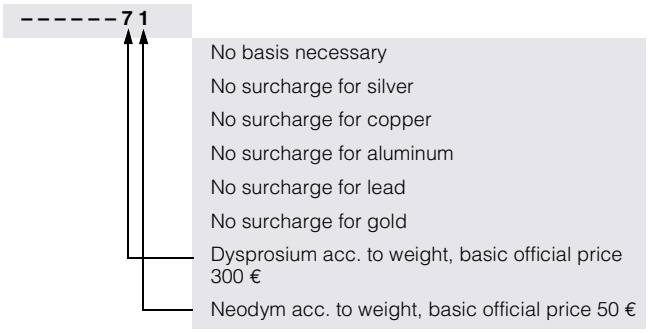
1st digit	List or customer net price using the percentage method
2nd digit	for silver (AG)[1]
3rd digit	for copper (CU)[1]
4th digit	for aluminum (AL)[1]
5th digit	for lead (PB)[1]
6th digit	for gold (AU)[1]
7th digit	for dysprosium (Dy)
8th digit	for neodym (Nd)

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 BOP 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)

Metal surcharges

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 €	Price in €	Price in €	Price in €	
			150.01 - 200.00	200.01 - 250.00	250.01 - 300.00	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						

1. General Provisions

By using this catalog you can purchase hard- and software products as well as services (together hereinafter referred to as “products”) described therein from Siemens Aktiengesellschaft subject to the following Terms and Conditions of Sale and Delivery (hereinafter referred to as "T&C"). Note, for products purchased from any Siemens entity having a registered office outside of Germany, the respective terms and conditions of sale and delivery of the respective Siemens entity apply exclusively. The following T&C apply exclusively for orders placed with Siemens Aktiengesellschaft, Germany.

1.1 For customers with a seat or registered office in European Union

For customers with a seat or registered office in European Union, the following terms and conditions apply subordinate to T&C:

- for products, which include specific terms and conditions in the text of the product description, these specific terms and conditions shall apply and subordinate thereto,,
- for stand-alone software products and software products forming a part of a product or project, the "General Conditions for Software Products for Infrastructure & Industry Business (German law)"[1] and/or
- for consulting services the “Allgemeine Geschäftsbedingungen für Beratungsleistungen für Infrastructure & Industry Geschäft (Deutsches Recht)”[1] (available only in German) and/or
- for other services, the „Supplementary Terms and Conditions for Services for Infrastructure & Industry Business (German Law) (“BL”)"[1] and/or
- for other products the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"[1].
  In case such products should contain Open Source Software, the conditions of which shall prevail over the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"[1], the Product will be given a note as to which special conditions apply to this open source software. This shall apply mutatis mutandis for notices referring to other third-party software components.

1.2 For customers with a seat or registered office outside European Union

For customers with a seat or registered office outside European Union, the following terms and conditions apply subordinate to T&C:

- for products, which include specific terms and conditions in the description text, these specific terms and conditions shall apply and subordinate thereto,
- for consulting services the “Standard Terms and Conditions for Consulting Services for Infrastructure & Industry Business (Swiss Law)"[1] and/or
- for other services the "International Terms & Conditions for Services"[1] supplemented by "Software Licensing Conditions"[1] and/or
- for other products the "International Terms & Conditions for Products"[1] supplemented by "Software Licensing Conditions"[1]

1.3 For customers with master or framework agreement

To the extent products offered are covered by an existing master or framework agreement, the terms and conditions of that agreement shall apply instead of T&C.

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. The metal factor, provided it is relevant, can be found in the respective product description.

You will find a detailed explanation of the metal factor on the page headed "Metal surcharges".

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.

[1] The text of the Terms and Conditions of Siemens AG can be downloaded at https://mall.industry.siemens.com/legal/ww/en/terms_of_trade_en.pdf

Conditions of sale and delivery

4. Export Control and Sanctions Compliance

4.1 General

Customer shall comply with all applicable sanctions, embargoes and (re-)export control laws and regulations, and, in any event, with those of the European Union, the United States of America and any locally applicable jurisdiction (collectively “Export Regulations”).

4.2 Checks for Products

Prior to any transaction by customer concerning products (including hardware, documentation and technology) delivered by Siemens, or products (including maintenance and technical support) performed by Siemens with a third party, customer shall check and certify by appropriate measures that

- (i) the customer’s use, transfer, or distribution of such products, the brokering of contracts or the provision of other economic resources in connection with products will not be in violation of any Export Regulations, also taking into account any prohibitions to circumvent these (e.g., by undue diversion)
- (ii) the products are not intended or provided for prohibited or unauthorized non-civilian purposes (e.g. armaments, nuclear technology, weapons, or any other usage in the field of defense and military);
- (iii) customer has screened all direct and indirect parties involved in the receipt, use, transfer, or distribution of the products against all applicable restricted party lists of the Export Regulations concerning trading with entities, persons and organizations listed therein and
- (iv) products within the scope of items-related restrictions, as specified in the respective annexes to the Export Regulations, will not, unless permitted by the Export Regulations, be
  (a) exported, directly or indirectly (e.g., via Eurasian Economic Union (EAEU) countries), to Russia or Belarus, or
  (b) resold to any third party business partner that does not take a prior commitment not to export such products to Russia or Belarus.

4.3 Non-Acceptable Use of Software and Cloud Services

Customer shall not, unless permitted by the Export Regulations or respective governmental licenses or approvals,

(i) download, install, access or use the products from or in any location prohibited by or subject to comprehensive sanctions or subject or to license requirements according to the Export Regulations;
(ii) grant access to, transfer, (re-)export (including any "deemed (re-)exports"), or otherwise make available the products to any entity, person, or organization identified on a restricted party list of the Export Regulations;
(iii) use the products for any purpose prohibited by the Export Regulations (e.g. use in connection with armaments, nuclear technology or weapons);
(iv) upload to a products platform any customer content unless it is non-controlled (e.g. in the EU: AL = N;
in the U.S.: ECCN = N or EAR99);
(v) facilitate any of the afore mentioned activities by any user.
Customer shall provide all users with all information necessary to ensure compliance with the Export Regulations.

4.4 Semiconductor Development

Customer will not, without advance written authorization from Siemens, use offerings for the development or production of integrated circuits at any semiconductor fabrication facility located in China meeting the criteria specified in the U.S. Export Administration Regulations, 15 C.F.R. 744.23.

4.5 Information

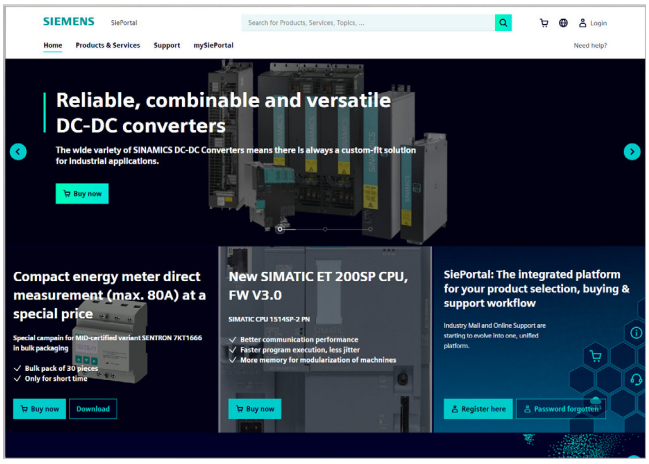
Upon request by Siemens, customer shall promptly provide Siemens with all information pertaining to users, the intended use and the location of use or the final destination (in the case of hardware, documentation and technology) of the products. Customer will notify Siemens prior to customer disclosing any information to Siemens that is defense-related or requires controlled or special data handling pursuant to applicable government regulations, and will use the disclosure tools and methods specified by Siemens.

4.6 Reservation

Siemens shall not be obligated to fulfill this agreement if such fulfillment is prevented by any impediments arising out of national or international foreign trade or customs requirements or any embargoes or other sanctions. Customer acknowledges that Siemens may be obliged under the Export Regulations to limit or suspend access by customer and/or users to products.

5. Miscellaneous

Errors excepted and subject to change without prior notice.



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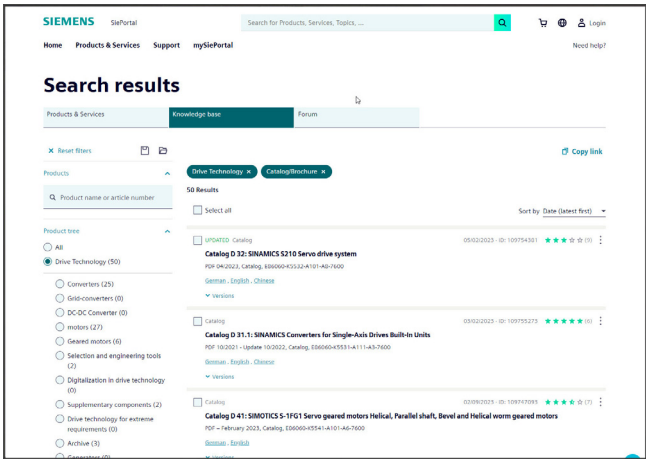

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Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit
www.siemens.com/cybersecurity-industry

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under
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