SINAMICS G130 Drive Converter Chassis Units
SINAMICS G150 Drive Converter Cabinet Units

Catalog D 11 · 2008

SINAMICS Drives

SIEMENS

Related catalogs

SINAMICS G110, SINAMICS G120 D 11.1
Inverter Chassis Units
SINAMICS G120D
Distributed Frequency Inverters

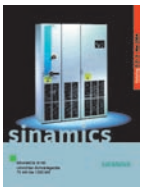
E86060-K5511-A111-A5-7600

Motion Control PM 21
SIMOTION, SINAMICS S120 and Motors for Production Machines

E86060-K4921-A101-A1-7600

SINAMICS S150 D 21.3
Drive Converter Cabinet Units
75 kW to 1200 kW

E86060-K5521-A131-A1-7600



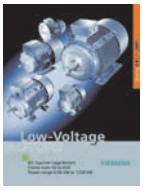
SIMOVERT MASTERDRIVES VC DA 65.10
Single-Motor and Multi-Motor Drives
0.55 kW to 2300 kW

E86060-K5165-A101-A3-7600

Low-Voltage Controls and Distribution LV 1
SIRIUS · SENTRON · SIVACON
E86060-K1002-A101-A7-7600
Technical Information LV 1 T
is supplied on CD with Catalog LV 1

Low-Voltage Motors D 81.1
IEC Squirrel-Cage Motors
Frame sizes 56 to 450

E86060-K5581-A111-A2-7600
E86060-K5581-A121-A2 -7600 (News)



SINAMICS GM150/SINAMICS SM150 D 12
Medium-Voltage Converters
0.8 MVA to 28 MVA

E86060-K5512-A101-A1-7600

Catalog CA 01 CA 01
The Offline Mall of Automation and Drives

CD-ROM: E86060-D4001-A110-C6-7600
DVD: E86060-D4001-A510-C6-7600

A&D Mall

Internet:
www.siemens.com/automation/mall

The Engineering Manual

Engineering Manual SINAMICS Low Voltage

Engineering Manual SINAMICS G130, G150, S120 Chassis, S120 Cabinet Modules, S150

The engineering manual is divided into the following chapters:

Fundamental Principles and System Description
- General Engineering Information for SINAMICS
- Converter Chassis Units SINAMICS G130
- Converter Cabinet Units SINAMICS G150
- SINAMICS S120 Built-in and Cabinet Modules
- Converter Cabinet Units SINAMICS S150
- Drive Dimensioning
- Motors
- Dimensional Drawings

This manual offers users comprehensive support with the configuring of drives and associated system components.

The first two chapters deal mainly with the fundamental physical principles of variable-speed drives and include general system descriptions and planning information which relate to all products in the SINAMICS range.
The other chapters then discuss in detail questions relating to the dimensioning of drives with converters of specific types as well as the selection of suitable motors.
The final chapter contains the dimensional drawings for equipment included in the manual.

The Engineering Manual SINAMICS Low Voltage is stored as a PDF file under "Supplementary information" on the CD-ROM supplied with the catalog.
The manual is available in English and German.

Note:
The manual is not available in hard copy form, but only as an electronic file in PDF format.

SINAMICS Drives

SINAMICS G130
Drive Converter Chassis Units
SINAMICS G150
Drive Converter Cabinet Units

Catalog D 11 · 2008

The products and systems described in this catalog are manufactured/distributed under application of a certified quality management system in accordance with DIN EN ISO 9001 and DIN EN ISO 14001 (Certified Registration No. 002241 QM UM). The certificate is recognized by all IQNet countries.

Supersedes:
Catalog D 11 · 2006

The products contained in this catalog can also be found in the electronic catalog CA 01.
Order No.:
E86060-D4001-A110-C6-7600 (CD-ROM)
E86060-D4001-A510-C6-7600 (DVD)

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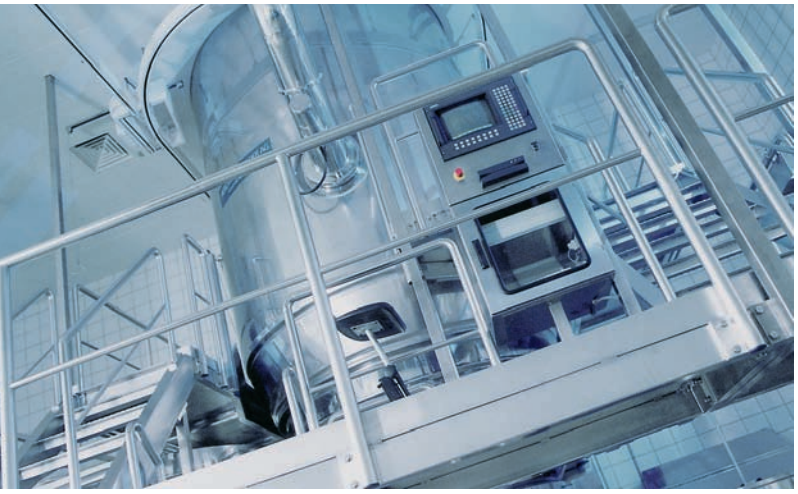
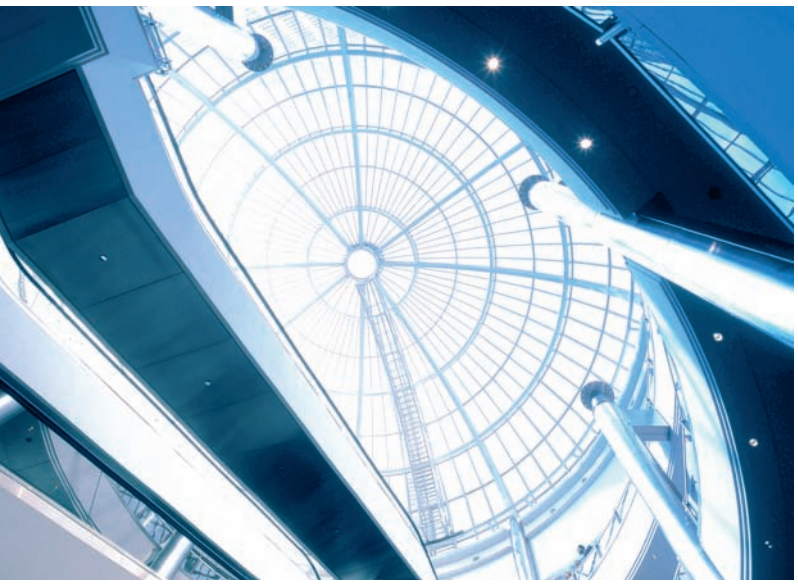
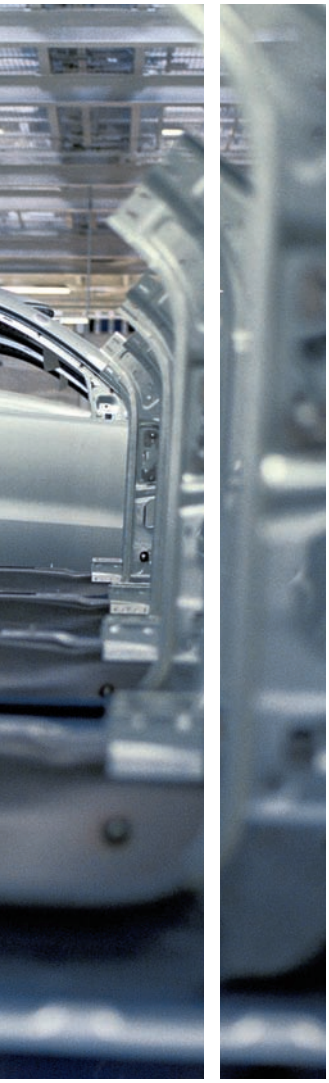






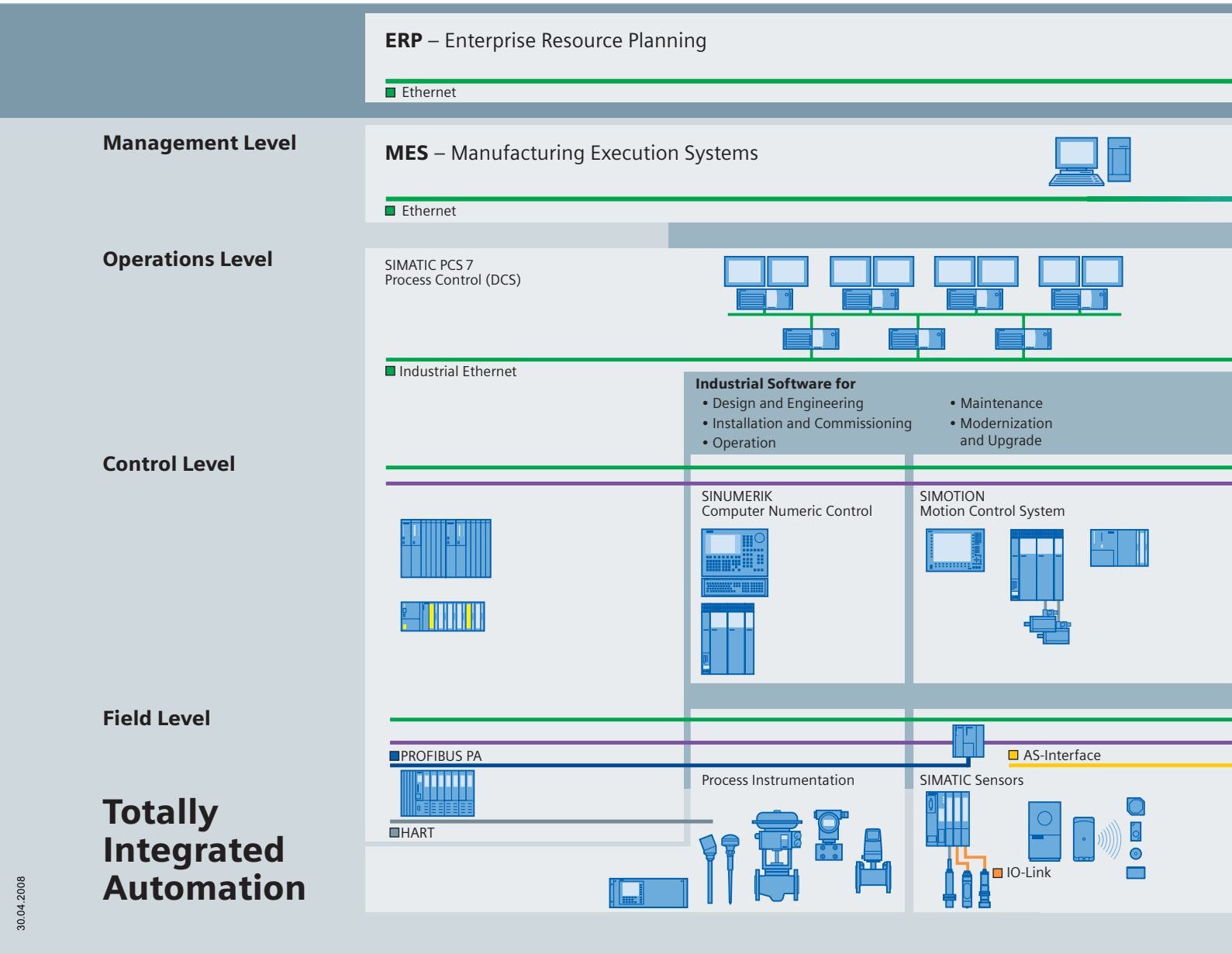
Answers for Industry.

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

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

The high quality of our products sets industry-wide benchmarks. High environmental aims are part of our eco-management, and we implement these aims consistently. Right from product design, possible effects on the environment are examined. Hence many of our products and systems are RoHS compliant (Restriction of Hazardous Substances). As a matter of course, our production sites are certified according to DIN EN ISO 14001, but to us, environmental protection also means most efficient utilization of valuable resources. The best example are our energy-efficient drives with energy savings up to 60 %.

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



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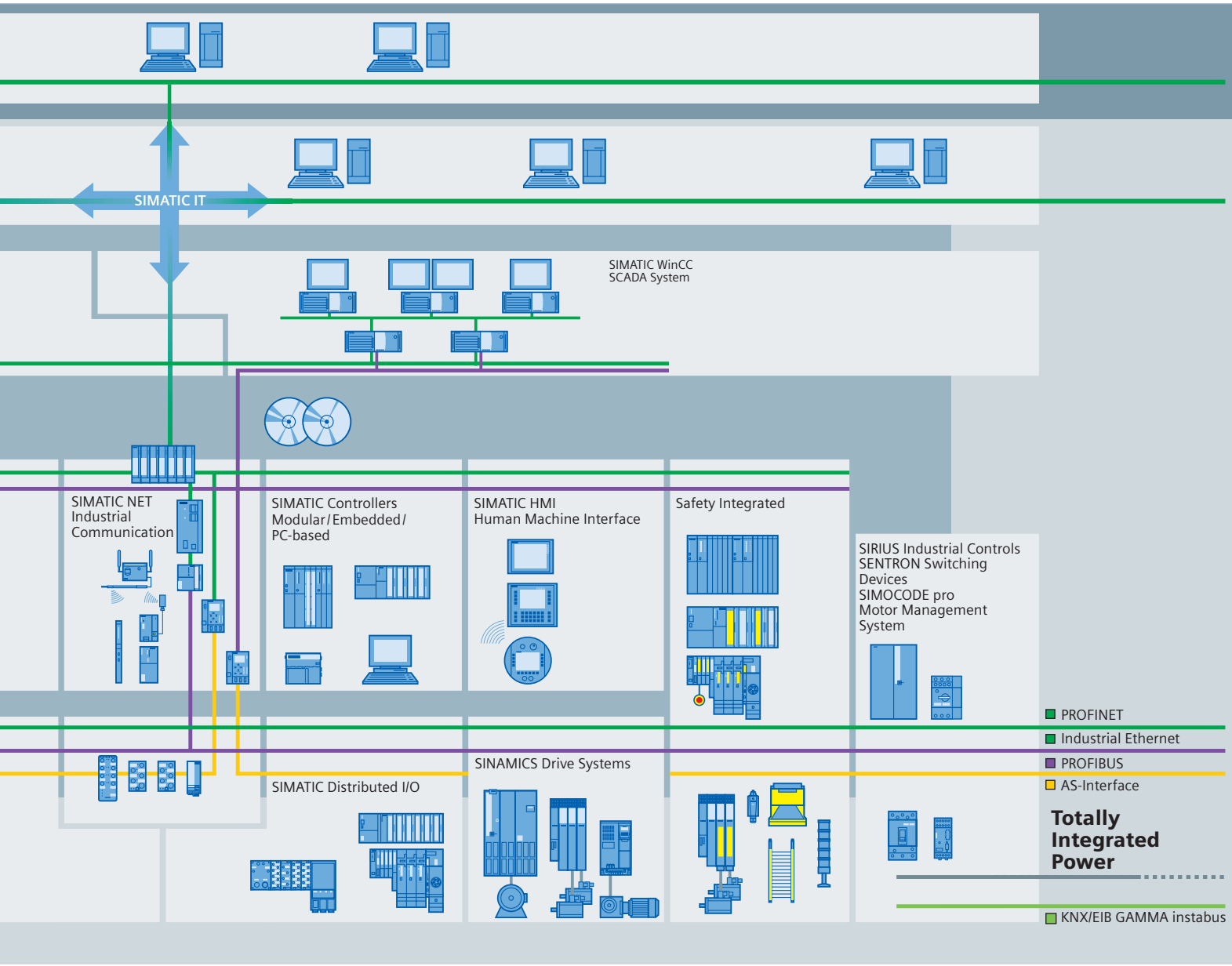
Setting standards in productivity and competitiveness.

Totally Integrated Automation.

Thanks to Totally Integrated Automation, Siemens is the only provider of an integrated basis for implementation of customized automation solutions – in all industries from inbound to outbound.



TIA is characterized by its unique continuity.

It provides maximum transparency at all levels with reduced interfacing requirements – covering the field level, production control level, up to the corporate management level. With TIA you also profit throughout the complete life cycle of your plant – starting with the initial planning steps through operation up to modernization, where we offer a high measure of investment security resulting from continuity in the further development of our products and from reducing the number of interfaces to a minimum.

The unique continuity is already a defined characteristic at the development stage of our products and systems.

The result: maximum interoperability – covering the controller, HMI, drives, up to the process control system. This reduces the complexity of the automation solution in your plant. You will experience this, for example, in the engineering phase of the automation solution in the form of reduced time requirements and cost, or during operation using the continuous diagnostics facilities of Totally Integrated Automation for increasing the availability of your plant.

Introduction

Introduction

Introduction

The SINAMICS drive family

Application of the SINAMICS range

Application

SINAMICS is the new family of Siemens drives designed for machine and plant engineering applications. SINAMICS offers solutions for all drive tasks:

- Simple pump and fan applications in the process industry
- Applied single drives in centrifuges, presses, extruders, elevators, as well as conveyor and transport systems
- Drive line-ups in textile, plastic film and paper machines, as well as in rolling mill plants
- Highly dynamic servo drives for machine tools, as well as packaging and printing machines

Versions

Depending on the application, the SINAMICS range offers the ideal version for any drive task.

- SINAMICS G is designed for standard applications with induction motors. These applications have less stringent requirements regarding the dynamics and accuracy of the motor speed.
- SINAMICS S handles complex drive tasks with synchronous/induction motors and fulfills stringent requirements regarding
  - dynamics and accuracy,
  - integration of extensive technological functions in the drive control system.

Platform concept and Totally Integrated Automation

All SINAMICS versions are based on a platform concept. Joint hardware and software components, as well as standardized tools for design, configuration and commissioning tasks, ensure high-level integration across all components. SINAMICS handles a wide variety of drive tasks without system gaps. The different SINAMICS versions can be easily combined with each other.

SINAMICS is part of the Siemens "Totally Integrated Automation" concept. Integrated SINAMICS systems covering configuration, data storage, and communication at automation level ensure low-maintenance solutions with the SIMOTION, SINUMERIK and SIMATIC control systems.

SINAMICS as part of the Siemens modular automation system

Quality in accordance with DIN EN ISO 9001

SINAMICS conforms with the most exacting quality requirements. Comprehensive quality assurance measures in all development and production processes ensure a consistently high level of quality.

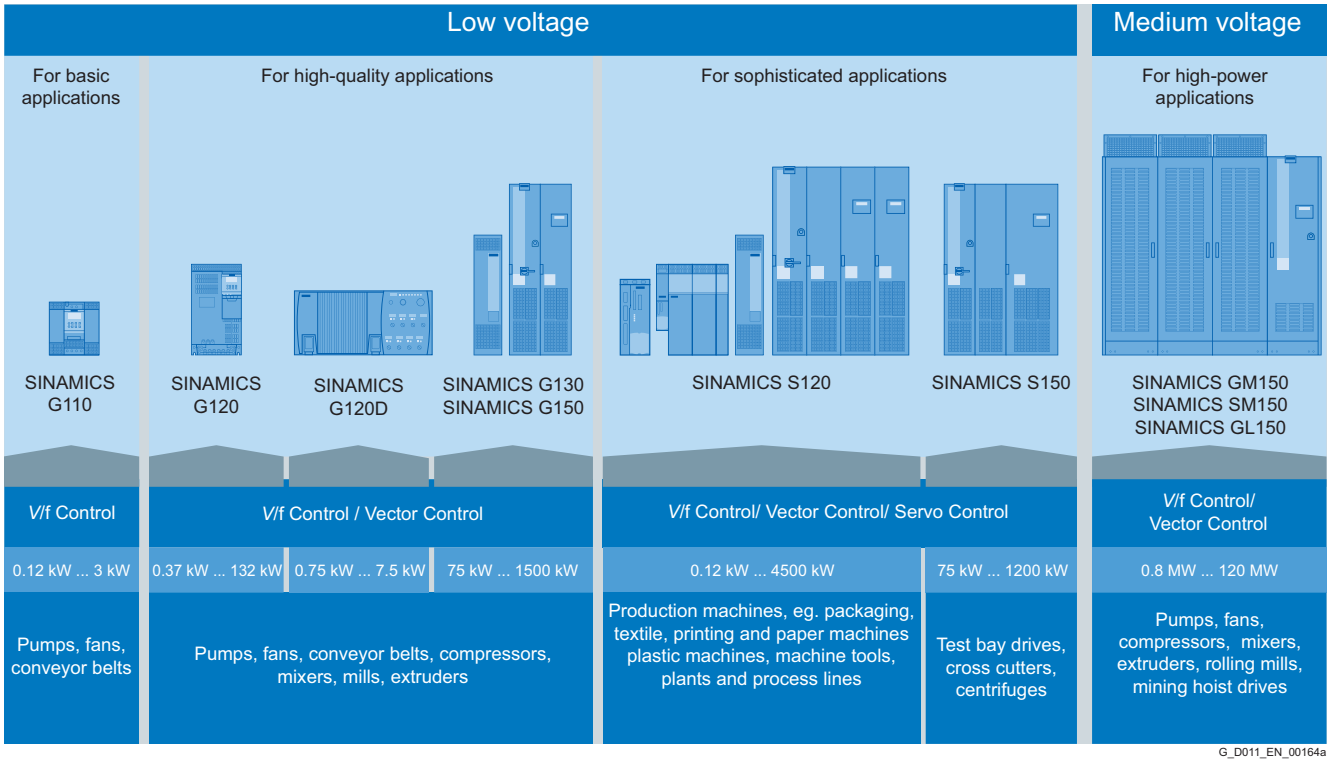
Of course, our quality assurance system is certified by an independent authority in accordance with DIN EN ISO 9001.

Suitable for global use

SINAMICS meets the requirements of relevant international standards and regulations – from the EN standards through IEC standards to UL and cULus regulations.

Introduction

The SINAMICS drive family



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Tailored to the respective areas of application, the SINAMICS range encompasses the following products:

Low-voltage converters / inverters (line supply < 1000 V)

- **SINAMICS G110** – the versatile drive for low power ranges
- **SINAMICS G120** – the modular single drive for low to medium power ranges
- **SINAMICS G120D** – the distributed single drive providing a high degree of protection for installation without a control cabinet
- **SINAMICS G130** and **SINAMICS G150** – the universal drive solution for high-performance single drives
- **SINAMICS S120** – the flexible, modular drive system for sophisticated drive tasks
- **SINAMICS S150** – the sophisticated drive solution for high-performance single drives

Medium-voltage converters (line supply > 1000 V)

- **SINAMICS GM150** – the universal drive solution for single drives
- **SINAMICS SM150** – the sophisticated drive solution for single and multi-motor drives
- **SINAMICS GL150** – the drive solution for synchronous machines up to 100 MW

The SINAMICS range is characterized by the following system properties:

- Uniform functionality based on a platform concept
- Uniform engineering
- High degree of flexibility and combination
- Wide range of performance
- Designed for global use
- SINAMICS Safety Integrated
- Greater efficiency and effectiveness
- Versatile interfacing facilities to host controllers
- Totally Integrated Automation

The members of the SINAMICS drive family

SINAMICS low-voltage converters / inverters

SINAMICS G110	SINAMICS G120	SINAMICS G120D
		
The versatile drive for low power ranges	*The modular single drive for low to medium power ranges*	*The distributed single drive providing a high degree of protection for installation without a control cabinet*
Main applications		
• Machines and systems for industrial and commercial applications	• Machines and systems for industrial and commercial applications (mechanical engineering, automotive, textiles, chemicals, printing, steel)	• Conveyor drive applications in the industrial environment, main focus on the automotive industry; also suitable for high-performance applications, e. g. at airports and in the food, beverages and tobacco industry (dry areas)
Application examples		
• Pumps and fans • Auxiliary drives • Conveyor systems • Advertisement panels • Door/gate operating mechanisms • Centrifuges	• Pumps and fans • Compressors • Conveyor systems	• Conveyor systems • Electric overhead-conveyor systems in distribution logistics
Highlights		
• Compact • Flexible adaptation to different applications • Simple, fast commissioning • Clear terminal layout • Optimum interaction with SIMATIC and LOGO!	• Modular • Flexible expansion capability • Simple, fast commissioning • Regenerative feedback • Innovative cooling concept • Optimum interaction with SIMOTION and SIMATIC • SINAMICS Safety Integrated	• Flat design with uniform drill dimensions (constant footprint) in IP65 degree of protection • Modular • Flexible expansion capability • Simple, fast commissioning • Regenerative feedback • Optimum interaction with SIMOTION and SIMATIC • SINAMICS Safety Integrated
Catalog D 11.1	**Catalog D 11.1**	**Catalog D 11.1**

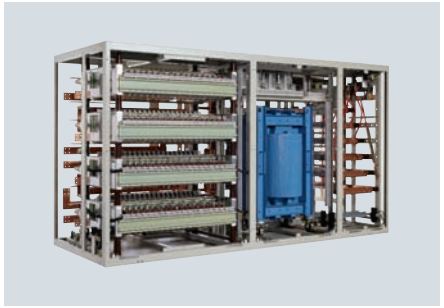
Introduction

The members of the SINAMICS drive family

SINAMICS low-voltage converters / inverters

SINAMICS G130/SINAMICS G150	SINAMICS S120	SINAMICS S150
		
The universal drive solution for high-performance single drives without regenerative feedback	*The flexible, modular drive system for sophisticated drive tasks*	*The sophisticated drive solution for high-performance single drives*
Main applications		
• Machines and systems in the process and production industry, water/waste, power stations, oil and gas, petrochemicals, chemical raw materials, paper, cement, stone, steel	• Machines and systems for industrial applications (packaging, plastics, textiles, printing, wood, glass, ceramics, presses, paper, lifting equipment, semiconductors, automated assembly and testing equipment, handling, machine tools)	• Machines and systems in the process and production industry, food, beverages and tobacco, automotive and steel industry, mining/open-cast mining, shipbuilding, lifting equipment, conveyor systems
Application examples		
• Pumps and fans • Compressors • Extruders and mixers • Mills	• Motion control applications (positioning, synchronous operation) • Numerical control, interpolating motion control • Converting • Technological applications	• Test bay drives • Centrifuges • Elevators and cranes • Cross cutters and shears • Conveyor belts • Presses • Cable winches
Highlights		
• Space-saving • Low-noise • Simple, fast commissioning • SINAMICS G130: modular components • SINAMICS G150: ready-to-connect cabinet unit • Optimum interaction with SIMATIC • SINAMICS Safety Integrated	• For universal use • Flexible and modular • Scalable in terms of power, function, number of axes, performance • Simple, fast commissioning, auto-configuration • Innovative, futureproof system architecture • Graded infeed/regenerative feedback concepts • Wide range of motors • Optimum interaction with SIMOTION, SIMATIC and SINUMERIK • SINAMICS Safety Integrated	• Four-quadrant operation as standard • High control accuracy and dynamic response • Almost no system perturbation, considerably lower than the IEEE 519 THD limits • Tolerant to fluctuations in line voltage • Option of reactive power compensation • Simple, fast commissioning • Ready-to-connect cabinet unit • Optimum interaction with SIMATIC • SINAMICS Safety Integrated
Catalog D 11	**Catalog PM 21, D 21.3**	**Catalog D 21.3**

The members of the SINAMICS drive family

SINAMICS medium-voltage converters		
SINAMICS GM150	**SINAMICS SM150**	**SINAMICS GL150**
		
The universal drive solution for variable-speed single drives	*The drive solution for high-performance variable-speed single- and multi-motor drives*	*The drive solution for synchronous machines up to 100 MW*
Main applications		
• Machines and systems in the process industry	• Machines and systems, e.g. in the steel and mining industry	• Machines and systems in the process industry, especially in the oil, gas and petrochemicals sectors
Application examples		
• Pumps and fans • Compressors • Extruders and mixers • Mills • Marine drives	• Roller mills • Conveyor baskets • Test bay drives • Conveyor belts	• Compressors • Pumps and fans • Extruders and mixers • Marine drives • Blast furnace blowers
Highlights		
• Space-saving • Simple, fast commissioning • Ready-to-connect cabinet unit • Optimum interaction with SIMATIC	• Four-quadrant operation as standard • High efficiency and minimum load on the motor • High control accuracy and dynamic response • Almost no system perturbation • Option of reactive power compensation • Simple, fast commissioning • Ready-to-connect cabinet unit • Optimum interaction with SIMATIC	• Compact design and high power density • Easy operation and monitoring • Extremely reliable in operation and almost maintenance-free • Fully digital closed-loop transvector control • Two directions of rotation through reversal of rotating field • Capable of seamless integration into higher-level automation systems
Catalog D 12	**Catalog D 12**	**--------**

The versatile drive for low power ranges

Overview

SINAMICS G110 drive inverter chassis units are inverters for the whole range of industrial variable-speed drive applications. The particularly compact SINAMICS G110 inverter works with voltage/frequency control (*V/f*) and is the ideal inverter solution in the lower power and performance ranges of the SINAMICS product family.

The inverter is available in three frame sizes and covers a power range from 0.12 kW to 3.0 kW for connection to single-phase supplies of 200 V to 240 V.

Benefits

- Flexible use due to comprehensive parameterization facilities and various interfaces (analog and USS versions)
- Simple installation, parameterization and commissioning
- Powerful diagnostic facilities with optional operator panel
- Fast standard commissioning by copying parameters using the optional operator panel
- Low-noise motor operation resulting from high pulse frequency
- Low mechanical wear through
  - skipped frequency band in case of resonance
  - parameterizable ramp-up/ramp-down times
  - ramp smoothing and
  - connection of the inverter to the rotating motor (flying restart)
- Increase in plant availability as a result of automatic restarting following a power failure or stoppage
- Fast current limitation for fault-free operation in the event of sudden load surges
- Versions with integral EMC filters for industrial and public supplies
- DIP switches for quickly adapting to 50 Hz or 60 Hz applications
- DIP switches for simple bus termination for the USS version (RS485)
- 2/3-wire method (static/pulsed signals) for universal control via digital inputs

Application

The SINAMICS G110 is particularly suitable

- for use as a drive in industrial and commercial applications
- in many different sectors, e.g., food, textile, packaging
- in conveyor system applications
- for applications using pumps and fans
- for factory gate/garage door operating mechanisms and barrier openers
- as a drive for changing billboards.

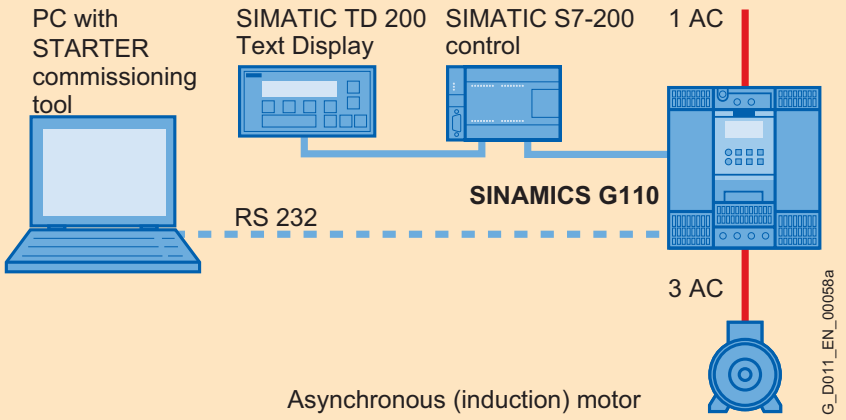
Design

SINAMICS G110 inverters are compact units that are ready to connect. All units contain state-of-the-art IGBT technology in the power unit as well as digital microprocessor technology. SINAMICS G110 inverters are quick to install and easy to connect.

The SINAMICS G110 is available with an analog input or an RS485 communications interface (USS). The digital inputs can be programmed as required, and thus can be adapted flexibly to a wide range of applications. A version with a rib-free heat sink is particularly suitable for installation in flat control cabinets.

The SINAMICS G110 is programmed either from a PC using the STARTER commissioning tool or using an optional Basic Operator Panel. For a standard commissioning of several inverters with the same parameters, the entered settings can be saved in the operator panel and can be easily transferred to each further inverter.

Integration



SINAMICS G110 configuration example (USS version together with SIMATIC S7-200, connection between PC and inverter using optional PC connection kit)

Technical specifications

Electrical data	
Line voltages; power ranges	200 … 240 V 1 AC, ±10 %; 0.12 … 3.0 kW
Supply systems	IT, TN, TT
Line frequency	50/60 Hz
Output frequency	0 … 650 Hz
Control methods	*V/f* control, linear (*M*~*n*) *V/f* control, quadratic (*M*~n^2) *V/f* control, parameterizable
Fixed frequencies	3, parameterizable
Skipped frequency ranges	1, parameterizable
Digital inputs	3 parameterizable 24 V DC digital inputs
Analog input (for analog version)	1 analog input for setpoints from 0 ... 10 V, scalable or for use as 4th digital input
Digital output	1 24 V DC digital output
Communication interface (for USS version)	RS485 serial interface for use with USS protocol

Functions	
Software functions	• Automatic restart following interruptions in operation due to a power failure • Smooth connection of the inverter to the rotating motor • Parameterizable ramp-up/ramp-down times • Ramp smoothing
Protection functions	• Undervoltage • Overvoltage • Ground fault • Short-circuit • Stall prevention • Thermal motor protection I^2t • Inverter overtemperature • Motor overtemperature
Suitable motors	Induction motors
Mechanical data	
Degree of protection	IP20
Cooling method	
• Inverters ≤ 0.75 kW	Convection cooling, version with flat heat sink
• Inverters > 0.75 kW	Internal air cooling (integral fan)
Standards	
Compliance with standards	CE, UL, cUL, c-tick

The modular single drive for low to medium power ranges

Overview

The new SINAMICS G120 inverter has a modular structure (Power Module with Control Unit and BOP) and features numerous innovative functions (e.g. Safety Integrated) as well as communication capability and regenerative feedback capability. With different device versions (frame sizes FSA to FSF) in a power range of 0.37 kW to 90 kW, it is suitable for a wide variety of drive solutions.

Benefits

- Flexibility thanks to its modular structure. For a futureproof drive concept – each new innovation can be integrated in one single system
- The safety functions make it easier for drives to be constructed in safety-oriented, integrated automation and drive environments
- Capable of communication via PROFIBUS
- Innovative cooling concept and paint finish on the electronic modules increase robustness (longer service life)
- Engineering and commissioning with familiar tools, i.e. SIZER and STARTER
- Simple device replacement and parameter cloning with optional, pre-installed MMC card
- Low-noise motor operation resulting from high pulse frequency
- Compact, small design
- With globally recognized certification: UL and CE, Safety Integrated (IEC 61508/SIL2)

Application

SINAMICS G120 is particularly suitable

- as a universal drive in all industrial and commercial applications
- in the automotive, textiles, printing and chemical industries
- for end-to-end applications, e.g. in conveyor systems

Design

The SINAMICS G120 is a modular inverter for standard drives. Each SINAMICS G120 comprises two operative units – the Power Module (PM) and a Control Unit (CU). The BOP (Basic Operator Panel) or the STARTER commissioning software (via the interface) can be used to parameterize, operate and monitor the system.

Different Control Units and Power Modules can be combined to create drive solutions optimized to suit individual applications and budgets. All Power Modules are suitable for use in safety applications.

In conjunction with a Safety Control Unit, the drive can be turned into a Safety Integrated drive. This features a fail-safe closed-loop control function for induction motors in different control modes (*V/f*, FCC, Vector Control with and without sensor).

Technical specifications

Electrical data	
Line voltages; power ranges	380 … 480 V 3 AC, ±10 %; 0.37 … 90 kW
Supply systems	IT, TN, TT
Line frequency	50/60 Hz
Output frequency	0 … 650 Hz
Control methods	• *V/f* control, linear (*M*~*n*) • *V/f* control, quadratic (*M*~n^2) • *V/f* control, parameterizable • Sensorless Vector Control • Vector Control with sensor (closed control loop) • Torque control
Fixed frequencies	16, parameterizable
Digital inputs	Up to 9 digital inputs depending on Control Unit; with fail-safe variants 2 fail-safe digital inputs, 24 V DC
Analog input (for analog version)	2 analog inputs, scalable from 0 ... 10 V
Digital output	3 digital outputs
Communication interfaces	• RS485/USS (CU240S/CU240E – both available soon) • PROFIBUS (CU240S DP) • PROFIsafe (CU240S DP-F) • PROFINET (CU240S PN – available soon)

Functions	
Software functions	• Torque control, flying restart, slip compensation, automatic restart following interruptions in operation due to a power failure, free function blocks for logic and arithmetic operations • Signal interconnection with BICO technology • Kinetic buffering positioning deceleration ramp • High-quality internal PID controller for simple process control • Parameterizable ramp-up times from 0 ... 650 s, ramp smoothing • Compound braking for controlled rapid braking • 3 selectable motor data sets
Protection functions	• Undervoltage • Overvoltage • Ground fault • Stall prevention • Thermal motor protection I^2t • Inverter overtemperature • Motor overtemperature
Safety Integrated function	Yes
Connectable motors	Induction motors
Mechanical data	
Degree of protection	IP20
Cooling method	Innovative cooling concept; the power electronics are cooled by means of heat dissipation with an external fan; open-loop and closed-loop control electronics are cooled by convection
Standards	
Compliance with standards	CE, UL, cUL, c-tick, Safety Integrated IEC 61508/SIL2

The universal drive solution for high-performance single drives

Overview

SINAMICS G130 drive converter chassis units and SINAMICS G150 drive converter cabinet units are designed for variable-speed drives in machine building and plant construction.

They have been specially tuned to the requirements of drives with quadratic and constant load characteristics, with medium performance requirements and without regenerative feedback.

The control accuracy of the sensorless Vector Control is suitable for most applications, and additional actual speed value encoders are therefore superfluous.

However, the SINAMICS G130/SINAMICS G150 converters are optionally available with an encoder evaluator in order to handle applications that require an encoder for plant-specific reasons.

The SINAMICS G130 and SINAMICS G150 offer an economic drive solution that can be matched to customers' specific requirements by adding from the wide range of available components and options.

Benefits

- Particularly quiet and compact converters due to the use of state-of-the-art IGBT power semiconductors and an innovative cooling concept
- All unit modules are easily accessible, making them extremely service-friendly
- Can be easily integrated into automation solutions due to a standard communications interface and various analog and digital interfaces
- Increase in plant availability since individual modules and power components can be replaced quickly and easily
- Easy commissioning and parameterization using interactive menus on the user-friendly AOP30 Advanced Operator Panel with graphical LCD and plain-text display. Alternatively, the drive can be commissioned from a PC using the STARTER commissioning tool (→ Tools and configuration)

Application

Variable-speed drives are advantageous for all applications that involve moving, conveying, pumping or compressing solids, liquids or gases.

This means the following applications, in particular:

- Pumps and fans
- Compressors
- Extruders and mixers
- Mills

Design

SINAMICS G130

The SINAMICS G130 provides machine builders and plant constructors with a modular drive system that can be tailored to specific applications.

SINAMICS G130 consists of two modular, stand-alone components:

- Power Module and
- Control Unit

They may be located separately from one another or combined in a single unit. The Power Module contains a slot for the Control Unit.

The user-friendly AOP30 Advanced Operator Panel and the STARTER commissioning tool can be used for commissioning and local operation.

Predefined interfaces, via terminal block or PROFIBUS, make commissioning and control of the drive much easier. The Control Unit interfaces can be supplemented with add-on modules.

SINAMICS G150

SINAMICS G150 are ready-to-connect converters in the standard control cabinet.

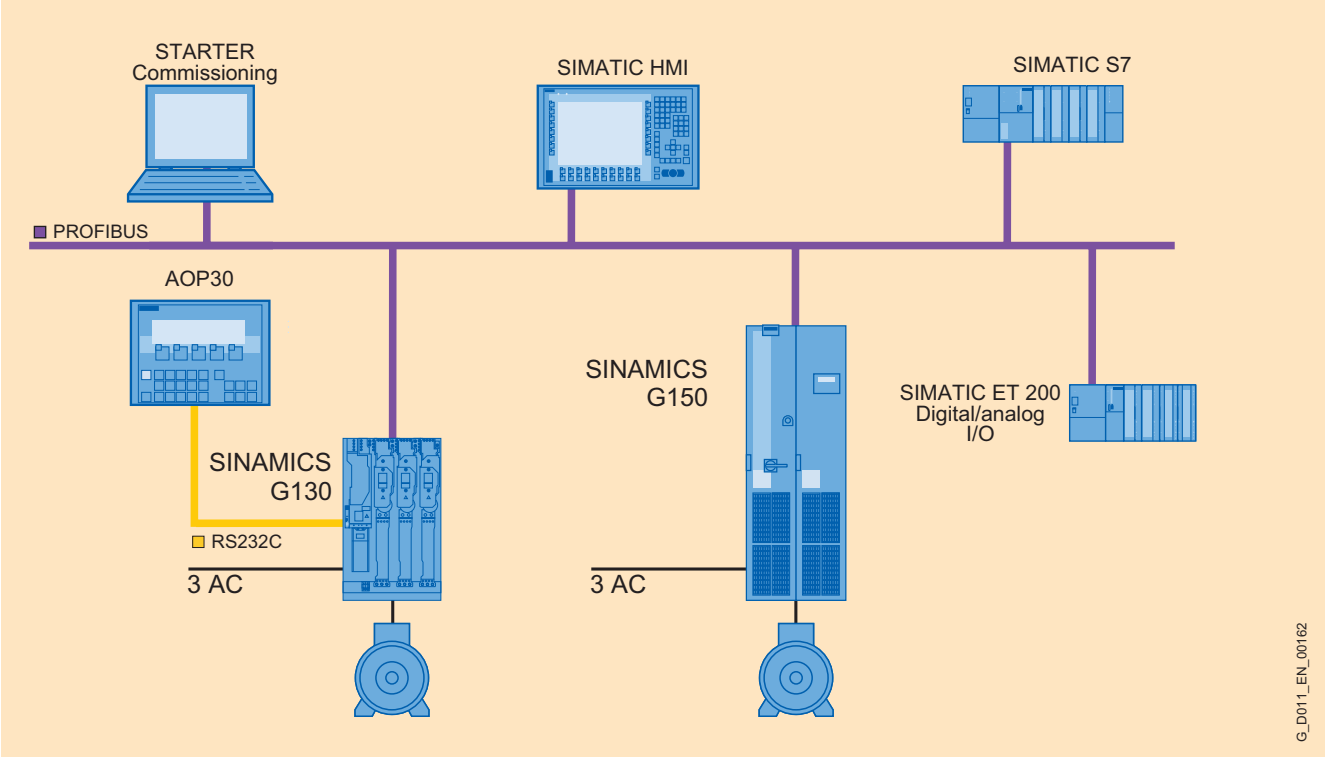
They can be matched to individual requirements by selecting from an extensive range of options.

Available with cabinet widths from 400 mm upwards in intervals of 200 mm, with various degrees of protection up to IP54 and two design versions.

- *Version A*
  offers sufficient space for all the options available.
  The different variants allow the power and motor supply to be arranged at the top or bottom, as required, which in turn offers excellent flexibility in terms of location in the plant. This version is additionally available with power units connected in parallel.
- *Version C*
  is a particularly space-saving version envisaged for applications where the power supply components are accommodated in a central low-voltage distribution unit and need not be provided again in the control cabinet.

The user-friendly AOP30 Advanced Operator Panel is fitted as standard in the cabinet door for both versions.

Integration

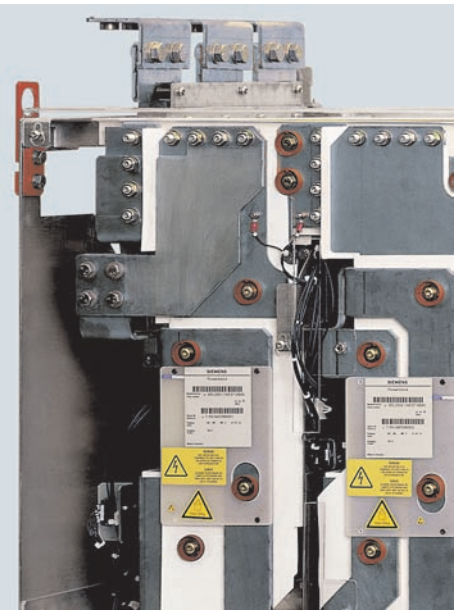


Configuration example for SINAMICS G130 and SINAMICS G150 with SIMATIC S7

Introduction

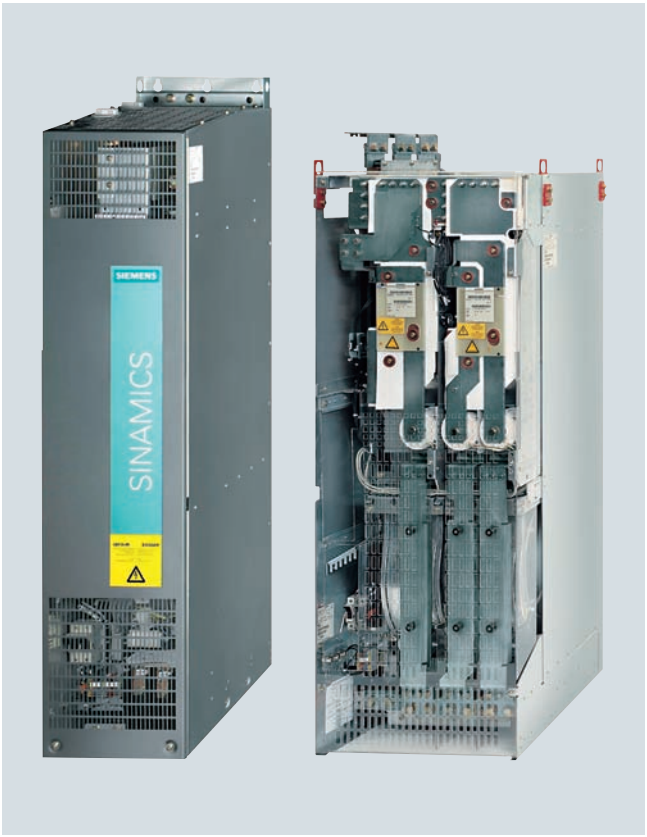
SINAMICS G130
Drive converter chassis units

2



SINAMICS G130 chassis units

Overview



SINAMICS G130 drive converter chassis units in frame sizes FX + HX

The SINAMICS G130 is a converter that can be combined very flexibly with the associated system components and integrated into customer-specific control cabinets or directly into machines.

The SINAMICS G130 drive converter chassis units are available for the following voltages and power ranges:

Line voltage	Power
380 ... 480 V 3 AC	110 ... 560 kW
500 ... 600 V 3 AC	110 ... 560 kW
660 ... 690 V 3 AC	75 ... 800 kW

A wide range of add-on electrical components allow the drive system to be optimized for specific requirements. Configuration and commissioning are greatly simplified by predefined interfaces.

The control accuracy of the sensorless Vector Control is suitable for most applications, and additional actual speed value encoders are therefore superfluous.

However, encoder evaluator modules are available for the SINAMICS G130 converters to handle applications that require an encoder for plant-specific reasons.

Communication between the Control Unit, the Power Module and other active SINAMICS components takes place via DRIVE-CLiQ, the drive's internal interface. The DRIVE-CLiQ connections, which are available as pre-assembled cables of different lengths, allow a complete converter system to be put together quickly.

A communications interface is provided as standard to communicate with the control system. There is also the option to expand the interface using digital and analog inputs and outputs. The TM31 Terminal Module and TB30 Terminal Board are available for this. Additional expansion cards can also be installed to allow communication via PROFINET and the CAN protocol.

Benefits

- Particularly quiet and compact converters due to the use of state-of-the-art IGBT power semiconductors and an innovative cooling concept
- Increase in plant availability since individual modules and power components can be replaced quickly and easily. The design of replaceable components is based on the principle that they must be quick and easy to change. In addition, the "SparesOnWeb" Internet tool makes it easy to view the spare parts that are available for the system components ordered.
- Can be easily integrated into automation solutions due to a standard communications interface and various analog and digital interfaces.
- Easy commissioning and parameterization using interactive menus on the user-friendly AOP30 Advanced Operator Panel with graphical LCD and plain-text display, or from a PC using the STARTER commissioning tool (→ Tools and configuration)
- Preset software functions make it easier to tailor the converter to the individual plant
- All components, from individual parts to the ready-to-connect cabinet, undergo rigorous testing throughout the entire production process. This guarantees a high level of functional reliability during installation and commissioning, as well as in operation.

Application

Variable-speed drives are advantageous for all applications that involve moving, conveying, pumping or compressing solids, liquids or gases.

This means the following applications, in particular:

- Pumps and fans
- Compressors
- Extruders and mixers
- Mills

Documentation

The device documentation consists of detailed operating instructions with the following sections:

- Description
- Installation instructions
- Commissioning guide
- Function description
- Maintenance instructions
- Spare parts list

as well as equipment-specific dimensional drawings, arrangement diagrams, circuit and terminal diagrams.

The documentation is supplied as standard with the CU Kit on CD-ROM. The documentation is available in English, French, German, Italian and Spanish.

Design

The SINAMICS G130 drive converter chassis unit provides machine builders and plant constructors with a modular drive system that can be tailored to specific applications.

SINAMICS G130 drive converter chassis units consist of two modular, stand-alone components:

- Power Module and
- Control Unit

They may be located separately from one another or combined in a single unit. The Power Module contains a slot for the Control Unit.

The Power Modules are supplied with a DRIVE-CLiQ cable for communication and a cable for the 24 V supply to the Control Unit. These cables are pre-assembled for installing the Control Unit in the Power Module. If the two units are in a separate location, the cables must be ordered in the appropriate lengths.

The user-friendly AOP30 Advanced Operator Panel and the BOP20 Basic Operator Panel can be used for commissioning and local operation.

Predefined interfaces, via terminal block or PROFIBUS, make the commissioning and control of the drive much easier. The interfaces of the CU320 Control Unit can be supplemented with additional modules, such as the plug-in TB30 Terminal Board or the TM31 Terminal Module.

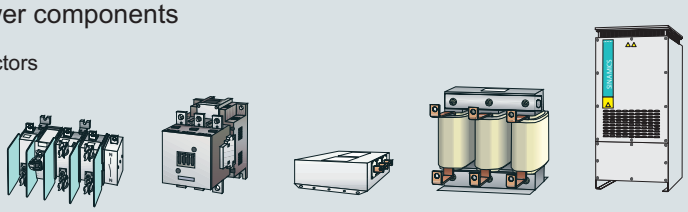
If further customer interfaces are needed to communicate with the drive, an external 24 V supply must be provided.

The two following figures are helpful when it comes to assembling the required converter components correctly.
The first figure shows the structure and the individual components of a SINAMICS G130 drive.
The second figure is a flowchart containing the decision and selection criteria required for the individual components.

Design (continued)

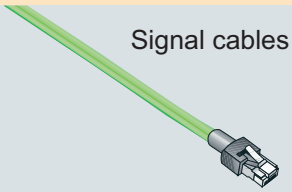
3 AC supply

Line-side power components
e.g.
Switch disconnectors
Line contactors
Line filters
Line reactors
Line harmonics filters



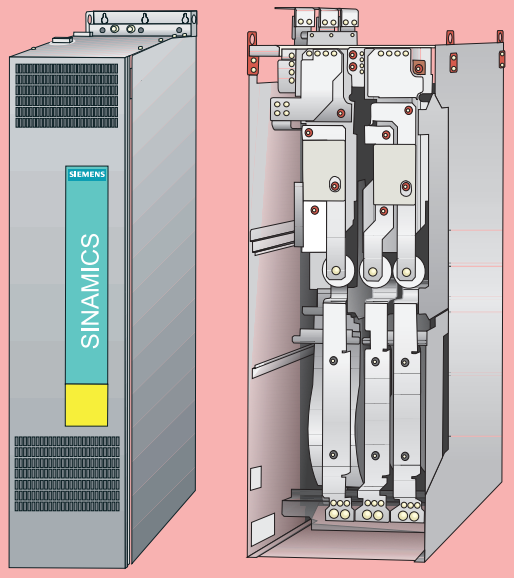
Connection system

Signal cables



SINAMICS G130 components

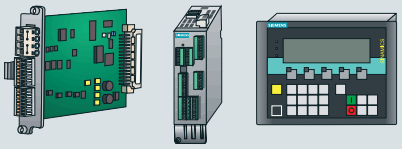
Power Modules



Control Unit Kit

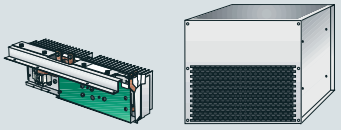
CU320 Control Unit
with CompactFlash card

Supplementary system components
e.g.
Terminal Board
Terminal Module
Sensor Module



Advanced Operator Panel
PROFINET boards
CANopen boards

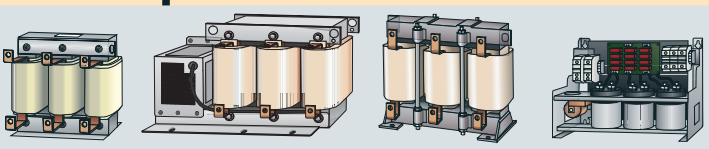
DC link components



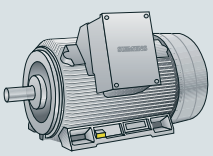
Braking Modules
with braking resistors

Motor-side power components

Motor reactors
Sine-wave filters
dv/dt-filter plus VPL

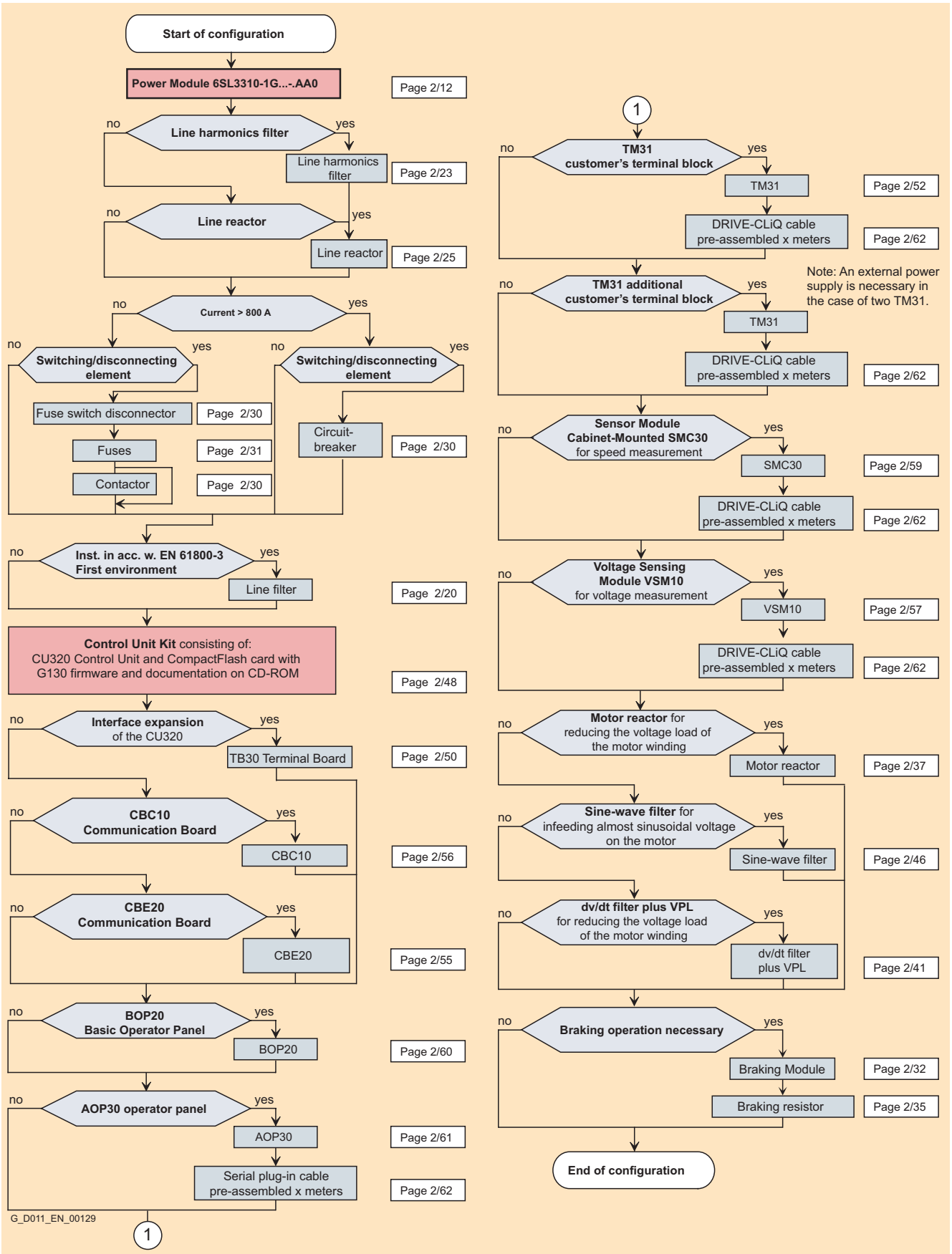


Motors



G_D011_EN_00163

Design (continued)



Function

Communication with higher-level control and customer's terminal block

A communications interface on the CU320 Control Unit, the TM31 Terminal Module, the TB30 Terminal Board and expansions for supporting PROFINET and CANopen are provided as standard for use as the customer interface.

You can use this customer's terminal block to connect the system to the higher-level controller using analog and digital signals, or to connect additional units.

To simplify configuration and commissioning of the drive, the TM31 Terminal Module can be preset to a variety of factory settings.

For more detailed information, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

Open-loop and closed-loop control functions

The converter control contains a high-quality Vector Control with speed and current controls as well as motor and converter protection.

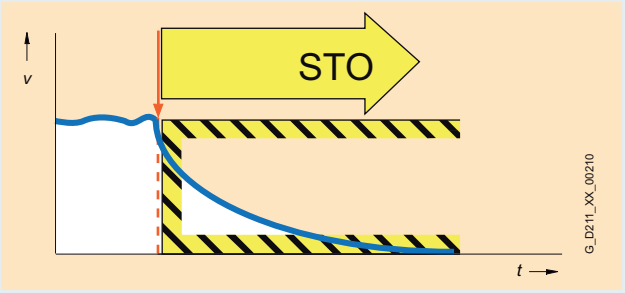
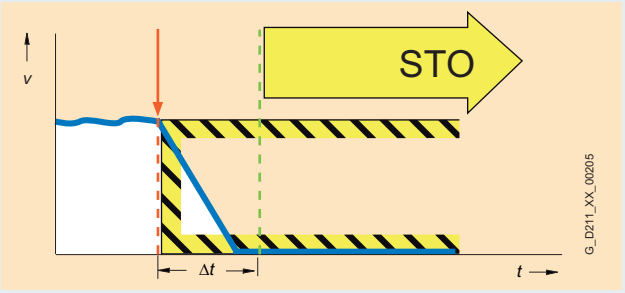
Software and protection functions

The software functions available as standard are described below:

Software and protection functions	
Setpoint input	The setpoint can be defined internally or externally, internally as fixed or motorized potentiometer or jog setpoints, externally via the communications interface or an analog input of the customer's terminal block. The internal fixed setpoint and the motorized potentiometer setpoint can be switched over or adjusted using control commands via all interfaces.
Motor identification	The automatic motor identification permits fast and simple commissioning and optimization of the drive control.
Ramp-function generator	A user-friendly ramp-function generator with separately adjustable ramp-up and ramp-down times, together with adjustable rounding times in the lower and upper speed ranges, improves the control response and therefore prevents mechanical overloading of the drive train. The ramp-down ramps can be parameterized separately for emergency stop.
$V_{dc\ max}$ controller	The $V_{dc\ max}$ controller automatically prevents overvoltages in the DC link if the set ramp-down ramp is too short, for example. This can also extend the set ramp-down time.
Kinetic buffering (KIP)	Line voltage failures are bridged to the extent permitted by the kinetic energy of the drive train. The speed drops depending on the moment of inertia and load torque. The current speed setpoint is resumed when the line voltage returns.
Automatic restart [1]	The automatic restart switches the drive on again when the power is restored after a power failure, and ramps up to the current speed setpoint.
Flying restart [1]	The flying restart permits bumpless connection of the converter to a rotating motor.
Technology controller	The "Technology controller" function module allows simple control functions to be implemented, e.g. level control or volumetric flow control. The technology controller is designed as a PID controller, whereby the differentiator can be switched to the control deviation channel or the actual value channel (factory setting). The P, I, and D components can be set separately.
Free function blocks	Using the freely programmable function blocks, it is easy to implement logic and arithmetic functions for controlling the SINAMICS G130 unit. The blocks can be programmed by means of an operator panel or the STARTER commissioning tool.
Drive Control Chart (DCC)	Drive Control Chart (DCC) is an additional tool for the easy configuration of process-oriented functions for the SINAMICS G130. The block library contains a large selection of control, arithmetic and logic blocks as well as extensive open-loop and closed-loop control functions. The user-friendly DCC editor enables easy graphical configuration and a clear representation of control loop structures as well as a high degree of reusability of existing diagrams. DCC is an add-on to the STARTER commissioning tool (→ Tools and configuration).
I^2t detection for motor protection	The motor temperature is calculated in a motor model stored in the converter software, taking into account the current speed and load. More exact sensing of the temperature, also taking into account the influence of the ambient temperature, is possible by means of direct temperature sensing using KTY84 sensors in the motor winding.
Evaluation of motor temperature	Motor protection by evaluating a KTY84 or PTC temperature sensor. When a KTY84 sensor is connected, the limit values can be set for alarm or shutdown. When connecting a PTC thermistor, the reaction following triggering of the PTC thermistor (alarm or shutdown) can be defined.
Motor blocking protection	A blocked motor is recognized and protected against thermal overloading by shutting down.

[1] Factory setting: not activated (can be parameterized)

Function (continued)

Safety Integrated	
Safe Torque Off (STO)	Description of functions This function prevents the drive from restarting unexpectedly in accordance with EN 60204-1, Section 5.4. Safe Torque Off disables the drive pulses and disconnects the power supply to the motor (corresponds to Stop Category 0 of EN 60204-1). The drive is reliably torque-free. This state is monitored internally in the drive. Application, customer benefits STO has the immediate effect that the drive cannot supply any more torque-generating energy. STO can be used wherever the drive will reach a standstill in a sufficiently short time based on the load or when coasting down of the drive will not have any relevance for safety. 
Safe Stop 1 (SS1)	Description of functions The Safe Stop 1 function can safely stop the drive in accordance with EN 60204-1, Stop Category 1. When the SS1 function is selected, the drive brakes along a quick stop ramp (OFF3) and automatically activates the Safe Torque Off when the parameterized safety delay timer runs down. Application, customer benefits When the stop function of the drive is activated and it does not come to a halt quickly enough due to the load inertia, it can be actively braked by the converter. This integrated quick braking function eliminates the need for costly mechanical brakes that are subject to wear.  The Safety Integrated functions STO and SS1 of SINAMICS G130 are certified by independent institutes. The appropriate external test certificates and manufacturer declarations are available from the Siemens representatives, as well as at http://support.automation.siemens.com/WW/view/en/23158850
Power unit protection	
Ground fault monitoring at output side	A ground fault on the output side is recognized by aggregate current monitoring, and results in shutdown in grounded networks.
Electronic short-circuit protection on output side	A short-circuit (e.g. on the converter output terminals, in the motor cable or in the motor's terminal box) is detected on the output side and the converter switches off with a fault.
Thermal overload protection	A warning message is issued first when the overtemperature threshold responds. If the temperature rises further, either a shutdown is carried out or an automatic influencing of the pulse frequency or output current takes place so that a reduction in the thermal load is achieved. After elimination of the cause of the fault (e.g., improvement in the ventilation), the original operating values are automatically resumed.

75 kW to 800 kW

Technical specifications

Electrical data			
Line voltages and power ranges	• 380 ... 480 V 3 AC, ±10 % (-15 % < 1 min) 110 ... 560 kW • 500 ... 600 V 3 AC, ±10 % (-15 % < 1 min) 110 ... 560 kW • 660 ... 690 V 3 AC, ±10 % (-15 % < 1 min) 75 ... 800 kW		
Supply systems	TN/TT line supplies or isolated supplies (IT line supplies)		
Line frequency	47 ... 63 Hz		
Output frequency	0 ... 300 Hz		
Power factor			
- Fundamental mode	> 0.98		
- Total	0.93 ... 0.96		
Converter efficiency	> 98 %		
Control method	Vector Control with and without sensor or *V/f* control		
Fixed speeds	15 fixed speeds plus 1 minimum speed, parameterizable (in the default setting, 3 fixed setpoints plus 1 minimum speed are selectable using terminal block/PROFIBUS)		
Skipped speed ranges	4, parameterizable		
Setpoint resolution	0.001 rpm digital 12 bit analog		
Braking operation	By means of additional Braking Modules and braking resistors		
Mechanical data			
Degree of protection	IP00 or IP20 dependent on type		
Protection class I	in accordance with EN 61800-5-1		
Cooling method	Forced air cooling AF in accordance with EN 60146		
Sound pressure level L_{pA} (1 m)	≤ 73 dB at 50 Hz line frequency		
Shock protection	BGV A3		
Compliance with standards			
Standards	EN 61800-5-1 EN 60146-1, EN 61800-2, EN 61800-3, EN 60204-1, EN 60529 [1]		
CE marking	In accordance with EMC directive No. 2004/108/EC and low-voltage directive No. 2006/95/EC		
EMC conformance	The SINAMICS G130 converter systems are not designed for connection to the public power network ("First environment"). EMC conformance is compliant with the EMC product standard for variable-speed drives EN 61800-3, "Second environment" (industrial networks). The equipment can cause electromagnetic interference when it is connected to the public network. If supplementary measures are taken (e.g. → line filter), it can also be operated in the "First environment".		
Approvals	cULus (File No. E192450)		
Ambient conditions	**Storage**	**Transport**	**Operation**
Ambient temperature	-25 ... +55 °C	-25 ... +70 °C from -40 °C for 24 hours	0 ... +40 °C up to +50 °C see derating data
Relative humidity [1] (non-condensing)	5 ... 95 % Corr. to 1K4 to EN 60721-3-1	5 ... 95 % at 40 °C Corr. to 2K3 to EN 60721-3-2	5 ... 95 % Corr. to 3K3 to EN 60721-3-3
Environmental class/harmful chemical substances [1]	Class 1C2 to EN 60721-3-1	Class 2C2 to EN 60721-3-2	Class 3C2 to EN 60721-3-3
Organic/biological influences [1]	Class 1B1 to EN 60721-3-1	Class 2B1 to EN 60721-3-2	Class 3B1 to EN 60721-3-3
Installation altitude	up to 2000 m above sea level without derating, > 2000 m see derating data		
Strain resistance	**Storage**	**Transport**	**Operation**
Vibratory load [1]			
- Deflection	1.5 mm at 5 ... 9 Hz	3.1 mm at 5 ... 9 Hz	0.075 mm at 10 ... 58 Hz
- Acceleration	5 m/s^2 at > 9 ... 200 Hz Corr. to 1M2 to EN 60721-3-1	10 m/s^2 at > 9 ... 200 Hz Corr. to 2M2 to EN 60721-3-2	10 m/s^2 at > 58 ... 200 Hz –
Shock load [1]			
- Acceleration	40 m/s^2 at 22 ms Corr. to 1M2 to EN 60721-3-1	100 m/s^2 at 11 ms Corr. to 2M2 to EN 60721-3-2	100 m/s^2 at 11 ms Corr. to 3M4 to EN 60721-3-3

Deviations from the defined classes are identified by underlining.

[1] The EN standards specified are the European editions of the international IEC standards with the same designations.

Technical specifications (continued)

Derating data

Compensation of current derating as a function of installation altitude/ambient temperature

If the SINAMICS G130 chassis units are operated at an **installation altitude > 2000 m** above sea level, factors relating to a reduction of the maximum permissible output current (derating) must be taken into account. These are specified in the tables below. It must be ensured that the air flow corresponds to the rate specified in the technical specification tables. The specified values already include a permitted correction between installation altitude and ambient temperature (incoming air temperature at the inlet to the unit).

Installation altitude above sea level	**Current derating** at an ambient temperature of						
m	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0-2000						95.0 %	87.0 %
2001-2500					96.3 %	91.4 %	83.7 %
2501-3000		100 %		96.2 %	92.5 %	87.9 %	80.5 %
3001-3500			96.7 %	92.3 %	88.8 %	84.3 %	77.3 %
3501-4000		97.8 %	92.7 %	88.4 %	85.0 %	80.8 %	74.0 %

Current derating as a function of the ambient temperature (incoming air temperature) and installation altitude

Voltage derating as a function of the installation altitude

In addition to current derating, voltage derating must be considered in accordance with the following table with **installation altitudes > 2000 m** above sea level.

Installation altitude above sea level	**Voltage derating** for a rated input voltage of												
m	380 V	400 V	420 V	440 V	460 V	480 V	500 V	525 V	550 V	575 V	600 V	660 V	690 V
0-2000												100 %	
2001-2250						96 %							96 %
2251-2500					98 %	94 %						98 %	94 %
2501-2750		100 %		98 %	94 %	90 %		100 %				95 %	90 %
2751-3000				95 %	91 %	88 %						92 %	88 %
3001-3250			97 %	93 %	89 %	85 %					98 %	89 %	85 %
3251-3500		98 %	93 %	89 %	85 %	82 %				98 %	94 %	85 %	82 %
3501-3750		95 %	91 %	87 %	83 %	79 %			98 %	95 %	91 %	–	–
3751-4000	96 %	92 %	87 %	83 %	80 %	76 %			95 %	91 %	87 %	–	–

Voltage derating depending on installation altitude

Technical specifications (continued)

Current derating depending on pulse frequency

To reduce motor noise or to increase output frequency, the pulse frequency can be increased relative to the factory setting. When the pulse frequency is increased, the derating factor of the output current must be taken into account. This derating factor must be applied to the currents specified in the technical specifications.

Order No. 6SL3310-...	Output [kW]	Output current at 2 kHz [A]	Derating factor at 4 kHz
380 ... 480 V 3 AC			
1GE32-1AA0	110	210	82 %
1GE32-6AA0	132	260	83 %
1GE33-1AA0	160	310	88 %
1GE33-8AA0	200	380	87 %
1GE35-0AA0	250	490	78 %

Derating factor of the output current depending on the pulse frequency for units with a rated pulse frequency of 2 kHz

Order No. 6SL3310-...	Output [kW]	Output current at 1.25 kHz [A]	Derating factor at 2.5 kHz
380 ... 480 V 3 AC			
1GE36-1AA0	315	605	72 %
1GE37-5AA0	400	745	72 %
1GE38-4AA0	450	840	79 %
1GE41-0AA0	560	985	87 %
500 ... 600 V 3 AC			
1GF31-8AA0	110	175	87 %
1GF32-2AA0	132	215	87 %
1GF32-6AA0	160	260	88 %
1GF33-3AA0	200	330	82 %
1GF34-1AA0	250	410	82 %
1GF34-7AA0	315	465	87 %
1GF35-8AA0	400	575	85 %
1GF37-4AA0	500	735	79 %
1GF38-1AA0	560	810	72 %
660 ... 690 V 3 AC			
1GH28-5AA0	75	85	89 %
1GH31-0AA0	90	100	88 %
1GH31-2AA0	110	120	88 %
1GH31-5AA0	132	150	84 %
1GH31-8AA0	160	175	87 %
1GH32-2AA0	200	215	87 %
1GH32-6AA0	250	260	88 %
1GH33-3AA0	315	330	82 %
1GH34-1AA0	400	410	82 %
1GH34-7AA0	450	465	87 %
1GH35-8AA0	560	575	85 %
1GH37-4AA0	710	735	79 %
1GH38-1AA0	800	810	72 %

Derating factor of the output current depending on the pulse frequency for units with a rated pulse frequency of 1.25 kHz

Technical specifications (continued)

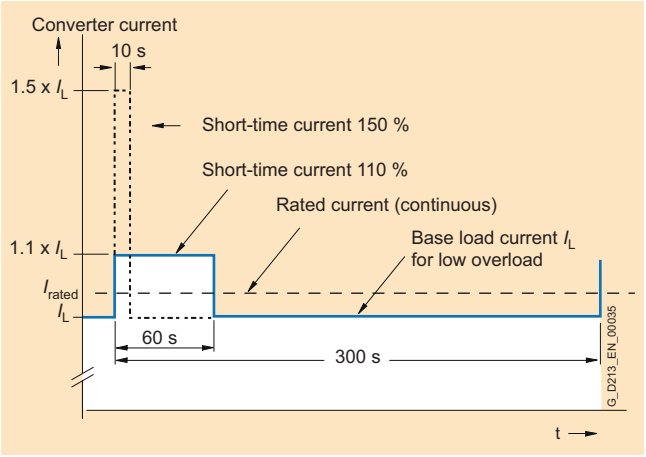
Overload capacity

SINAMICS G130 drive converter chassis units are equipped with an overload reserve to deal with breakaway torques, for example. If larger surge loads occur, this must be taken into account when configuring. In drives with overload requirements, the appropriate base load current must therefore be used as a basis for the required load.

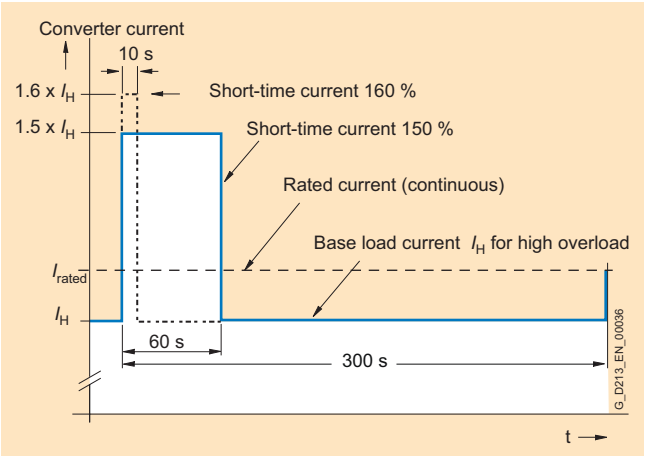
The criterion for overload is that the drive is operated with its base load current before and after the overload occurs, and a load duration of 300 s is assumed here.

The base load current I_L for a low overload is based on a duty cycle of 110 % for 60 s or 150 % for 10 s.

The base load current I_H for a high overload is based on a duty cycle of 150 % for 60 s or 160 % for 10 s.



Low overload



High overload

EMC guidelines

The electromagnetic compatibility describes - in accordance with the definition of the EMC directive - the "capability of a device to work satisfactorily in the electromagnetic environment without itself causing electromagnetic interferences which are unacceptable for other devices present in this environment". To guarantee that the appropriate EMC directives are observed, the devices must demonstrate a sufficiently high noise immunity, and also the emitted interference must be limited to acceptable values.

The EMC requirements for "Variable-speed drive systems" are described in the product standard EN 61800-3. A variable-speed drive system (or power drive system, PDS) consists of the drive converter and the electric motor including cables. The driven machine is not part of the drive system. EN 61800-3 defines different limits depending on the location of the drive system, referred to as the first and second environment.

The **first environment** comprises living accomodation or locations where the drive system is directly connected to the public low-voltage network without an intermediate transformer.

The **second environment** is understood to be locations outside living areas. These are basically industrial areas which are powered from the medium-voltage network via their own transformers.

Four different categories are defined in EN 61800-3 depending on the location and the power of the drive:

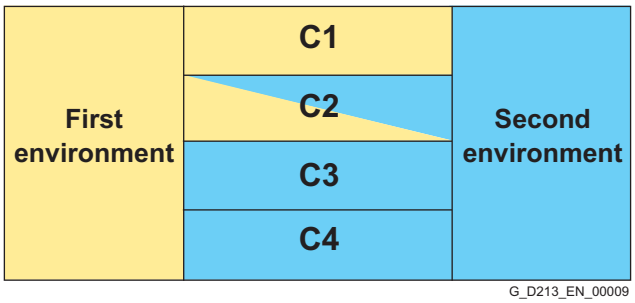
Category C1: Drive systems for rated voltages < 1000 V for unlimited use in the first environment.

Category C2: Stationary drive systems for rated voltages < 1000 V for use in the second environment. Use in the first environment is possible if the drive system is installed and used by qualified personnel. The warning and installation information supplied by the manufacturer must be observed.

Category C3: Drive systems for rated voltages < 1000 V for exclusive use in the second environment.

Category C4: Drive systems for rated voltages ≥ 1000 V or for rated currents ≥ 400 A for use in complex systems in the second environment.

The following diagram shows the assignment of the four categories to the first and second environments:



SINAMICS G130 drive converter chassis units are almost exclusively used in the second environment (categories C3 and C4).

To limit the **emitted interference**, the SINAMICS G130 drive converter chassis units are equipped as standard with an RFI suppression filter in accordance with the limits specified in Category C3. This means that they meet the requirements for industrial use. Line filters (→ page 20) are available for use in the first environment (Category C2).

SINAMICS G130 drive converter chassis units fulfill the requirements for **noise immunity** defined in EN 61800-3 for the second environment and consequently also the lower noise immunity values in the first environment.

The warning and installation information (part of the device documentation) must be observed.

Power Modules

Overview

The Power Module contains

- the line-side 6-pulse rectifier
- the capacitors for the voltage source DC link
- the IGBT-based inverter
- the associated gating and monitoring electronics
- the precharging for the DC link
- the control and power supply for the fans in the Power Module

Design

The Power Module features the following interfaces as standard:

- Connecting lugs for the line supply
- Connecting lugs for the motor circuit
- Connecting lugs for the brake choppers
- Connecting lugs for the dv/dt filter plus VPL
- Connection for external 24 V supply
- 3 DRIVE-CLiQ sockets
- 24 V voltage outputs for the supply of the
  - CU320 Control Unit and the
  - AOP30 Advanced Operator Panel
- 1 x temperature sensor input (KTY84-130 or PTC)
- PE (protective ground) connection

Selection and ordering data

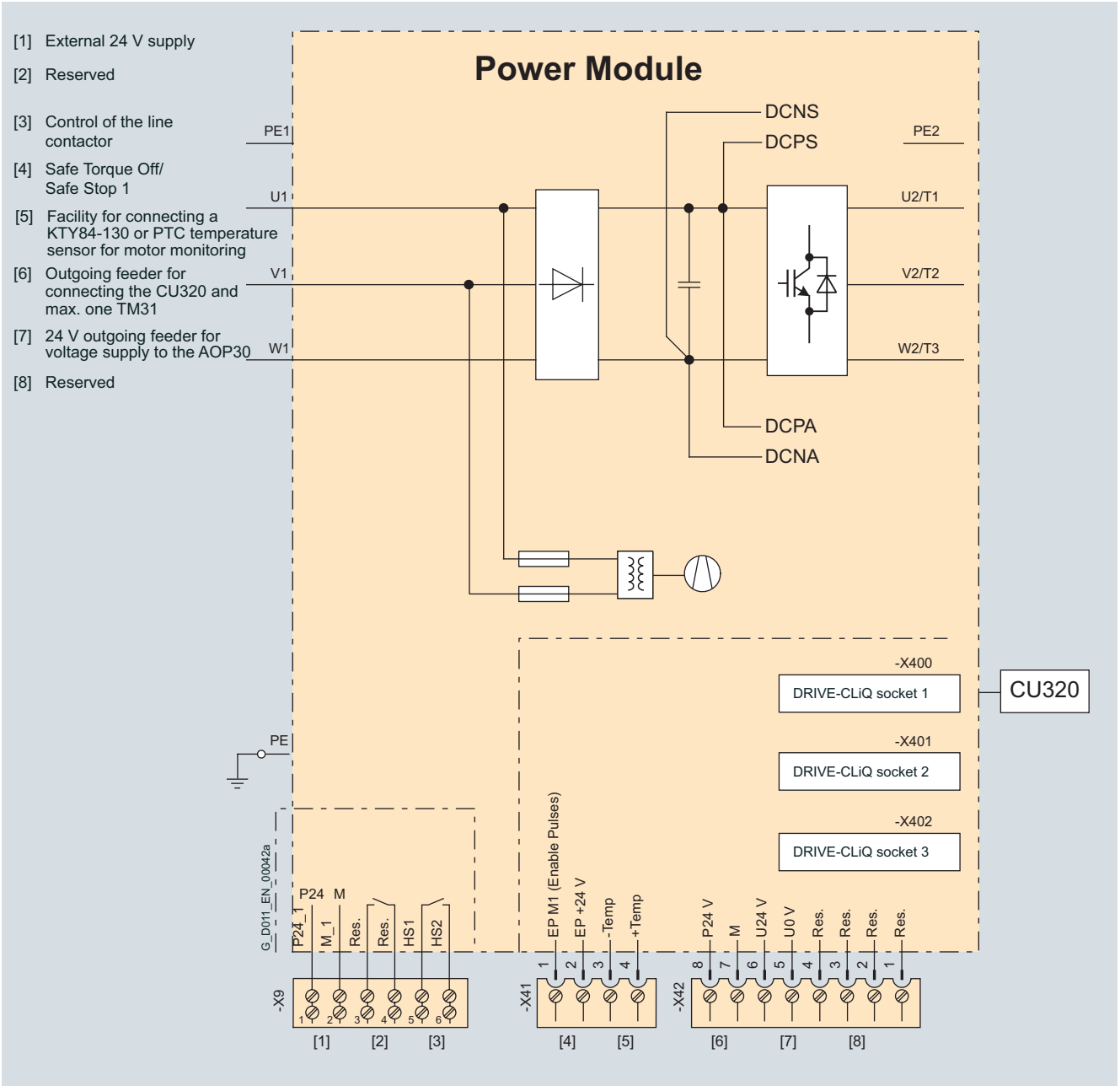
Type rating		Rated output current	**Power Module**
At 400 V, 500 V or 690 V	At 60 Hz/ 460 V or 575 V		
kW	hp	A	Order No.
380 ... 480 V 3 AC			
110	150	210	**6SL3310-1GE32-1AA0**
132	200	260	**6SL3310-1GE32-6AA0**
160	250	310	**6SL3310-1GE33-1AA0**
200	300	380	**6SL3310-1GE33-8AA0**
250	400	490	**6SL3310-1GE35-0AA0**
315	500	605	**6SL3310-1GE36-1AA0**
400	600	745	**6SL3310-1GE37-5AA0**
450	700	840	**6SL3310-1GE38-4AA0**
560	800	985	**6SL3310-1GE41-0AA0**
500 ... 600 V 3 AC			
110	150	175	**6SL3310-1GF31-8AA0**
132	200	215	**6SL3310-1GF32-2AA0**
160	250	260	**6SL3310-1GF32-6AA0**
200	300	330	**6SL3310-1GF33-3AA0**
250	400	410	**6SL3310-1GF34-1AA0**
315	450	465	**6SL3310-1GF34-7AA0**
400	600	575	**6SL3310-1GF35-8AA0**
500	700	735	**6SL3310-1GF37-4AA0**
560	800	810	**6SL3310-1GF38-1AA0**
660 ... 690 V 3 AC			
75		85	**6SL3310-1GH28-5AA0**
90		100	**6SL3310-1GH31-0AA0**
110		120	**6SL3310-1GH31-2AA0**
132		150	**6SL3310-1GH31-5AA0**
160		175	**6SL3310-1GH31-8AA0**
200		215	**6SL3310-1GH32-2AA0**
250		260	**6SL3310-1GH32-6AA0**
315		330	**6SL3310-1GH33-3AA0**
400		410	**6SL3310-1GH34-1AA0**
450		465	**6SL3310-1GH34-7AA0**
560		575	**6SL3310-1GH35-8AA0**
710		735	**6SL3310-1GH37-4AA0**
800		810	**6SL3310-1GH38-1AA0**

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

Integration

The Power Module communicates with the CU320 Control Unit via DRIVE-CLiQ (a fast serial interface) and receives its control information via this route. The DRIVE-CLiQ cable required for this is included in the scope of delivery of the Power Module.

DRIVE-CLiQ cables for establishing connections with other DRIVE-CLiQ devices can be ordered pre-assembled and cut to length as required (→ Signal cables).



Connection diagram for Power Module

Technical specifications

Line voltage 380 ... 480 V 3 AC		Power Modules 6SL3310-1GE32-1AA0	6SL3310-1GE32-6AA0	6SL3310-1GE33-1AA0	6SL3310-1GE33-8AA0	6SL3310-1GE35-0AA0
Type rating						
• with I_L at 50 Hz 400 V [1]	kW	**110**	**132**	**160**	**200**	**250**
• with I_H at 50 Hz 400 V [1]	kW	90	110	132	160	200
• with I_L at 60 Hz 460 V [2]	hp	150	200	250	300	400
• with I_H at 60 Hz 460 V [2]	hp	150	200	200	250	350
Output current						
• Rated current I_{rated}	A	210	260	310	380	490
• Base load current I_L [3]	A	205	250	302	370	477
• Base load current I_H [4]	A	178	233	277	340	438
Input current						
• Rated input current	A	229	284	338	395	509
• Input current, max.	A	335	410	495	606	781
• Current requirement auxiliary supply 24 V DC [5]	A	0.8	0.8	0.9	0.9	0.9
Power loss	kW	2.46	3.27	4.00	4.54	5.78
Cooling air requirement	m^3/s	0.17	0.23	0.36	0.36	0.36
Cable length, max. between Power Module and motor [6]						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
Degree of protection		IP20	IP20	IP20	IP20	IP20
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	64/67	64/67	69/73	69/73	69/73
Line connection U1, V1, W1		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
Conductor cross-section, max.						
• DIN VDE	mm^2	2 × 185	2 × 185	2 × 240	2 × 240	2 × 240
Motor connection U2/T1, V2/T2, W2/T3		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
Conductor cross-section, max.						
• DIN VDE	mm^2	2 × 185	2 × 185	2 × 240	2 × 240	2 × 240
PE1/GND connection		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
Conductor cross-section, max.						
• DIN VDE	mm^2	2 × 185	2 × 185	2 × 240	2 × 240	2 × 240
PE2/GND connection		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
Conductor cross-section, max.						
• DIN VDE	mm^2	2 × 185	2 × 185	2 × 240	2 × 240	2 × 240
Dimensions						
• Width	mm	326	326	326	326	326
• Height	mm	1400	1400	1533	1533	1533
• Depth	mm	356	356	545	545	545
Weight, approx.	kg	104	104	176	176	176
Approvals		CE, cULus E192450	CE, cULus E192450	CE, cULus E192450	CE, cULus E192450	CE, cULus E192450
Frame size		FX	FX	GX	GX	GX

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 400 V 3 AC 50 Hz.

2) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 460 V 3 AC 60 Hz.

3) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

4) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

5) If the auxiliary supply is to be fed in separately from the load supply, e.g. if the control should be able to continue communication if the line voltage fails.

6) Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		Power Modules 6SL3310-1GE36-1AA0	6SL3310-1GE37-5AA0	6SL3310-1GE38-4AA0	6SL3310-1GE41-0AA0
Type rating					
• with I_L at 50 Hz 400 V [1]	kW	**315**	**400**	**450**	**560**
• with I_H at 50 Hz 400 V [1]	kW	250	315	400	450
• with I_L at 60 Hz 460 V [2]	hp	500	600	700	800
• with I_H at 60 Hz 460 V [2]	hp	350	450	600	700
Output current					
• Rated current I_{rated}	A	605	745	840	985
• Base load current I_L [3]	A	590	725	820	960
• Base load current I_H [4]	A	460	570	700	860
Input current					
• Rated input current	A	629	775	873	1024
• Input current, max.	A	967	1188	1344	1573
• Current requirement auxiliary supply 24 V DC [5]	A	1.0	1.0	1.0	1.25
Power loss	kW	7.8	9.1	9.6	13.8
Cooling air requirement	m^3/s	0.78	0.78	0.78	1.48
Cable length, max. between Power Module and motor [6]					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	70/73	70/73	70/73	72/75
Line connection U1, V1, W1		M12 screw	M12 screw	M12 screw	M12 screw
Conductor cross-section, max.					
• DIN VDE	mm^2	4 × 240	4 × 240	4 × 240	6 × 240
Motor connection U2/T1, V2/T2, W2/T3		M12 screw	M12 screw	M12 screw	M12 screw
Conductor cross-section, max.					
• DIN VDE	mm^2	4 × 240	4 × 240	4 × 240	6 × 240
PE1/GND connection		M12 screw	M12 screw	M12 screw	M12 screw
Conductor cross-section, max.					
• DIN VDE	mm^2	2 × 240	2 × 240	2 × 240	4 × 240
PE2/GND connection		2 x M12 screw	2 x M12 screw	2 x M12 screw	3 x M12 screw
Conductor cross-section, max.					
• DIN VDE	mm^2	4 × 240	4 × 240	4 × 240	6 × 240
Dimensions					
• Width	mm	503	503	503	909
• Height	mm	1506	1506	1506	1510
• Depth	mm	540	540	540	540
Weight, approx.	kg	294	294	294	530
Approvals		CE, cULus E192450	CE, cULus E192450	CE, cULus E192450	CE, cULus E192450
Frame size		HX	HX	HX	JX

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 400 V 3 AC 50 Hz.

2) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 460 V 3 AC 60 Hz.

3) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

4) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

5) If the auxiliary supply is to be fed in separately from the load supply, e.g. if the control should be able to continue communication if the line voltage fails.

6) Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 500 ... 600 V 3 AC		Power Modules 6SL3310-1GF31-8AA0	6SL3310-1GF32-2AA0	6SL3310-1GF32-6AA0	6SL3310-1GF33-3AA0	6SL3310-1GF34-1AA0
Type rating						
• with I_L at 50 Hz 500 V [1]	kW	**110**	**132**	**160**	**200**	**250**
• with I_H at 50 Hz 500 V [1]	kW	90	110	132	160	200
• with I_L at 60 Hz 575 V [2]	hp	150	200	250	300	400
• with I_H at 60 Hz 575 V [2]	hp	150	200	200	250	350
Output current						
• Rated current I_{rated}	A	175	215	260	330	410
• Base load current I_L [3]	A	171	208	250	320	400
• Base load current I_H [4]	A	157	192	233	280	367
Input current						
• Rated input current	A	191	224	270	343	426
• Input current, max.	A	279	341	410	525	655
• Current requirement auxiliary supply 24 V DC [5]	A	0.9	0.9	0.9	0.9	1.0
Power loss	kW	3	3.4	3.9	4.9	6.4
Cooling air requirement	m^3/s	0.36	0.36	0.36	0.36	0.78
Cable length, max. between Power Module and motor [6]						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
Degree of protection		IP20	IP20	IP20	IP20	IP00
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	69/73	69/73	69/73	69/73	70/73
Line connection U1, V1, W1		M10 screw	M10 screw	M10 screw	M10 screw	M12 screw
Conductor cross-section, max.						
• DIN VDE	mm^2	2 x 240	2 x 240	2 x 240	2 x 240	4 x 240
Motor connection U2/T1, V2/T2, W2/T3		M10 screw	M10 screw	M10 screw	M10 screw	M12 screw
Conductor cross-section, max.						
• DIN VDE	mm^2	2 x 240	2 x 240	2 x 240	2 x 240	4 x 240
PE1/GND connection		M10 screw	M10 screw	M10 screw	M10 screw	M12 screw
Conductor cross-section, max.						
• DIN VDE	mm^2	2 x 240	2 x 240	2 x 240	2 x 240	2 x 240
PE2/GND connection		M10 screw	M10 screw	M10 screw	M10 screw	2 x M12 screw
Conductor cross-section, max.						
• DIN VDE	mm^2	2 x 240	2 x 240	2 x 240	2 x 240	4 x 240
Dimensions						
• Width	mm	326	326	326	326	503
• Height	mm	1533	1533	1533	1533	1506
• Depth	mm	545	545	545	545	540
Weight, approx.	kg	176	176	176	176	294
Approvals		CE, cULus E192450	CE, cULus E192450	CE, cULus E192450	CE, cULus E192450	CE, cULus E192450
Frame size		GX	GX	GX	GX	HX

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 500 V 3 AC 50 Hz.

2) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 575 V 3 AC 60 Hz.

3) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

4) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

5) If the auxiliary supply is to be fed in separately from the load supply, e.g. if the control should be able to continue communication if the line voltage fails.

6) Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 500 ... 600 V 3 AC		Power Modules 6SL3310-1GF34-7AA0	6SL3310-1GF35-8AA0	6SL3310-1GF37-4AA0	6SL3310-1GF38-1AA0
Type rating					
• with I_L at 50 Hz 500 V [1]	kW	**315**	**400**	**500**	**560**
• with I_H at 50 Hz 500 V [1]	kW	250	315	450	500
• with I_L at 60 Hz 575 V [2]	hp	450	600	700	800
• with I_H at 60 Hz 575 V [2]	hp	450	500	700	700
Output current					
• Rated current I_{rated}	A	465	575	735	810
• Base load current I_L [3]	A	452	560	710	790
• Base load current I_H [4]	A	416	514	657	724
Input current					
• Rated input current	A	483	598	764	842
• Input current, max.	A	740	918	1164	1295
• Current requirement auxiliary supply 24 V DC [5]	A	1.0	1.0	1.25	1.25
Power loss	kW	7.3	8.1	12.0	13.3
Cooling air requirement	m^3/s	0.78	0.78	1.48	1.48
Cable length, max. between Power Module and motor [6]					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	70/73	70/73	73/75	73/75
Line connection U1, V1, W1		M12 screw	M12 screw	M12 screw	M12 screw
Conductor cross-section, max.					
• DIN VDE	mm^2	4 x 240	4 x 240	6 x 240	6 x 240
Motor connection U2/T1, V2/T2, W2/T3		M12 screw	M12 screw	M12 screw	M12 screw
Conductor cross-section, max.					
• DIN VDE	mm^2	4 x 240	4 x 240	6 x 240	6 x 240
PE1/GND connection		M12 screw	M12 screw	2 x M12 screw	2 x M12 screw
Conductor cross-section, max.					
• DIN VDE	mm^2	2 x 240	2 x 240	4 x 240	4 x 240
PE2/GND connection		2 x M12 screw	2 x M12 screw	3 x M12 screw	3 x M12 screw
Conductor cross-section, max.					
• DIN VDE	mm^2	4 x 240	4 x 240	6 x 240	6 x 240
Dimensions					
• Width	mm	503	503	909	909
• Height	mm	1506	1506	1510	1510
• Depth	mm	540	540	540	540
Weight, approx.	kg	294	294	530	530
Approvals		CE, cULus E192450	CE, cULus E192450	CE, cULus E192450	CE, cULus E192450
Frame size		HX	HX	JX	JX

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 500 V 3 AC 50 Hz.

2) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 575 V 3 AC 60 Hz.

3) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

4) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

5) If the auxiliary supply is to be fed in separately from the load supply, e.g. if the control should be able to continue communication if the line voltage fails.

6) Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		Power Modules 6SL3310-1GH28-5AA0	6SL3310-1GH31-0AA0	6SL3310-1GH31-2AA0	6SL3310-1GH31-5AA0	6SL3310-1GH31-8AA0	6SL3310-1GH32-2AA0
Type rating							
• with I_L at 50 Hz 690 V [1]	kW	**75**	**90**	**110**	**132**	**160**	**200**
• with I_H at 50 Hz 690 V [1]	kW	55	75	90	110	132	160
Output current							
• Rated current I_{rated}	A	85	100	120	150	175	215
• Base load current I_L [2]	A	80	95	115	142	171	208
• Base load current I_H [3]	A	76	89	107	134	157	192
Input current							
• Rated input current	A	93	109	131	164	191	224
• Input current, max.	A	131	155	188	232	279	341
• Current requirement auxiliary supply 24 V DC [4]	A	0.8	0.8	0.8	0.8	0.9	0.9
Power loss	kW	1.5	1.8	2.4	2.5	3.8	4.8
Cooling air requirement	m^3/s	0.17	0.17	0.17	0.17	0.36	0.36
Cable length, max. between Power Module and motor [5]							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	64/67	64/67	64/67	64/67	69/73	69/73
Line connection U1, V1, W1		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
Conductor cross-section, max.							
• DIN VDE	mm^2	2 x 185	2 x 185	2 x 185	2 x 185	2 x 240	2 x 240
Motor connection U2/T1, V2/T2, W2/T3		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
Conductor cross-section, max.							
• DIN VDE	mm^2	2 x 185	2 x 185	2 x 185	2 x 185	2 x 240	2 x 240
PE1/GND connection		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
Conductor cross-section, max.							
• DIN VDE	mm^2	2 x 185	2 x 185	2 x 185	2 x 185	2 x 240	2 x 240
PE2/GND connection		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
Conductor cross-section, max.							
• DIN VDE	mm^2	2 x 185	2 x 185	2 x 185	2 x 185	2 x 240	2 x 240
Dimensions							
• Width	mm	326	326	326	326	326	326
• Height	mm	1400	1400	1400	1400	1533	1533
• Depth	mm	356	356	356	356	545	545
Weight, approx.	kg	104	104	104	104	176	176
Approvals		CE	CE	CE	CE	CE	CE
Frame size		FX	FX	FX	FX	GX	GX

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 690 V 3 AC 50 Hz.

2) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

3) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

4) If the auxiliary supply is to be fed in separately from the load supply, e.g. if the control should be able to continue communication if the line voltage fails.

5) Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		Power Modules 6SL3310-1GH32-6AA0	6SL3310-1GH33-3AA0	6SL3310-1GH34-1AA0	6SL3310-1GH34-7AA0	6SL3310-1GH35-8AA0	6SL3310-1GH37-4AA0	6SL3310-1GH38-1AA0
Type rating								
• with I_L at 50 Hz 690 V [1]	kW	**250**	**315**	**400**	**450**	**560**	**710**	**800**
• with I_H at 50 Hz 690 V [1]	kW	200	250	315	400	500	560	710
Output current								
• Rated current I_{rated}	A	260	330	410	465	575	735	810
• Base load current I_L [2]	A	250	320	400	452	560	710	790
• Base load current I_H [3]	A	233	280	367	416	514	657	724
Input current								
• Rated input current	A	270	343	426	483	598	764	842
• Input current, max.	A	410	525	655	740	918	1164	1295
• Current requirement auxiliary supply 24 V DC [4]	A	0.9	0.9	1.0	1.0	1.0	1.25	1.25
Power loss	kW	5	5.8	7.5	8.5	10.3	12.8	13.9
Cooling air requirement	m^3/s	0.36	0.36	0.78	0.78	0.78	1.48	1.48
Cable length, max. between Power Module and motor [5]								
• Shielded	m	300	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450	450
Degree of protection		IP20	IP20	IP00	IP00	IP00	IP00	IP00
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	69/73	69/73	70/73	70/73	70/73	73/75	73/75
Line connection U1, V1, W1		M10 screw	M10 screw	2 x M12 screw	2 x M12 screw	2 x M12 screw	3 x M12 screw	3 x M12 screw
Conductor cross-section, max.								
• DIN VDE	mm^2	2 x 240	2 x 240	4 x 240	4 x 240	4 x 240	6 x 240	6 x 240
Motor connection U2/T1, V2/T2, W2/T3		M10 screw	M10 screw	2 x M12 screw	2 x M12 screw	2 x M12 screw	3 x M12 screw	3 x M12 screw
Conductor cross-section, max.								
• DIN VDE	mm^2	2 x 240	2 x 240	4 x 240	4 x 240	4 x 240	6 x 240	6 x 240
PE1/GND connection		M10 screw	M10 screw	M12 screw	M12 screw	M12 screw	2 x M12 screw	2 x M12 screw
Conductor cross-section, max.								
• DIN VDE	mm^2	2 x 240	2 x 240	2 x 240	2 x 240	2 x 240	4 x 240	4 x 240
PE2/GND connection		M10 screw	M10 screw	2 x M12 screw	2 x M12 screw	2 x M12 screw	3 x M12 screw	3 x M12 screw
Conductor cross-section, max.								
• DIN VDE	mm^2	2 x 240	2 x 240	4 x 240	4 x 240	4 x 240	6 x 240	6 x 240
Dimensions								
• Width	mm	326	326	503	503	503	909	909
• Height	mm	1533	1533	1506	1506	1506	1510	1510
• Depth	mm	545	545	540	540	540	540	540
Weight, approx.	kg	176	176	294	294	294	530	530
Approvals		CE	CE	CE	CE	CE	CE	CE
Frame size		GX	GX	HX	HX	HX	JX	JX

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 690 V 3 AC 50 Hz.

2) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s.

3) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s. See technical specifications (→ Overload capacity).

4) If the auxiliary supply is to be fed in separately from the load supply, e.g. if the control should be able to continue communication if the line voltage fails.

5) Longer cable lengths for specific configurations are available on request.

Line-side power components
Line filters

Overview

Line-side power components are used to protect the connected components against transient or continuous overvoltages and ensure that prescribed limit values are adhered to.

To limit the emitted interference, the drive converters are equipped with a radio interference suppression filter as standard in accordance with the limits defined in Category C3. SINAMICS G130 converters equipped with the line filter also meet the limits for use in the first environment (Category C2) as specified in EN 61800-3.

The SINAMICS G130 units comply with the immunity requirements defined in EN 61800-3 as standard for the first and second environments.

When combined with line reactors, line filters also limit the conducted interference emitted by the Power Modules to the limits of Category C2 in the EN 61800-3 product standard. When combined with a plant design rigorously based on the EMC design directives, the limits at the installation site will conform to the requirements for the first environment.

Line filters are suitable for connection to grounded-neutral systems (TN or TT networks).

Selection and ordering data

Suitable for Power Module	Type rating of the Power Module	**Line filter**
	kW	Order No.
380 ... 480 V 3 AC		
6SL3310-1GE32-1AA0	110	**6SL3000-0BE32-5AA0**
6SL3310-1GE32-6AA0	132	**6SL3000-0BE34-4AA0**
6SL3310-1GE33-1AA0	160	
6SL3310-1GE33-8AA0	200	
6SL3310-1GE35-0AA0	250	**6SL3000-0BE36-0AA0**
6SL3310-1GE36-1AA0	315	**6SL3000-0BE41-2AA0**
6SL3310-1GE37-5AA0	400	
6SL3310-1GE38-4AA0	450	
6SL3310-1GE41-0AA0	560	
500 ... 600 V 3 AC		
6SL3310-1GF31-8AA0	110	**6SL3000-0BG32-5AA0**
6SL3310-1GF32-2AA0	132	
6SL3310-1GF32-6AA0	160	**6SL3000-0BG34-4AA0**
6SL3310-1GF33-3AA0	200	
6SL3310-1GF34-1AA0	250	
6SL3310-1GF34-7AA0	315	**6SL3000-0BG36-0AA0**
6SL3310-1GF35-8AA0	400	**6SL3000-0BG41-2AA0**
6SL3310-1GF37-4AA0	500	
6SL3310-1GF38-1AA0	560	
660 ... 690 V 3 AC		
6SL3310-1GH28-5AA0	75	**6SL3000-0BG32-5AA0**
6SL3310-1GH31-0AA0	90	
6SL3310-1GH31-2AA0	110	
6SL3310-1GH31-5AA0	132	
6SL3310-1GH31-8AA0	160	
6SL3310-1GH32-2AA0	200	
6SL3310-1GH32-6AA0	250	**6SL3000-0BG34-4AA0**
6SL3310-1GH33-3AA0	315	
6SL3310-1GH34-1AA0	400	
6SL3310-1GH34-7AA0	450	**6SL3000-0BG36-0AA0**
6SL3310-1GH35-8AA0	560	**6SL3000-0BG41-2AA0**
6SL3310-1GH37-4AA0	710	
6SL3310-1GH38-1AA0	800	

For more detailed information about line filters and plant design compliant with EMC guidelines, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line filter 6SL3000-0BE32-5AA0	6SL3000-0BE34-4AA0	6SL3000-0BE36-0AA0	6SL3000-0BE41-2AA0
Rated current	A	250	440	600	1200
Power loss	kW	0.049	0.049	0.055	0.137
Line/power connection		1 x hole for M10	1 x hole for M10	1 x hole for M10	1 x hole for M12
Conductor cross-section, max.					
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection	via busbar connection
PE connection		Hole for M8	Hole for M8	Hole for M10	Hole for M10
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	360	360	400	425
• Height	mm	240	240	265	265
• Depth	mm	116	116	140	145
Weight, approx.	kg	12.3	12.3	19	25.2
Approvals		cURus E1283	cURus E1283	cURus E1283	cURus E1283
Suitable for Power Module		6SL3310-1GE32-1AA0 (110 kW)	6SL3310-1GE32-6AA0 (132 kW) 6SL3310-1GE33-1AA0 (160 kW) 6SL3310-1GE33-8AA0 (200 kW)	6SL3310-1GE35-0AA0 (250 kW)	6SL3310-1GE36-1AA0 (315 kW) 6SL3310-1GE37-5AA0 (400 kW) 6SL3310-1GE38-4AA0 (450 kW) 6SL3310-1GE41-0AA0 (560 kW)

Line voltage 500 ... 600 V 3 AC		Line filter 6SL3000-0BG32-5AA0	6SL3000-0BG34-4AA0	6SL3000-0BG36-0AA0	6SL3000-0BG41-2AA0
Rated current	A	250	440	600	1200
Power loss	kW	0.049	0.049	0.055	0.137
Line/power connection		1 x hole for M10	1 x hole for M10	1 x hole for M10	1 x hole for M12
Conductor cross-section, max.					
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection	via busbar connection
PE connection		Hole for M8	Hole for M8	Hole for M10	Hole for M10
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	360	360	400	425
• Height	mm	240	240	265	265
• Depth	mm	116	116	140	145
Weight, approx.	kg	12.3	12.3	19	25.2
Approvals		cURus E1283	cURus E1283	cURus E1283	cURus E1283
Suitable for Power Module		6SL3310-1GF31-8AA0 (110 kW) 6SL3310-1GF32-2AA0 (132 kW)	6SL3310-1GF32-6AA0 (160 kW) 6SL3310-1GF33-3AA0 (200 kW) 6SL3310-1GE34-1AA0 (250 kW)	6SL3310-1GF34-7AA0 (315 kW)	6SL3310-1GF35-8AA0 (400 kW) 6SL3310-1GF37-4AA0 (500 kW) 6SL3310-1GF38-1AA0 (560 kW)

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		Line filter 6SL3000-0BG32-5AA0	6SL3000-0BG34-4AA0	6SL3000-0BG36-0AA0	6SL3000-0BG41-2AA0
Rated current	A	250	440	600	1200
Power loss	kW	0.049	0.049	0.055	0.137
Line/power connection		1 x hole for M10	1 x hole for M10	1 x hole for M10	1 x hole for M12
Conductor cross-section, max.					
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection	via busbar connection
PE connection		Hole for M8	Hole for M8	Hole for M10	Hole for M10
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	360	360	400	425
• Height	mm	240	240	265	265
• Depth	mm	116	116	140	145
Weight, approx.	kg	12.3	12.3	19	25.2
Approvals		cURus E1283	cURus E1283	cURus E1283	cURus E1283
Suitable for Power Module		6SL3310-1GH28-5AA0 (75 kW) 6SL3310-1GH31-0AA0 (90 kW) 6SL3310-1GH31-2AA0 (110 kW) 6SL3310-1GH31-5AA0 (132 kW) 6SL3310-1GH31-8AA0 (160 kW) 6SL3310-1GH32-2AA0 (200 kW)	6SL3310-1GH32-6AA0 (250 kW)	6SL3310-1GH34-7AA0 (450 kW)	6SL3310-1GH35-8AA0 (560 kW) 6SL3310-1GH37-4AA0 (710 kW) 6SL3310-1GH38-1AA0 (800 kW)

Overview

Line harmonics filters reduce the converter's low-frequency harmonic effects to a level that can otherwise only be achieved using 12-pulse rectifiers.

They render the converter compliant with every stringent limit specified in standard IEEE 519-1992.

Design

Line harmonics filters are supplied as stand-alone components in a rugged housing. They are installed between the customer-end low-voltage distribution unit and the converter. The voltage is disconnected and fused in the customer-end low-voltage switchgear, as is the power supply cable.

The line harmonics filters are connected without fans (natural convection). This means that no external auxiliary power supply is required.

The line harmonics filters are equipped with a floating thermostatic switch, which can be monitored externally, for the purpose of monitoring thermal overloads (as a result of insufficient cooling air being fed in, for example).

Note: The converter must have a line reactor in order to use a line harmonics filter.

Selection and ordering data

Suitable for Power Module	Type rating of Power Module at 400 V, 500 V or 690 V	**Line harmonics filter**
	kW	Order No.
380 ... 480 V 3 AC		
6SL3310-1GE33-1AA0	160	**6SL3000-0JE36-1AA0**
6SL3310-1GE33-8AA0	200	
6SL3310-1GE35-0AA0	250	
6SL3310-1GE36-1AA0	315	
6SL3310-1GE37-5AA0	400	**6SL3000-0JE38-4AA0**
6SL3310-1GE38-4AA0	450	
6SL3310-1GE41-0AA0	560	**6SL3000-0JE41-0AA0**
500 ... 600 V 3 AC		
6SL3310-1GF31-8AA0	110	**6SL3000-0JH33-3AA0**
6SL3310-1GF32-2AA0	132	
6SL3310-1GF32-6AA0	160	
6SL3310-1GF33-3AA0	200	
6SL3310-1GF34-1AA0	250	**6SL3000-0JH34-7AA0**
6SL3310-1GF34-7AA0	315	
6SL3310-1GF35-8AA0	400	**6SL3000-0JH35-8AA0**
6SL3310-1GF37-4AA0	500	**6SL3000-0JH38-1AA0**
6SL3310-1GF38-1AA0	560	
660 ... 690 V 3 AC		
6SL3310-1GH31-8AA0	160	**6SL3000-0JH33-3AA0**
6SL3310-1GH32-2AA0	200	
6SL3310-1GH32-6AA0	250	
6SL3310-1GH33-3AA0	315	
6SL3310-1GH34-1AA0	400	**6SL3000-0JH34-7AA0**
6SL3310-1GH34-7AA0	450	
6SL3310-1GH35-8AA0	560	**6SL3000-0JH35-8AA0**
6SL3310-1GH37-4AA0	710	**6SL3000-0JH38-1AA0**
6SL3310-1GH38-1AA0	800	

For additional information about line harmonics filters, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line harmonics filter 6SL3000-0JE36-1AA0	6SL3000-0JE38-4AA0	6SL3000-0JE41-0AA0
Rated current [1]	A	500	700	900
Power loss	kW	1.0	1.5	2.0
Line/power connection				
Conductor cross-section, max.				
• DIN VDE	mm^2	4 × 240	4 × 240	4 × 240
PE connection		3 × M12 stud	3 × M12 stud	3 × M12 stud
Degree of protection		IP21	IP21	IP21
Dimensions				
• Width	mm	600	800	1000
• Height	mm	1700	1700	1700
• Depth	mm	540	540	540
Weight, approx.	kg	460	600	900
Paint finish		RAL 7035	RAL 7035	RAL 7035
Standards		IEEE 519-1992	IEEE 519-1992	IEEE 519-1992
Approvals		CE	CE	CE
Suitable for Power Module		6SL3310-1GE33-1AA0 (160 kW) 6SL3310-1GF33-3AA0 (200 kW) 6SL3310-1GE33-8AA0 (250 kW) 6SL3310-1GE36-1AA0 (315 kW)	6SL3310-1GE37-5AA0 (400 kW) 6SL3310-1GE38-4AA0 (450 kW)	6SL3310-1GE41-0AA0 (560 kW)

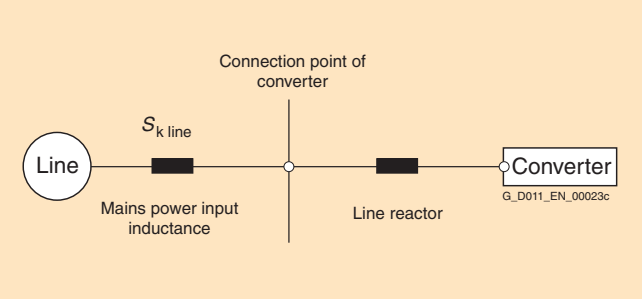
Line voltage 500 ... 600 V 3 AC 660 ... 690 V 3 AC		Line harmonics filter 6SL3000-0JH33-3AA0	6SL3000-0JH34-7AA0	6SL3000-0JH35-8AA0	6SL3000-0JH38-1AA0
Rated current [1]	A	290	400	520	710
Power loss	kW	0.8	1.0	1.5	2.0
Line/power connection					
Conductor cross-section, max.					
• DIN VDE	mm^2	4 × 240	4 × 240	4 × 240	4 × 240
PE connection		3 × M12 stud	3 × M12 stud	3 × M12 stud	3 × M12 stud
Degree of protection		IP21	IP21	IP21	IP21
Dimensions					
• Width	mm	600	800	1000	1000
• Height	mm	1700	1700	1700	1700
• Depth	mm	540	540	540	540
Weight, approx.	kg	450	600	830	830
Paint finish		RAL 7035	RAL 7035	RAL 7035	RAL 7035
Standards		IEEE 519-1992	IEEE 519-1992	IEEE 519-1992	IEEE 519-1992
Approvals		CE	CE	CE	CE
Suitable for Power Module		6SL3310-1GF31-8AA0 (110 kW) 6SL3310-1GF32-2AA0 (132 kW) 6SL3310-1GF32-6AA0 (160 kW) 6SL3310-1GH31-8AA0 (160 kW) 6SL3310-1GF33-3AA0 (200 kW) 6SL3310-1GH32-2AA0 (200 kW) 6SL3310-1GF32-6AA0 (250 kW) 6SL3310-1GH33-3AA0 (315 kW)	6SL3310-1GF34-1AA0 (250 kW) 6SL3310-1GF34-7AA0 (315 kW) 6SL3310-1GH34-1AA0 (400 kW) 6SL3310-1GH34-7AA0 (450 kW)	6SL3310-1GF35-8AA0 (400 kW) 6SL3310-1GH35-8AA0 (560 kW)	6SL3310-1GF37-4AA0 (500 kW) 6SL3310-1GF38-1AA0 (560 kW) 6SL3310-1GH37-4AA0 (710 kW) 6SL3310-1GH38-1AA0 (800 kW)

[1] The rated current of the line harmonics filters is defined according to the active power. It can therefore be lower than the rated input current of the relevant Power Module.

Overview

A line reactor is needed for high system fault levels, partly to protect the actual converter against excessive harmonic currents, and thus against overload, and partly to limit harmonics to the permitted values. The harmonic currents are limited by the complete inductance comprising the line reactor and mains supply cable inductance. Line reactors can be omitted if the mains supply cable inductance is increased sufficiently, i.e., the value of RSC must be sufficiently small.

RSC = Relative Short-Circuit power: Ratio of short-circuit power $S_{k\ line}$ at the line connection point to fundamental apparent output S_{conv} of the connected converters (in accordance with EN 61800-5-1/VDE 0160).



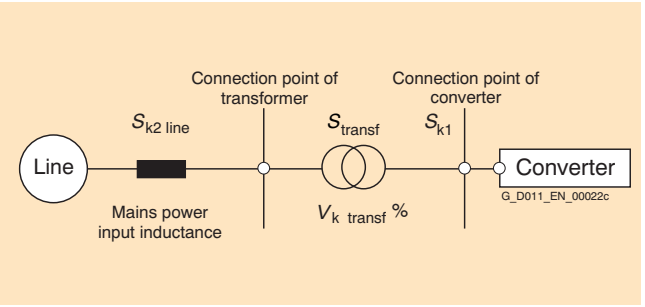
For SINAMICS G130 drive converter chassis units:

Power	Line reactor not required	Line reactor required
kW	for RSC	for RSC
< 200	≤ 43	> 43
200 ... 500	≤ 33	> 33
> 500	≤ 20	> 20

As, in practice, it is not known on which supply configuration individual converters are to be operated, i. e. which supply short-circuit power is present at the converter connection point, it is recommended that a line reactor is connected on the line side of the converter.

A line reactor can only be dispensed with when the value for RSC is less than that in the above table. This is the case when, as shown in the following figure, the converter is connected to the line through a transformer with the appropriate rating.

Attention: A line reactor is always needed, however, if a line filter is used.



In this case, the supply short-circuit power S_{k1} at the converter connection point is approximately:
$S_{k1} = S_{transf} / (V_{k\ transf} + S_{transf} / S_{k2\ line})$

Formula symbol	Meaning
S_{transf}	Transformer power rating
$S_{k\ transf}$	Relative short-circuit power of transformer
$S_{k2\ line}$	Short-circuit power of the higher-level voltage level

Line-side power components
Line reactors

Selection and ordering data

Suitable for Power Module	Type rating of the Power Module	**Line reactor**
	kW	Order No.
380 ... 480 V 3 AC		
6SL3310-1GE32-1AA0	110	**6SL3000-0CE32-3AA0**
6SL3310-1GE32-6AA0	132	**6SL3000-0CE32-8AA0**
6SL3310-1GE33-1AA0	160	**6SL3000-0CE33-3AA0**
6SL3310-1GE33-8AA0	200	**6SL3000-0CE35-1AA0**
6SL3310-1GE35-0AA0	250	
6SL3310-1GE36-1AA0	315	**6SL3000-0CE36-3AA0**
6SL3310-1GE37-5AA0	400	**6SL3000-0CE37-7AA0**
6SL3310-1GE38-4AA0	450	**6SL3000-0CE38-7AA0**
6SL3310-1GE41-0AA0	560	**6SL3000-0CE41-0AA0**
500 ... 600 V 3 AC		
6SL3310-1GF31-8AA0	110	**6SL3000-0CH32-2AA0**
6SL3310-1GF32-2AA0	132	
6SL3310-1GF32-6AA0	160	**6SL3000-0CH32-7AA0**
6SL3310-1GF33-3AA0	200	**6SL3000-0CH33-4AA0**
6SL3310-1GF34-1AA0	250	**6SL3000-0CH34-8AA0**
6SL3310-1GF34-7AA0	315	
6SL3310-1GF35-8AA0	400	**6SL3000-0CH36-0AA0**
6SL3310-1GF37-4AA0	500	**6SL3000-0CH38-4AA0**
6SL3310-1GF38-1AA0	560	
660 ... 690 V 3 AC		
6SL3310-1GH28-5AA0	75	**6SL3000-0CH31-1AA0**
6SL3310-1GH31-0AA0	90	
6SL3310-1GH31-2AA0	110	**6SL3000-0CH31-6AA0**
6SL3310-1GH31-5AA0	132	
6SL3310-1GH31-8AA0	160	**6SL3000-0CH32-2AA0**
6SL3310-1GH32-2AA0	200	
6SL3310-1GH32-6AA0	250	**6SL3000-0CH32-7AA0**
6SL3310-1GH33-3AA0	315	**6SL3000-0CH33-4AA0**
6SL3310-1GH34-1AA0	400	**6SL3000-0CH34-8AA0**
6SL3310-1GH34-7AA0	450	
6SL3310-1GH35-8AA0	560	**6SL3000-0CH36-0AA0**
6SL3310-1GH37-4AA0	710	**6SL3000-0CH38-4AA0**
6SL3310-1GH38-1AA0	800	

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line reactor 6SL3000-0CE32-3AA0	6SL3000-0CE32-8AA0	6SL3000-0CE33-3AA0	6SL3000-0CE35-1AA0
I_{thmax}	A	224	278	331	508
Nominal inductance L_{rated}	µH	76	62	52	42
Power loss	kW	0.274	0.247	0.267	0.365
Line/power connection		1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M12
Conductor cross-section, max.					
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection	via busbar connection
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	270	270	270	300
• Height	mm	248	248	248	269
• Depth	mm	200	200	200	212
Weight, approx.	kg	24.5	26.0	27.8	38
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GE32-1AA0 (110 kW)	6SL3310-1GE32-6AA0 (132 kW)	6SL3310-1GE33-1AA0 (160 kW)	6SL3310-1GE33-8AA0 (200 kW) 6SL3310-1GE35-0AA0 (250 kW)

Line voltage 380 ... 480 V 3 AC		Line reactor 6SL3000-0CE36-3AA0	6SL3000-0CE37-7AA0	6SL3000-0CE38-7AA0	6SL3000-0CE41-0AA0
I_{thmax}	A	628	773	871	1022
Nominal inductance L_{rated}	µH	27	22	19	16
Power loss	kW	0.368	0.351	0.458	0.498
Line/power connection		1 × hole for M12	1 × hole for M12	1 × hole for M12	1 × hole for M12
Conductor cross-section, max.					
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection	via busbar connection
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	300	300	350	350
• Height	mm	269	269	321	321
• Depth	mm	212	212	212	212
Weight, approx.	kg	41.4	51.3	63.2	69.6
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GE36-1AA0 (315 kW)	6SL3310-1GE37-5AA0 (400 kW)	6SL3310-1GE38-4AA0 (450 kW)	6SL3310-1GE41-0AA0 (560 kW)

Technical specifications (continued)

Line voltage 500 ... 600 V 3 AC		Line reactor 6SL3000-0CH32-2AA0	6SL3000-0CH32-2AA0	6SL3000-0CH32-7AA0	6SL3000-0CH33-4AA0
I_{thmax}	A	260	215	270	342
Nominal inductance L_{rated}	µH	150	150	100	81
Power loss	kW	0.24	0.275	0.277	0.27
Line/power connection		1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10
Conductor cross-section, max.					
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection	via busbar connection
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	270	270	270	270
• Height	mm	248	248	248	248
• Depth	mm	200	200	200	200
Weight, approx.	kg	31.1	31.1	27.9	38.9
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GF31-8AA0 (110 kW)	6SL3310-1GF32-2AA0 (132 kW)	6SL3310-1GF32-6AA0 (160 kW)	6SL3310-1GF33-3AA0 (200 kW)

Line voltage 500 ... 600 V 3 AC		Line reactor 6SL3000-0CH34-8AA0	6SL3000-0CH36-0AA0	6SL3000-0CH38-4AA0
I_{thmax}	A	482	597	840
Nominal inductance L_{rated}	µH	65	46	40
Power loss	kW	0.48	0.485	0.618
Line/power connection		1 × hole for M10	1 × hole for M12	1 × hole for M12
Conductor cross-section, max.				
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection
PE connection		M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00
Dimensions				
• Width	mm	350	350	410
• Height	mm	321	321	385
• Depth	mm	232	232	224
Weight, approx.	kg	55.6	63.8	98
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GF34-1AA0 (250 kW) 6SL3310-1GF34-7AA0 (315 kW)	6SL3310-1GF35-8AA0 (400 kW)	6SL3310-1GF37-4AA0 (500 kW) 6SL3310-1GF38-1AA0 (560 kW)

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		Line reactor 6SL3000-0CH31-1AA0	6SL3000-0CH31-6AA0	6SL3000-0CH32-2AA0	6SL3000-0CH32-7AA0
I_{thmax}	A	107	155	230	270
Nominal inductance L_{rated}	µH	310	220	150	100
Power loss	kW	0.252	0.279	0.275	0.277
Line/power connection		1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10
Conductor cross-section, max.					
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection	via busbar connection
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	270	270	270	270
• Height	mm	248	248	248	248
• Depth	mm	200	200	200	200
Weight, approx.	kg	24.4	25.9	31.1	27.9
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GH28-5AA0 (75 kW) 6SL3310-1GH31-0AA0 (90 kW)	6SL3310-1GH31-2AA0 (110 kW) 6SL3310-1GH31-5AA0 (132 kW)	6SL3310-1GH31-8AA0 (160 kW) 6SL3310-1GH32-2AA0 (200 kW)	6SL3310-1GH32-6AA0 (250 kW)

Line voltage 660 ... 690 V 3 AC		Line reactor 6SL3000-0CH33-4AA0	6SL3000-0CH34-8AA0	6SL3000-0CH36-0AA0	6SL3000-0CH38-4AA0
I_{thmax}	A	342	482	597	840
Nominal inductance L_{rated}	µH	81	65	46	40
Power loss	kW	0.27	0.48	0.485	0.618
Line/power connection		1 × hole for M10	1 × hole for M10	1 × hole for M12	1 × hole for M12
Conductor cross-section, max.					
• DIN VDE	mm^2	via busbar connection	via busbar connection	via busbar connection	via busbar connection
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	270	350	350	410
• Height	mm	248	321	321	385
• Depth	mm	200	232	232	224
Weight, approx.	kg	38.9	55.6	63.8	98
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GH33-3AA0 (315 kW)	6SL3310-1GH34-1AA0 (400 kW) 6SL3310-1GH34-7AA0 (450 kW)	6SL3310-1GH35-8AA0 (560 kW)	6SL3310-1GH37-4AA0 (710 W) 6SL3310-1GH38-1AA0 (800 kW)

Line-side power components
Recommended line components

Overview

The table below lists recommended ratings for input-end switching and fuse protection elements for compliance with IEC standards.

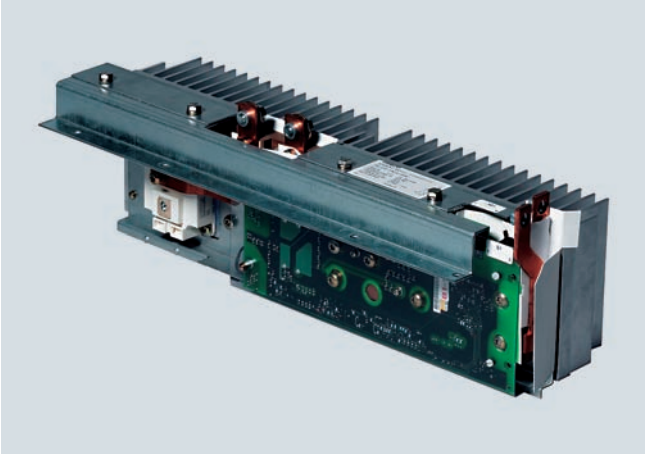
Further information about the line contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1 and LV 1T.

Type rating (at 400 V, 500 V or 690 V)	Rated input current	Suitable for Power Module	**Line contactor**	**Non-withdrawable circuit-breaker**	**Switch disconnector**
kW	A	6SL3310-...	Type	Type	Type
380 ... 480 V 3 AC					
110	229	1GE32-1AA0	**3RT1456-.....**	-	**3KL5530-.....**
132	284	1GE32-6AA0	**3RT1466-.....**	-	**3KL5730-.....**
160	338	1GE33-1AA0	**3RT1466-.....**	-	**3KL5730-.....**
200	395	1GE33-8AA0	**3RT1476-.....**	-	**3KL6130-.....**
250	509	1GE35-0AA0	**3RT1476-.....**	-	**3KL6130-.....**
315	629	1GE36-1AA0	**3RT1476-.....**	-	**3KL6230-.....**
400	775	1GE37-5AA0	**3RT1466-.....** **(3 units)**	-	**3KL6230-.....**
450	873	1GE38-4AA0	-	**3WL1110-...**	-
560	1024	1GE41-0AA0	-	**3WL1112-...**	-
500 ... 600 V 3 AC					
110	191	1GF31-8AA0	**3RT1456-.....**	-	**3KL5530-.....**
132	242	1GF32-2AA0	**3RT1456-.....**	-	**3KL5530-.....**
160	270	1GF32-6AA0	**3RT1466-.....**	-	**3KL5730-.....**
200	343	1GF33-3AA0	**3RT1466-.....**	-	**3KL5730-.....**
250	426	1GF34-1AA0	**3RT1476-.....**	-	**3KL6130-.....**
315	483	1GF34-7AA0	**3RT1476-.....**	-	**3KL6130-.....**
400	598	1GF35-8AA0	**3RT1476-.....**	-	**3KL6230-.....**
500	764	1GF37-4AA0	**3RT1466-.....** **(3 units)**	-	**3KL6230-.....**
560	842	1GF38-1AA0	-	**3WL1210-...**	-
660 ... 690 V 3 AC					
75	93	1GH28-5AA0	**3RT1446-.....**	-	**3KL5230-.....**
90	109	1GH31-0AA0	**3RT1446-.....**	-	**3KL5230-.....**
110	131	1GH31-2AA0	**3RT1446-.....**	-	**3KL5530-.....**
132	164	1GH31-5AA0	**3RT1456-.....**	-	**3KL5530-.....**
160	191	1GH31-8AA0	**3RT1456-.....**	-	**3KL5530-.....**
200	224	1GH32-2AA0	**3RT1456-.....**	-	**3KL5530-.....**
250	270	1GH32-6AA0	**3RT1466-.....**	-	**3KL5730-.....**
315	343	1GH33-3AA0	**3RT1466-.....**	-	**3KL5730-.....**
400	426	1GH34-1AA0	**3RT1476-.....**	-	**3KL6130-.....**
450	483	1GH34-7AA0	**3RT1476-.....**	-	**3KL6130-.....**
560	598	1GH35-8AA0	**3RT1476-.....**	-	**3KL6230-.....**
710	764	1GH37-4AA0	**3RT1466-.....** **(3 units)**	-	**3KL6230-.....**
800	842	1GH38-1AA0	-	**3WL1210-...**	-

Overview (continued)

Type rating	Rated input current	Suitable for Power Module	Cable protection fuse		Cable protection fuse incl. semiconductor protection	
(at 400 V, 500 V or 690 V)				Rated current		Rated current
kW	A	6SL3310-...	Type	A	Type	A
380 ... 480 V 3 AC						
110	229	1GE32-1AA0	**3NA3144**	250	**3NE1230-2**	315
132	284	1GE32-6AA0	**3NA3250**	300	**3NE1331-2**	350
160	338	1GE33-1AA0	**3NA3254**	355	**3NE1334-2**	450
200	395	1GE33-8AA0	**3NA3260**	400	**3NE1334-2**	450
250	509	1GE35-0AA0	**3NA3372**	630	**3NE1436-2**	630
315	629	1GE36-1AA0	**3NA3475**	800	**3NE1438-2**	800
400	775	1GE37-5AA0	**3NA3475**	800	**3NE1448-2**	850
450	873	1GE38-4AA0	**3NA3365**	2 x 500	**3NE1436-2**	2 x 630
560	1024	1GE41-0AA0	**3NA3472**	2 x 630	**3NE1437-2**	2 x 710
500 ... 600 V 3 AC						
110	191	1GF31-8AA0	**3NA3244-6**	250	**3NE1227-2**	250
132	242	1GF32-2AA0	**3NA3252-6**	315	**3NE1230-2**	315
160	270	1GF32-6AA0	**3NA3354-6**	355	**3NE1331-2**	350
200	343	1GF33-3AA0	**3NA3365-6**	500	**3NE1334-2**	500
250	426	1GF34-1AA0	**3NA3365-6**	500	**3NE1334-2**	500
315	483	1GF34-7AA0	**3NA3252-6**	2 × 315	**3NE1435-2**	560
400	598	1GF35-8AA0	**3NA3354-6**	2 × 355	**3NE1447-2**	670
500	764	1GF37-4AA0	**3NA3365-6**	2 × 500	**3NE1448-2**	850
560	842	1GF38-1AA0	**3NA3365-6**	2 × 500	**3NE1334-2**	2 x 500
660 ... 690 V 3 AC						
75	93	1GH28-5AA0	**3NA3132-6**	125	**3NE1022-2**	125
90	109	1GH31-0AA0	**3NA3132-6**	125	**3NE1022-2**	125
110	131	1GH31-2AA0	**3NA3136-6**	160	**3NE1224-2**	160
132	164	1GH31-5AA0	**3NA3240-6**	200	**3NE1225-2**	200
160	191	1GH31-8AA0	**3NA3244-6**	250	**3NE1227-2**	250
200	224	1GH32-2AA0	**3NA3252-6**	315	**3NE1230-2**	315
250	270	1GH32-6AA0	**3NA3354-6**	355	**3NE1331-2**	350
315	343	1GH33-3AA0	**3NA3365-6**	500	**3NE1334-2**	500
400	426	1GH34-1AA0	**3NA3365-6**	500	**3NE1334-2**	500
450	483	1GH34-7AA0	**3NA3252-6**	2 × 315	**3NE1435-2**	560
560	598	1GH35-8AA0	**3NA3354-6**	2 × 355	**3NE1447-2**	670
710	764	1GH37-4AA0	**3NA3365-6**	2 × 500	**3NE1448-2**	850
800	842	1GH38-1AA0	**3NA3365-6**	2 × 500	**3NE1334-2**	2 × 500

Overview



A Braking Module and the matching braking resistor are required when the drive is to be braked or shut down in a controlled manner, e.g. for Emergency Stop.

The Braking Module houses the power electronics and the associated control circuit. The supply voltage for the electronics is taken from the DC link.

During operation, the DC link power is converted into heat loss in an external braking resistor.

The Braking Module works autonomously from the converter control. If more braking power is required than provided by the Braking Modules listed here, then braking units may be connected in parallel circuit for higher converter outputs (on request). In this case, one Braking Module is assigned to each braking resistor.

The activation threshold of the Braking Module can be adjusted using the DIP switch. The braking power values specified in the technical specifications apply to the upper activation threshold.

Design

The Braking Module is installed in a slot inside the Power Module and receives forced ventilation via the Power Module's fan. The Braking Module is connected to the DC link using the busbars or flexible cables supplied with the module.

The Braking Module features the following interfaces as standard:

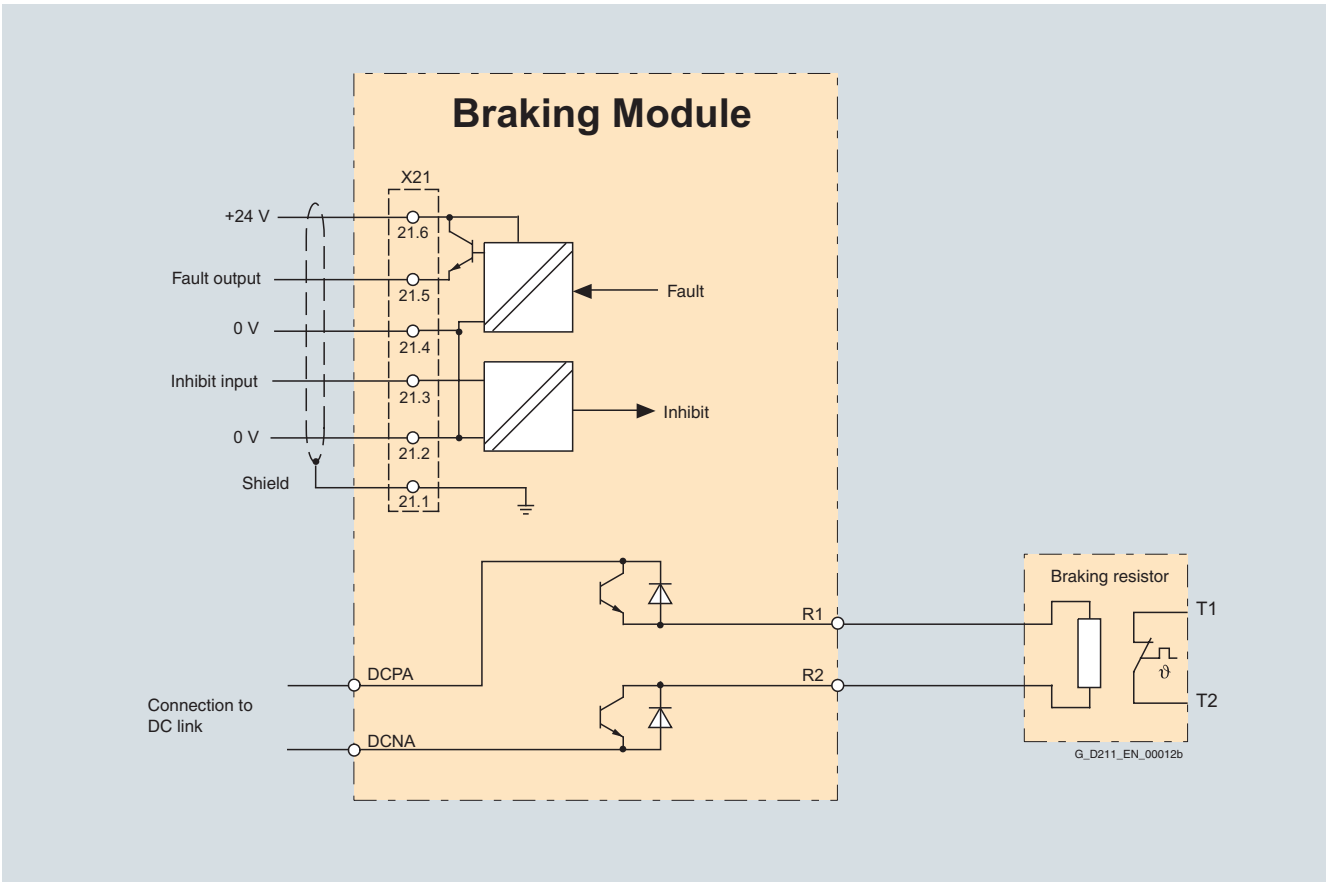
- DC link connection
- Braking resistor connection terminal
- 1 digital input (disable Braking Module/acknowledge faults)
- 1 digital output (fault in Braking Module)
- 1 DIP switch for adjusting the activation threshold

For information about Braking Module activation thresholds and more detailed planning instructions, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

Selection and ordering data

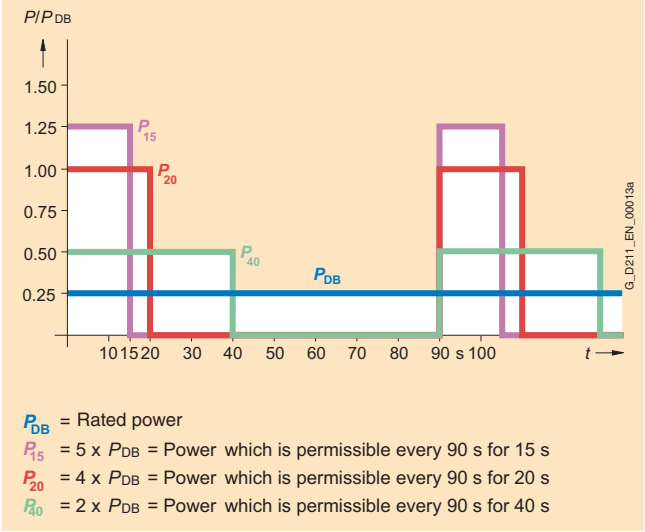
Suitable for Power Module	Type rating of the Power Module	**Braking Module**
	kW	Order No.
380 ... 480 V 3 AC		
6SL3310-1GE32-1AA0	110	**6SL3300-1AE31-3AA0**
6SL3310-1GE32-6AA0	132	
6SL3310-1GE33-1AA0	160	**6SL3300-1AE32-5AA0**
6SL3310-1GE33-8AA0	200	
6SL3310-1GE35-0AA0	250	
6SL3310-1GE36-1AA0	315	**6SL3300-1AE32-5BA0**
6SL3310-1GE37-5AA0	400	
6SL3310-1GE38-4AA0	450	
6SL3310-1GE41-0AA0	560	
500 ... 600 V 3 AC		
6SL3310-1GF31-8AA0	110	**6SL3300-1AF32-5AA0**
6SL3310-1GF32-2AA0	132	
6SL3310-1GF32-6AA0	160	
6SL3310-1GF33-3AA0	200	
6SL3310-1GF34-1AA0	250	**6SL3300-1AF32-5BA0**
6SL3310-1GF34-7AA0	315	
6SL3310-1GF35-8AA0	400	
6SL3310-1GF37-4AA0	500	
6SL3310-1GF38-1AA0	560	
660 ... 690 V 3 AC		
6SL3310-1GH28-5AA0	75	**6SL3300-1AH31-3AA0**
6SL3310-1GH31-0AA0	90	
6SL3310-1GH31-2AA0	110	
6SL3310-1GH31-5AA0	132	
6SL3310-1GH31-8AA0	160	**6SL3300-1AH32-5AA0**
6SL3310-1GH32-2AA0	200	
6SL3310-1GH32-6AA0	250	
6SL3310-1GH33-3AA0	315	
6SL3310-1GH34-1AA0	400	**6SL3300-1AH32-5BA0**
6SL3310-1GH34-7AA0	450	
6SL3310-1GH35-8AA0	560	
6SL3310-1GH37-4AA0	710	
6SL3310-1GH38-1AA0	800	

Integration



Connection diagram for Braking Module

Characteristic curves



P_{DB} = Rated power
P_{15} = 5 x P_{DB} = Power which is permissible every 90 s for 15 s
P_{20} = 4 x P_{DB} = Power which is permissible every 90 s for 20 s
P_{40} = 2 x P_{DB} = Power which is permissible every 90 s for 40 s

Load diagram for Braking Modules and braking resistors

Technical specifications

		Braking Module 6SL3300-1AE31-3AA0	6SL3300-1AE32-5AA0 6SL3300-1AE32-5BA0	6SL3300-1AF32-5AA0 6SL3300-1AF32-5BA0	6SL3300-1AH31-3AA0	6SL3300-1AH32-5AA0 6SL3300-1AH32-5BA0
Line voltage		**380 ... 480 V 3 AC**		**500 ... 600 V 3 AC**	**660 ... 690 V 3 AC**	
P_{DB} rated power	kW	25	50	50	25	50
P_{15} power	kW	125	250	250	125	250
P_{20} power	kW	100	200	200	100	200
P_{40} power	kW	50	100	100	50	100
Digital input						
• Voltage	V	24	24	24	24	24
• Low level (an open digital input is interpreted as "low")	V	-3 ... +5	-3 ... +5	-3 ... +5	-3 ... +5	-3 ... +5
• High level	V	15 ... 30	15 ... 30	15 ... 30	15 ... 30	15 ... 30
• Current consumption at 24 V DC, typ.	mA	10	10	10	10	10
• Conductor cross-section, max.						
- DIN VDE	mm^2	1.5	1.5	1.5	1.5	1.5
Digital output (sustained-short-circuit-proof)						
• Voltage	V	24	24	24	24	24
• Load current of digital output, max.	mA	500	500	500	500	500
• Conductor cross-section, max.						
- DIN VDE	mm^2	1.5	1.5	1.5	1.5	1.5
Design in accordance with		UL and IEC	UL and IEC	UL and IEC	IEC	IEC
R1/R2 connection		M8 nut	M8 nut	M8 nut	M8 nut	M8 nut
Conductor cross-section, max.						
• DIN VDE	mm^2	35	50	50	35	50
Weight, approx.	kg	3.6	7.3 (6SL3300-1AE32-5AA0) 7.5 (6SL3300-1AE32-5BA0)	7.3 (6SL3300-1AF32-5AA0) 7.5 (6SL3300-1AF32-5BA0)	3.6	7.3 (6SL3300-1AH32-5AA0) 7.5 (6SL3300-1AH32-5BA0)
Approvals		CE, cULus E192450	CE, cULus E192450	CE, cULus	CE	CE

Power	
P_{DB}	Rated power (continuous braking power)
$P_{40} = 2 \times P_{DB}$	40 s power related to a braking interval of 90 s
$P_{20} = 4 \times P_{DB}$	20 s power related to a braking interval of 90 s
$P_{15} = 5 \times P_{DB}$	15 s power related to a braking interval of 90 s

Overview

Exess power in the DC link is dissipated via the braking resistor.

The braking resistor is connected to a Braking Module. The braking resistor is positioned outside the cabinet or switchgear room. This enables the resulting heat loss around the Power Modules to be dissipated, thereby allowing a corresponding reduction in the level of air conditioning required.

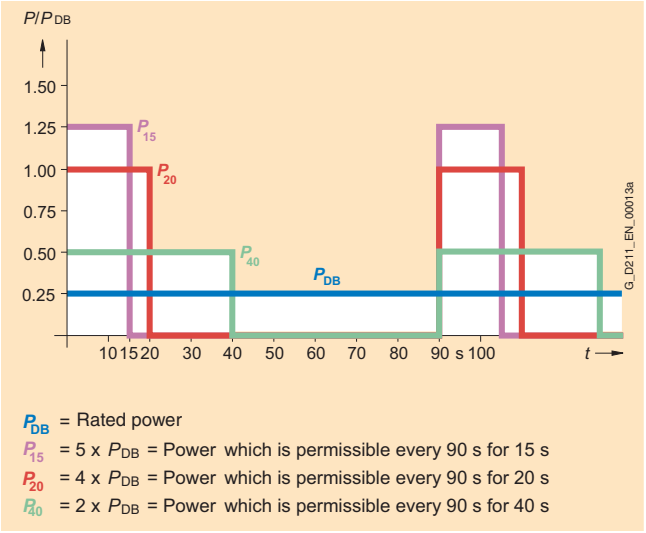
The braking resistor is electronically monitored for excess load and temperature. A temperature switch (NC contact) is also fitted. This responds when the maximum permissible temperature is exceeded and can be evaluated by a controller.

Selection and ordering data

Line voltage of Power Module	P_{DB} rated power of braking resistor	Braking resistor
	kW	Order No.
380 ... 480 V 3 AC	25	**6SL3000-1BE31-3AA0**
	50	**6SL3000-1BE32-5AA0**
500 ... 600 V 3 AC	50	**6SL3000-1BF32-5AA0**
660 ... 690 V 3 AC	25	**6SL3000-1BH31-3AA0**
	50	**6SL3000-1BH32-5AA0**

For information about possible braking resistor load cycles and more detailed planning instructions, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

Characteristic curves



P_{DB} = Rated power
P_{15} = 5 x P_{DB} = Power which is permissible every 90 s for 15 s
P_{20} = 4 x P_{DB} = Power which is permissible every 90 s for 20 s
P_{40} = 2 x P_{DB} = Power which is permissible every 90 s for 40 s

Load diagram for Braking Modules and braking resistors

Technical specifications

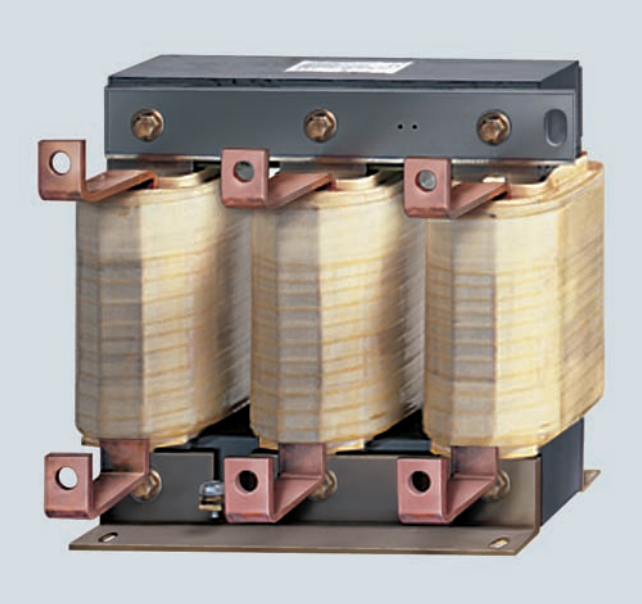
Line voltage 380 ... 480 V 3 AC		**Braking resistor 6SL3000-1BE31-3AA0**	**6SL3000-1BE32-5AA0**
Resistor	Ω	4.4 (±7.5 %)	2.2 (±7.5 %)
P_{DB} rated power (continuous braking power)	kW	25	50
P_{15} power	kW	125	250
P_{20} power	kW	100	200
P_{40} power	kW	50	100
Current, max.	A	189	378
Conductor cross-section, max.			
• DIN VDE	mm^2	50	70
Power connection		M10 stud	M10 stud
Degree of protection		IP20	IP20
Dimensions			
• Width	mm	740	810
• Height	mm	605	1325
• Depth	mm	485	485
Weight, approx.	kg	50	120
Approvals		CE, cURus	CE, cURus

Technical specifications (continued)

Line voltage 500 ... 600 V 3 AC		Braking resistor 6SL3000-1BF32-5AA0
Resistor	Ω	3.4 (±7.5 %)
P_{DB} rated power (continuous braking power)	kW	50
P_{15} power	kW	250
P_{20} power	kW	200
P_{40} power	kW	100
Current, max.	A	255
Conductor cross-section, max.		
• DIN VDE	mm^2	70
Power connection		M10 stud
Degree of protection		IP20
Dimensions		
• Width	mm	810
• Height	mm	1325
• Depth	mm	485
Weight, approx.	kg	120
Approvals		CE, cURus

Line voltage 660 ... 690 V 3 AC		Braking resistor 6SL3000-1BH31-3AA0	6SL3000-1BH32-5AA0
Resistor	Ω	9.8 (±7.5 %)	4.9 (±7.5 %)
P_{DB} rated power (continuous braking power)	kW	25	50
P_{15} power	kW	125	250
P_{20} power	kW	100	200
P_{40} power	kW	50	100
Current, max.	A	125	255
Conductor cross-section, max.			
• DIN VDE	mm^2	50	70
Power connection		M10 stud	M10 stud
Degree of protection		IP20	IP20
Dimensions			
• Width	mm	740	810
• Height	mm	605	1325
• Depth	mm	485	485
Weight, approx.	kg	50	120
Approvals		CE, cURus	CE, cURus

Overview



Motor reactors reduce the voltage load on the motor windings by reducing the voltage gradients on the motor terminals generated when the converter is used. At the same time, the capacitive charge/discharge currents that occur at the converter output when long motor cables are used are reduced. The maximum permissible output frequency when a motor reactor is used is 150 Hz.

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

Selection and ordering data

Suitable for Power Module	Type rating of the Power Module	**Motor reactor**
	kW	Order No.
380 ... 480 V 3 AC		
6SL3310-1GE32-1AA0	110	**6SL3000-2BE32-1AA0**
6SL3310-1GE32-6AA0	132	**6SL3000-2BE32-6AA0**
6SL3310-1GE33-1AA0	160	**6SL3000-2BE33-2AA0**
6SL3310-1GE33-8AA0	200	**6SL3000-2BE33-8AA0**
6SL3310-1GE35-0AA0	250	**6SL3000-2BE35-0AA0**
6SL3310-1GE36-1AA0	315	**6SL3000-2AE36-1AA0**
6SL3310-1GE37-5AA0	400	**6SL3000-2AE38-4AA0**
6SL3310-1GE38-4AA0	450	
6SL3310-1GE41-0AA0	560	**6SL3000-2AE41-0AA0**
500 ... 600 V 3 AC		
6SL3310-1GF31-8AA0	110	**6SL3000-2AH31-8AA0**
6SL3310-1GF32-2AA0	132	**6SL3000-2AH32-4AA0**
6SL3310-1GF32-6AA0	160	**6SL3000-2AH32-6AA0**
6SL3310-1GF33-3AA0	200	**6SL3000-2AH33-6AA0**
6SL3310-1GF34-1AA0	250	**6SL3000-2AH34-5AA0**
6SL3310-1GF34-7AA0	315	**6SL3000-2AH34-7AA0**
6SL3310-1GF35-8AA0	400	**6SL3000-2AH35-8AA0**
6SL3310-1GF37-4AA0	500	**6SL3000-2AH38-1AA0**
6SL3310-1GF38-1AA0	560	
660 ... 690 V 3 AC		
6SL3310-1GH28-5AA0	75	**6SL3000-2AH31-0AA0**
6SL3310-1GH31-0AA0	90	
6SL3310-1GH31-2AA0	110	**6SL3000-2AH31-5AA0**
6SL3310-1GH31-5AA0	132	
6SL3310-1GH31-8AA0	160	**6SL3000-2AH31-8AA0**
6SL3310-1GH32-2AA0	200	**6SL3000-2AH32-4AA0**
6SL3310-1GH32-6AA0	250	**6SL3000-2AH32-6AA0**
6SL3310-1GH33-3AA0	315	**6SL3000-2AH33-6AA0**
6SL3310-1GH34-1AA0	400	**6SL3000-2AH34-5AA0**
6SL3310-1GH34-7AA0	450	**6SL3000-2AH34-7AA0**
6SL3310-1GH35-8AA0	560	**6SL3000-2AH35-8AA0**
6SL3310-1GH37-4AA0	710	**6SL3000-2AH38-1AA0**
6SL3310-1GH38-1AA0	800	

Technical specifications

Line voltage 380 ... 480 V 3 AC		Motor reactor (for pulse frequencies from 2 kHz to 4 kHz)				
		6SL3000-2BE32-1AA0	6SL3000-2BE32-6AA0	6SL3000-2BE33-2AA0	6SL3000-2BE33-8AA0	6SL3000-2BE35-0AA0
Rated current	A	210	260	310	380	490
Power loss	kW	0.486	0.500	0.470	0.500	0.500
Line/power connection		1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M12
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between motor reactor and motor [1]						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00	IP00
Dimensions						
• Width	mm	300	300	300	300	300
• Height	mm	285	315	285	285	365
• Depth	mm	257	277	257	277	277
Weight, approx.	kg	60	66	62	73	100
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GE32-1AA0 (110 kW)	6SL3310-1GE32-6AA0 (132 kW)	6SL3310-1GE33-1AA0 (160 kW)	6SL3310-1GE33-8AA0 (200 kW)	6SL3310-1GE35-0AA0 (250 kW)

Line voltage 380 ... 480 V 3 AC		Motor reactor (for pulse frequencies from 1.25 kHz to 2.5 kHz)			
		6SL3000-2AE36-1AA0	6SL3000-2AE38-4AA0	6SL3000-2AE38-4AA0	6SL3000-2AE41-0AA0
Rated current	A	605	840	840	985
Power loss	kW	0.9	0.84	0.943	1.062
Line/power connection		1 × hole for M12	1 × hole for M12	1 × hole for M12	1 × hole for M12
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between motor reactor and motor [1]					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	410	410	410	410
• Height	mm	392	392	392	392
• Depth	mm	292	292	292	302
Weight, approx.	kg	130	140	140	146
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GE36-1AA0 (315 kW)	6SL3310-1GE37-5AA0 (400 kW)	6SL3310-1GE38-4AA0 (450 kW)	6SL3310-1GE41-0AA0 (560 kW)

[1] Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 500 ... 600 V 3 AC		Motor reactor (for pulse frequencies from 1.25 kHz to 2.5 kHz)				
		6SL3000-2AH31-8AA0	6SL3000-2AH32-4AA0	6SL3000-2AH32-6AA0	6SL3000-2AH33-6AA0	6SL3000-2AH34-5AA0
Rated current	A	175	215	260	330	410
Power loss	kW	0.403	0.425	0.441	0.454	0.545
Line/power connection		1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between motor reactor and motor [1]						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00	IP00
Dimensions						
• Width	mm	300	300	300	300	350
• Height	mm	285	285	285	285	330
• Depth	mm	212	212	212	212	215
Weight, approx.	kg	33	35	40	43	56
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GF31-8AA0 (110 kW)	6SL3310-1GF32-2AA0 (132 kW)	6SL3310-1GF32-6AA0 (160 kW)	6SL3310-1GF33-3AA0 (200 kW)	6SL3310-1GF34-1AA0 (250 kW)

Line voltage 500 ... 600 V 3 AC		Motor reactor (for pulse frequencies from 1.25 kHz to 2.5 kHz)			
		6SL3000-2AH34-7AA0	6SL3000-2AH35-8AA0	6SL3000-2AH38-1AA0	6SL3000-2AH38-1AA0
Rated current	A	465	575	735	810
Power loss	kW	0.723	0.801	0.910	1.003
Line/power connection		1 × hole for M12	1 × hole for M12	1 × hole for M12	1 × hole for M12
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between motor reactor and motor [1]					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	410	410	410	410
• Height	mm	392	392	392	392
• Depth	mm	292	292	279	279
Weight, approx.	kg	80	80	146	146
Approvals		CE, cURus E257859	CE, cURus E257859	CE, cURus E257859	CE, cURus E257859
Suitable for Power Module		6SL3310-1GF34-7AA0 (315 kW)	6SL3310-1GF35-8AA0 (400 kW)	6SL3310-1GF37-4AA0 (500 kW)	6SL3310-1GF38-1AA0 (560 kW)

[1] Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		Motor reactor (for pulse frequencies from 1.25 kHz to 2.5 kHz)						
		6SL3000-2AH31-0AA0	6SL3000-2AH31-0AA0	6SL3000-2AH31-5AA0	6SL3000-2AH31-5AA0	6SL3000-2AH31-8AA0	6SL3000-2AH32-4AA0	6SL3000-2AH32-6AA0
Rated current	A	100	100	150	150	175	215	260
Power loss	kW	0.26	0.3	0.26	0.332	0.403	0.425	0.441
Line/power connection		1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10	1 × hole for M10
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between motor reactor and motor [1]								
• Shielded	m	300	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00	IP00
Dimensions								
• Width	mm	270	270	270	270	300	300	300
• Height	mm	248	248	248	248	285	285	285
• Depth	mm	200	200	200	200	212	212	212
Weight, approx.	kg	26	26	26	26	33	35	40
Approvals		CE	CE	CE	CE	CE	CE	CE
Suitable for Power Module		6SL3310-1GH28-5AA0 (75 kW)	6SL3310-1GH31-0AA0 (90 kW)	6SL3310-1GH31-2AA0 (110 kW)	6SL3310-1GH31-5AA0 (132 kW)	6SL3310-1GH31-8AA0 (160 kW)	6SL3310-1GH32-2AA0 (200 kW)	6SL3310-1GH32-6AA0 (250 kW)

Line voltage 660 ... 690 V 3 AC		Motor reactor (for pulse frequencies from 1.25 kHz to 2.5 kHz)					
		6SL3000-2AH33-6AA0	6SL3000-2AH34-5AA0	6SL3000-2AH34-7AA0	6SL3000-2AH35-8AA0	6SL3000-2AH38-1AA0	6SL3000-2AH38-1AA0
Rated current	A	330	410	465	575	810	810
Power loss	kW	0.454	0.545	0.723	0.801	0.91	1.003
Line/power connection		1 × hole for M10	1 × hole for M10	1 × hole for M12	1 × hole for M12	1 × hole for M12	1 × hole for M12
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between motor reactor and motor [1]							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00
Dimensions							
• Width	mm	300	350	410	410	410	410
• Height	mm	285	330	392	392	392	392
• Depth	mm	212	215	292	292	279	279
Weight, approx.	kg	43	56	80	80	146	146
Approvals		CE	CE	CE	CE	CE	CE
Suitable for Power Module	Type	6SL3310-1GH33-3AA0 (315 kW)	6SL3310-1GH34-1AA0 (400 kW)	6SL3310-1GH34-7AA0 (450 kW)	6SL3310-1GH35-8AA0 (560 kW)	6SL3310-1GH37-4AA0 (710 kW)	6SL3310-1GH38-1AA0 (800 kW)

[1] Longer cable lengths for specific configurations are available on request.

Overview

The dv/dt filter plus VPL consists of two components: the dv/dt reactor and the VPL (**V**oltage **P**eak **L**imiter), which limits voltage peaks and returns the energy to the DC link.

dv/dt filters plus VPL must be used for motors for which the voltage endurance of the insulation system is unknown or insufficient. Standard motors of the 1LA5, 1LA6 and 1LA8 series require them only in cases where the motor has not been specially insulated for operation on a converter (see Catalog D 81.1, chapter "Motors operating with frequency converters").

The dv/dt filters plus VPL limit the rate of voltage rise to values of < 500 V/µs and the typical voltage peaks at rated line voltages to the values below (with motor cable lengths < 150 m):

< 1000 V at V_{line} < 575 V

< 1250 V at 660 V < V_{line} < 690 V.

Note: The maximum permissible cable length between the dv/dt filter plus VPL and the Power Module is 5 m.

Selection and ordering data

Suitable for Power Module	Type rating of the Power Module	**dv/dt filter plus VPL**
	kW	Order No.
380 ... 480 V 3 AC		
6SL3310-1GE32-1AA0	110	**6SL3000-2DE32-6AA0**
6SL3310-1GE32-6AA0	132	
6SL3310-1GE33-1AA0	160	**6SL3000-2DE35-0AA0**
6SL3310-1GE33-8AA0	200	
6SL3310-1GE35-0AA0	250	
6SL3310-1GE36-1AA0	315	**6SL3000-2DE38-4AA0**
6SL3310-1GE37-5AA0	400	
6SL3310-1GE38-4AA0	450	
6SL3310-1GE41-0AA0	560	**6SL3000-2DE41-4AA0**
500 ... 600 V 3 AC		
6SL3310-1GF31-8AA0	110	**6SL3000-2DH32-2AA0**
6SL3310-1GF32-2AA0	132	
6SL3310-1GF32-6AA0	160	**6SL3000-2DH33-3AA0**
6SL3310-1GF33-3AA0	200	
6SL3310-1GF34-1AA0	250	**6SL3000-2DH34-1AA0**
6SL3310-1GF34-7AA0	315	**6SL3000-2DH35-8AA0**
6SL3310-1GF35-8AA0	400	
6SL3310-1GF37-4AA0	500	**6SL3000-2DH38-1AA0**
6SL3310-1GF38-1AA0	560	
660 ... 690 V 3 AC		
6SL3310-1GH28-5AA0	75	**6SL3000-2DH31-0AA0**
6SL3310-1GH31-0AA0	90	
6SL3310-1GH31-2AA0	110	**6SL3000-2DH31-5AA0**
6SL3310-1GH31-5AA0	132	
6SL3310-1GH31-8AA0	160	**6SL3000-2DH32-2AA0**
6SL3310-1GH32-2AA0	200	
6SL3310-1GH32-6AA0	250	**6SL3000-2DH33-3AA0**
6SL3310-1GH33-3AA0	315	
6SL3310-1GH34-1AA0	400	**6SL3000-2DH34-1AA0**
6SL3310-1GH34-7AA0	450	**6SL3000-2DH35-8AA0**
6SL3310-1GH35-8AA0	560	
6SL3310-1GH37-4AA0	710	**6SL3000-2DH38-1AA0**
6SL3310-1GH38-1AA0	800	

For further information about dv/dt filters, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

[1] Protoflex EMC 3 Plus cables comply with the limits for interference voltage and emitted noise specified in the EN 61800-3 standard for use in the second environment. The limits in standard EN 61800-3 correspond to those in standard 55011 Class A Group 2.

Load-side power components
dv/dt filters plus VPL

Technical specifications

Line voltage 380 ... 480 V 3 AC		dv/dt filter plus VPL 6SL3000-2DE32-6AA0	6SL3000-2DE35-0AA0	6SL3000-2DE38-4AA0	6SL3000-2DE41-4AA0
I_{thmax}	A	260	490	840	1405
Degree of protection		IP00	IP00	IP00	IP00
Cable length, max.					
between dv/dt filter and motor [1]					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Approvals		CE, cURus E148698	CE, cURus E148698	CE, cURus E148698	CE, cURus E148698
dv/dt reactor					
Power loss	kW	0.78	0.963	1.226	1.23
Connections					
• to Power Module		1 × M10 hole	1 × M12 hole	1 × M12 hole	2 × M12 hole
• to load		1 × M10 hole	1 × M12 hole	1 × M12 hole	2 × M12 hole
• PE		M6 screw	M6 screw	M6 screw	M6 screw
Dimensions					
• Width	mm	410	460	460	445
• Height	mm	370	370	385	385
• Depth	mm	229	275	312	312
Weight, approx.	kg	66	122	149	158
Voltage Peak Limiter (VPL)					
Power loss	kW	0.104	0.152	0.302	0.525
Connections					
• to dv/dt reactor		M8 nut	Terminals 70 mm^2	1 × M8 hole	1 × M10 hole
• to DC link		M8 nut	Terminals 70 mm^2	1 × M8 hole	1 × M10 hole
• PE		M8 stud	Terminals 35 mm^2	M8 stud	M8 stud
Dimensions					
• Width	mm	263	392	309	309
• Height	mm	265	265	265	265
• Depth	mm	188	210	440	392
Weight, approx.	kg	6	16	48	72
Suitable for Power Module		6SL3310-1GE32-1AA0 (110 kW) 6SL3310-1GE32-6AA0 (132 kW)	6SL3310-1GE33-1AA0 (160 kW) 6SL3310-1GE33-8AA0 (200 kW) 6SL3310-1GE35-0AA0 (250 kW)	6SL3310-1GE36-1AA0 (315 kW) 6SL3310-1GE37-5AA0 (400 kW) 6SL3310-1GE38-4AA0 (450 kW)	6SL3310-1GE41-0AA0 (560 kW)

Note: Two dv/dt reactors are required for Power Modules with a type rating of 560 kW.
The listed technical specifications relate to one dv/dt reactor.

[1] Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 500 ... 600 V 3 AC		dv/dt filter plus VPL 6SL3000-2DH32-2AA0	6SL3000-2DH33-3AA0	6SL3000-2DH34-1AA0	6SL3000-2DH35-8AA0	6SL3000-2DH38-1AA0
I_{thmax}	A	215	330	410	575	810
Degree of protection		IP00	IP00	IP00	IP00	IP00
Cable length, max.						
between dv/dt filter and motor [1]						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
Approvals		CE, cURus E148698	CE, cURus E148698	CE, cURus E148698	CE, cURus E148698	CE, cURus E148698
dv/dt reactor						
Power loss	kW	0.645	0.661	0.884	0.964	0.927
Connections						
• to Power Module		1 × M10 hole	1 × M10 hole	1 × M12 hole	1 × M12 hole	2 × M12 hole
• to load		1 × M10 hole	1 × M10 hole	1 × M12 hole	1 × M12 hole	2 × M12 hole
• PE		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Dimensions						
• Width	mm	460	460	460	460	445
• Height	mm	360	360	385	385	385
• Depth	mm	275	275	312	312	312
Weight, approx.	kg	83	135	147	172	160
Voltage Peak Limiter (VPL)						
Power loss	kW	0.113	0.152	0.189	0.241	0.372
Connections						
• to dv/dt reactor		Terminals 70 mm^2	Terminals 70 mm^2	1 × M8 hole	1 × M8 hole	1 × M10 hole
• to DC link		Terminals 70 mm^2	Terminals 70 mm^2	1 × M8 hole	1 × M8 hole	1 × M10 hole
• PE		Terminals 35 mm^2	Terminals 35 mm^2	M8 stud	M8 stud	M8 stud
Dimensions						
• Width	mm	392	392	309	309	309
• Height	mm	265	265	265	265	265
• Depth	mm	210	210	440	440	392
Weight, approx.	kg	16	16	48	48	72
Suitable for Power Module		6SL3310-1GF31-8AA0 (110 kW)	6SL3310-1GF32-6AA0 (160 kW)	6SL3310-1GF34-1AA0 (250 kW)	6SL3310-1GF34-7AA0 (315 kW)	6SL3310-1GF37-4AA0 (500 kW)
		6SL3310-1GF32-2AA0 (132 kW)	6SL3310-1GF33-3AA0 (200 kW)		6SL3310-1GF35-8AA0 (400 kW)	6SL3310-1GF38-1AA0 (560 kW)

Note: Two dv/dt reactors are required for Power Modules with a type rating of 500 kW and 560 kW.
The listed technical specifications relate to one dv/dt reactor.

[1] Longer cable lengths for specific configurations are available on request.

Load-side power components
dv/dt filters plus VPL

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		dv/dt filter plus VPL 6SL3000-2DH31-0AA0	6SL3000-2DH31-5AA0	6SL3000-2DH32-2AA0	6SL3000-2DH33-3AA0
I_{thmax}	A	100	150	215	330
Degree of protection		IP00	IP00	IP00	IP00
Cable length, max.					
between dv/dt filter and motor [1]					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Approvals		CE, cURus E148698	CE, cURus E148698	CE, cURus E148698	CE, cURus E148698
dv/dt reactor					
Power loss	kW	0.541	0.436	0.645	0.661
Connections					
• to Power Module		1 × M10 hole	1 × M10 hole	1 × M10 hole	1 × M10 hole
• to load		1 × M10 hole	1 × M10 hole	1 × M10 hole	1 × M10 hole
• PE		M6 screw	M6 screw	M6 screw	M6 screw
Dimensions					
• Width	mm	350	350	460	460
• Height	mm	320	320	360	360
• Depth	mm	227	227	275	275
Weight, approx.	kg	48	50	83	135
Voltage Peak Limiter (VPL)					
Power loss	kW	0.053	0.071	0.113	0.152
Connections					
• to dv/dt reactor		M8 nut	M8 nut	Terminals 70 mm^2	Terminals 70 mm^2
• to DC link		M8 nut	M8 nut	Terminals 70 mm^2	Terminals 70 mm^2
• PE		M8 stud	M8 stud	Terminals 35 mm^2	Terminals 35 mm^2
Dimensions					
• Width	mm	263	263	392	392
• Height	mm	265	265	265	265
• Depth	mm	188	188	210	210
Weight, approx.	kg	6	6	16	16
Suitable for Power Module		6SL3310-1GH28-5AA0 (75 kW) 6SL3310-1GH31-0AA0 (90 kW)	6SL3310-1GH31-2AA0 (110 kW) 6SL3310-1GH31-5AA0 (132 kW)	6SL3310-1GH31-8AA0 (160 kW) 6SL3310-1GH32-2AA0 (200 kW)	6SL3310-1GH32-6AA0 (250 kW) 6SL3310-1GH33-3AA0 (315 kW)

[1] Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		dv/dt filter plus VPL 6SL3000-2DH34-1AA0	6SL3000-2DH35-8AA0	6SL3000-2DH38-1AA0
I_{thmax}	A	410	575	810
Degree of protection		IP00	IP00	IP00
Cable length, max.				
between dv/dt filter and motor [1]				
• Shielded	m	300	300	300
• Unshielded	m	450	450	450
Approvals		CE, cURus E148698	CE, cURus E148698	CE, cURus E148698
dv/dt reactor				
Power loss	kW	0.884	0.964	0.927
Connections				
• to Power Module		1 × M12 hole	1 × M12 hole	2 × M12 hole
• to load		1 × M12 hole	1 × M12 hole	2 × M12 hole
• PE		M6 screw	M6 screw	M6 screw
Dimensions				
• Width	mm	460	460	445
• Height	mm	385	385	385
• Depth	mm	312	312	312
Weight, approx.	kg	147	172	160
Voltage Peak Limiter (VPL)				
Power loss	kW	0.189	0.241	0.372
Connections				
• to dv/dt reactor		1 × M8 hole	1 × M8 hole	1 × M10 hole
• to DC link		1 × M8 hole	1 × M8 hole	1 × M10 hole
• PE		M8 stud	M8 stud	M8 stud
Dimensions				
• Width	mm	309	309	309
• Height	mm	265	265	265
• Depth	mm	440	440	392
Weight, approx.	kg	48	48	72
Suitable for Power Module		6SL3310-1GH34-1AA0 (400 kW)	6SL3310-1GH34-7AA0 (450 kW) 6SL3310-1GH35-8AA0 (560 kW)	6SL3310-1GH37-4AA0 (710 kW) 6SL3310-1GH38-1AA0 (800 kW)

Note: Two dv/dt reactors are required for Power Modules with a type rating of 710 kW and 800 kW.
The listed technical specifications relate to one dv/dt reactor.

[1] Longer cable lengths for specific configurations are available on request.

Load-side power components
Sine-wave filters

Overview

Sine-wave filters are available in the voltage range from 380 V to 480 V up to a power of 250 kW and in the voltage range from 500 V to 600 V up to a type rating of 132 kW.

The sine-wave filter at the converter output supplies almost perfect sinusoidal voltages on the motor so that standard motors can be used without special cables or derating. Standard cables can be used. The maximum permissible motor feeder cable length is 300 m. The maximum output frequency is 150 Hz.

Note: The pulse frequency of the converter must be increased when a sine-wave filter is used. This reduces the power available at the converter output (derating factor approx. 0.88). The output voltage control factor is reduced to approximately 85 % (380 V to 480 V) or to approximately 81 % (500 V to 600 V). It must be noted that the reduced voltage at the motor terminals compared to the rated motor voltage means that the motor reaches the field weakening range earlier.

Selection and ordering data

Suitable for Power Module	Type rating of the Power Module	**Sine-wave filter**
	kW	Order No.
380 ... 480 V 3 AC		
6SL3310-1GE32-1AA0	110	**6SL3000-2CE32-3AA0**
6SL3310-1GE32-6AA0	132	
6SL3310-1GE33-1AA0	160	**6SL3000-2CE32-8AA0**
6SL3310-1GE33-8AA0	200	**6SL3000-2CE33-3AA0**
6SL3310-1GE35-0AA0	250	**6SL3000-2CE34-1AA0**
500 ... 600 V 3 AC		
6SL3310-1GF31-8AA0	110	**6SL3000-2CF31-7AA0**
6SL3310-1GF32-2AA0	132	

Technical specifications

Line voltage 380 ... 480 V 3 AC		Sine-wave filter 6SL3000-2CE32-3AA0	6SL3000-2CE32-8AA0	6SL3000-2CE33-3AA0	6SL3000-2CE34-1AA0
Rated current	A	225	276	333	408
Power loss	kW	0.6	0.69	0.53	0.7
Connections					
• Line/load		1 hole for M10	1 hole for M10	1 hole for M10	1 hole for M10
• PE		1 hole for M10	1 hole for M10	1 hole for M10	1 hole for M10
Cable length between sine-wave filter and motor, max.					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	620	620	620	620
• Height	mm	300	300	370	370
• Depth	mm	320	320	360	360
Weight, approx.	kg	124	127	136	198
Approvals		CE, cURus E219022	CE, cURus E219022	CE, cURus E219022	CE, cURus E219022
Suitable for Power Module		6SL3310-1GE32-1AA0 (110 kW) 6SL3310-1GE32-6AA0 (132 kW)	6SL3310-1GE33-1AA0 (160 kW)	6SL3310-1GE33-8AA0 (200 kW)	6SL3310-1GE35-0AA0 (250 kW)

Line voltage 500 ... 600 V 3 AC		Sine-wave filter 6SL3000-2CF31-7AA0
Rated current	A	188
Power loss	kW	0.8
Connections		
• Line/power		1 hole for M10
• PE		1 hole for M10
Cable length between motor reactor and motor, max.		
• Shielded	m	300
• Unshielded	m	450
Degree of protection		IP00
Dimensions		
• Width	mm	620
• Height	mm	370
• Depth	mm	360
Weight, approx.	kg	210
Approvals		CE, cURus E219022
Suitable for Power Module		6SL3310-1GF31-8AA0 (110 kW) 6SL3310-1GF32-2AA0 (132 kW)

Control Unit Kit

Overview

The Control Unit Kit, which consists of the CU320 Control Unit and the drive software installed on the CompactFlash card, provides predefined interfaces that simplify configuration and commissioning. The CompactFlash card is plugged into the CU320, and can be quickly replaced in order to upgrade or install software. The communication, open-loop and closed-loop control functions for the chassis units run in the CU320 Control Unit.

Design

The CU320 Control Unit features the following interfaces as standard:

- 4 x DRIVE-CLiQ sockets for communication with other DRIVE-CLiQ devices, e.g. chassis units or Terminal Modules
- 1 x PROFIBUS interface
- 8 x parameterizable digital inputs (floating)
- 8 x parameterizable bidirectional digital inputs/digital outputs (non-floating), of which 6 are high-speed digital inputs
- 1 x serial RS232 interface
- 1 x slot for the BOP20 Basic Operator Panel
- 1 x option slot
- 3 x test sockets and one reference ground for commissioning support
- 1 x connection for the electronics power supply via the 24 V DC power supply connector
- 1 x PE (protective ground) connection
- 1 x ground connection.

A shield connection for the signal cable shield on the option module is located on the CU320 Control Unit.

The available option slot is used to expand the interfaces for example, to include additional terminals. Multi-color LEDs display the status of the CU320 Control Unit.

Technical specifications

CU320 Control Unit	
Current requirement at 24 V DC, typ. without taking account of digital outputs, option slot expansion	0.8 A
Conductor cross-section, max.	2.5 mm^2
Fuse protection, max.	20 A
Digital inputs	8 x floating digital inputs 8 x bidirectional non-floating digital inputs/digital outputs
• Voltage	-3 V ... + 30 V
• Low level (an open digital input is interpreted as "low")	-3 V ... + 5 V
• High level	15 V ... 30 V
• Power consumption at 24 V DC, typ.	10 mA
• Signal propagation delays for digital inputs, approx. [1]	
- L → H	50 µs
- H → L	100 µs
• Signal propagation delays for high-speed digital inputs, approx.[1] (high-speed digital inputs can be used for position detection)	
- L → H	5 µs
- H → L	50 µs
• Delay time, approx. [1]	150 µs
• Conductor cross-section, max.	0.5 mm^2
Digital outputs (continuously short-circuit-proof)	8 bidirectional non-floating digital outputs/digital inputs
• Voltage	24 V DC
• Load current per digital output, max.	500 mA
• Conductor cross-section, max.	0.5 mm^2
Power loss	20 W
PE connection	M5 screw
Ground connection	M5 screw
Dimensions	
• Width	50 mm
• Height	270 mm
• Depth	226 mm
Weight, approx.	1.5 kg
Approvals	cULus E164110

Selection and ordering data

Description	Order No.
Control Unit Kit consisting of: • CU320 Control Unit • CompactFlash card with the latest firmware • Device documentation on CD-ROM	**6SL3040-0GA00-1AA0**

Accessories

Description	Order No.
PROFIBUS connector without PG/PC connection	**6ES7972-0BA41-0XA0**
PROFIBUS connector with PG/PC connection	**6ES7972-0BB41-0XA0**

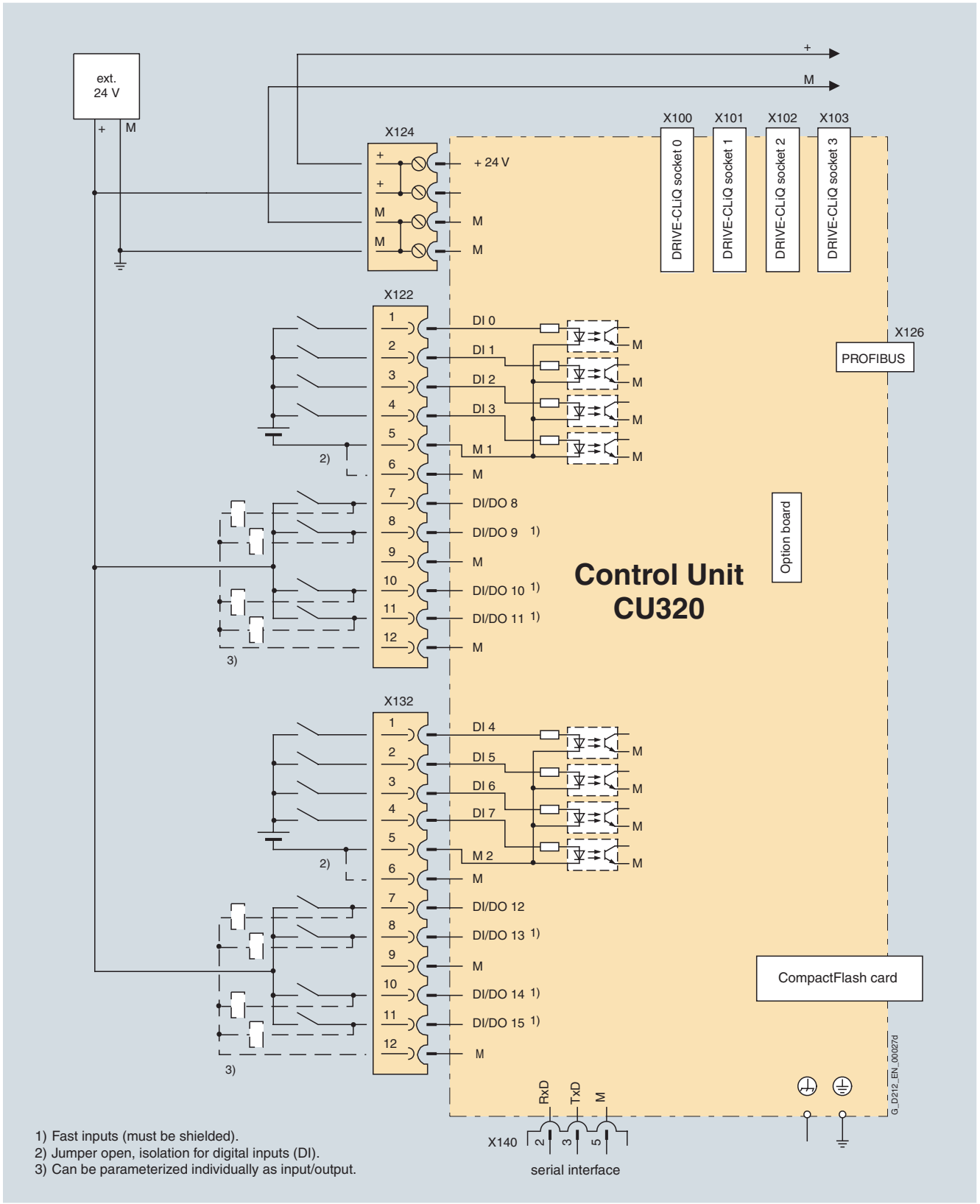
For more detailed information on the CU320 Control Unit, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

[1] The specified delay times refer to the hardware. The actual reaction time depends on the time slice in which the digital input or output is processed.

Integration

Communication between a CU320 Control Unit and the connected components takes place via DRIVE-CLiQ.

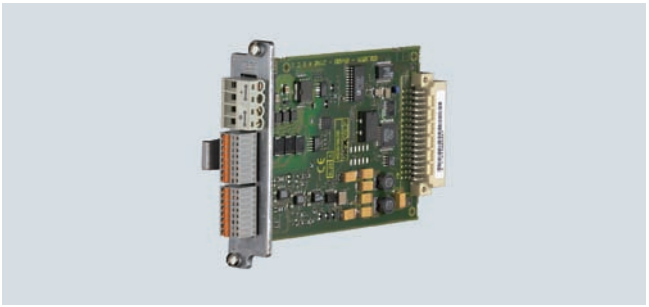
A DRIVE-CLiQ cable for connecting the CU320 to the G130 converter is supplied as standard with the Power Module.



Connection diagram for CU320 Control Unit

Supplementary system components
TB30 Terminal Board

Overview



The TB30 Terminal Board expands the number of digital inputs/digital outputs and analog inputs/analog outputs of the CU320 Control Unit.

Design

The following interfaces are located on the TB30 Terminal Board:

- Power supply for digital inputs/digital outputs
- 4 x digital inputs
- 4 x digital outputs
- 2 x analog inputs
- 2 x analog outputs

The TB30 Terminal Board plugs into the option slot on a Control Unit.

A shield connection for the signal cable shield is located on the CU320 Control Unit.

Selection and ordering data

Description	Order No.
TB30 Terminal Board	**6SL3055-0AA00-2TA0**

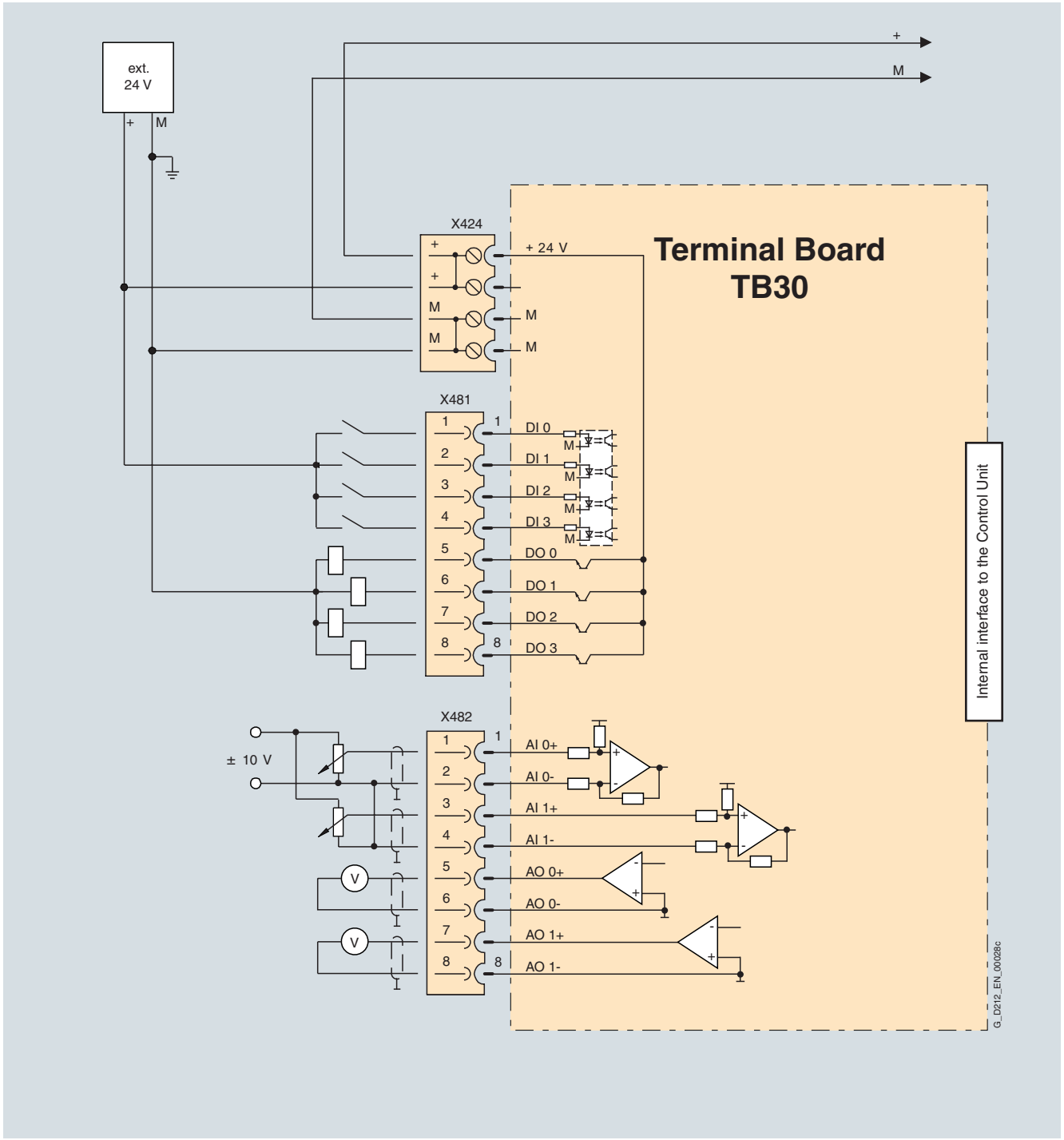
Technical specifications

TB30 Terminal Board	
Current requirement, max. at 24 V DC via CU320 Control Unit without taking account of the digital outputs	0.05 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Digital inputs in accordance with IEC 61131-2 Type 1	
• Voltage	-3 … +30 V
• Low level (an open digital input is interpreted as "low")	-3 … +5 V
• High level	15 … 30 V
• Current consumption at 24 V DC, typ.	10 mA
• Delay time of digital inputs [1], approx.	
- L → H	50 µs
- H → L	100 µs
• Conductor cross-section, max.	0.5 mm^2
Digital outputs (continuously short-circuit-proof)	
• Voltage	24 V DC
• Load current per digital output, max.	500 mA
• Delay time of digital outputs [1], approx.	150 µs
• Conductor cross-section, max.	0.5 mm^2
Analog inputs (difference)	
• Voltage range (an open analog input is interpreted as 0 V)	-10 … +10 V
• Internal resistance R_i	65 kΩ
• Resolution [2]	13 bit + sign
• Conductor cross-section, max.	0,5 mm^2
Analog outputs (continuously short-circuit-proof)	
• Voltage range	-10 … +10 V
• Load current, max.	-3 … +3 mA
• Resolution	11 bit + sign
• Settling time, approx.	200 µs
• Conductor cross-section, max.	0.5 mm^2
Power loss	< 3 W
Weight, approx.	0.1 kg
Approvals	cULus (File No.: E164110)

[1] The specified delay times refer to the hardware. The actual reaction time depends on the time slice in which the digital input/output is processed.

[2] If the analog input is to be operated in the signal processing sense with continuously variable input voltage, the sampling frequency $f_a = 1/t_{time\ slice}$ must be at least twice the value of the highest signal frequency f_{max}.

Integration



Connection example - TB30 Terminal Board

Supplementary system components
TM31 Terminal Module

Overview

With the TM31 Terminal Module, the number of available digital inputs and outputs and the number of analog inputs and outputs within a drive can be expanded.

The TM31 Terminal Module also features relay outputs with changeover contact and a temperature sensor input.

Design

The following interfaces are located on the TM31 Terminal Module:

- 8 x digital inputs
- 4 x bidirectional digital inputs/outputs
- 2 x relay outputs with changeover contact
- 2 x analog inputs
- 2 x analog outputs
- 1 x temperature sensor input (KTY84-130 or PTC)
- 2 x DRIVE-CLiQ sockets
- 1 x connection for the electronics power supply via the 24 V DC power supply connector
- 1 x PE (protective ground) connection

The TM31 Terminal Module can be snapped onto a TH 35 top-hat rail in accordance with EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM31 Terminal Module via a shield connection terminal, e.g. type SK8 from Phoenix Contact or type KLBÜ CO1 from Weidmüller. The shield connection terminal must not be used for strain relief.

The status of the TM31 Terminal Module is indicated via a multi-color LED.

Selection and ordering data

Description	Order No.
TM31 Terminal Module (without DRIVE-CLiQ cable)	**6SL3055-0AA00-3AA0**

Technical specifications

TM31 Terminal Module	
Current requirement, max. at 24 V DC without taking account of digital outputs and DRIVE-CLiQ supply	0.2 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Digital inputs	
• Voltage	-3 … +30 V
• Low level (an open digital input is interpreted as "low")	-3 … +5 V
• High level	15 … 30 V
• Current consumption at 24 V DC, typ.	10 mA
• Delay times of digital inputs [1], approx.	
- L → H	50 µs
- H → L	100 µs
• Conductor cross-section, max.	1.5 mm^2
Digital outputs (continuously short-circuit-proof)	
• Voltage	24 V DC
• Aggregate current of digital outputs, max.	1000 mA
• Delay times of digital outputs [1]	
- typ.	150 µs at 0.5 A resistive load
- max.	500 µs
• Conductor cross-section, max.	1.5 mm^2
Analog inputs	
• As voltage input	
- Voltage range	-10 … +10 V
- Internal resistance R_i	100 kΩ
• As current input	
- Current range	4 … 20 mA, -20 … +20 mA, 0 … 20 mA
- Internal resistance R_i	250 Ω
- Resolution [2]	11 bit + sign
• Conductor cross-section, max.	1.5 mm^2
Analog outputs (continuously short-circuit-proof)	
• Voltage range	-10 … +10 V
• Load current, max.	-3 … +3 mA
• Current range	4 … 20 mA, -20 … +20 mA, 0 … 20 mA
• Load resistance, max.	500 Ω for outputs in the -20 … +20 mA range
• Resolution	11 bit + sign
• Conductor cross-section, max.	1.5 mm^2

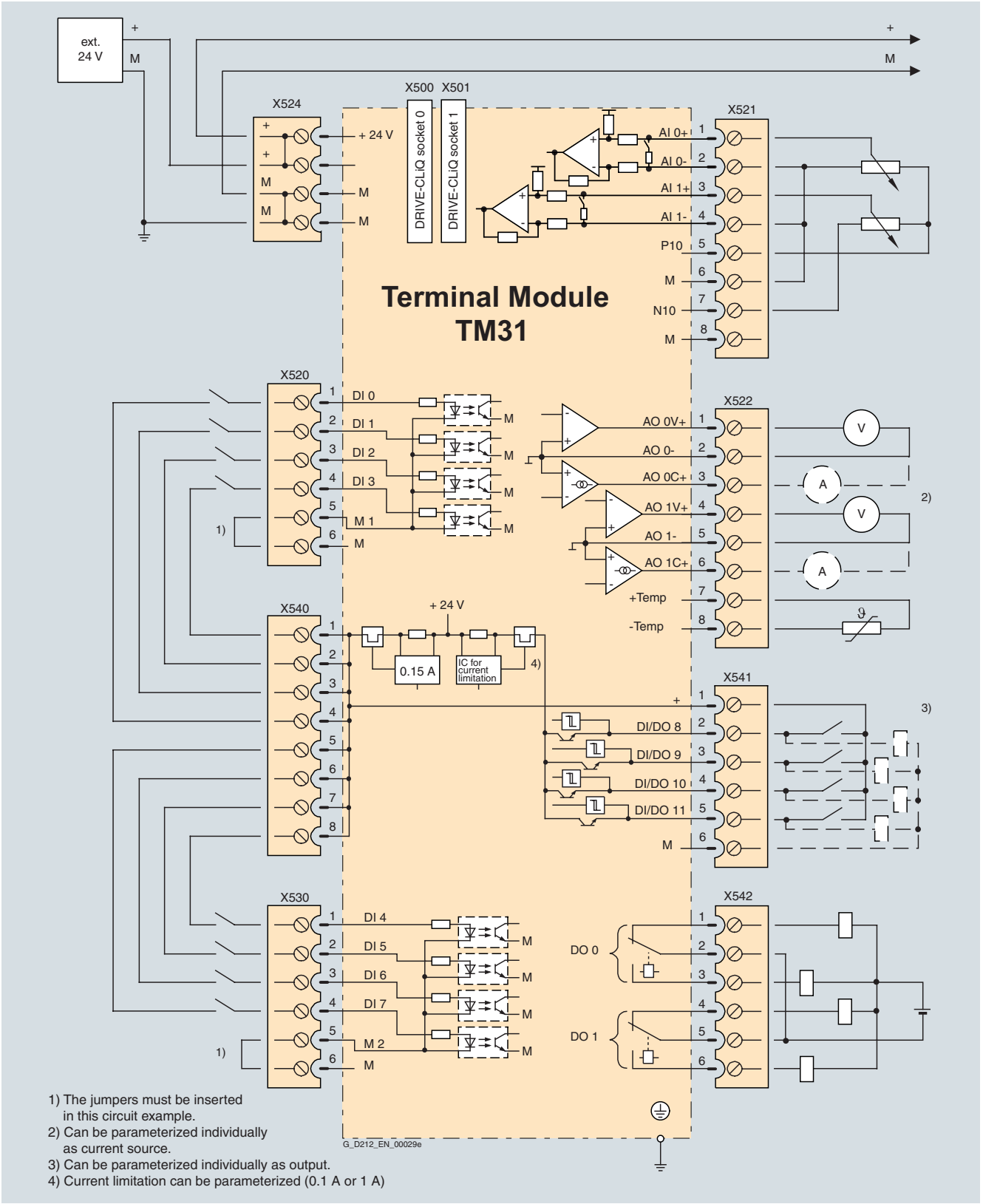
TM31 Terminal Module	
Relay outputs (changeover contacts)	
• Load current, max.	8 A
• Operating voltage, max.	250 V AC, 30 V DC
• Switching capacity, max.	
- at 250 V AC	2000 VA (cos φ = 1) 750 VA (cos φ = 0.4)
- at 30 V DC	240 W (resistive load)
• Required minimum current	100 mA
• Conductor cross-section, max.	2.5 mm^2
Power loss	< 10 W
PE connection	M4 screw
Dimensions	
• Width	50 mm
• Height	150 mm
• Depth	111 mm
Weight, approx.	0.87 kg
Approvals	cULus (File No.: 164110)

[1] The specified delay times refer to the hardware. The actual reaction time depends on the time slice in which the digital input/output is processed.

[2] If the analog input is to be operated in the signal processing sense with continuously variable input voltage, the sampling frequency $f_a = 1/t_{time\ slice}$ must be at least twice the value of the highest signal frequency f_{max}.

Integration

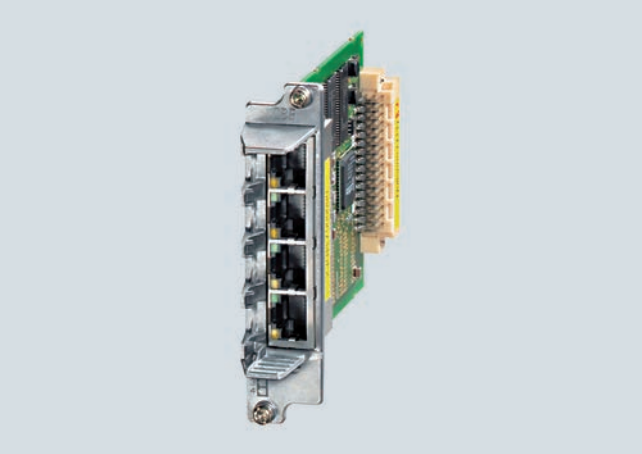
The TM31 Terminal Module communicates with the CU320 Control Unit via DRIVE-CLiQ.



1) The jumpers must be inserted in this circuit example.
2) Can be parameterized individually as current source.
3) Can be parameterized individually as output.
4) Current limitation can be parameterized (0.1 A or 1 A)

Connection example - TM31 Terminal Module

Overview



The CBE20 Communication Board can be used to connect to a PROFINET IO network via a CU320 Control Unit.

The SINAMICS G130 then assumes the function of a PROFINET IO device and can perform the following functions:

- PROFINET IO device
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
  - RT (Real-Time)
  - IRT (Isochronous Real-Time), minimum send cycle 500 µs
- Connects to controls as a PROFINET IO device using PROFIdrive compliant with Specification V4
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 4-port switch with four RJ45 sockets based on the PROFINET ASIC ERTEC400. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

Integration

The CBE20 Communication Board plugs into the option slot on the CU320 Control Unit.

Technical specifications

CBE20 Communication Board	
Ambient temperature, permissible	
• Storage and transport	-40 … +70 °C
• Operation	0 … 55 °C
Approvals	cULus (File No.: E164110)

Selection and ordering data

Description	Order No.
CBE20 Communication Board	**6SL3055-0AA00-2EB0**

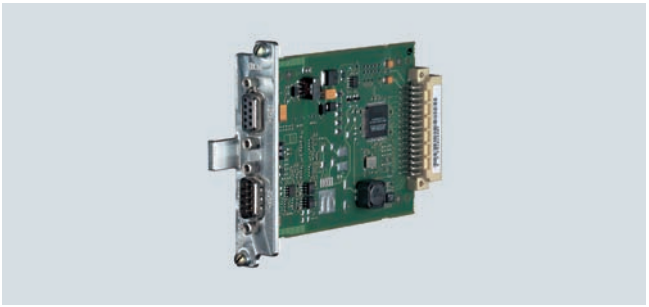
Accessories

Description	Order No.
Industrial Ethernet FC	
• RJ45 plug 145 (1 unit)	**6GK1901-1BB30-0AA0**
• RJ45 plug 145 (10 units)	**6GK1901-1BB30-0AB0**
• Stripping tool	**6GK1901-1GA00**
• Standard cable GP 2x2	**6XV1840-2AH10**
• Flexible cable GP 2x2	**6XV1870-2B**
• Trailing cable GP 2x2	**6XV1870-2D**
• Trailing cable 2x2	**6XV1840-3AH10**
• Marine cable 2x2	**6XV1840-4AH10**

For further information about connectors and cables, please refer to Catalog IK PI.

Supplementary system components
CBC10 Communication Board

Overview



The CBC10 Communication Board is used to interface the CU320 Control Unit to the CAN (Controller Area Network) protocol. The board's driver software fulfills the standards of the following CANopen specification of the CiA organization (CAN in Automation):

- Communication profiles in accordance with DS 301
- Drive profile in accordance with DSP 402 (in this case Profile Velocity Mode)
- EDS (Electronic Data Sheet) in accordance with DSP 306
- Operational status signaling in accordance with DSP 305

Design

The CBC10 Communication Board plugs into the option slot on the CU320 Control Unit. The CAN interface on the CBC10 has 2 SUB-D connections for input and output.

Technical specifications

CBC10 Communication Board	
Current requirement, max. at 24 V DC via CU320 Control Unit	0.05 A
Power loss	< 10 W
Weight, approx.	0.1 kg
Approvals	cULus (File No.: E164110)

Selection and ordering data

Description	Order No.
CBC10 Communication Board	**6SL3055-0AA00-2CA0**

Accessories

Description	Order No.
SUB-D connector, 9-pole, female (3 units)	**6FC9341-2AE**
SUB-D connector, 9-pole, male (3 units)	**6FC9341-2AF**

Overview

The VSM10 Voltage Sensing Module reads the voltage waveshape at the motor end. This allows the SINAMICS G130 converter to be connected to a permanent-field, sensorless synchronous machine (flying restart function).

Design

The VSM10 Voltage Sensing Module features the following interfaces:

- 1 x connection for direct voltage sensing up to 690 V
- 1 x connection for voltage sensing using voltage transformers, maximum voltage 100 V
- 1 x temperature sensor input (KTY84-130 or PTC)
- 1 x DRIVE-CLiQ socket
- 1 x connection for the electronics power supply via the 24 V DC power supply connector
- 1 x PE (protective ground) connection

The VSM10 Voltage Sensing Module can be snapped onto a TH 35 top-hat rail to EN 60715 (IEC 60715).

The status of the VSM10 Voltage Sensing Module is indicated by a two-color LED.

Technical specifications

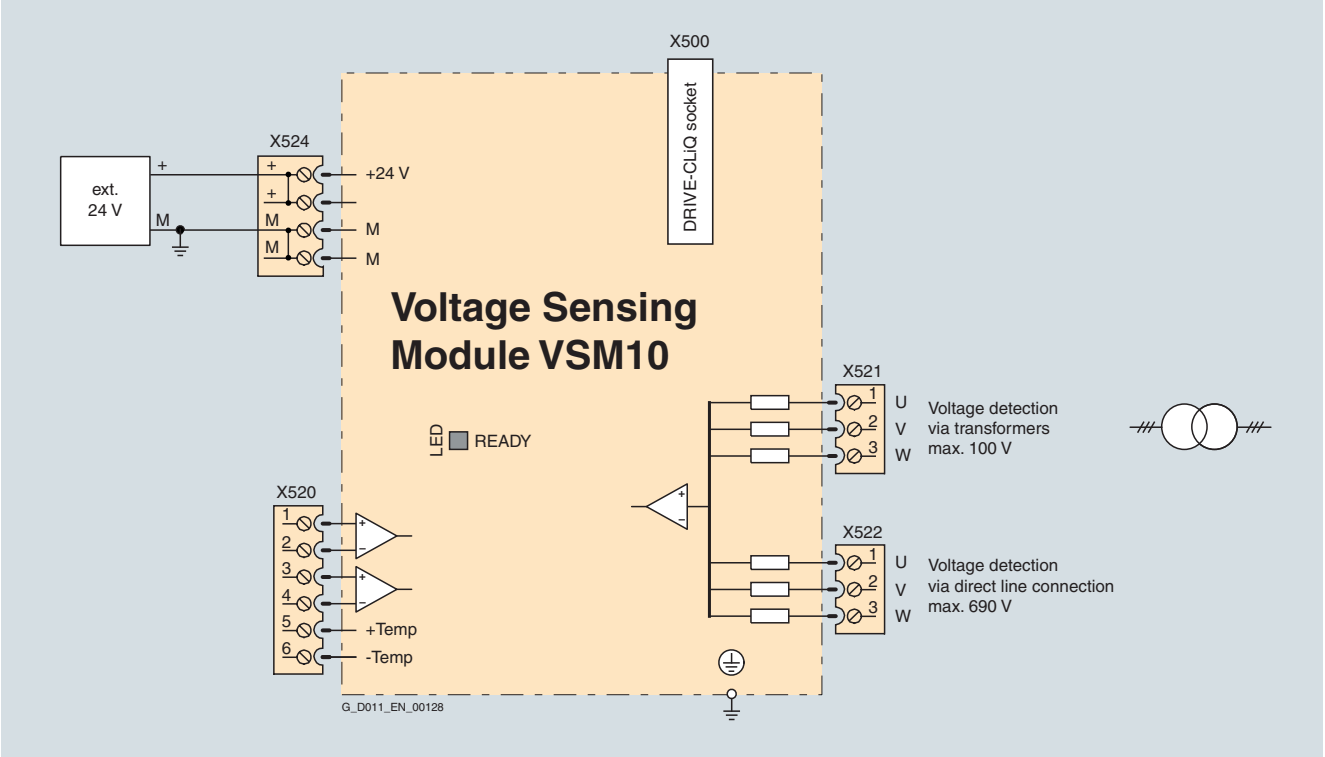
VSM10 Voltage Sensing Module	
Current requirement, max. at 24 V DC	0.15 A
• Conductor cross-section, max.	2.5 mm^2
Power loss, approx.	7.2 W
Voltage sensing	
• Input resistance	
- Terminal X521	> 362 kΩ/phase
- Terminal X522	> 2.5 MΩ/phase
2 analog inputs	
• Internal resistance (between the differential inputs)	approx. 100 kΩ
• Resolution	12 bit
PE connection	On housing with M4 screw
Dimensions	
• Width	50 mm
• Height	150 mm
• Depth	111 mm
Weight, approx.	1.0 kg
Approvals	cULus (File No.: E164110)

Selection and ordering data

Description	Order No.
VSM10 Voltage Sensing Module (without DRIVE-CLiQ cable)	**6SL3053-0AA00-3AA0**

Integration

The VSM10 Voltage Sensing Module communicates with the CU320 Control Unit via DRIVE-CLiQ.



Connection example - VSM10 Voltage Sensing Module

Overview

The SMC30 Sensor Module Cabinet-Mounted is required to evaluate the encoders of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC30.

The following encoder signals can be evaluated:

- Incremental encoders TTL/HTL with/without open-circuit detection (open-circuit detection is only available with bipolar signals)
- SSI encoder with TTL/HTL incremental signals
- SSI encoder without incremental signals

The motor temperature can also be detected using KTY84-130 or PTC thermistors.

Design

The SMC30 Sensor Module Cabinet-Mounted features the following interfaces as standard:

- 1 x DRIVE-CLiQ interface
- 1 x encoder connection including motor temperature detection (KTY84-130 or PTC) via SUB-D connector or terminals
- 1 x connection for the electronics power supply via the 24 V DC power supply connector
- 1 x PE (protective ground) connection

The status of the SMC30 Sensor Module Cabinet-Mounted is indicated via a multi-color LED.

SMC30 Sensor Modules Cabinet-Mounted can be snapped onto a TH 35 top-hat rail in accordance with EN 60715 (IEC 60715).

The maximum encoder cable length between SMC30 Modules and encoders is 100 m. For HTL encoders, this length can be increased to 300 m if signals A+/A- and B+/B- are evaluated and the power supply cable has a minimum cross-section of 0.5 mm^2.

The signal cable shield can be connected to the SMC30 Sensor Module Cabinet-Mounted via a shield connection terminal, e.g. type SK8 from Phoenix Contact or type KLBÜ CO1 from Weidmüller.

Integration

The SMC30 Sensor Module Cabinet-Mounted communicates with a Control Unit via DRIVE-CLiQ.

Technical specifications

SMC30 Sensor Module Cabinet-Mounted	
Current requirement, max. at 24 V DC, without taking account of encoder	0.2 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Power loss	< 10 W
Encoders which can be evaluated	• Incremental encoder TTL/HTL • SSI encoder with TTL/HTL incremental signals • SSI encoder without incremental signals
• Encoder supply	24 V DC / 0.35 A or 5 V DC / 0.35 A
• Encoder frequency, max.	300 kHz
• SSI baud rate	100 … 250 kbaud
• Limiting frequency	300 kHz
• Resolution absolute position SSI	30 bit
• Cable length, max.	
- TTL encoder	100 m (only bipolar signals permitted) [1]
- HTL encoder	100 m for unipolar signals 300 m for bipolar signals [1]
- SSI encoder	100 m
PE connection	M4 screw
Dimensions	
• Width	30 mm
• Height	150 mm
• Depth	111 mm
Weight, approx.	0.45 kg
Approvals	cULus (File No.: E164110)

Selection and ordering data

Description	Order No.
SMC30 Sensor Module Cabinet-Mounted (without DRIVE-CLiQ cable)	**6SL3055-0AA00-5CA2**

[1] Signal cables twisted in pairs and shielded.

Supplementary system components
BOP20 Basic Operator Panel

Overview

BOP20 Basic Operator Panel

The BOP20 Basic Operator Panel can be plugged into the CU320 Control Unit and may be used to acknowledge faults, set parameters and read diagnostic information (e.g. alarms and fault messages).

Design

The BOP20 Basic Operator Panel has a backlit two-line display area and 6 keys.

The integrated plug connector at the rear of the BOP20 Basic Operator Panel supplies its power and enables communication with the CU320 Control Unit.

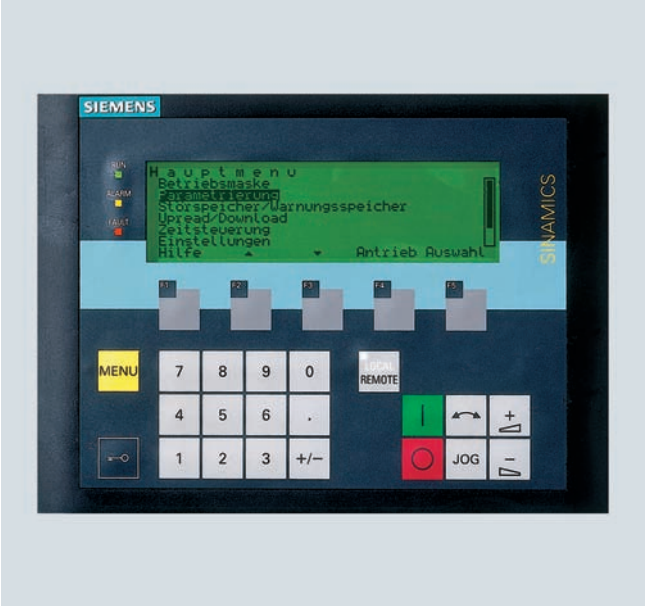
Integration

CU320 Control Unit with attached BOP20 Basic Operator Panel

Selection and ordering data

Description	Order No.
BOP20 Basic Operator Panel	**6SL3055-0AA00-4BA0**

Overview



The user-friendly AOP30 Advanced Operator Panel is an optional input/output device for SINAMICS G130 converters. On the SINAMICS G150 drive converter cabinet units, it is fitted in the cabinet doors as standard. It can be ordered separately for a SINAMICS G130 converter.

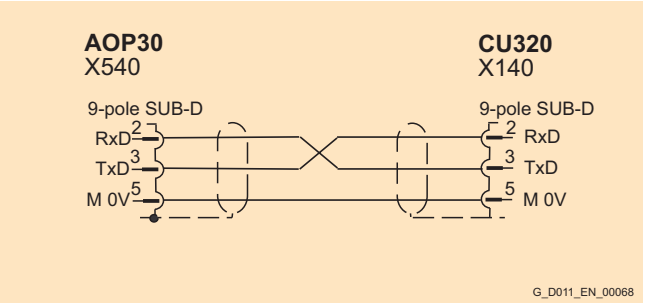
It has the following features and characteristics:

- Graphical LCD display with backlighting for plain text display and a bar display of process variables
- LEDs for display of the operational status
- Help function describing causes of and remedies for faults and alarms
- Keypad for operational control of a drive
- Local/remote switchover for selecting the input point (priority assigned to operator panel or customer's terminal block/communications channel)
- Numeric keypad for input of setpoint or parameter values
- Function keys for prompted navigation in the menu
- Two-stage safety strategy to protect against accidental or unauthorized changes to settings.
  - Operation of the drive from the operator panel can be disabled by a password, ensuring that only parameter values and process variables can be displayed in the panel.
  - A password can be used to prevent the unauthorized modification of converter parameters.
- Front panel with degree of protection IP55.

The AOP30 and SINAMICS drive communicate via the RS232 serial interface and PPI protocol.

The AOP30 may be omitted if the drive is only operated via PROFIBUS, for example, and no local display is required on the cabinet. The AOP30 can then be used simply for commissioning purposes and to obtain diagnostic information, in which case it is plugged into the RS232 interface on the CU320 Control Unit.

An external 24 V power supply (max. power requirement 200 mA) is needed to run the AOP30. This can be tapped off from the Power Module's power supply.



Assignment of the serial plug-in cable

Design

The AOP30 is an operator panel with graphical display and membrane keypad. The device can be installed in a cabinet door with a thickness between 2 mm and 4 mm.

Features:

- Display with green backlighting, resolution: 240 x 64 pixels
- 26-key membrane keyboard
- Connection for a 24 V power supply
- RS232 interface to the CU320
- Time and data are stored by an internal buffer battery
- 3 LEDs to signal the operating state of the drive:
  - RUN green
  - ALARM yellow
  - FAULT red

Function

The current operating states, setpoints and actual values, parameters, indices, faults and alarms are displayed on the display panel.

English, French, German, Italian, Spanish and **Chinese** are stored on the CU320 Control Unit's CompactFlash card as operator panel languages. The desired language must be downloaded to the AOP30 prior to commissioning. **Russian, Polish** and **Czech** are available in addition to these standard panel languages. These can be downloaded free of charge from the Internet under the following link:
http://support.automation.siemens.com/

Selection and ordering data

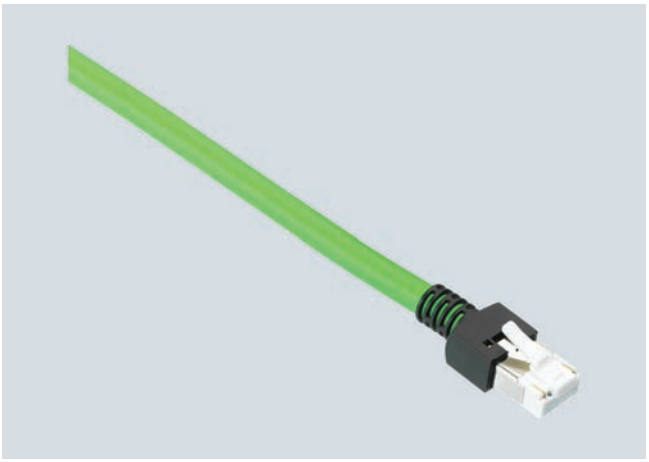
Description	Order No.
AOP30 Advanced Operator Panel	**6SL3055-0AA00-4CA3**

Accessories

RS232 plug-in cable for connecting the AOP to the CU320	Length m	Order No.
	1	**6FX8002-1AA01-1AB0**
	2	**6FX8002-1AA01-1AC0**
	3	**6FX8002-1AA01-1AD0**
	4	**6FX8002-1AA01-1AE0**
	5	**6FX8002-1AA01-1AF0**
	6	**6FX8002-1AA01-1AG0**
	7	**6FX8002-1AA01-1AH0**
	8	**6FX8002-1AA01-1AJ0**
	9	**6FX8002-1AA01-1AK0**
	10	**6FX8002-1AA01-1BA0**

2

Overview



Communication between the CU320 Control Unit, the Power Module and other active SINAMICS components takes place via DRIVE-CLiQ, the drive's internal serial interface. Pre-assembled cables are available for this purpose.

MOTION-CONNECT DRIVE-CLiQ cables

Pre-assembled MOTION-CONNECT cables for DRIVE-CLiQ are available precut to length in order to connect the Control Units to the Power Modules and terminals.

The DRIVE-CLiQ cable needed to connect the Power Module to the Control Unit is already supplied as standard with the Power Module.

Application

The DRIVE-CLiQ cables are only suitable for wiring DRIVE-CLiQ components which have an external 24 V DC power supply.

Serial plug-in cable for connecting the AOP30 to the CU320

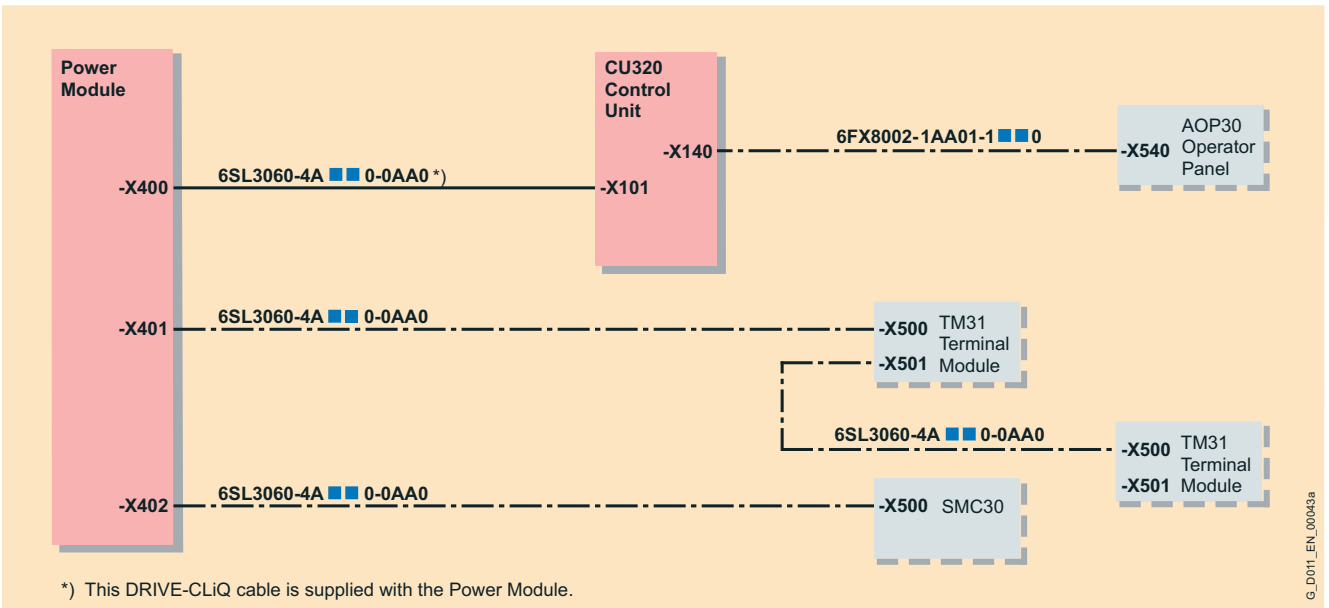
The AOP30 Advanced Operator Panel is connected to the CU320 Control Unit via a serial plug-in cable (RS232C cable).

The maximum cable length is 10 m. To guarantee uninterrupted communication, a shielded cable is recommended, and the cable shield should be connected to both connector housings.

Selection and ordering data

Signal cable	Length m	Order No.
Pre-assembled DRIVE-CLiQ cable Degree of protection of connector IP20/IP20	0.11	**6SL3060-4AB00-0AA0**
	0.16	**6SL3060-4AD00-0AA0**
	0.21	**6SL3060-4AF00-0AA0**
	0.26	**6SL3060-4AH00-0AA0**
	0.36	**6SL3060-4AM00-0AA0**
	0.60	**6SL3060-4AU00-0AA0**
	0.95	**6SL3060-4AA10-0AA0**
	1.20	**6SL3060-4AW00-0AA0**
	1.45	**6SL3060-4AF10-0AA0**
	2.80	**6SL3060-4AJ20-0AA0**
	5.00	**6SL3060-4AA50-0AA0**

Integration

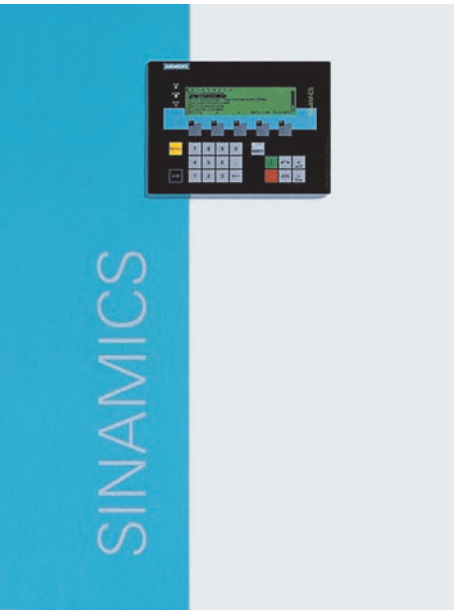


*) This DRIVE-CLiQ cable is supplied with the Power Module.

Connection example – CU320 Control Unit

SINAMICS G150
Drive converter cabinet units

3



SINAMICS G150 cabinet units

Overview

SINAMICS G150 drive converter cabinet units, versions A and C

With its SINAMICS G150 drive converter cabinet units, Siemens is offering a drive system on which all line-side and motor-side components as well as the Power Module are integrated extremely compactly into a specially designed cabinet enclosure. This approach minimizes the effort and expense required to configure and install them.

SINAMICS G150 has been specially tuned to the requirements of drives with quadratic and constant load characteristics, with medium performance requirements and without regenerative feedback.

The control accuracy of the sensorless Vector Control is suitable for most applications, and additional actual speed value encoders are therefore superfluous.

However, the SINAMICS G150 converters are optionally available with an encoder evaluator in order to handle applications that require an encoder for plant-specific reasons.

SINAMICS G150 drive converter cabinet units offer an economic drive solution that can be matched to customers' specific requirements by adding from the wide range of available components and options.

There are two versions of the drive converter cabinet units:

- *Version A*
  All available line connection components, such as the main switch, circuit-breakers, line contactor, line fuses, line filter, motor-side components, and additional monitoring devices, can be installed as required. This version is also available with power units connected in parallel.
- *Version C*
  This offers an extremely space-optimized structure without line-side components. This particularly slimline version can be used, for example, when line connection components are accommodated in a central low-voltage distribution panel (MCC) on the plantside.

The SINAMICS G150 drive converter cabinet units are available for the following voltages and power ranges:

Line voltage	Power range for single circuit (versions A and C)	Power range for parallel circuit (version A)
380 ... 480 V 3 AC	110 ... 560 kW	630 ... 900 kW
500 ... 600 V 3 AC	110 ... 560 kW	630 ... 1000 kW
660 ... 690 V 3 AC	75 ... 800 kW	1000 ... 1500 kW

Degrees of protection are IP20 (standard), and, as an option, IP21, IP23, IP43 and IP54.

Global use

SINAMICS G150 drive converter cabinet units are manufactured in compliance with relevant international standards and regulations, and are therefore suitable for global use (→ Technical specifications).

Benefits

- Particularly quiet and compact converters due to the use of state-of-the-art IGBT power semiconductors and an innovative cooling concept.
- Individual modules and power components can be replaced quickly and easily, which ensures a higher level of plant availability. The design of replaceable components is based on the principle that they must be quick and easy to change. In addition, the "SparesOnWeb" Internet tool makes it easy to view the spare parts that are available for the system components ordered.
- Can be easily integrated in automation solutions due to a communications interface supplied as standard and various analog and digital interfaces.
- Easy commissioning and parameterization using interactive menus on the user-friendly AOP30 Advanced Operator Panel with graphical LCD and plain-text display, or from a PC using the STARTER commissioning tool (→ Tools and configuration)
- Preset software functions make it easier to tailor the converter to the individual plant. For example, the key functions for controlling pumps are stored as a preprogrammed macro in the drive.
- They have been designed as "zoned" units and therefore offer the highest possible standard of operational reliability. EMC measures have been rigorously implemented. With the help of simulated conditions, partitions have been designed to act as air guides and heat dissipation units.
- Special measures used in the construction of the cabinets ensure that they remain mechanically durable throughout their entire life cycle. All components, from individual parts to the ready-to-connect cabinet, undergo rigorous testing throughout the entire production process. This guarantees a high level of functional reliability during installation and commissioning, as well as in operation.

Application

Variable-speed drives are advantageous for all applications that involve moving, conveying, pumping or compressing solids, liquids or gases.

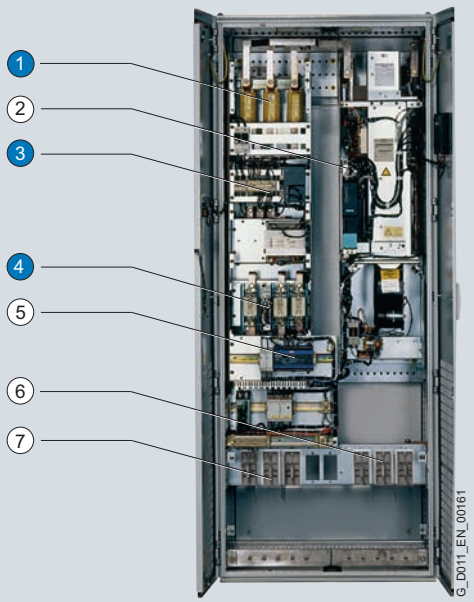
This means the following applications in particular:

- Pumps and fans
- Compressors
- Extruders and mixers
- Mills

Design

SINAMICS G150 drive converter cabinet units are characterized by their compact, modular, and service-friendly design.

A wide range of options is available depending on the cabinet version which permit optimum adaptation of the drive system to the respective requirements (→ Options).

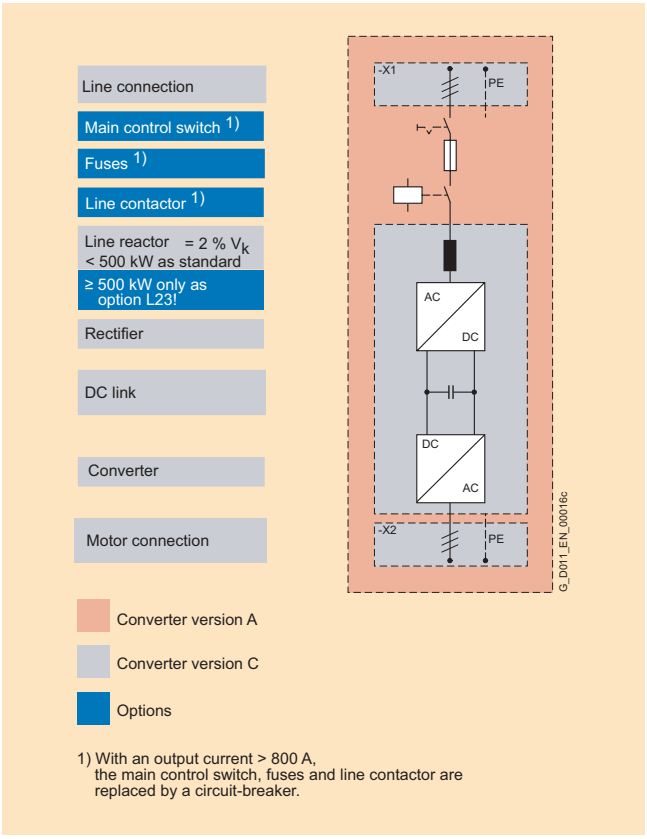


1 Line reactor (< 500 kW standard)
2 PROFIBUS connection
3 Line contactor
4 Main control switch with fuses
5 Customer's terminal block
6 Motor connection
7 Line connection

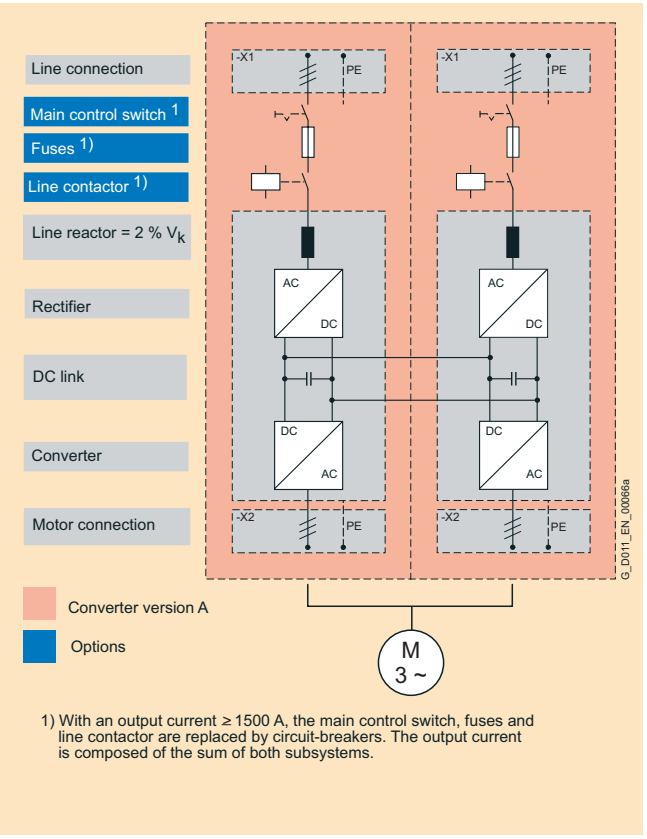
○ Standard version
● Options

Example of design of a SINAMICS G150 drive converter cabinet unit, version A

Design (continued)



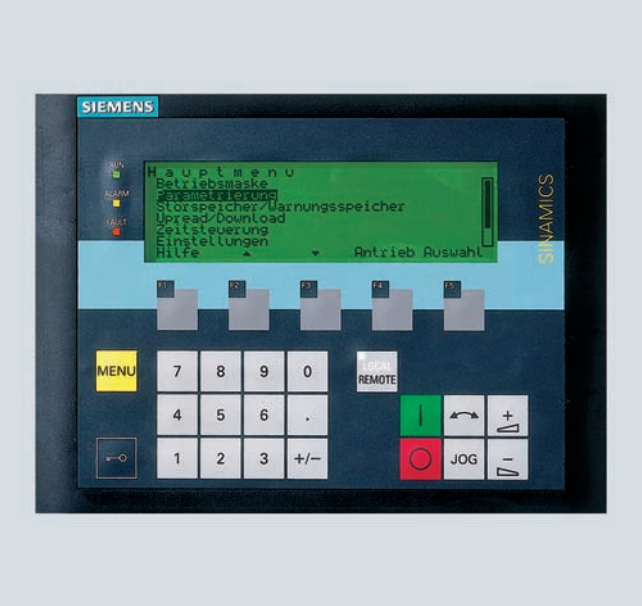
Basic design of a SINAMICS G150 drive converter cabinet unit with a number of version-specific options



Basic design of a SINAMICS G150 drive converter cabinet unit with parallel circuit in order to increase output, with a number of version-specific options

Function

AOP30 Advanced Operator Panel



An AOP30 Advanced Operator Panel is located in the cabinet door of the converter for operation, monitoring and commissioning tasks.

The AOP30's two-stage safety concept prevents unintentional or unauthorized changes to settings. Operation of the drive from the operator panel can be disabled by a password ensuring that only parameter values and process variables can be displayed on the panel. The OFF key is factory-set to active but can also be deactivated by the customer. A password can be used to prevent the unauthorized modification of converter parameters.

The user is guided through the screens for commissioning the drive by the menu-driven display. Only 6 motor parameters (which can be found on the motor rating plate) have to be entered when the AOP30 is commissioned for the first time. The control is then optimized automatically to fine-tune the converter to the motor.

English, French, German, Italian, Spanish and **Chinese** are stored on the CU320 Control Unit's CompactFlash card as operator panel languages. The desired language must be downloaded to the AOP30 prior to commissioning. **Russian, Polish** and **Czech** are available in addition to these standard panel languages. These can be downloaded free of charge from the Internet under the following link:
http://support.automation.siemens.com/

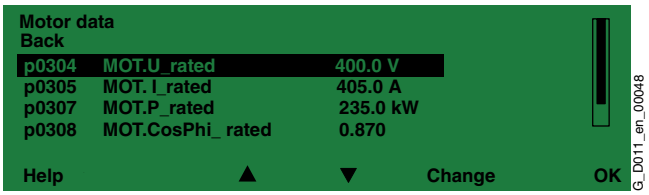
The following pictures show examples of plain-text displays in various operating phases.

First commissioning is carried out using the operator panel.

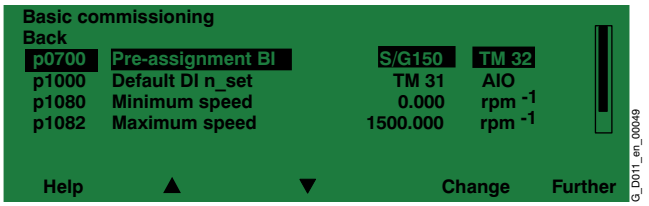
Only 6 motor parameters have to be entered:

power, speed, current, cos phi, voltage and frequency of the motor.

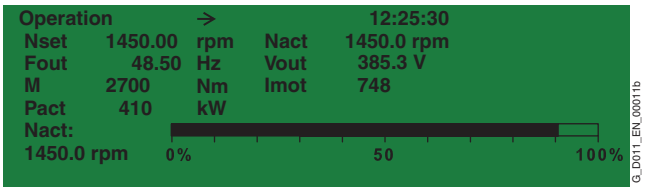
This information can be found on the motor rating plate and is entered into the screens on the display by following a short, menu-driven procedure. The cooling method of the motor must be entered in addition.

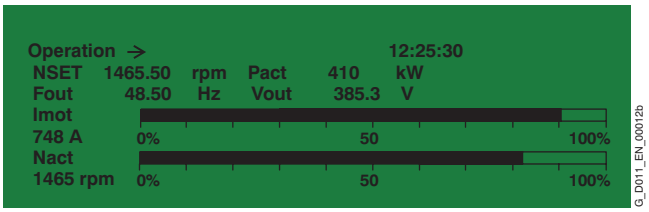


The next screen contains the parameter values that are used to automatically optimize the control.

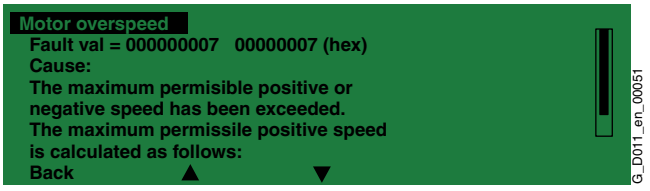


During **operation**, current data are output on the display as absolute values such as setpoint and actual values , or it is possible to parameterize up to 3 process variables as a quasi-analog bar display.





Any **alarms** which occur are signaled by flashing of the yellow "ALARM" LED, **faults** by lighting up of the red "FAULT" LED. There is also an indication of the cause displayed in plain text on the display's status line.



Function (continued)

Communication with higher-level control and customer's terminal block

A communications interface on the CU320 Control Unit and the TM31 Terminal Module and TB30 Terminal Board are provided as standard for use as the customer interface.

You can use this customer's terminal block to connect the system to the higher-level controller using analog and digital signals, or to connect additional units.

To simplify configuration and commissioning of the drive, the TM31 Terminal Module can be preset to a variety of factory default settings.

Open-loop and closed-loop control functions

The converter control contains a high-quality sensorless Vector Control with speed and current controls as well as motor and converter protection.

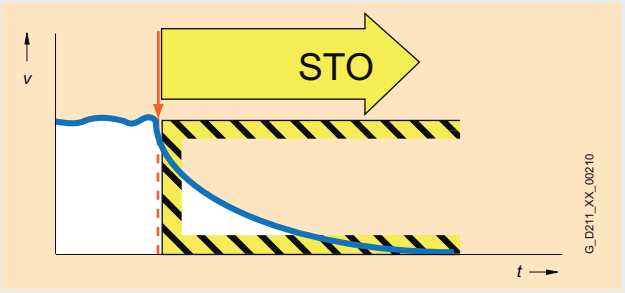
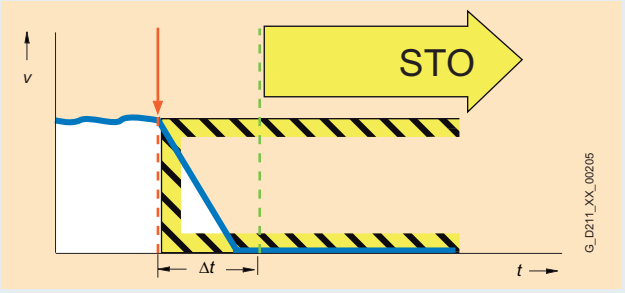
Software and protection functions

The software functions available as standard are described below:

Software and protection functions	
Setpoint input	The setpoint can be defined internally and externally, internally as fixed or motorized potentiometer or jog setpoints, externally via the communications interface or an analog input on the customer's terminal block. The internal fixed setpoint and the motorized potentiometer setpoint can be switched over or adjusted using control commands via all interfaces.
Motor identification	Automatic motor identification permits fast and simple commissioning and optimization of the drive control.
Ramp-function generator	A user-friendly ramp-function generator with separately adjustable ramp-up and ramp-down times, together with adjustable rounding times in the lower and upper speed ranges, improves the control response and therefore prevents mechanical overloading of the drive train. The ramp-down ramps can be parameterized separately for emergency stop.
$V_{dc\ max}$ controller	The $V_{dc\ max}$ controller automatically prevents overvoltages in the DC link if the set ramp-down ramp is too short, for example. This may also extend the set ramp-down time.
Kinetic buffering (KIP)	Line voltage failures are bridged to the extent permitted by the kinetic energy of the drive train. The speed drops depending on the moment of inertia and load torque. The current speed setpoint is resumed when the line voltage returns.
Automatic restart [1]	The automatic restart switches the drive on again when the power is restored after a power failure, and ramps up to the current speed setpoint.
Flying restart [1]	The flying restart permits bumpless connection of the converter to a rotating motor.
Technology controller	The "technology controller's" function module allows simple control functions to be implemented, e.g. level control or volumetric flow control. The technology controller is designed as a PID controller, whereby the differentiator can be switched to the control deviation channel or the actual value channel (factory setting). The P, I, and D components can be set separately.
Free function blocks	Using the freely programmable function blocks, it is easy to implement logic and arithmetic functions for controlling the SINAMICS G150 unit. The blocks can be programmed by means of an operator panel or the STARTER commissioning tool.
Drive Control Chart (DCC)	Drive Control Chart (DCC) is an additional tool for the easy configuration of process-oriented functions for the SINAMICS G150. The block library contains a large selection of control, arithmetic and logic blocks as well as extensive open-loop and closed-loop control functions. The user-friendly DCC editor enables easy graphical configuration and a clear representation of control loop structures as well as a high degree of reusability of existing diagrams. DCC is an add-on to the STARTER commissioning tool (→ Tools and configuration).
I^2t detection for motor protection	The motor temperature is calculated in a motor model stored in the converter software, taking into account the current speed and load. More exact sensing of the temperature, also taking into account the influence of the ambient temperature, is possible by means of direct temperature sensing using KTY84 sensors in the motor winding.
Evaluation of motor temperature	Motor protection by evaluating a KTY84 or PTC temperature sensor. When a KTY84 sensor is connected, the limit values can be set for alarm or shutdown. When connecting a PTC thermistor, the reaction following triggering of it (alarm or shutdown) can be defined.
Motor blocking protection	A blocked motor is recognized and protected against thermal overloading by shutting down.

[1] Factory setting: not activated (can be parameterized)

Function (continued)

Safety Integrated	
Safe Torque Off (STO)	Description of functions This function prevents the drive from restarting unexpectedly in accordance with EN 60204-1, Section 5.4. Safe Torque Off disables the drive pulses and disconnects the power supply to the motor (corresponds to Stop Category 0 of EN 60204-1). The drive is reliably torque-free. This state is monitored internally in the drive. Application, customer benefits STO has the immediate effect that the drive cannot supply any torque-generating energy. STO can be used wherever the drive will reach a standstill in a sufficiently short time based on the load or when coasting down of the drive will not have any relevance for safety. 
Safe Stop 1 (SS1)	Description of functions The Safe Stop 1 function can safely stop the drive in accordance with EN 60204-1, Stop Category 1. When the SS1 function is selected, the drive brakes along a quick stop ramp (OFF3) and automatically activates the Safe Torque Off when the parameterized safety delay timer runs down. Application, customer benefits When the stop function is activated and it does not come to a halt quickly enough due to the load inertia, it can be actively braked by the converter. This integrated quick braking function eliminates the need for costly mechanical brakes that are subject to wear.  The Safety Integrated functions STO and SS1 of SINAMICS G150 are certified by independent institutes. The appropriate external test certificates and manufacturer declarations are available from the Siemens representatives, as well as at http://support.automation.siemens.com/WW/view/en/23158850
Terminal module for controlling functions STO and SS1 (option K82)	The integrated safety functions, starting from the Safety Integrated (SI) input terminals of the SINAMICS components (Control Unit, Power Module), satisfy the requirements specified in the Machinery Directive 98/37/EC, EN 60204-1, DIN EN ISO13849-1 Category 3 (formerly EN 954-1) for Performance Level (PL) d and IEC 61508 SIL2. These are certified by the BGIA. In combination with option K82, the safety functions comply with Machinery Directive 98/37/EC, EN 60204-1 and DIN EN ISO 13849-1 Category 3 (formerly EN 954-1) for Performance Level (PL) d.
Power unit protection	
Ground fault monitoring on the output side	A ground fault on the output side is detected by aggregate current monitoring and results in shutdown in grounded networks.
Electronic short-circuit protection on output side	A short-circuit (e.g. on the converter output terminals, in the motor cable or in the motor's terminal box) is detected on the output side and the converter switches off with a fault.
Thermal overload protection	A warning message is issued first when the overtemperature threshold responds. If the temperature rises further, either a shutdown is carried out or an automatic influencing of the pulse frequency or output current takes place so that a reduction in the thermal load is achieved. After elimination of the cause of the fault (e.g. improvement in the ventilation), the original operating values are automatically resumed.

75 kW to 1500 kW

Technical specifications

Electrical data	Single circuit	Parallel circuit
Line voltages and power ranges	• 380 ... 480 V 3 AC, ±10 % (-15 % < 1 min) 110 ... 560 kW	630 ... 900 kW
	• 500 ... 600 V 3 AC, ±10 % (-15 % < 1 min) 110 ... 560 kW	630 ... 1000 kW
	• 660 ... 690 V 3 AC, ±10 % (-15 % < 1 min) 75 ... 800 kW	1000 ... 1500 kW
Types of supplies	TN/TT systems or isolated systems (IT systems)	
Line frequency	47 ... 63 Hz	
Output frequency	0 ... 300 Hz	
Power factor		
- Fundamental mode	> 0.98	
- Total	0.93 ... 0.96	
Converter efficiency	> 98 %	
Control method	Vector Control with and without sensor or *V/f* control	
Fixed speeds	15 fixed speeds plus 1 minimum speed, parameterizable (in the default setting, 3 fixed setpoints plus 1 minimum speed are selectable using terminal block/PROFIBUS)	
Skipped speed ranges	4, parameterizable	
Setpoint resolution	0.001 rpm digital 12 bit analog	
Braking operation	Optional via braking unit	
Mechanical data		
Degree of protection	IP20 (higher degrees of protection up to IP54 optional)	
Protection class I	In accordance with EN 50178 Part 1 [1]	
Cooling method	Forced air cooling AF in accordance with EN 60146	
Sound pressure level L_{pA} (1 m)	≤ 72 dB at 50 Hz line frequency	≤ 75 dB
Shock protection	BGV A3	
Cabinet system	Rittal TS 8, doors with double-barb lock, three-section base plates for cable entry	
Paint finish	RAL 7035 (indoor requirements)	
Compliance with standards		
Standards	EN 50178 [1] EN 60146-1, EN 61800-2, EN 61800-3, EN 60204-1, EN 60529 [2]	
CE marking	In accordance with EMC directive No. 2004/108/EC and low-voltage directive No. 2006/95/EC	
EMC conformance	The SINAMICS G150 converter systems are not designed for connection to the public power network ("First environment"). EMC conformance is compliant with the EMC product standard for variable-speed drives EN 61800-3, "Second environment" (industrial networks). The equipment can cause electromagnetic interference when it is connected to the public network. If supplementary measures are taken, (e.g. line filters, → option L00), it can also be operated in the "First environment".	

Ambient conditions	Storage	Transport	Operation
Ambient temperature	-25 ... +55 °C	-25 ... +70 °C from -40 °C for 24 hours	0 ... +40 °C up to +50 °C see derating data
Relative humidity [2] (non-condensing)	5 ... 95 % Class 1K4 to EN 60721-3-1	5 ... 95 % at 40 °C Class 2K3 to EN 60721-3-2	5 ... 95 % Class 3K3 to EN 60721-3-3
Environmental class/harmful chemical substances [2]	Class 1C2 to EN 60721-3-1	Class 2C2 to EN 60721-3-2	Class 3C2 to EN 60721-3-3
Organic/biological influences [2]	Class 1B1 to EN 60721-3-1	Class 2B1 to EN 60721-3-2	Class 3B1 to EN 60721-3-3
Installation altitude	Up to 2000 m above sea level without derating, > 2000 m see derating data		

Strain resistance	Storage	Transport	Operation
Vibratory load [2]			
- Deflection	1.5 mm at 5 ... 9 Hz	3.1 mm at 5 ... 9 Hz	0.075 mm at 10 ... 58 Hz
- Acceleration	5 m/s^2 at > 9 ... 200 Hz Class 1M2 to EN 60721-3-1	10 m/s^2 at > 9 ... 200 Hz Class 2M2 to EN 60721-3-2	10 m/s^2 at > 58 ... 200 Hz –
Shock load [2]			
- Acceleration	40 m/s^2 at 22 ms Class 1M2 to EN 60721-3-1	100 m/s^2 at 11 ms Class 2M2 to EN 60721-3-2	100 m/s^2 at 11 ms Class 3M4 to EN 60721-3-3

Deviations from the defined classes are identified by underlining.

[1] The EN standard specified is the European edition of international standard IEC 62103.

[2] The EN standards specified are the European editions of the international IEC standards with the same designations.

Technical specifications (continued)

Derating data

Compensation of current derating as a function of installation altitude/ambient temperature

If the SINAMICS G150 drive converter cabinet units are operated at an **installation altitude > 2000 m** above sea level, factors relating to a reduction of the maximum permissible output current (derating) must be taken into account. These are specified in the tables below. It must be ensured that the air flow corresponds to the rate specified in the technical specifications tables. The specified values already include a permitted correction between installation altitude and ambient temperature (incoming air temperature at the inlet to the drive converter cabinet unit).

Installation altitude above sea level	**Current derating** at an ambient temperature of						
m	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0-2000						95.0 %	87.0 %
2001-2500					96.3 %	91.4 %	83.7 %
2501-3000		100 %		96.2 %	92.5 %	87.9 %	80.5 %
3001-3500			96.7 %	92.3 %	88.8 %	84.3 %	77.3 %
3501-4000		97.8 %	92.7 %	88.4 %	85.0 %	80.8 %	74.0 %

Current derating depending on ambient temperature (inlet-air temperature) and installation altitude for cabinet units with degree of protection IP20, IP21, IP23 and IP43

Installation altitude above sea level	**Current derating** at an ambient temperature of						
m	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0-2000					95.0 %	87.5 %	80.0 %
2001-2500		100 %		96.3 %	91.4 %	84.2 %	77.0 %
2501-3000			96.2 %	92.5 %	87.9 %	81.0 %	74.1 %
3001-3500		96.7 %	92.3 %	88.8 %	84.3 %	77.7 %	71.1 %
3501-4000	97.8 %	92.7 %	88.4 %	85.0 %	80.8 %	74.7 %	68,0 %

Current derating depending on ambient temperature (inlet-air temperature) and installation altitude for cabinet units with degree of protection IP54

Voltage derating as a function of installation altitude

In addition to current derating, voltage derating must be considered in accordance with the following table with **installation altitudes > 2000 m** above sea level.

Installation altitude above sea level	**Voltage derating** for a rated input voltage of												
m	380 V	400 V	420 V	440 V	460 V	480 V	500 V	525 V	550 V	575 V	600 V	660 V	690 V
0-2000												100 %	
2001-2250						96 %							96 %
2251-2500					98 %	94 %						98 %	94 %
2501-2750		100 %		98 %	94 %	90 %			100 %			94 %	90 %
2751-3000				95 %	91 %	88 %						91 %	88 %
3001-3250			97 %	93 %	89 %	85 %					98 %	89 %	85 %
3251-3500		98 %	93 %	89 %	85 %	82 %				98 %	94 %	85 %	82 %
3501-3750		95 %	91 %	87 %	83 %	79 %			98 %	95 %	91 %	–	–
3751-4000	96 %	92 %	87 %	83 %	80 %	76 %			95 %	91 %	87 %	–	–

Voltage derating depending on installation altitude

Technical specifications (continued)

Current derating depending on pulse frequency

To reduce motor noise or to increase output frequency, the pulse frequency can be increased relative to the factory setting. When the pulse frequency is increased, the derating factor of the output current must be taken into account. This derating factor must be applied to the currents specified in the technical specifications.

Order No. 6SL3710-...	Power [kW]	Output current at 2 kHz [A]	Derating factor at 4 kHz
380 ... 480 V 3 AC			
1GE32-1■A0	110	210	82 %
1GE32-6■A0	132	260	83 %
1GE33-1■A0	160	310	88 %
1GE33-8■A0	200	380	87 %
1GE35-0■A0	250	490	78 %

Derating factor of the output current depending on the pulse frequency for units with a rated pulse frequency of 2 kHz

Order No. 6SL3710-...	Power [kW]	Output current at 1.25 kHz [A]	Derating factor at 2.5 kHz
380 ... 480 V 3 AC			
1GE36-1■A0	315	605	72 %
1GE37-5■A0	400	745	72 %
1GE38-4■A0	450	840	79 %
1GE41-0■A0	560	985	87 %
2GE41-1AA0	630	1120	72 %
2GE41-4AA0	710	1380	72 %
2GE41-6AA0	900	1560	79 %
500 ... 600 V 3 AC			
1GF31-8■A0	110	175	87 %
1GF32-2■A0	132	215	87 %
1GF32-6■A0	160	260	88 %
1GF33-3■A0	200	330	82 %
1GF34-1■A0	250	410	82 %
1GF34-7■A0	315	465	87 %
1GF35-8■A0	400	575	85 %
1GF37-4■A0	500	735	79 %
1GF38-1■A0	560	810	72 %
2GF38-6AA0	630	860	87 %
2GF41-1AA0	710	1070	85 %
2GF41-4AA0	1000	1360	79 %
660 ... 690 V 3 AC			
1GH28-5■A0	75	85	89 %
1GH31-0■A0	90	100	88 %
1GH31-2■A0	110	120	88 %
1GH31-5■A0	132	150	84 %
1GH31-8■A0	160	175	87 %
1GH32-2■A0	200	215	87 %
1GH32-6■A0	250	260	88 %
1GH33-3■A0	315	330	82 %
1GH34-1■A0	400	410	82 %
1GH34-7■A0	450	465	87 %
1GH35-8■A0	560	575	85 %
1GH37-4■A0	710	735	79 %
1GH38-1■A0	800	810	72 %
2GH41-1AA0	1000	1070	85 %
2GH41-4AA0	1350	1360	79 %
2GH41-5AA0	1500	1500	72 %

Derating factor of the output current depending on the pulse frequency for units with a rated pulse frequency of 1.25 kHz

Technical specifications (continued)

Degrees of protection of cabinet units

Standard EN 60529 applies to the protection of electrical equipment by means of housings, covers or equivalent, and includes:

- Protection of persons against accidental contact with live or moving parts within the housing and protection of the equipment against the ingress of solid foreign bodies (touch protection and protection against ingress of foreign bodies)
- Protection of the equipment against the ingress of water (water protection)
- Abbreviations for the internationally agreed degrees of protection.

The degrees of protection are specified by abbreviations comprising the code letters IP and two digits.

Degrees of protection of the drive converter cabinet unit	First digit (touch protection and protection against ingress of solid objects)	Second digit (protection of the equipment against the ingress of water)
IP20 (standard)	Protected against solid objects, diameter ≥ 12.5 mm.	No water protection
IP21 (option M21)	Protected against solid objects, diameter ≥ 12.5 mm.	Protected against vertically falling water drops Vertically falling water drops shall not have a harmful effect.
IP23 (option M23)	Protected against solid objects, diameter ≥ 12.5 mm.	Protected against spraying water Water sprayed on both sides of the vertical at an angle of up to 60° shall not have a harmful effect.
IP43 (option M43)	Protected against solid objects, diameter ≥ 1 mm.	Protected against spraying water Water sprayed on both sides of the vertical at an angle of up to 60° shall not have a harmful effect.
IP54 (option M54)	Dust protected. Ingress of dust is not totally prevented, but dust must not be allowed to enter in such quantities that the functioning or safety of the equipment is impaired.	Protected against splashing water Water splashing onto the enclosure from any direction shall not have a harmful effect.

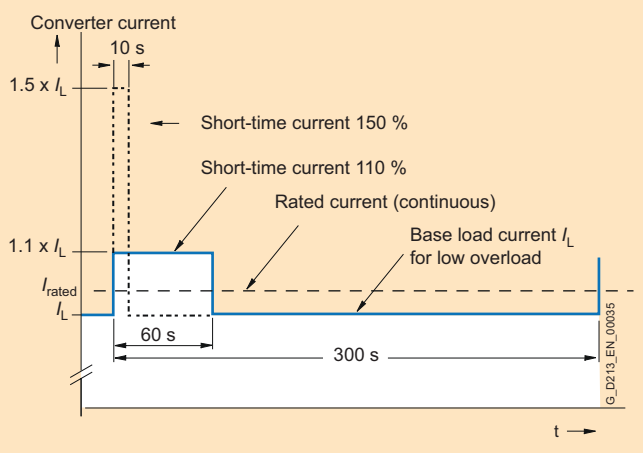
Overload capacity

SINAMICS G150 drive converter cabinet units are equipped with an overload reserve to deal with breakaway torques, for example. If larger surge loads occur, this must be taken into account when configuring. In drives with overload requirements, the appropriate base load current must therefore be used as a basis for the required load.

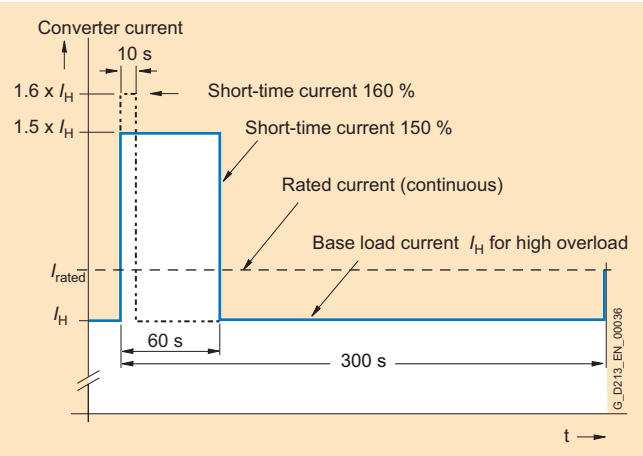
The criterion for overload is that the drive is operated with its base load current before and after the overload occurs, and a load duration of 300 s is assumed here.

The base load current I_L for a low overload is based on a load cycle of 110 % for 60 s or 150 % for 10 s.

The base load current I_H for a high overload is based on a load cycle of 150 % for 60 s or 160 % for 10 s.



Low overload



High overload

Technical specifications (continued)

EMC guidelines

The electromagnetic compatibility describes - in accordance with the definition of the EMC directive - the "capability of a device to work satisfactorily in the electromagnetic environment without itself causing electromagnetic interferences which are unacceptable for other devices present in this environment". To guarantee that the appropriate EMC directives are observed, the devices must demonstrate a sufficiently high noise immunity, and also the emitted interference must be limited to acceptable values.

The EMC requirements for "Variable-speed drive systems" are described in the product standard EN 61800-3. A variable-speed drive system (or power drive system PDS) consists of the drive converter and the electric motor including cables. The driven machine is not part of the drive system. EN 61800-3 defines different limits depending on the location of the drive system, referred to as the first and second environments.

The **first environment** comprises living accomodation or locations where the drive system is directly connected to a public low-voltage network without an intermediate transformer.

The **second environment** is understood to be all locations outside living areas. These are basically industrial areas which are powered from the medium-voltage network via their own transformers.

Four different categories are defined in EN 61800-3 depending on the location and the power of the drive:

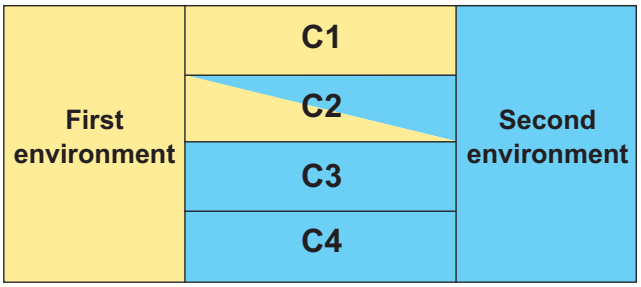
Category C1: Drive systems for rated voltages < 1000 V for unlimited use in the first environment.

Category C2: Stationary drive systems for rated voltages < 1000 V for use in the second environment. Use in the first environment is possible if the drive system is installed and used by qualified personnel. The warning and installation information supplied by the manufacturer must be observed.

Category C3: Drive systems for rated voltages < 1000 V for exclusive use in the second environment.

Category C4: Drive systems for rated voltages ≥ 1000 V or for rated currents ≥ 400 A for use in complex systems in the second environment.

The following graphic shows the assignment of the four categories to the first and second environment:



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SINAMICS G150 drive converter cabinet units are almost exclusively used in the second environment (categories C3 and C4).

To limit **emitted interference**, the SINAMICS G150 drive converter cabinet units are equipped as standard with an RFI suppression filter in accordance with the limit values specified in Category C3. This means that they meet the requirements for industrial use. Line filters (option L00) are available for use in the first environment (Category C2).

SINAMICS G150 drive converter cabinet units fulfill the requirements for **noise immunity** defined in EN 61800-3 for the second environment and consequently also the lower noise immunity values in the first environment.

The warning and installation information (part of the device documentation) must be observed.

Technical specifications (continued)

Technical specifications for single circuit

Line voltage 380 ... 480 V 3 AC		SINAMICS G150 drive converter cabinet units 6SL3710-1GE								
		32-1...	32-6...	33-1...	33-8...	35-0...	36-1...	37-5...	38-4...	41-0...
Type rating										
• with I_L at 50 Hz 400 V [1]	kW	**110**	**132**	**160**	**200**	**250**	**315**	**400**	**450**	**560**
• with I_H at 50 Hz 400 V [1]	kW	90	110	132	160	200	250	315	400	450
• with I_L at 60 Hz 460 V [2]	hp	150	200	250	300	400	500	600	600	800
• with I_H at 60 Hz 460 V [2]	hp	125	150	200	250	350	350	450	500	700
Output current										
• Rated current I_{rated}	A	210	260	310	380	490	605	745	840	985
• Base load current I_L [3]	A	205	250	302	370	477	590	725	820	960
• Base load current I_H [4]	A	178	233	277	340	438	460	570	700	860
Input current										
• Rated input current [5]	A	229	284	338	395	509	629	775	873	1024
• Input current, max.	A	335	410	495	606	781	967	1188	1344	1573
• Current requirement auxiliary supply 24 V DC [6]	A	1.1	1.1	1.35	1.35	1.35	1.4	1.4	1.4	1.5
Power loss	kW	2.9	3.8	4.4	5.3	6.4	8.2	9.6	10.1	14.4
Cooling air requirement	m^3/s	0.17	0.23	0.36	0.36	0.36	0.78	0.78	0.78	1.48
Cable lengths between converter and motor [8]										
• Shielded	m	300	300	300	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450	450	450	450
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	67/68	69/73	69/73	69/73	69/73	70/73	70/73	70/73	72/75
Dimensions										
• Width for version A/C	mm	800/400	800/400	800/400	1000/400	1000/400	1200/600	1200/600	1200/600	1600/1000
• Height [7]	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000
• Depth	mm	600	600	600	600	600	600	600	600	600
Weight (without options) for version A/C, approx.	kg	320/225	320/225	390/300	480/300	480/300	860/670	865/670	1075/670	1360/980

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

1) Rated output of a typ. 6-pole standard induction motor based on I_L or I_H at 400 V 3 AC 50 Hz.

2) Rated output of a typ. 6-pole standard induction motor based on I_L or I_H at 460 V 3 AC 60 Hz.

3) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s.
See technical specifications (→ Overload capacity).

4) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s.
See technical specifications (→ Overload capacity).

5) The current values given here are based on the rated output current.

6) If the main power supply fails and drive control remains active, the Power Module must be externally supplied with 24 V DC.
The following should also be taken into account:
– CU320: 0.8 A
– TM31: 0.5 A
– AOP30: 0.2 A
– SMC: 0.6 A
– Current requirement of digital inputs/outputs.

7) Version A: The cabinet height is increased by
250 mm for degree of protection IP21,
400 mm for degrees of protection IP23, IP43 and IP54,
405 mm for the **M13** and **M78** options.
Version C: The cabinet height is increased by
250 mm for degree of protection IP21,
400 mm for degrees of protection IP23, IP43 and IP54.

8) Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 500 ... 600 V 3 AC		SINAMICS G150 drive converter cabinet units 6SL3710-1GF								
		31-8...	32-2...	32-6...	33-3...	34-1...	34-7...	35-8...	37-4...	38-1...
Type rating										
• with I_L at 50 Hz 500 V [1]	kW	**110**	**132**	**160**	**200**	**250**	**315**	**400**	**500**	**560**
• with I_H at 50 Hz 500 V [1]	kW	90	110	132	160	200	250	315	450	500
• with I_L at 60 Hz 575 V [2]	hp	150	200	250	300	400	450	600	700	800
• with I_H at 60 Hz 575 V [2]	hp	150	200	200	250	350	450	500	700	700
Output current										
• Rated current I_{rated}	A	175	215	260	330	410	465	575	735	810
• Base load current I_L [3]	A	171	208	250	320	400	452	560	710	790
• Base load current I_H [4]	A	157	192	233	280	367	416	514	657	724
Input current										
• Rated input current [5]	A	191	224	270	343	426	483	598	764	842
• Input current, max.	A	279	341	410	525	655	740	918	1164	1295
• Current requirement auxiliary supply 24 V DC [6]	A	1.35	1.35	1.35	1.4	1.4	1.4	1.4	1.5	1.5
Power loss	kW	3.8	4.2	5.0	6.1	8.1	7.8	8.7	12.7	14.1
Cooling air requirement	m^3/s	0.36	0.36	0.36	0.36	0.78	0.78	0.78	1.48	1.48
Cable lengths between converter and motor [8]										
• Shielded	m	300	300	300	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450	450	450	450
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	69/73	69/73	69/73	69/73	72/75	72/75	72/75	72/75	72/75
Dimensions										
• Width for version A/C	mm	800/400	800/400	800/400	800/400	1200/600	1200/600	1200/600	1600/1000	1600/1000
• Height [7]	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000
• Depth	mm	600	600	600	600	600	600	600	600	600
Weight (without options) for version A/C, approx.	kg	390/300	390/300	390/300	390/300	860/670	860/670	860/670	1320/940	1360/980

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

1) Rated output of a typ. 6-pole standard induction motor based on I_L or I_H at 500 V 3 AC 50 Hz.

2) Rated output of a typ. 6-pole standard induction motor based on I_L or I_H at 575 V 3 AC 60 Hz.

3) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s.
See technical specifications (→ Overload capacity).

4) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s.
See technical specifications (→ Overload capacity).

5) The current values given here are based on the rated output current.

6) If the main power supply fails and drive control remains active, the Power Module must be externally supplied with 24 V DC.
The following should also be taken into account:
– CU320: 0.8 A
– TM31: 0.5 A
– AOP30: 0.2 A
– SMC: 0.6 A
– Current requirement of digital inputs/outputs.

7) Version A: The cabinet height is increased by
250 mm for degree of protection IP21,
400 mm for degrees of protection IP23, IP43 and IP54,
405 mm for the **M13** and **M78** options.
Version C: The cabinet height is increased by
250 mm for degree of protection IP21,
400 mm for degrees of protection IP23, IP43 and IP54.

8) Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		SINAMICS G150 drive converter cabinet units 6SL3710-1GH												
		28-5...	**31-0...**	**31-2...**	**31-5...**	**31-8...**	**32-2...**	**32-6...**	**33-3...**	**34-1...**	**34-7...**	**35-8...**	**37-4...**	**38-1...**
Type rating														
• with I_L at 50 Hz 690 V [1]	kW	**75**	**90**	**110**	**132**	**160**	**200**	**250**	**315**	**400**	**450**	**560**	**710**	**800**
• with I_H at 50 Hz 690 V [1]	kW	55	75	90	110	132	160	200	250	315	400	450	560	710
Output current														
• Rated current I_{rated}	A	85	100	120	150	175	215	260	330	410	465	575	735	810
• Base load current I_L [3]	A	80	95	115	142	171	208	250	320	400	452	560	710	790
• Base load current I_H [4]	A	76	89	107	134	157	192	233	280	367	416	514	657	724
Input current														
• Rated input current [5]	A	93	109	131	164	191	224	270	343	426	483	598	764	842
• Input current, max.	A	131	155	188	232	279	341	410	525	655	740	918	1164	1295
• Current requirement auxiliary supply 24 V DC [6]	A	1.1	1.1	1.1	1.1	1.35	1.35	1.35	1.35	1.4	1.4	1.4	1.5	1.5
Power loss	kW	1.7	2.1	2.7	2.8	3.8	4.2	5.0	6.1	8.1	9.1	10.8	13.5	14.7
Cooling air requirement	m^3/s	0.17	0.17	0.17	0.17	0.36	0.36	0.36	0.36	0.78	0.78	0.78	1.48	1.48
Cable lengths between converter and motor [8]														
• Shielded	m	300	300	300	300	300	300	300	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450	450	450	450	450	450	450	450
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	67/68	67/68	67/68	67/68	67/73	67/73	67/73	67/73	72/75	72/75	72/75	72/75	72/75
Dimensions														
• Width for version A/C	mm	800/ 400	800/ 400	800/ 400	800/ 400	800/ 400	800/ 400	800/ 400	800/ 400	1200/ 600	1200/ 600	1200/ 600	1600/ 1000	1200/ 1000
• Height [7]	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
• Depth	mm	600	600	600	600	600	600	600	600	600	600	600	600	600
Weight (without options) for version A/C, approx.	kg	320/ 225	320/ 225	320/ 225	320/ 225	390/ 300	390/ 300	390/ 300	390/ 300	860/ 670	860/ 670	860/ 670	1320/ 940	1360/ 980

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

[1] Rated output of a typ. 6-pole standard induction motor based on I_L or I_H at 690 V 3 AC 50 Hz.

[3] The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s.
See technical specifications (→ Overload capacity).

[4] The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s.
See technical specifications (→ Overload capacity).

[5] The current values given here are based on the rated output current.

[6] If the main power supply fails and drive control remains active, the Power Module must be externally supplied with 24 V DC.
The following should also be taken into account:
– CU320: 0.8 A
– TM31: 0.5 A
– AOP30: 0.2 A
– SMC: 0.6 A
– Current requirement of digital inputs/outputs.

[7] Version A: The cabinet height is increased by
250 mm for degree of protection IP21,
400 mm for degrees of protection IP23, IP43 and IP54,
405 mm for the **M13** and **M78** options.
Version C: The cabinet height is increased by
250 mm for degree of protection IP21,
400 mm for degrees of protection IP23, IP43 and IP54.

[8] Longer cable lengths for specific configurations are available on request.

Technical specifications (continued)

Technical specifications for parallel circuit

		SINAMICS G150 drive converter cabinet units, version A Type 6SL3710-								
		2GE41-1AA0	2GE41-4AA0	2GE41-6AA0	2GF38-6AA0	2GF41-1AA0	2GF41-4AA0	2GH41-1AA0	2GH41-4AA0	2GH41-5AA0
Line voltage		**380 ... 480 V 3 AC**			**500 ... 600 V 3 AC**			**660 ... 690 V 3 AC**		
Type rating										
• with I_L [1]	kW	**630**	**710**	**900**	**630**	**710**	**1000**	**1000**	**1350**	**1500**
• with I_H [1]	kW	500	560	710	560	630	800	900	1200	1350
• with I_L at 60 Hz 460 V or 575 V [2]	hp	900	1000	1250	900	1000	1250	–	–	–
• with I_H at 60 Hz 460 V or 575 V [2]	hp	700	900	1000	800	900	1000	–	–	–
Output current										
• Rated current I_{rated} [8]	A	1120	1380	1560	860	1070	1360	1070	1360	1500
• Base load current I_L [3] [8]	A	1092	1340	1516	836	1036	1314	1036	1314	1462
• Base load current I_H [4] [8]	A	850	1054	1294	770	950	1216	950	1216	1340
Input current										
• Rated input current [5] [8]	A	1174	1444	1624	904	1116	1424	1116	1424	1568
• Input current, max.		1800	2215	2495	1388	1708	2186	1708	2186	2406
• Current requirement auxiliary supply 24 V DC [6]	A	2.8	2.8	3.0	2.8	2.8	3.0	2.8	2.8	3.0
Power loss	kW	16.2	19.0	19.9	15.4	17.2	23.8	21.3	26.6	29.0
Cooling air requirement	m^3/s	1.56	1.56	1.56	1.56	1.56	2.96	1.56	2.96	2.96
Cable lengths between converter and motor [10]										
• Shielded	m	300	300	300	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450	450	450	450
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB	73/76	73/76	73/76	75/78	75/78	75/78	75/78	75/78	75/78
Dimensions										
• Width [9]	mm	2400	2400	2400	2400	2400	3200	2400	3200	3200
• Height [7]	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000
• Depth	mm	600	600	600	600	600	600	600	600	600
Weight (without options), approx.	kg	1700	1710	2130	1700	1700	2620	1700	2620	2700

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

Note:
In the case of converters with power units connected in parallel, units with a rated input current of
- <1500 A require option **L13**.
- ≥1500 A require option **L26**.

(→ Selection and ordering data)

1) Rated output of a typ. 6-pole standard induction motor based on I_L or I_H at 400 V, 500 V or 690 V 3 AC 50 Hz.

2) Rated output of a typ. 6-pole standard induction motor based on I_L or I_H at 460 V or 575 V 3 AC 60 Hz.

3) The base load current I_L is based on a load cycle of 110 % for 60 s or 150 % for 10 s with a load cycle period of 300 s.
See technical specifications (→ Overload capacity).

4) The base load current I_H is based on a load cycle of 150 % for 60 s or 160 % for 10 s with a load cycle period of 300 s.
See technical specifications (→ Overload capacity).

5) The current values given here are based on the rated output current.

6) If the main power supply fails and drive control remains active, the Power Module must be externally supplied with 24 V DC.
The following should also be taken into account:
– CU320: 0.8 A
– TM31: 0.5 A
– AOP30: 0.2 A
– SMC: 0.6 A
– Current requirement of digital inputs/outputs.

7) The cabinet height is increased by
250 mm for degree of protection IP21,
400 mm for degrees of protection IP23, IP43 and IP54,
405 mm for the **M13** and **M78** options.

8) The currents listed here represent the aggregate current of both converter sections.

9) The power units connected in parallel are supplied as two transport units.

10) Longer cable lengths for specific configurations are available on request.

Selection and ordering data

Single circuit

Type rating		Rated output current	SINAMICS G150 drive converter cabinet units
at 400 V, 500 V or 690 V	at 60 Hz/ 460 V or 575 V		(Order No. supplement, see below)
kW	hp	A	Order No.
380 ... 480 V 3 AC			
110	150	210	**6SL3710-1GE32-1■A0**
132	200	260	**6SL3710-1GE32-6■A0**
160	250	310	**6SL3710-1GE33-1■A0**
200	300	380	**6SL3710-1GE33-8■A0**
250	400	490	**6SL3710-1GE35-0■A0**
315	500	605	**6SL3710-1GE36-1■A0**
400	600	745	**6SL3710-1GE37-5■A0**
450	700	840	**6SL3710-1GE38-4■A0**
560	800	985	**6SL3710-1GE41-0■A0**
500 ... 600 V 3 AC			
110	150	175	**6SL3710-1GF31-8■A0**
132	200	215	**6SL3710-1GF32-2■A0**
160	250	260	**6SL3710-1GF32-6■A0**
200	300	330	**6SL3710-1GF33-3■A0**
250	400	410	**6SL3710-1GF34-1■A0**
315	450	465	**6SL3710-1GF34-7■A0**
400	600	575	**6SL3710-1GF35-8■A0**
500	700	735	**6SL3710-1GF37-4■A0**
560	800	810	**6SL3710-1GF38-1■A0**
660 ... 690 V 3 AC			
75		85	**6SL3710-1GH28-5■A0**
90		100	**6SL3710-1GH31-0■A0**
110		120	**6SL3710-1GH31-2■A0**
132		150	**6SL3710-1GH31-5■A0**
160		175	**6SL3710-1GH31-8■A0**
200		215	**6SL3710-1GH32-2■A0**
250		260	**6SL3710-1GH32-6■A0**
315		330	**6SL3710-1GH33-3■A0**
400		410	**6SL3710-1GH34-1■A0**
450		465	**6SL3710-1GH34-7■A0**
560		575	**6SL3710-1GH35-8■A0**
710		735	**6SL3710-1GH37-4■A0**
800		810	**6SL3710-1GH38-1■A0**

Order No. supplement

Version A with possibility for mounting all connection components	**A**
Version C Especially for space-saving mounting	**C**

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

Parallel circuit

Type rating		Rated output current	SINAMICS G150 drive converter cabinet units, Version A
at 400 V, 500 V or 690 V	at 60 Hz/ 460 V or 575 V		
kW	hp	A	Order No.
380 ... 480 V 3 AC			
630	900	1120	**6SL3710-2GE41-1AA0**
710	1000	1380	**6SL3710-2GE41-4AA0**
900	1250	1560	**6SL3710-2GE41-6AA0**
500 ... 600 V 3 AC			
630	900	860	**6SL3710-2GF38-6AA0**
710	1000	1070	**6SL3710-2GF41-1AA0**
1000	1250	1360	**6SL3710-2GF41-4AA0**
660 ... 690 V 3 AC			
1000		1070	**6SL3710-2GH41-1AA0**
1350		1360	**6SL3710-2GH41-4AA0**
1500		1500	**6SL3710-2GH41-5AA0**

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

In the case of converters with parallel-connected power units, both converter sections must be simultaneously connected to the supply network as the DC links of the two sections are coupled. For this reason, units with parallel circuit require the following components: Line contactors (option **L13** for converters with a rated input current of < 1500 A) or circuit-breakers (option **L26** for converters with a rated input current of ≥ 1500 A).

SINAMICS G150 drive converter cabinet units, Version A	Rated input current	Order code (option)
	A	
380 ... 480 V 3 AC		
6SL3710-2GE41-1AA0	1174	**L13 (line contactor)**
6SL3710-2GE41-4AA0	1444	**L13 (line contactor)**
6SL3710-2GE41-6AA0	1624	**L26 (circuit-breaker)**
500 ... 600 V 3 AC		
6SL3710-2GF38-6AA0	904	**L13 (line contactor)**
6SL3710-2GF41-1AA0	1116	**L13 (line contactor)**
6SL3710-2GF41-4AA0	1424	**L13 (line contactor)**
660 ... 690 V 3 AC		
6SL3710-2GH41-1AA0	1116	**L13 (line contactor)**
6SL3710-2GH41-4AA0	1424	**L13 (line contactor)**
6SL3710-2GH41-5AA0	1568	**L26 (circuit-breaker)**

Options

Note: When ordering a converter with options, add "**-Z**" to the order number of the converter, followed by the order code(s) for the desired option(s).

Example:
6SL3710-1GE32-1CA0-Z
+M07+D60+...

See also ordering examples.

Available options	Order code	for version A	for version C
Line-side options			
Line filter (RFI) for use in the first environment in accordance with EN 61800-3, Category C2 (TN/TT systems)	**L00**	✓	–
Line contactor (for currents ≤ 800 A with a single circuit or < 1500 A with a parallel circuit)	**L13**	✓	–
Delivery without line reactor	**L22**	✓	✓
Line reactor V_k = 2 %	**L23**	✓	✓
Main control switch including fuses resp. circuit-breaker	**L26**	✓	–
EMC shield busbar [1]	**M70**	✓	✓
PE (ground) busbar [1]	**M75**	✓	✓
Load-side options			
Motor reactor	**L08**	✓	–
dv/dt filter plus Voltage Peak Limiter	**L10**	✓	–
Sine-wave filter (up to 250 kW at 380 ... 480 V, up to 132 kW at 500 ... 600 V)	**L15**	✓	–
EMC shield busbar [1]	**M70**	✓	✓
PE (ground) busbar [1]	**M75**	✓	✓
Motor protection and safety functions			
EMERGENCY OFF pushbutton, door mounted	**L45**	✓	–
EMERGENCY OFF Category 0, 230 V AC or 24 V DC	**L57**	✓	–
EMERGENCY STOP Category 1, 230 V AC [2]	**L59**	✓	–
EMERGENCY STOP Category 1, 24 V DC [2]	**L60**	✓	–
Thermistor motor protection unit with PTB approval (alarm)	**L83**	✓	–
Thermistor motor protection unit with PTB approval (shutdown)	**L84**	✓	–
PT100 evaluation unit (for six PT100 sensors)	**L86**	✓	–
Insulation monitoring	**L87**	✓	–
Additional touch protection	**M60**	✓	✓
Increase in degree of protection			
IP21 Degree of protection	**M21**	✓	✓
IP23 Degree of protection	**M23**	✓	✓
IP43 Degree of protection	**M43**	✓	✓
IP54 Degree of protection	**M54**	✓	✓
Mechanical options			
Base 100 mm high, RAL 7022	**M06**	✓	✓
Cable plinth 200 mm high, RAL 7035	**M07**	✓	✓
Top cable entry, line side	**M13**	✓	–
Top cable entry, motor side	**M78**	✓	–
Crane transport assembly (top-mounted)	**M90**	✓	✓

✓	possible
–	not supported

Converter version A

Converter version C

[1] This option is listed for the line-side and load-side options, but is only required once.

[2] The drive stop requirements must be taken into account with this option. Additional braking units may be required.

The selection matrix must be observed with respect to the combination of options.

Options (continued)

Available options	Order code	for version A	for version C
Other options			
CAN protocol CBC10 Communication Board	**G20**	✓	✓
PROFINET CBE20 Communication Board	**G33**	✓	✓
Additional TM31 customer terminal module	**G61**	✓	–
SMC30 Sensor Module Cabinet-Mounted	**K50**	✓	✓
VSM10 Voltage Sensing Module Cabinet-Mounted	**K51**	✓	–
Terminal interface for "Safe Torque Off" and "Safe Stop 1" safety functions	**K82**	✓	–
Connection for external auxiliary equipment (controlled, max. 10 A)	**L19**	✓	–
Cabinet light with service socket	**L50**	✓	–
Cabinet anti-condensation heating	**L55**	✓	✓
Braking unit 25 kW (P_{20} power: 100 kW)	**L61**	✓	–
Braking unit 50 kW (P_{20} power: 200 kW)	**L62**	✓	–
Special cabinet paint finish [3]	**Y09**	✓	✓
Documentation (standard: English/German)			
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	**D02**	✓	✓
Customer documentation in paper format	**D04**	✓	✓
Preliminary copy of customer documentation	**D14**	✓	✓
Documentation language: English/French	**D58**	✓	✓
Documentation language: English/Spanish	**D60**	✓	✓
Documentation language: English/Italian	**D80**	✓	✓
Languages (standard: English/German)			
Rating plate language in English/French	**T58**	✓	✓
Rating plate language in English/Spanish	**T60**	✓	✓
Rating plate language in English/Italian	**T80**	✓	✓
Options specific to the chemical industry			
NAMUR terminal block	**B00**	✓	–
Safely isolated 24 V power supply (PELV)	**B02**	✓	–
Separate output for external auxiliaries (uncontrolled)	**B03**	✓	–
Options specific to the shipbuilding industry			
Marine version	**M66**	✓	✓
Individual certificate from Germanischer Lloyd (GL)	**E11**	✓	✓
Individual certificate from Lloyds Register (LR)	**E21**	✓	✓
Individual certificate from Bureau Veritas (BV)	**E31**	✓	✓
Individual certificate from Det Norske Veritas (DNV)	**E51**	✓	✓
Individual certificate from American Bureau of Shipping (ABS)	**E61**	✓	✓
Individual certificate from Chinese Classification Society (CCS)	**E71**	✓	✓
Converter acceptance inspection in presence of customer			
Visual inspection	**F03**	✓	✓
Function test of the converter without motor connected	**F71**	✓	✓
Function test of the converter with test bay motor (no load)	**F75**	✓	✓
Insulation test on converter	**F77**	✓	✓
Customized converter acceptance (on request)	**F97**	✓	✓

✓ possible
– not supported

[3] The order code Y.. requires data in plain text.

The selection matrix must be observed with respect to the combination of options.

Converter version A

Converter version C

Options (continued)

Option selection matrix

Certain options are mutually exclusive. The following tables only provide an overview. Please refer to the descriptions of the individual options for a precise description of options and other exclusions.

✓	possible combination
–	combination not supported

Electrical options

	G20	G33	K50	K51	K82	L00	L13	L15	L19	L22	L23	L26	L45	L50	L55	L57	L59	L60	L61	L62	L83	L84	L86	L87
G20		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
G33	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K50	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K51	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K82	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4)
L00	✓	✓	✓	✓	✓		✓	✓	✓	–	1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
L13	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	2)	✓	✓	✓	3)	3)	3)	✓	✓	✓	✓	✓	✓
L15	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L19	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L22	✓	✓	✓	✓	✓	–	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L23	✓	✓	✓	✓	✓	1)	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L26	✓	✓	✓	✓	✓	✓	2)	✓	✓	✓	✓		✓	✓	✓	3)	3)	3)	✓	✓	✓	✓	✓	✓
L45	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L50	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L55	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
L57	✓	✓	✓	✓	✓	✓	3)	✓	✓	✓	✓	3)	✓	✓	✓		–	–	✓	✓	✓	✓	✓	✓
L59	✓	✓	✓	✓	✓	✓	3)	✓	✓	✓	✓	3)	✓	✓	✓	–		–	✓	✓	✓	✓	✓	✓
L60	✓	✓	✓	✓	✓	✓	3)	✓	✓	✓	✓	3)	✓	✓	✓	–	–		✓	✓	✓	✓	✓	✓
L61	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	✓	✓	✓	✓
L62	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		✓	✓	✓	✓
L83	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
L84	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
L86	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
L87	✓	✓	✓	✓	4)	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

1) For converters < 500 kW/700 hp, the line reactor (order code **L23**) is supplied with the converter as standard.
For converters ≥ 500 kW/700 hp, option **L23** must be ordered if
- the converters are to be operated on lines with short-circuit power (RSC > 20) or
- a line filter is used (option **L00**).

2) Combination **L13/L26** is only possible for currents of < 800 A. Circuit-breakers are used from 800 A upwards. These perform the same function as options **L13** and **L26**.

3) Converters in a single circuit require either option **L13** or, for currents of > 800 A option **L26** (circuit-breaker).
Converters in a parallel circuit require **L13** or **L26**.
Braking units may also be needed, depending on the drive stopping time required.

4) K82 and L87 can be combined as standard for converters with parallel-connected power units. This combination is available on request for converters in a single circuit.

Options (continued)

Mechanical options/electrical options

	L00	L08	L10	L15	M06	M07	M13	M21	M23	M43	M54	M60	M66	M70	M75	M78	M90
L00		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5)	✓	✓	✓
L08	✓		–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓
L10	✓	–		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓
L15	✓	–	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓
M06	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M13	✓	✓	✓	✓	✓	✓		–	✓	✓	✓	–	✓	6)	6)	✓	✓
M21	✓	✓	✓	✓	✓	✓	–		–	–	–	7)	–	✓	✓	–	✓
M23	✓	✓	✓	✓	✓	✓	✓	–		–	–	–	8)	✓	✓	✓	✓
M43	✓	✓	✓	✓	✓	✓	✓	–	–		–	–	✓	✓	✓	✓	✓
M54	✓	✓	✓	✓	✓	✓	✓	–	–	–		–	✓	✓	✓	✓	✓
M60	✓	✓	✓	✓	✓	✓	–	7)	–	–	–		✓	✓	✓	–	✓
M66	✓	✓	✓	✓	✓	✓	✓	–	8)	✓	✓	✓		✓	✓	✓	✓
M70	5)	✓	✓	✓	✓	✓	6)	✓	✓	✓	✓	✓	✓		✓	5)	✓
M75	✓	✓	✓	✓	✓	✓	6)	✓	✓	✓	✓	✓	✓	✓		5)	✓
M78	✓	–	–	–	✓	✓	✓	–	✓	✓	✓	–	✓	5)	5)		✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

5) Option **L00** includes option **M70**.

6) If the line connection (option **M13**) and the motor connection (option **M78**) are from above, the EMC shield bus (option **M70**) and the PE busbar (option **M75**) are not required in the lower cabinet area.

7) Can only be selected for converters in the voltage range 400 V up to 250 kW, 500 V up to 200 kW and 690 V up to 315 kW. Option **M60** is supplied as standard for larger power ranges.

8) Option **M66** includes option **M23**.

Rating plate language

	T58	T60	T80
T58		–	–
T60	–		–
T80	–	–	

Ordering examples

Example 1

Task:
A drive converter cabinet unit is needed to control the fan speed for a 380 kW fan drive for connecting to an existing 400 V MCC outgoing circuit. The rated speed of the fan is 975 rpm. As a result of the ambient conditions, the converter should be mounted on a 100 mm cabinet base and the degree of protection should be IP54. The installation altitude is < 1000 m above sea level, the ambient temperature is 45 °C.

Solution:
Due to the existing MCC outgoing circuit, the line connection components, such as main switch, line contactor and line fuses, can be omitted and the space-saving version C can be selected. For this constellation, taking into account the derating factors for IP54 degree of protection and for the increased ambient temperature, a 450 kW, 400 V drive converter cabinet unit must be selected with options
M06 (100 mm cabinet base) and
M54 (IP54 degree of protection)

The relevant ordering data are:
6SL3710-1GE38-4CA0-Z
+M06 +M54

Example 2

Task:
A 280 kW pump to control pressure equalization is to be supplied via a converter for a brand new district heating pumping station. A 690 V supply is available. The installation altitude is 350 m above sea level and the ambient temperature 40 °C. The rated speed of the pump is 740 rpm. The pump unit and motor are located in an unmanned substation, so the winding temperature of the motor must be monitored by PT100 resistance thermometers and evaluated by the converter. The color of the drive converter cabinet units is to be RAL 3002.

Solution:
A 315 kW, 690 V version A drive converter cabinet unit must be selected with the following options:
L26 Main control switch including fuses resp. circuit-breaker
L13 (line contactor),
L86 (PT100 evaluation unit) and
Y09 (special cabinet paint coating).

The relevant ordering data are:
6SL3710-1GH33-3AA0-Z
+L26 +L13 +L86 +Y09
Cabinet color RAL 3002

Options (continued)

Description of options

For more detailed descriptions of options, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored on the CD-ROM included with the catalog.

B00, B02, B03
Options in accordance with NAMUR requirements

Exclusion list to other options:

The following limitations and exclusion resulting from the use of **B00** NAMUR terminal block must be observed with regard to other available options.

Not permissible with option	Reason
L45, L57, L59, L60	An EMERGENCY OFF of Category 0 is already included in the NAMUR version. The forced line disconnection is accessed at terminals -A1-X2: 17, 18.
L83, L84	Option **B00** already provides a thermistor motor protection unit (shutdown) as standard.
L19	A combination of options L19 and B00 is available on request.
L87	The insulation monitor monitors the complete network which is electrically connected. An insulation monitor must therefore be provided on the plant side.

With options such as **L50, L55, L86**, the connection is as described in the standard. There is no wiring to the NAMUR terminal block.

Attention: Option **B00** must be ordered with supply disconnection option **L13** for currents of < 800 A (parallel circuit: < 1500 A) or option **L26** for currents of > 800 A (parallel circuit: ≥ 1500 A).

B00
NAMUR terminal block

The terminal block has been configured in accordance with the requirements and guidelines of the Standards Working Group for Instrumentation and Control in the Chemicals Industry (NAMUR Recommendation NE37), i.e. certain functions of the device are assigned to specified terminals.

The terminal block and the associated functions are reduced to a required amount. In comparison to the NAMUR recommendation, optional terminals are not listed.

Terminal -A1-X2:	Meaning	Preassignment	Comments
10	DI	ON (dynamic)/ ON/OFF (static)	The effective mode can be coded using a wire jumper on the terminal -A1-400:9; 10.
11	DI	OFF (dynamic)	
12	DI	Faster	
13	DI	Slower	
14	DI	RESET	
15	DI	Interlock	
16	DI	Counterclockwise	"0" signal for CW phase sequence "1" signal for CCW phase sequence
17, 18		Line disconnection	EMERGENCY OFF sequence
30, 31		Ready	Relay output (NO contact)
32, 33		Motor rotates	Relay output (NO contact)
34	DO (NO)	Fault	Relay output (changeover contact)
35	DO (COM)		
36	DO (NC)		
50, 51	AI 0/4-20 mA	Speed setpoint	
60, 61	AO 0/4-20 mA	Motor frequency	
62, 63	AO 0/4-20 mA	Motor current	Motor current is default setting; can be reparameterized for other variables

The 24 V supply is provided at the customer end via terminals -A1-X2:1-3 (fused inside the converter with 1 A). It must be ensured that the safety requirements "Protective extra-low voltage, PELV" are complied with.

Terminal -A1-X2:	Meaning	
1	M	Reference conductor
2	P24	Infeed 24 V DC
3	P24	Outgoing circuit 24 V DC

For temperature monitoring of explosion-proof motors, the option **B00** contains a PTC thermistor with PTB approval. A switch-off is carried out if the limit is exceeded. The associated PTC sensor is connected to terminal -A1-X3:90, 91.

Terminal -A1-X3:	Meaning	
90, 91	AI	Connection of PTC sensor

In parallel to operation via the NAMUR terminal block, there is also the option to operate the converter via the communications interface provided as standard on the CU320 Control Unit. The PROFIdrive profile "process technology" used in the chemical industry can be selected via macros.

Options (continued)

B02
Safely isolated 24 V power supply (PELV)

If no protective separation for 24 V supply (PELV) is available at the customer end, this option is used to fit a second power supply to guarantee the PELV. (Terminal assignments as for option **B00**, 24 V supply at terminals -A1-X1:1, 2, 3 are omitted.)

Attention: Option **B02** is only possible together with **B00**.

B03
Separate output for external auxiliaries (uncontrolled)

If a motor fan has to be supplied on the plant, for example, option **B03** provides an uncontrolled separate output with a 10 A fuse. As soon as the supply voltage is present at the converter input, a voltage is also present at these terminals. This corresponds to the converter input voltage ($V = V_{line}$). This must be observed when planning the external fans.

Terminal -A1-X1:	Meaning
1, 2, 3, PE	Separate output for external auxiliaries

Attention: Option **B03** is only possible together with **B00**.

D02
Customer documentation in DXF format

This option can be used to order documents such as circuit diagrams, terminal diagrams, arrangement diagram and dimensional drawings in DXF format, in order to process them further in CAD systems, for example. They are supplied on the documentation CD in the desired language (standard is English/German, for other languages, see options **D58, D60, D80**).

D04
Customer documentation in paper format

Device documentation is supplied electronically on CD-ROM as standard. If the customer also requires a hard copy of the documentation and selects option D04, the following documents will be shipped in a folder with the converter:

- Operating instructions
- Circuit diagram
- Terminal diagram
- Layout diagram
- Dimensional drawing
- Spare parts list
- Test certificate

Regardless of whether option D04 is selected, a hard copy of the safety and transportation guidelines, a check list and a registration form is always supplied.

D14
Preliminary copy of customer documentation

If documents such as circuit diagrams, terminal diagrams, arrangement diagrams and dimensional drawings are required in advance for system engineering, advance documentation can be ordered when ordering the converter. These documents are then supplied electronically a few working days after the order has been entered. The plant-specific documentation is supplied to the ordering party via e-mail in the desired language (standard is English/German, for other languages, see options **D58, D60, D80**). The recipient's e-mail address must be provided when the order is placed. If option **D02** is selected at the same time, the documents are sent out in DXF format, otherwise they are sent in PDF format. In the e-mail, the recipient is also provided with a link for downloading general advance documentation such as Operating Instructions, Manuals and Commissioning Manuals.

D58
Documentation language: English/French

With option **D58**, the documentation will be supplied with the converter in English and French (standard: English/German). When option **D04** is specified in addition, a printed version of the documentation in English and French is also supplied.

D60
Documentation language: English/Spanish

With option **D60**, the documentation will be supplied with the converter in English and Spanish (standard: English/German). When option **D04** is specified in addition, a printed version of the documentation in English and Spanish is also supplied.

D80
Documentation language: English/Italian

With option **D80**, the documentation will be supplied with the converter in English and Italian (standard: English/German). When option **D04** is specified in addition, a printed version of the documentation in English and Italian is also supplied.

E11 to E71
Individual certification of the converter

The individual certification of the converter by the relevant certification body contains the expansions described for option **M66**.

E11 Individual certificate from Germanischer Lloyd (GL)

E21 Individual certificate from Lloyds Register (LR)

E31 Individual certificate from Bureau Veritas (BV)

E51 Individual certificate from Det Norske Veritas (DNV)

E61 Individual certificate from American Bureau of Shipping (ABS)

E71 Individual certificate from Chinese Classification Society (CCS)

Note: A combination of several individual certificates is not provided.

Options (continued)

F03, F71, F75, F77, F97
Converter acceptance in the presence of the customer

Order code	Description	
F03	Visual inspection	The scope of the acceptance comprises: • Checking the degree of protection • Checking the equipment (components) • Checking the equipment identifier • Checking the clearance and creepage distances • Checking the cables • Checking the customer documentation • Submitting the acceptance report The checks are carried out with the converter deenergized.
F71	Function test of the converter without motor connected	The scope of the acceptance comprises: • Visual inspection as described for option **F03** • Checking the power supply • Checking the protection and monitoring equipment (simulation) • Checking the fans • Testing the precharging • Function test without connected motor • Submitting the acceptance report Following the visual inspection in the deenergized state, the converter is connected to the rated voltage. No current flows at the converter output.
F75	Function test of the converter with test bay motor (no load)	The scope of the acceptance comprises: • Visual inspection as described for option **F03** • Checking the power supply • Checking the protection and monitoring equipment (simulation) • Checking the fans • Testing the precharging • Function test with test bay motor (no load) • Submitting the acceptance report Following the visual inspection in the deenergized state, the converter is connected to the rated voltage. A small current flows at the converter's output in order to operate the test bay motor (no load).
F77	Insulation test on converter	The scope of the acceptance comprises: • High-voltage test • Measurement of insulation resistance
F97	Customized acceptance (on request)	If acceptances are desired which are not covered by the options **F03**, **F71**, **F75** or **F77**, customized acceptances/supplementary tests can be ordered using the order code **F97** on request and following technical clarification.

G20
CBC10 Communication Board

The CBC10 Communication Board is used to interface the CU320 Control Unit and thus the SINAMICS G150 to the CAN (Controller Area Network) protocol. The board's driver software fulfills the standards of the following CANopen specification of the CiA organization (CAN in Automation):

- Communication profiles in accordance with DS 301
- Drive profile in accordance with DSP 402 (in this case Profile Velocity Mode)
- EDS (Electronic Data Sheet) in accordance with DSP 306
- Operating status signaling in accordance with DSP 305

The CBC10 Communication Board plugs into the option slot on the CU320 Control Unit. The CAN interface on the CBC10 has 2 SUB-D connections for input and output.

G33
CBE20 Communication Board

The CBE20 Communication Board can be used to connect the SINAMICS G150 to a PROFINET IO network via a CU320 Control Unit.

The SINAMICS G150 then assumes the function of a PROFINET IO device and can perform the following functions:

- PROFINET IO device
- 100 Mbit/s full-duplex
- Supports real-time classes of PROFINET IO:
  - RT (Real-Time)
  - IRT (Isochronous Real-Time), minimum send cycle 500 µs
- Connects to controls as a PROFINET IO device using PROFIdrive compliant with Specification V4
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 4-port switch with four RJ45 B sockets based on the PROFINET AXIC ERTEC400. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

The CBE20 Communication Board plugs into the option slot on the CU320 Control Unit.

G61
Additional TM31 customer terminal module

The standard version of the SINAMICS G150 drive converter cabinet units already contains an Interface Module (TM31 Terminal Module). With a second module, the number of available digital inputs/outputs and the number of analog inputs/outputs within the drive system can be expanded.

K50
SMC30 Sensor Module Cabinet-Mounted

The SMC30 Sensor Module can be used to acquire the actual motor speed. The signals emitted by the rotary pulse encoder are converted here and made available via the DRIVE-CLiQ interface of the closed-loop control for evaluation purposes.

The following encoders are supported by the SMC30:

- TTL encoders
- HTL encoders.

The motor temperature can also be detected using KTY84-130 or PTC thermistors.

Options (continued)

K51
VSM10 Voltage Sensing Module Cabinet-Mounted

The VSM10 Voltage Sensing Module reads the voltage waveshape at the motor end. This allows the SINAMICS G150 converter to be connected to a permanent-field, encoderless synchronous machine (flying restart function). The VSM10 is wired to the motor terminals in a short-circuit-proof connection in the delivery state.

K82
Terminal interface for "Safe Torque Off" and "Safe STOP 1" safety functions

The terminal module provides control of the safety functions integrated in the devices in a variable wide voltage range from 24 V to 240 V DC/AC and can, therefore, be adapted to the relevant plant conditions.

The integrated safety functions, starting from the Safety Integrated (SI) input terminals of the SINAMICS components (Control Unit, Power Module), satisfy the requirements specified in the Machinery Directive 98/37/EC, EN 60204-1, DIN EN ISO 13849-1 Category 3 (formerly EN 954-1) for Performance Level (PL) d and IEC 61508 SIL2. These are certified by the BGIA.

In combination with option K82, the safety functions comply with Machinery Directive 98/37/EC, EN 60204-1 and DIN EN ISO 13849-1 Category 3 (formerly EN 954-1) for Performance Level (PL) d. Use option K82 to activate the following Safety Integrated functions (terminology according to draft IEC 61800-5-2):

- Safe Torque Off (STO)
- Safe Stop 1 (SS1) (time-controlled)

L00
Line filter (RFI) for use in the first environment in accordance with EN 61800-3, Category C2 (TN/TT systems)

To limit the **emitted interference**, the drive converters are equipped as standard with a radio interference suppression filter that conforms to the limits defined in Category C3. SINAMICS G150 converters equipped with the line filter also meet the limits for use in the first environment (Category C2) as specified in EN 61800-3.

The SINAMICS G150 units comply as standard with the **immunity** requirements defined in EN 61800-3 for the first and second environments.

In conjunction with line reactors, line filters also limit the conducted interference emitted by the Power Modules to the limit values of Category C2 defined in product standard EN 61800-3. Option **L23** must be ordered in addition for converter outputs > 500 kW.

To allow the power cable shield to be connected in conformance with EMC requirements, an additional EMC shield bus (option **M70**) is factory fitted at the converter input and output. A separate order is not required in this case.

L08
Motor reactor

Motor reactors reduce the voltage load on the motor windings by reducing the voltage gradients on the motor terminals generated when the converter is used. At the same time, the capacitive charge/discharge currents that occur at the converter output when long motor cables are used are reduced. The maximum permissible output frequency when a motor reactor is used is 150 Hz.

A motor reactor can be supplied on request for drive converter cabinet units with power units connected in parallel.

Option **L08** is only available with version A and cannot be combined with option **M78** (top cable entry, motor side).

L10
dv/dt filter plus Voltage Peak Limiter

The dv/dt filter plus VPL consists of two components: the dv/dt reactor and the VPL (**V**oltage **P**eak **L**imiter), which limits voltage peaks and returns the energy to the DC link.

The dv/dt filters plus VPL are to be used for motors of the series only if the insulation system is unknown or insufficient. Standard motors if the 1LA5, 1LA6 and 1LA8 series only require them in cases where the motor has not been specially insulated for operation on a converter (see Catalog D 81.1, chapter "Motors operating with frequency converters").

The dv/dt filters plus VPL limit the rate of voltage rise to values of < 500 V/µs and the typical voltage peaks at rated line voltages to the following values (with motor cable lengths of < 150 m):

< 1000 V at V_{line} < 575 V

< 1250 V at 660 V < V_{line} < 690 V.

Depending on the converter output, option **L10** can be accommodated in the drive converter cabinet unit or an additional cabinet of width 400 mm is required.

Voltage range	Installation of the dv/dt filter plus VPL within the drive converter cabinet unit	Installation of the VPL in an additional cabinet
V	kW	kW
380 ... 480	110 ... 250	315 ... 560
500 ... 600	110 ... 200	250 ... 560
660 ... 690	75 ... 315	400 ... 800

The dv/dt filter plus VPL is available on request for drive converter cabinet units with power units connected in parallel.

Option **L10** cannot be combined with option **M78** (top cable entry, motor side).

Max. connectable motor cable lengths

Maximum cable lengths		
Protoflex EMC 3 Plus [1]	Shielded cable, e.g. Protodur NYCWY	Unshielded cable, e.g. Protodur NYY
m	m	m
Without reactor or filter		
300	300	450
With motor reactor (option L08)		
300	300	450
With dv/dt filter plus VPL (option L10)		
300	300	450

Longer cable lengths for specific configurations are available on request.

[1] Protoflex EMC 3 Plus cables comply with the limits for interference voltage and emitted noise specified in standard EN 61800-3 for use in the second environment. The limits in standard EN 61800-3 correspond to those in standard EN 55011 Class A Group 2.

Options (continued)

Minimum motor cable lengths for operation with power units connected in parallel

Minimum motor cable lengths must be adhered to in the case of

- a 12-pulse supply and
- a motor with a winding system and
- no motor reactor (option L08) used.

Type rating	SINAMICS G150 drive converter cabinet unit, version A	Minimum cable length
kW	Type 6SL3710-...	m
380 ... 480 V 3 AC		
630	-2GE41-1AA0	13
710	-2GE41-4AA0	10
900	-2GE41-6AA0	9
500 ... 600 V 3 AC		
630	-2GF38-6AA0	18
710	-2GF41-1AA0	15
1000	-2GF41-4AA0	13
660 ... 690 V 3 AC		
1000	-2GH41-1AA0	20
1350	-2GH41-4AA0	18
1500	-2GH41-5AA0	15

L13
Line contactor (for currents ≤ 800 A with single circuit or < 1500 A with a parallel circuit)

The SINAMICS G150 drive converter cabinet units are provided as standard without a line contactor. Option **L13** is needed if a switching element is required for disconnecting the cabinet from the supply (required for EMERGENCY OFF). The contactor is energized and powered inside the converter. For units with rated input currents > 800 A in a single circuit or ≥ 1500 A in a parallel circuit, the function of option **L13** is performed by option **L26**.

Note: Option **L13** is mandatory for converters with parallel-connected power units and a rated input current < 1500 A.

Terminal -X50:	Meaning
4	Checkback contact (NO contact) contactor closed
5	Checkback contact (NC contact) contactor closed
6	Root

L15
Sine-wave filter

Sine-wave filters are available in the voltage range from 380 V to 480 V up to 250 kW and in the voltage range from 500 V to 600 V up to 132 kW.

The sine-wave filter at the converter output delivers practically sinusoidal voltages on the motor so that standard motors can be used without special cables and without derating. Standard cables can be used. The maximum permitted motor incoming cable length is 300 m.

Note: The pulse frequency of the converter must be increased when used in conjunction with option **L15**. This reduces the power available at the converter output (derating factor approx. 0.88 %). The control factor of the output voltage returns to approximately 85 % (380 V to 480 V) or 81 % (500 V to 600 V). The maximum output frequency is 150 Hz. It should be noted that the reduced voltage at the motor terminals compared to the rated motor voltage means that the motor switches to field weakening mode earlier.

L19
Connection for external auxiliary equipment

An outgoing circuit fused at max. 10 A for external auxiliary equipment (for example, separately driven motor fan).

The voltage is tapped at the converter input and, therefore, has the same level as the supply voltage.

The outgoing circuit can be controlled internally by the converter or externally.

Terminal -X155:	Meaning	Range
1	L1	380 ... 690 V AC
2	L2	380 ... 690 V AC
3	L3	380 ... 690 V AC
11	Contactor control	230 V AC
12	Contactor control	230 V AC
13	Circuit-breaker checkback	230 V AC/0.5 A; 24 V DC /2 A
14	Circuit-breaker checkback	230 V AC/0.5 A; 24 V DC /2 A
15	Contactor checkback	230 V AC/6 A
16	Contactor checkback	230 V AC/6 A
PE	PE	

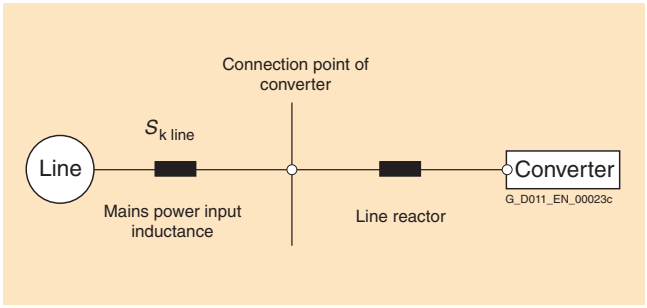
Options (continued)

L22/L23
Delivery without line reactor (L22 for converters ≤ 500 kW) With line reactor 2 % (L23 for converters in single ciruit > 500 kW)

The line reactor is included in the converter as standard for converters up to 500 kW and for those with power units connected in parallel. The line reactor (V_k = 2 %) is optional for converter outputs ≥ 500 kW, because converters in this power range are often connected to the medium-voltage network using transformers adapted to the converter output.

A line reactor is needed for high short-circuit power levels, partly to protect the actual converter against excessive harmonic currents, and thus against overload, and partly to limit line harmonics to the permitted values. The harmonic currents are limited by the complete inductance comprising the line reactor and mains supply cable inductance. Line reactors can be omitted if the mains supply cable inductance is increased sufficiently, i. e., the value of RSC must be sufficiently small.

RSC = Relative Short-Circuit power: Ratio of short-circuit power $S_{k\ line}$ at the line connection point to fundamental apparent output S_{conv} of the connected converters (in accordance with EN 50178/VDE 0160).

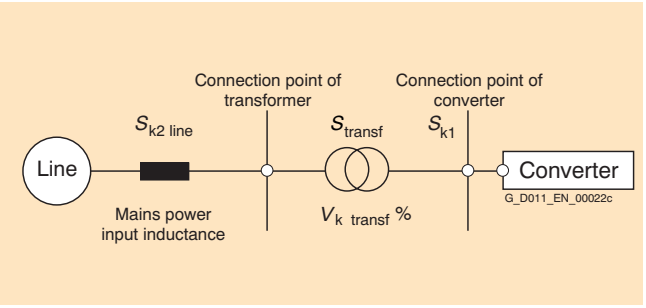


For SINAMICS G150 drive converter cabinet units:

Type rating	Line reactor can be omitted		Line reactor required	
kW	for RSC	Order code (option)	for RSC	Order code (option)
< 200	≤ 43	**L22**	> 43	-
200 ... 500	≤ 33	**L22**	> 33	-
≥ 500	≤ 20	-	> 20	**L23**

As, in practice, it is not known on which supply configuration individual converters are to be operated, i. e., which supply short-circuit power is present at the converter connection point, it is recommended that a line reactor is connected on the line side of the converter.

The line reactor can be omitted (option **L22**) only if the values for RSC are lower than those shown in the table. This is the case when, as shown in the following figure, the converter is connected to the line through a transformer with the appropriate rating.



As high-output converters are usually connected to medium-voltage networks using transformers because of the harmonic effects on the supply, cabinet units in a single circuit with outputs over 500 kW have no line reactors as standard.

A line reactor (**L23** option) is always required, however, if

- for cabinet units > 500 kW, the RSC ratio is > 20, or
- a line filter is used.

L26
Main switch incl. fuses/circuit-breakers

A switch disconnector with fuses is available as the main switch for converters in a single circuit with ratings up to 800 A. Cabinets with an output current greater than 800 A use a circuit-breaker instead of a switch disconnector. The circuit-breaker is controlled and supplied within the converter.

Option **L26** is mandatory for converters with parallel-connected power units and a rated input current of ≥ 1500 A. Circuit-breakers are fitted in these units. For parallel-connected converters with rated input currents of < 1500 A, option **L26** can be selected to equip them with fused main switches in addition to the obligatory line contactors (option **L13**).

L45
EMERGENCY OFF pushbutton, door mounted

The EMERGENCY OFF button with protective collar is fitted in the converter cabinet door and its contacts are connected to the terminal block. The EMERGENCY OFF functions of Category 0 or 1 can be activated in conjunction with options **L57**, **L59** and **L60**.

Attention: By pressing the EMERGENCY OFF button, the motor is stopped either uncontrolled or controlled depending on the selected Category 0 or 1, and the main voltage disconnected from the motor in accordance with IEC 60204-1 (VDE 0113). Auxiliary voltages (e.g. for separately-driven fans or anti-condensation heating) may still be present. Certain areas within the converter also remain under voltage, e.g. the control function or auxiliaries. If complete disconnection of all voltages is required, the EMERGENCY OFF button must be incorporated into a protection function to be provided on the plantside. An NC contact is available at terminal –X120 for this purpose.

The EMERGENCY OFF button is preconfigured at the factory only when one of the options **L57** to **L60** is selected simultaneously. Other circuit arrangements must be implemented on the plant side.

Options (continued)

L50
Cabinet light with service socket

One universal lamp with an integrated service socket is installed for each cabinet panel.

The power supply (on terminal block -X390) for the cabinet light and socket must be provided externally and fused at max. 10 A. The cabinet light is switched on manually via a switch or automatically by an integrated motion detector. The mode is switch-selected.

The power supply to the anti-condensation heating (110 V AC to 230 V, at terminal block -X390) must be provided externally and fused at max. 16 A.

Terminal -X390:	Meaning
1	L1 (230 V AC)
2	N
3	PE

L55
Anti-condensation heating for cabinet

The anti-condensation heating is recommended at low ambient temperatures and high levels of humidity to prevent condensation forming. A 100 W cabinet heating unit is installed in each cabinet element (two heating units are installed in each cabinet with cabinet element widths of 800 mm to 1200 mm).

The power supply to the anti-condensation heating (110 V to 230 V AC, at terminal block -X240) must be provided externally and fused at max. 16 A.

Terminal -X240:	Meaning
1	L1 (110 V ... 230 V AC)
2	N
3	PE

L57
EMERGENCY OFF Category 0, 230 V AC or 24 V DC

EMERGENCY OFF Category 0 for uncontrolled stop in accordance with EN 60204-1.

The function includes voltage disconnection of the converter via the line contactor with bypassing the microprocessor controller by means of a safety combination in accordance with EN 60204-1. The motor coasts in the process. When delivered, the button circuit is preset to 230 V AC. Jumpers must be set when using 24 V DC.

Attention: Option **L57** always assumes that the converter can be electrically isolated from the supply; i.e. option **L13** for units in a single circuit with converter currents ≤ 800 A and option **L26** for converter currents > 800 A.
Irrespective of whether option **L57** is selected, converters with parallel-connected power units must always be equipped with **L13** (for converter currents < 1500 A) or **L26** (for converter currents ≥ 1500 A).

Terminal -X120:	Meaning
7	Looping in the EMERGENCY OFF button from plant side; remove jumper 7-8!
8	Looping in the EMERGENCY OFF button from plant side; remove jumper 7-8!
15	"On" for monitored start; remove jumper 15-16!
16	"On" for monitored start; remove jumper 15-16!
17	Checkback "Triggering safety combination"
18	Checkback "Triggering safety combination"

L59
EMERGENCY STOP Category 1, 230 V AC

EMERGENCY STOP Category 1 for controlled stop in accordance with EN 60204.

The function includes rapid shutdown of the drive via fast stop using a ramp-down ramp to be parameterized by the user. This is followed by voltage disconnection as described in EMERGENCY OFF Category 0.

A braking unit may be necessary to achieve the required shutdown times.

Attention: Option **L59** always assumes that the converter can be electrically isolated from the supply; i.e. option **L13** for units in a single circuit with converter currents ≤ 800 A and option **L26** for converter currents > 800 A. Irrespective of whether option **L59** is selected, converters with parallel-connected power units must always be equipped with **L13** (for converter currents < 1500 A) or **L26** (for converter currents ≥ 1500 A).

Terminal -X120:	Meaning
7	Looping in the EMERGENCY OFF button from plant side; remove jumper 7-8!
8	Looping in the EMERGENCY OFF button from plant side; remove jumper 7-8!
15	"On" for manual start; remove jumper 15-16!
16	"On" for manual start; remove jumper 15-16!
17	Checkback "Triggering safety combination"
18	Checkback "Triggering safety combination"

L60
EMERGENCY STOP Category 1, 24 V DC

EMERGENCY STOP Category 1 for controlled stop in accordance with EN 60204-1.

The function includes rapid shutdown of the drive via fast stop using a ramp-down ramp to be parameterized by the user. This is followed by voltage disconnection as described in EMERGENCY OFF Category 0.

A braking unit may be necessary to achieve the required shutdown times.

Attention: Option **L60** always assumes that the converter can be electrically isolated from the supply; i.e. option **L13** for units in a single circuit with converter currents ≤ 800 A and option **L26** for converter currents > 800 A. Irrespective of whether option **L60** is selected, converters with parallel-connected power units must always be equipped with **L13** (for converter currents < 1500 A) or **L26** (for converter currents ≥ 1500 A).

Terminal -X120:	Meaning
7	Looping in the EMERGENCY OFF button from plant side; remove jumper 7-8!
8	Looping in the EMERGENCY OFF button from plant side; remove jumper 7-8!
15	"On" for manual start; remove jumper 15-16!
16	"On" for manual start; remove jumper 15-16!
17	Checkback "Triggering safety combination"
18	Checkback "Triggering safety combination"

Options (continued)

L61, L62
Braking units

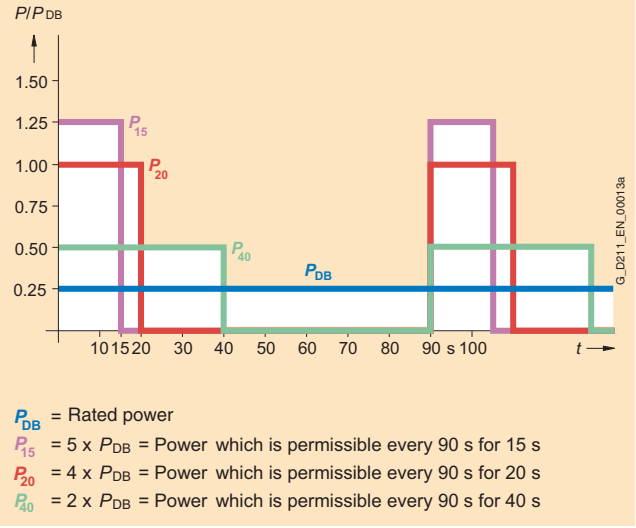
It may be necessary to use braking units for drives that allow regenerative braking.

The braking unit comprises two components: a Braking Module fitted in the converter cabinet and a braking resistor, which must be provided externally (IP20 degree of protection). The braking unit functions as an autonomous unit, and does not require an external power supply. During the braking process, the kinetic energy is converted into heat in the externally installed braking resistor. A max. cable length of 100 m is permissible between the Braking Module and the braking resistor. It is therefore possible to release the heat outside the converter room.

The braking resistor is connected to terminal block –X5 on the drive converter cabinet unit:

Terminal -X5:	Meaning
1	Connection of braking resistor
2	Connection of braking resistor

Characteristic curves



P_{DB} = Rated power
P_{15} = 5 x P_{DB} = Power which is permissible every 90 s for 15 s
P_{20} = 4 x P_{DB} = Power which is permissible every 90 s for 20 s
P_{40} = 2 x P_{DB} = Power which is permissible every 90 s for 40 s

Load diagram for Braking Modules and braking resistors

For information about possible braking unit load cycles and more detailed planning instructions, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

The following braking units are available for the SINAMICS G150 converters and must be selected according to the converter rating:

Option	**SINAMICS G150 converter cabinet units**	**Braking Module**				**Braking resistance R_B**
		Rated power (continuous braking power) P_{DB}	Power P_{40}	Power P_{20}	Peak power P_{15}	
	kW	kW	kW	kW	kW	ohm
380 ... 480 V 3 AC						
L61	110 ... 132	25	50	100	125	4.4 ±7.5 %
L62	160 ... 900	50	100	200	250	2.2 ±7.5 %
500 ... 600 V 3 AC						
L62	110 ... 1000	50	100	200	250	3.4 ±7.5 %
660 ... 690 V 3 AC						
L61	75 ... 132	25	50	100	125	9.8 ±7.5 %
L62	160 ... 1500	50	100	200	250	4.9 ±7.5 %

Power	
P_{DB}	Rated power (continuous braking power)
P_{40} = 2 x P_{DB}	40 s power referred to a braking interval of 90 s
P_{20} = 4 x P_{DB}	20 s power referred to a braking interval of 90 s
P_{15} = 5 x P_{DB}	15 s power referred to a braking interval of 90 s

A second 50 kW braking unit can be fitted in converters with parallel-connected power units in order to increase the braking power. In this case, one Braking Module is assigned to each braking resistor. You can order a second braking unit by selecting option **L62** twice.

If greater braking powers are required in addition to the braking units listed here, then braking units may be connected in parallel circuit for greater converter outputs (on request).

L83
Thermistor motor protection unit (alarm)

Thermistor motor protection unit (with PTB approval) for PTC thermistors type A for alarm. The power supply for the thermistor motor protection unit and the evaluation is provided within the converter.

Terminal -F127:	Meaning
T1	Connection of sensor loop
T2	Connection of sensor loop

L84
Thermistor motor protection unit (shutdown)

Thermistor motor protection unit (with PTB approval) for PTC thermistors type A for shutdown. The power supply for the thermistor motor protection unit is supplied and the evaluation is provided within the converter.

Terminal -F125:	Meaning
T1	Connection of sensor loop
T2	Connection of sensor loop

Options (continued)

L86
PT100 evaluation unit

The PT100 evaluation unit can monitor up to 6 sensors. The sensors can be connected in a two-wire or three-wire system. The limit values can be programmed by the user for each channel.

In the factory setting, the measurement channels are divided into two groups of three channels. With motors, for example, three PT100 units can, therefore, be monitored in the stator windings and two PT100 units in the motor bearings. Channels that are not used can be suppressed using appropriate parameter settings.

The output relays are integrated into the internal fault and shutdown sequence of the converter. The customer can also tap the event logs via two free fault signal relays. Two user-programmable analog outputs (0/4 mA to 20 mA or 0/2 V to 10 V) are also available for integration in a higher-level controller.

Terminal -A1-A140:	Meaning
T11 to T13	PT100; sensor 1; group 1
T21 to T23	PT100; sensor 2; group 1
T31 to T33	PT100; sensor 3; group 1
T41 to T43	PT100; sensor 1; group 2
T51 to T53	PT100; sensor 2; group 2
T61 to T63	PT100; sensor 3; group 2
The sensors can be connected to the PT100 evaluation unit using a two-wire or three-wire system. The inputs Tx1 and Tx3 must be used for a two-wire system. With a three-wire system, input Tx2 must also be connected (x = 1, 2, ..., 6)	
51, 52, 54	Relay output Limit for group 1 reached; (changeover contact)
61, 62, 64	Relay output Limit for group 2 reached; (changeover contact)
Ground (OUT 1)	Analog output OUT 1; Group 1 sensors
U1 (OUT 1)	Analog output OUT 1; Group 1 sensors
I1 (OUT 1)	Analog output OUT 1; Group 1 sensors
Ground (OUT 2)	Analog output OUT 2; Group 2 sensors
U2 (OUT 2)	Analog output OUT 2; Group 2 sensors
I2 (OUT 2)	Analog output OUT 2; Group 2 sensors

L87
Insulation monitoring

An insulation monitor must be used if the converter is operated on an isolated network. This device monitors the complete electrically connected circuit for insulation faults.

An alarm is output in the event of a fault.

Attention: Only **one** insulation monitor can be used in an electrically connected network.

Since the response philosophy when a ground fault occurs in the insulated network can be different, the output relays are available for integration into a control system on the plant side. It is also possible to integrate the outputs into the converter monitoring on the plant side.

Terminal -A1-A101:	Meaning
11	Signaling relay ALARM 1
12	Signaling relay ALARM 1
14	Signaling relay ALARM 1
21	Signaling relay ALARM 2
22	Signaling relay ALARM 2
24	Signaling relay ALARM 2
M+	External kΩ display 0 µA ... 400 µA
M-	External kΩ display 0 µA ... 400 µA
R1	External reset button (NC contact or wire jumper otherwise the fault code is not stored)
R2	External reset button (NC contact or wire jumper)
T1	External test button
T2	External test button

Insulation monitoring can be supplied on request for drive converter cabinet units with power units connected in parallel.

M06
Base 100 mm high, RAL 7022

The additional cabinet base allows larger bending radii for cables (inlet from below) and the routing of them within the cabinet base.

The cabinet base is always colored RAL 7022. A special color is not possible. It is delivered completely fitted with the cabinet. The height of the operator panel changes accordingly.

M07
Cable plinth 200 mm high, RAL 7035

The cable wiring compartment is made of stable sheet steel and increases the flexibility for the cable connection (inlet from below) and allows routing of cables within the wiring compartment. It is delivered completely fitted with the cabinet. The height of the operator panel changes accordingly.

Attention: The cable wiring compartment is colored RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the cable wiring compartment is also painted in this color.

Options (continued)

M13
Top cable entry, line side

The control cabinet is provided with an additional hood in the case of a line connection from above. This hood contains the terminal links for the power cables as well as the cable clamping rail for mechanical support of the cables, an EMC shield bus and a PE rail.

The cabinet height is increased by 405 mm. The rails for the connection from above are delivered completely fitted. For transport reasons, the hoods are delivered separately and must be fitted on site. Crane transport assemblies (option **M90**) can still be used. However, these must be removed on site in order to fit the hoods. Use of cable braces should be considered in the case of small crane hook heights.

A non-drilled mounting plate made of aluminum (5 mm thick) should be provided on the top of the hood for feeding in the cables. Depending on the number of cables and the cable cross-sections used, holes must be provided in this mounting plate on the plant side for fitting cable glands for introduction of the cables.

Note: The control cables are still connected from below. With option **M13**, the standard line connection from below is not used.

The hoods have IP21 degree of protection. In combination with options **M23, M43** and **M54**, additional plastic ventilation grilles and filter pads are provided.

Attention: The hoods are colored RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the hoods are also painted in this color. Ventilation grilles used with IP23, IP43 and IP54 degrees of protection are colored RAL 7035 and cannot be painted.

The covers provided with option **M60** are included in the scope of supply.

Option **M13** cannot be combined with option **L50** (cabinet light with service socket) for drive converter cabinet units with power units connected in parallel.

M21
IP21 Degree of protection

Cabinet version in IP20, but with additional top cover or canopy. The cabinet height is then increased by 250 mm.

For transport reasons, the top covers or canopies are delivered separately and must be fitted on site.

Attention: The top covers or canopies are colored RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the top covers or canopies are also painted this color.

M23/M43/M54
IP23/IP43/IP54 Degrees of protection

When option M23, M43 or M54 is selected, the converter is fitted with a hood. The cabinet height is increased by 400 mm. The covers used with option **M60** are included in the scope of supply. They are a standard part of the cabinet internal air routing and are adapted accordingly.

For transport reasons, the hoods are delivered separately and must be fitted on site.

Attention: The hoods are colored RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the hoods are also painted in this color. The molded plastic parts (e.g. ventilation grilles) are colored RAL 7035 and cannot be painted.

M60
Additional touch protection

The drive converter cabinet units are designed as standard in accordance with BGV A3. Option **M60** provides additional covers (outside normal arm's reach) in the vicinity of the AC rails and above the power unit (can only be selected as an option with converters up to 250 kW in the 400 V range, with converters up to 200 kW in the 500 V range and with converters up to 315 kW in the 690 V range, with degrees of protection IP20 and IP21; otherwise supplied as standard).

M66
Marine version

In accordance with the requirements of the classification company:

- Lloyds Register
- American Bureau of Shipping
- Germanischer Lloyd
- Bureau Veritas
- Det Norske Veritas
- Chinese Classification Society

This option includes a strengthened mechanical version of the cabinet, handles (handrail) below the operator panel and mechanical locking of the cabinet doors. The cabinet is provided in the IP23 degree of protection (option **M23**) and includes a cabinet anti-condensation heating (option **L55**). To attach the converter to the bilge, a welding frame (height 5 mm) is supplied separately.

Note: A combination of options **M21, M23** and **L55** is not possible. If the converter is used for a safety-relevant drive on the ship, individual certification is necessary (see options **E11** to **E71**).

Options (continued)

M70
EMC shield busbar

The EMC shield bus is used to connect shielded power cables for line and motor feeder cables. The EMC shield bus is included as standard with option **L00** (RFI suppression filter).

M75
PE (ground) busbar

The PE busbar is used to run the PE conductor for the supply and motor infeed cables.

This can be ordered as an option for converters with low power and currents < 700 A. The PE busbar is supplied as standard for output currents > 700 A or groups of cabinets consisting of several cabinet elements.

M78
Top cable entry, motor side

The control cabinet is provided with an additional hood in the case of a motor connection from above. Within these hoods, there are the connecting lugs for the power cable and the cable-clamping bar for the mechanical attachment of the cable, an EMC shield bus and a PE busbar.

This cabinet height is increased by 405 mm. The rails for the connection from above are delivered completely fitted. For transport reasons, the hoods are delivered separately and must be fitted on site. Crane transport assemblies (option **M90**) can still be used. However, these must be removed on site in order to fit the hoods. Use of cable braces should be considered in the case of small crane hook heights.

A non-drilled mounting plate made of aluminum (5 mm thick) is provided on the top of the hood for feeding in the cables. Depending on the number of cables and the cable cross-sections used, holes must be provided in this mounting plate on the plant side for fitting cable glands for introduction of the cables.

Note: The control cables are still connected from below. With option **M78**, the standard motor connection from below is not used. A combination of motor-side options **L08, L10** and **L15** is not possible. If option **L61** or **L62** is selected at the same time as option **M78**, the braking resistor should also be connected from above.

The hoods have IP21 degree of protection. In combination with options **M23, M43** and **M54** , additional plastic ventilation grilles and filter pads are provided.

Attention: The hoods are colored RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the hoods are also painted in this color. Ventilation grilles used with IP23, IP43 and IP54 degrees of protection are colored RAL 7035 and cannot be painted.

The covers provided with option **M60** are included in the scope of delivery.

M90
Crane transport assembly (top-mounted)

In the case of single cabinets up to a width of 600 mm, the crane transport assembly has transport eye bolts. With a cabinet width of 800 mm or more, transport rails are used.

Y09
Special cabinet paint finish

The drive converter cabinet units are colored RAL 7035 as standard. The special color must be specified in plain text when ordering. All RAL colors can be selected which are available as powder coatings. If options such as cable wiring compartment (order code **M07**), top covers or canopies (order code **M21**), hoods (order codes **M23/M43/M54**) or cable connection from above (order codes **M13/M78**) are required for the drive converter cabinet units, these are provided in the ordered cabinet color. The molded plastic parts (e.g. ventilation grilles) are colored RAL 7035 and cannot be painted.

Overview

Line harmonics filters reduce the converter's low-frequency harmonic effects to a level that can otherwise only be achieved using 12-pulse rectifiers.

They render the converter compliant with every stringent limit value specified in standard IEEE 519-1992.

Design

Line harmonics filters are supplied as stand-alone components in a rugged housing. They are installed between the customer-end low-voltage distribution unit and the converter. The voltage is disconnected and fused in the customer-end low-voltage switchgear, as is the power supply cable.

The line harmonics filters are connected without fans (natural convection). This means that no auxiliary power supply is required.

The line harmonics filters are equipped with a floating thermostatic switch, which can be monitored externally, for the purpose of monitoring thermal overloads (as a result of insufficient cooling air being fed in, for example).

Note: The converter must have a line reactor in order to use a line harmonics filter.

Selection and ordering data

Suitable for drive converter cabinet unit	Type rating at 400 V, 500 V or 690 V	**Line harmonics filters**
	kW	Order No.
380 ... 480 V 3 AC		
6SL3310-1GE33-1■A0	160	**6SL3000-0JE36-1AA0**
6SL3710-1GE33-8■A0	200	
6SL3710-1GE35-0■A0	250	
6SL3710-1GE36-1■A0	315	
6SL3710-1GE37-5■A0	400	**6SL3000-0JE38-4AA0**
6SL3710-1GE38-4■A0	450	
6SL3710-1GE41-0■A0	560	**6SL3000-0JE41-0AA0**
500 ... 600 V 3 AC		
6SL3310-1GF31-8■A0	110	**6SL3000-0JH33-3AA0**
6SL3710-1GF32-2■A0	132	
6SL3710-1GF32-6■A0	160	
6SL3710-1GF33-3■A0	200	
6SL3710-1GF34-1■A0	250	**6SL3000-0JH34-7AA0**
6SL3710-1GF34-7■A0	315	
6SL3710-1GF35-8■A0	400	**6SL3000-0JH35-8AA0**
6SL3710-1GF37-4■A0	500	**6SL3000-0JH38-1AA0**
6SL3710-1GF38-1■A0	560	
660 ... 690 V 3 AC		
6SL3310-1GH31-8■A0	160	**6SL3000-0JH33-3AA0**
6SL3710-1GH32-2■A0	200	
6SL3710-1GH32-6■A0	250	
6SL3710-1GH33-3■A0	315	
6SL3710-1GH34-1■A0	400	**6SL3000-0JH34-7AA0**
6SL3710-1GH34-7■A0	450	
6SL3710-1GH35-8■A0	560	**6SL3000-0JH35-8AA0**
6SL3710-1GH37-4■A0	710	**6SL3000-0JH38-1AA0**
6SL3710-1GH38-1■A0	800	

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line harmonics filter 6SL3000-0JE36-1AA0	6SL3000-0JE38-4AA0	6SL3000-0JE41-0AA0
Rated current [1]	A	500	700	900
Power loss	kW	1.0	1.5	2.0
Line/power connection				
Conductor cross-section, max.				
• DIN VDE	mm^2	4 × 240	4 × 240	4 × 240
PE connection		3 × M12 stud	3 × M12 stud	3 × M12 stud
Degree of protection		IP21	IP21	IP21
Dimensions				
• Width	mm	600	800	1000
• Height	mm	1700	1700	1700
• Depth	mm	540	540	540
Weight, approx.	kg	460	600	900
Paint finish		RAL 7035	RAL 7035	RAL 7035
Standards		IEEE 519-1992	IEEE 519-1992	IEEE 519-1992
Approvals		CE	CE	CE
Suitable for drive converter cabinet unit		6SL3310-1GE33-1■A0 (160 kW) 6SL3710-1GE33-8■A0 (200 kW) 6SL3710-1GE35-0■A0 (250 kW) 6SL3710-1GE36-1■A0 (315 kW)	6SL3710-1GE37-5■A0 (400 kW) 6SL3710-1GE38-4■A0 (450 kW)	6SL3710-1GE41-0■A0 (560 kW)

Line voltage 500 ... 600 V 3 AC 660 ... 690 V 3 AC		Line harmonics filter 6SL3000-0JH33-3AA0	6SL3000-0JH34-7AA0	6SL3000-0JH35-8AA0	6SL3000-0JH38-1AA0
Rated current [1]	A	290	400	520	710
Power loss	kW	0.8	1.0	1.5	2.0
Line/power connection					
Conductor cross-section, max.					
• DIN VDE	mm^2	4 × 240	4 × 240	4 × 240	4 × 240
PE connection		3 × M12 stud	3 × M12 stud	3 × M12 stud	3 × M12 stud
Degree of protection		IP21	IP21	IP21	IP21
Dimensions					
• Width	mm	600	800	1000	1000
• Height	mm	1700	1700	1700	1700
• Depth	mm	540	540	540	540
Weight, approx.	kg	450	600	830	830
Paint finish		RAL 7035	RAL 7035	RAL 7035	RAL 7035
Standards		IEEE 519-1992	IEEE 519-1992	IEEE 519-1992	IEEE 519-1992
Approvals		CE	CE	CE	CE
Suitable for drive converter cabinet unit		6SL3310-1GF31-8■A0 (110 kW) 6SL3710-1GF32-2■A0 (132 kW) 6SL3710-1GF32-6■A0 (160 kW) 6SL3710-1GF33-3■A0 (200 kW) 6SL3310-1GH31-8■A0 (160 kW) 6SL3710-1GH32-2■A0 (200 kW) 6SL3710-1GH32-6■A0 (250 kW) 6SL3710-1GH33-3■A0 (315 kW)	6SL3710-1GF34-1■A0 (250 kW) 6SL3710-1GF34-7■A0 (315 kW) 6SL3710-1GH34-1■A0 (400 kW) 6SL3710-1GH34-7■A0 (450 kW)	6SL3710-1GF35-8■A0 (400 kW) 6SL3710-1GH35-8■A0 (560 kW)	6SL3710-1GF37-4■A0 (500 kW) 6SL3710-1GF38-1■A0 (560 kW) 6SL3710-1GH37-4■A0 (710 kW) 6SL3710-1GH38-1■A0 (800 kW)

[1] The rated current of the line harmonics filters is defined in accordance with the active power. It can therefore be lower than the rated input current of the relevant Power Module.

Overview

The fuses specified below are the recommended types for protecting the unit on the low-voltage distribution panel. If option **L26** (main switch or circuit-breaker) has been selected, the converter itself will provide semiconductor protection. In this case, a fuse of type 3NA can be used on the low-voltage distribution panel.

If option **L26** has not been selected, we strongly advise use of fuses of type 3NE [1].

Further information about the line contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1 and LV 1 T.

Single circuit

Type rating		SINAMICS G150 converter	Fuse with existing fuse switch disconnector (option L26)			Fuse (with semiconductor protection effect) without fuse switch disconnector		
(at 400 V, 500 V or 690 V)	(at 60 Hz 460 V or 575 V)			Rated current	Frame size in accordance with DIN 43620-1		Rated current	Frame size in accordance with DIN 43620-1
kW	hp	6SL3710-...	Type	A		Type	A	
380 ... 480 V 3 AC								
110	150	1GE32-1 . A0	**3NA3144**	250	2	**3NE1230-2**	315	1
132	200	1GE32-6 . A0	**3NA3250**	300	2	**3NE1331-2**	350	2
160	250	1GE33-1 . A0	**3NA3254**	355	3	**3NE1334-2**	500	2
200	300	1GE33-8 . A0	**3NA3260**	400	3	**3NE1334-2**	500	2
250	400	1GE35-0 . A0	**3NA3372**	630	3	**3NE1436-2**	630	3
315	500	1GE36-1 . A0	**3NA3475**	800	4	**3NE1438-2**	800	3
400	600	1GE37-5 . A0	**3NA3475**	800	4	**3NE1448-2**	850	3
450	600	1GE38-4 . A0	**3NA3365**	2 x 500	3	**3NE1436-2**	2 x 630	3
560	800	1GE41-0 . A0	**3NA3472**	2 x 630	3	**3NE1437-2**	2 x 710	3
500 ... 600 V 3 AC								
110	150	1GF31-8 . A0	**3NA3244-6**	250	2	**3NE1227-2**	250	1
132	200	1GF32-2 . A0	**3NA3252-6**	315	2	**3NE1230-2**	315	1
160	250	1GF32-6 . A0	**3NA3354-6**	355	3	**3NE1331-2**	350	2
200	300	1GF33-3 . A0	**3NA3365-6**	500	3	**3NE1334-2**	500	2
250	400	1GF34-1 . A0	**3NA3365-6**	500	3	**3NE1334-2**	500	2
315	450	1GF34-7 . A0	**3NA3352-6**	2 × 315	3	**3NE1435-2**	560	3
400	500	1GF35-8 . A0	**3NA3354-6**	2 × 355	3	**3NE1447-2**	670	3
500	700	1GF37-4 . A0	**3NA3365-6**	2 × 500	3	**3NE1448-2**	850	3
560	800	1GF38-1 . A0	**3NA3365-6**	2 × 500	3	**3NE1334-2**	2 × 500	2
660 ... 690 V 3 AC								
75		1GH28-5 . A0	**3NA3132-6**	125	1	**3NE1022-2**	125	00
90		1GH31-0 . A0	**3NA3132-6**	125	1	**3NE1022-2**	125	00
110		1GH31-2 . A0	**3NA3136-6**	160	1	**3NE1224-2**	160	1
132		1GH31-5 . A0	**3NA3240-6**	200	2	**3NE1225-2**	200	1
160		1GH31-8 . A0	**3NA3244-6**	250	2	**3NE1227-2**	250	1
200		1GH32-2 . A0	**3NA3252-6**	315	2	**3NE1230-2**	315	1
250		1GH32-6 . A0	**3NA3354-6**	355	3	**3NE1331-2**	350	2
315		1GH33-3 . A0	**3NA3365-6**	500	3	**3NE1334-2**	500	2
400		1GH34-1 . A0	**3NA3365-6**	500	3	**3NE1334-2**	500	2
450		1GH34-7 . A0	**3NA3352-6**	2 × 315	3	**3NE1435-2**	560	3
560		1GH35-8 . A0	**3NA3354-6**	2 × 355	3	**3NE1447-2**	670	3
710		1GH37-4 . A0	**3NA3365-6**	2 × 500	3	**3NE1448-2**	850	3
800		1GH38-1 . A0	**3NA3365-6**	2 × 500	3	**3NE1334-2**	2 × 500	2

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

[1] The combined fuses (3NE1., gS class) for cable and semiconductor protection are recommended to protect the converter. These fuses are specially adapted to the requirements of the semiconductors in the input rectifier.

- Superfast
- Adapted to the limit current integral of the semiconductor
- Low arc voltage
- Improved current limiting (lower let-through values).

Line-side power components
Recommended fuses

Overview (continued)

Parallel circuit (data per converter subsystem)

Type rating		SINAMICS G150 converter	Fuse with existing fuse switch disconnector (option L26)			Fuse (with semiconductor protection effect) without fuse switch disconnector		
(at 400 V, 500 V or 690 V)	(at 60 Hz 460 V or 575 V)			Rated current	Frame size in accordance with DIN 43620-1		Rated current	Frame size in accordance with DIN 43620-1
kW	hp	6SL3710-...	Type	A		Type	A	
380 ... 480 V 3 AC								
630	900	2GE41-1AA0	**3NA3475**	800	4	**3NE1438-2**	800	3
710	1200	2GE41-4AA0	**3NA3745**	800	4	**3NE1448-2**	850	3
900	1200	2GE41-6AA0	**3NA3365**	2 × 500	3	**3NE1436-2**	2 × 630	3
500 ... 600 V 3 AC								
630	900	2GF38-6AA0	**3NA3352-6**	2 × 315	3	**3NE1435-2**	560	3
710	1000	2GF41-1AA0	**3NA3365-6**	2 × 500	3	**3NE1447-2**	670	3
1000	1600	2GF41-4AA0	**3NA3365-6**	2 × 500	3	**3NE1448-2**	850	3
660 ... 690 V 3 AC								
1000		2GH41-1AA0	**3NA3354-6**	2 × 355	3	**3NE1447-2**	670	3
1350		2GH41-4AA0	**3NA3365-6**	2 × 500	3	**3NE1448-2**	850	3
1500		2GH41-5AA0	**3NA3365-6**	2 × 500	3	**3NE1334-2**	2 × 500	2

Note: The type rating data in hp units are based on the NEC/CEC standards for the North American market.

Overview

The tables below show the recommended or maximum possible conductor cross-sections on the line and motor sides.

The recommended cross-sections are based on the listed fuses and single routing of the three-wire cables at an ambient temperature of 40 °C.

When the conditions differ from the above stated (cable routing, cable grouping, ambient temperature), the instructions for routing the cables must be taken into account.

Single circuit

Type rating	Converter SINAMICS G150 **Version A**	Weight (standard version)	Line connection			Motor connection			Cabinet grounding	
			Recommended cross-section [1] DIN VDE	Maximum conductor cross-section DIN VDE	Fixing screw M12 (Number of holes)	Recommended cross-section [1] DIN VDE	Maximum conductor cross-section DIN VDE	Fixing screw M12 (Number of holes)	Fixing screw M12 (Number of holes)	Comment
kW	6SL3710- ...	kg	mm^2	mm^2		mm^2	mm^2			
380 ... 480 V 3 AC										
110	1GE32-1AA0	320	2x70	4x240	(2)	2x50	2x150	(2)	(2)	
132	1GE32-6AA0	320	2x95	4x240	(2)	2x70	2x150	(2)	(2)	
160	1GE33-1AA0	390	2x120	4x240	(2)	2x95	2x150	(2)	(2)	
200	1GE33-8AA0	480	2x120	4x240	(2)	2x95	2x150	(2)	(2)	
250	1GE35-0AA0	480	2x185	4x240	(2)	2x150	2x240	(2)	(2)	
315	1GE36-1AA0	860	2x240	4x240	(2)	2x185	2x240	(2)	(2)	
400	1GE37-5AA0	865	3x185	4x240	(2)	3x150	2x240	(2)	(10)	ground bus
450	1GE38-4AA0	1075	4x150	8x240	(4)	3x185	4x240	(2)	(16)	ground bus
560	1GE41-0AA0	1360	4x185	8x240	(4)	4x185	6x240	(3)	(18)	ground bus
500 ... 600 V 3 AC										
110	1GF31-8AA0	390	120	4x240	(2)	95	2x150	(2)	(2)	
132	1GF32-2AA0	390	2x70	4x240	(2)	120	2x150	(2)	(2)	
160	1GF32-6AA0	390	2x95	4x240	(2)	2x70	2x150	(2)	(2)	
200	1GF33-3AA0	390	2x120	4x240	(2)	2x95	2x240	(2)	(2)	
250	1GF34-1AA0	860	2x185	4x240	(2)	2x120	4x240	(2)	(2)	
315	1GF34-7AA0	860	2x185	4x240	(2)	2x150	4x240	(2)	(2)	
400	1GF35-8AA0	860	2x240	4x240	(2)	2x185	4x240	(2)	(2)	
500	1GF37-4AA0	1320	3x185	8x240	(4)	3x150	6x240	(3)	(18)	ground bus
560	1GF38-1AA0	1360	4x150	8x240	(4)	3x185	6x240	(3)	(18)	ground bus
660 ... 690 V 3 AC										
75	1GH28-5AA0	320	50	4x240	(2)	35	2x70	(2)	(2)	
90	1GH31-0AA0	320	50	4x240	(2)	50	2x150	(2)	(2)	
110	1GH31-2AA0	320	70	4x240	(2)	70	2x150	(2)	(2)	
132	1GH31-5AA0	320	95	4x240	(2)	70	2x150	(2)	(2)	
160	1GH31-8AA0	390	120	4x240	(2)	95	2x150	(2)	(2)	
200	1GH32-2AA0	390	2x70	4x240	(2)	120	2x150	(2)	(2)	
250	1GH32-6AA0	390	2x95	4x240	(2)	2x70	2x185	(2)	(2)	
315	1GH33-3AA0	390	2x120	4x240	(2)	2x95	2x240	(2)	(2)	
400	1GH34-1AA0	860	2x185	4x240	(2)	2x120	4x240	(2)	(2)	
450	1GH34-7AA0	860	2x185	4x240	(2)	2x150	4x240	(2)	(2)	
560	1GH35-8AA0	860	2x240	4x240	(2)	2x185	4x240	(2)	(2)	
710	1GH37-4AA0	1320	3x185	8x240	(4)	3x150	6x240	(3)	(18)	ground bus
800	1GH38-1AA0	1360	4x150	8x240	(4)	3x185	6x240	(3)	(18)	ground bus

[1] The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code) or CEC (Canadian Electrical Code) standards.

Conductor cross-sections and connections

Overview (continued)

Single circuit

Type rating	Converter SINAMICS G150 **Version C**	Weight (standard version)	Line connection			Motor connection			Cabinet grounding	
			Recommended cross-section [1] DIN VDE	Maximum conductor cross-section DIN VDE	Fixing screw M12 (Number of holes)	Recommended cross-section [1] DIN VDE	Maximum conductor cross-section DIN VDE	Fixing screw M12 (Number of holes)	Fixing screw M12 (Number of holes)	Comment
kW	6SL3710- ...	kg	mm^2	mm^2		mm^2	mm^2			
380 ... 480 V 3 AC										
110	1GE32-1CA0	225	2x70	4x240	(1)	2x50	2x150	(1)	(2)	
132	1GE32-6CA0	225	2x95	4x240	(1)	2x70	2x150	(1)	(2)	
160	1GE33-1CA0	300	2x120	4x240	(1)	2x95	2x150	(1)	(2)	
200	1GE33-8CA0	300	2x120	4x240	(1)	2x95	2x150	(1)	(2)	
250	1GE35-0CA0	670	2x185	4x240	(1)	2x150	2x240	(1)	(2)	
315	1GE36-1CA0	670	2x240	4x240	(4)	2x185	2x240	(4)	(2)	
400	1GE37-5CA0	670	3x185	4x240	(4)	3x150	2x240	(4)	(8)	ground bus
450	1GE38-4CA0	670	4x150	8x240	(4)	3x185	4x240	(4)	(8)	ground bus
560	1GE41-0CA0	980	4x185	8x240	(4)	4x185	6x240	(4)	(10)	ground bus
500 ... 600 V 3 AC										
110	1GF31-8CA0	300	120	4x240	(1)	95	2x150	(1)	(2)	
132	1GF32-2CA0	300	2x70	4x240	(1)	120	2x150	(1)	(2)	
160	1GF32-6CA0	300	2x95	4x240	(1)	2x70	2x150	(1)	(2)	
200	1GF33-3CA0	300	2x120	4x240	(1)	2x95	2x240	(1)	(2)	
250	1GF34-1CA0	670	2x185	4x240	(2)	2x120	4x240	(2)	(2)	
315	1GF34-7CA0	670	2x185	4x240	(2)	2x150	4x240	(2)	(2)	
400	1GF35-8CA0	670	2x240	4x240	(2)	2x185	4x240	(2)	(2)	
450	1GF37-4CA0	940	3x185	8x240	(4)	3x150	6x240	(3)	(18)	ground bus
560	1GF38-1CA0	980	4x150	8x240	(4)	3x185	6x240	(3)	(18)	ground bus
660 ... 690 V 3 AC										
75	1GH28-5CA0	225	50	4x240	(1)	35	2x70	(1)	(2)	
90	1GH31-0CA0	225	50	4x240	(1)	50	2x150	(1)	(2)	
110	1GH31-2CA0	225	70	4x240	(1)	70	2x150	(1)	(2)	
132	1GH31-5CA0	225	95	4x240	(1)	70	2x150	(1)	(2)	
160	1GH31-8CA0	300	120	4x240	(1)	95	2x150	(1)	(2)	
200	1GH32-2CA0	300	2x70	4x240	(1)	120	2x150	(1)	(2)	
250	1GH32-6CA0	300	2x95	4x240	(1)	2x70	2x185	(1)	(2)	
315	1GH33-3CA0	300	2x120	4x240	(1)	2x95	2x240	(1)	(2)	
400	1GH34-1CA0	670	2x185	4x240	(2)	2x120	4x240	(2)	(2)	
450	1GH34-7CA0	670	2x185	4x240	(2)	2x150	4x240	(2)	(2)	
560	1GH35-8CA0	670	2x240	4x240	(2)	2x185	4x240	(2)	(2)	
710	1GH37-4CA0	940	3x185	8x240	(4)	3x150	6x240	(3)	(18)	ground bus
800	1GH38-1CA0	980	4x150	8x240	(4)	3x185	6x240	(3)	(18)	ground bus

[1] The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code) or CEC (Canadian Electrical Code) standards.

Overview (continued)

Parallel circuit

Type rating	Converter SINAMICS G150 **Version A**	Weight (standard version)	Line connection			Motor connection			Cabinet grounding	
			Recommended cross-section [1] DIN VDE	Maximum conductor cross-section DIN VDE	Fixing screw M12 (Number of holes)	Recommended cross-section [1] DIN VDE	Maximum conductor cross-section DIN VDE	Fixing screw M12 (Number of holes)	Fixing screw M12 (Number of holes)	Comment
kW	6SL3710- ...	kg	mm^2	mm^2		mm^2	mm^2			
380 ... 480 V 3 AC										
630	2GE41-1AA0	1700	2x240	4x240	(2)	2x185	4x240	(2)	(2)	
710	2GE41-4AA0	1710	3x185	4x240	(2)	3x150	4x240	(2)	(10)	ground bus
900	2GE41-6AA0	2130	4x150	8x240	(4)	3x185	4x240	(2)	(16)	ground bus
500 ... 600 V 3 AC										
630	2GF38-6AA0	1700	2x185	4x240	(2)	2x150	4x240	(2)	(2)	
710	2GF41-1AA0	1700	2x240	4x240	(2)	2x185	4x240	(2)	(2)	
1000	2GF41-4AA0	2620	3x185	8x240	(4)	3x150	6x240	(3)	(18)	ground bus
660 ... 690 V 3 AC										
1000	2GH41-1AA0	1700	2x240	4x240	(2)	2x185	4x240	(2)	(2)	
1350	2GH41-4AA0	2620	3x185	8x240	(4)	3x150	6x240	(3)	(18)	ground bus
1500	2GH41-5AA0	2700	4x150	8x240	(4)	3x185	6x240	(3)	(18)	ground bus

Note: The recommended and maximum conductor cross-sections relate to the appropriate subsystem of the converter connected in parallel circuit.

[1] The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code) or CEC (Canadian Electrical Code) standards.

Overview (continued)

Required cable cross-sections for line and motor connections

It is always advisable to use 3-wire three-phase cables or to connect several cables of this type in parallel. There are two main reasons for this:

- This is the only method by which the high IP55 degree of protection or better can be easily achieved for the motor terminal box because the cables are fed into the terminal box via screwed glands and the number of possible glands is limited by the geometry of the terminal box. Single cables are less suitable.
- With three-phase cables, the total ampere-turns over the cable outer diameter equals zero and they can be routed in (conductive, metal) cable ducts or racks without any noticeable currents (ground current or leakage current) being induced in these conductive, metal connections. The danger of induced leakage currents and thus of increased cable sheath losses is greater for single cables.

The cable cross-section required depends on the current transferred in the cable. The permissible current loading of cables is defined, for example, in DIN VDE 0276-1000. It depends partly on ambient conditions such as temperature and partly on the type of routing. When laid singly, the cables are cooled relatively well. Where there are several cables routed together, they can heat each other up, and thus receive much poorer ventilation. Please note the corresponding derating factors for these supplementary conditions in DIN VDE 0276-1000. With an ambient temperature of 40 °C, the cross-sections of copper cables can be based on the following table.

Current carrying capacity in accordance with DIN VDE 0298 Part 2 at 40 °C

Cross-section of 3-wire cables	With single routing	With several cables on a common cable rack
mm^2	A	A
50	138	95
70	176	121
95	212	146
120	245	169
150	282	194
185	323	222
240	380	261
300	418	289

With higher currents, cables must be connected in parallel.

Note: The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code) or CEC (Canadian Electrical Code) standards.

Grounding

Required PE conductor cross-sections:

The PE conductor must be dimensioned taking into account the following data:

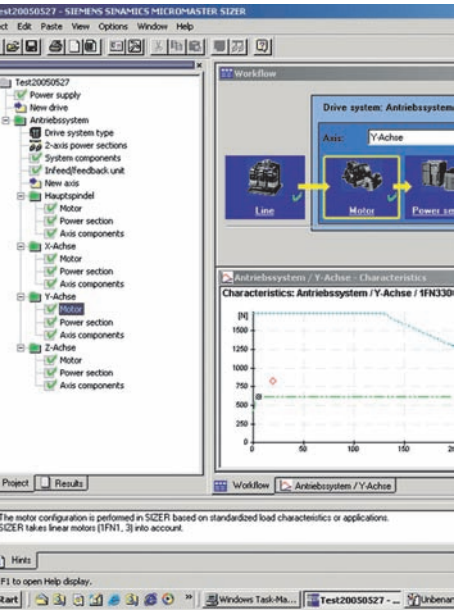
- In the case of a ground fault caused by voltage losses of the ground fault current on the PE conductor, no impermissible high contact voltages may occur (< 50 V AC or < 120 V DC, EN 50178 Section 5.3.2.2, IEC 60364-5-54).
- The PE conductor must not be excessively loaded by any ground fault current it carries.
- If it is possible for continuous currents to flow through the PE conductor when a fault as defined in EN 50178 Section 8.3.3.4 occurs, the PE conductor cross-section must be dimensioned for this continuous current.
- The PE conductor cross-section must be selected in accordance with 60204-1.

Cross-section of outer conductor	Minimum cross-section of external copper PE conductors
mm^2	mm^2
Up to 16	Minimum cross-section of outer conductor
16 ... 35	16
35 and above	At least half the cross-section of outer conductor

Note: The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code) or CEC (Canadian Electrical Code) standards.

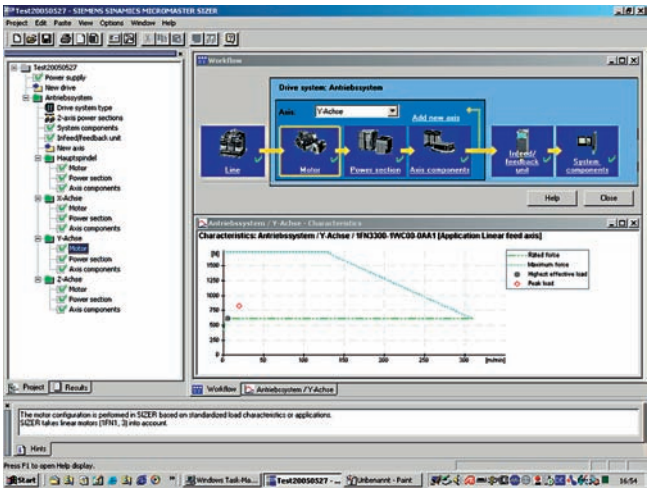
- Switchgear and motors are usually grounded separately via a local ground electrode. With this constellation, the ground fault current flows via the parallel ground connections and is divided. With this grounding system, no impermissible contact voltages can occur, despite the PE conductor cross-sections used in the above table. Based on experience with different grounding configurations, however, we recommend that the ground wire from the motor should be routed directly back to the converter. For EMC reasons and to prevent bearing currents, symmetrical motor cables rather than four-wire cables should be used here. The ground connection (PE) must be routed separately or arranged symmetrically in the motor cable. The symmetry of the PE conductor is achieved using a conductor surrounding all phase conductors or using a cable with a symmetrical arrangement of the three phase conductors and three ground conductors.
- Through their high-speed control, the converters limit the load current (motor and ground fault currents) to an rms value corresponding to the rated current. Because of this, we recommend use of a PE conductor cross-section that is similar to the outer conductor cross-section for grounding the control cabinet.

4 Tools and configuration



SIZER configuration tool

Overview



The SIZER configuration tool allows for easy configuration of the SINAMICS and MICROMASTER 4 drive families, as well as the SINUMERIK solution line CNC and SIMOTION Motion Control system. It provides technical support when sizing the hardware and firmware components required for a drive task. SIZER supports the complete configuration of the drive system, from simple individual drives to complex multi-axis applications.

SIZER supports all stages of the configuration in form of a workflow:

- Configuration of the line supply
- Dimensioning of the motor and gearbox, including calculation of mechanical transmission elements
- Configuration of the drive components
- Selection of the required accessories
- Selection of the line-side and motor-side power options, e.g. cables, filters, and reactors

When SIZER was being developed, particular importance was placed on high usability and a universal, function-based approach to the drive task. The extensive user guidance makes using the tool easy. Status information keeps you continually informed about the progress of the configuration process.

The SIZER user interface is available in German and English.

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 supports the configuration of drive devices and the copying/pasting/editing of existing drives that have already been configured.

The configuration process produces the following results:

- A parts list of the components required (export to Excel, use of the Excel data sheet for import to VSR)
- Technical specifications of the system
- Characteristic curves
- Information about harmonic effects on the supply
- Arrangement drawing of drive and control components and dimensional drawings of motors

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

User support is provided by the technological online help menu, which provides the following information:

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

Minimum system requirements

PG or PC with Pentium II 400 MHz (Windows 2000), Pentium III 500 MHz (Windows XP)

256 MB RAM (512 MB recommended)

At least 2.7 GB of free hard disk space

An additional 100 MB of free hard disk space on Windows system drive

Monitor resolution 1024 × 768 pixels

Windows 2000 SP2 / XP Professional SP1 / XP Home Edition SP1

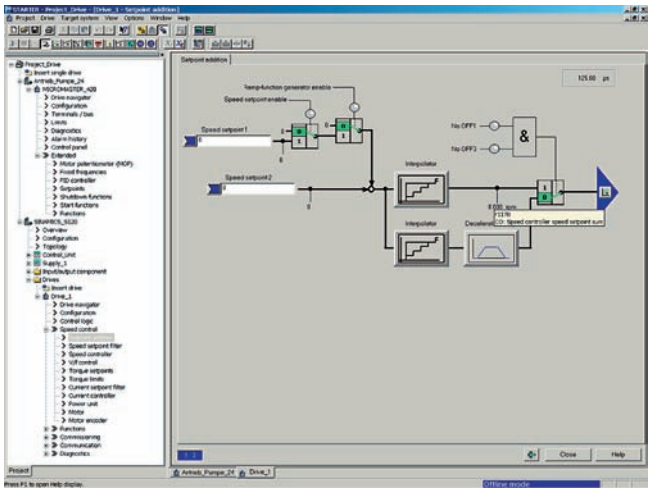
Microsoft Internet Explorer 5.5 SP2

Selection and ordering data

	Order No.
Configuration tool SINAMICS MICROMASTER SIZER German/English	**6SL3070-0AA00-0AG0**

4

Overview



The easy-to-use STARTER commissioning software can be used for

- Commissioning,
- Optimization and
- Diagnostics

In addition to the SINAMICS drives, the current version of STARTER also supports MICROMASTER 4 drives and frequency converters for the SIMATIC ET 200S FC distributed I/O system.

The project wizard can be used to create the drives within the structure of the project tree.

First-time users are supported by a solution-based dialog menu, whereby a standard graphics-based display maximizes clarity when setting the drive parameters.

First commissioning is guided by wizards, which make all the basic settings in the drive. This enables a drive to be up and running after only setting a small number of parameters within the drive configuration process.

The individual settings required are made using graphics-based parameterization screenforms, which also display the mode of operation.

Examples of individual settings that can be made include:

- Terminals
- Bus interface
- Setpoint channel (e.g. fixed setpoints)
- Speed control (e.g. ramp-function generator, limits)
- BICO interconnections
- Diagnostics

Experts can gain rapid access to the individual parameters via the expert list and do not have to navigate dialogs.

In addition, the following functions are available for optimization purposes:

- Self-optimization
- Trace (depending on drive)

Diagnostics functions provide information about:

- Control/status words
- Parameter status
- Operating conditions
- Communication states

Performance

- Easy-to-use: only a small number of settings need to be made for successful first commissioning: axis turning
- Solution-based dialog-based user guidance simplifies commissioning
- Self-optimization functions reduce manual effort for optimization
- The built-in trace function provides optimum support during commissioning, optimization and troubleshooting

DRIVE CONTROL CHART (DCC)

Drive Control Chart (DCC) is an additional tool for the easy configuration of process-oriented functions for the SINAMICS G130 and SINAMICS G150.

The user-friendly DCC editor enables easy graphics-based configuration, a clear representation of control loop structures as well as a high degree of reusability of existing diagrams. The open-loop and closed-loop control functionality is defined by using multi-instance-enabled blocks (Drive Control Blocks (DCBs)) from a predefined library (DCB library) that are selected and graphically linked by dragging and dropping. Text and diagnostic functions allow verification of program behavior or the identification of causes in the event of faults.

The block library contains a large selection of control, arithmetic and logic blocks as well as extensive open-loop and closed-loop control functions.

Drive Control Chart also provides a convenient basis for resolving drive-level open-loop and closed-loop control tasks directly in the converter. This results in further adaptability of SINAMICS to specific tasks. On-site processing in the drive supports modular machine concepts and results in increased overall machine performance.

DCC is an add-on to the STARTER commissioning tool and available as a supplementary option package.

Minimum hardware and software requirements

PG or PC with Pentium II 400 MHz (Windows 2000), Pentium III 500 MHz (Windows XP)

256 MB RAM (512 MB recommended)

Monitor resolution 1024 × 768 pixels

Windows 2000 SP3, XP Professional SP1

Microsoft Internet Explorer 5.01

STARTER commissioning tool

Integration

The CU320 Control Unit in the SINAMICS G130/SINAMICS G150 converter communicates with the programming device (PG) or PC via PROFIBUS. The PG/PC will require a PROFIBUS communications board and a connecting cable for this purpose. If the optional CBE20 PROFINET Communication Board is available, this can be used instead to provide an Ethernet communications link between the CU320 and PG/PC.

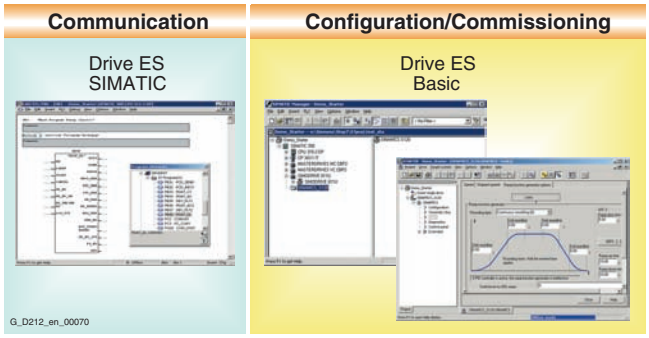
Selection and ordering data

	Order No.
STARTER commissioning tool for SINAMICS and MICROMASTER English/German/French/Italian/ Spanish	**6SL3072-0AA00-0AG0**
Drive Control Chart (DCC) option package for SINAMICS English/German/French/Italian/ Spanish Single engineering license Note: DCC can be used only if Version V4.1 SP1 or higher of the STARTER commissioning tool is installed	**6AU1810-1HA20-1XA0**
PROFIBUS CP 5512 communications board (PCMCIA type 2 card + adapter with 9-pole SUB-D socket for connection to PROFIBUS. For MS Windows 2000/XP Professional and PCMCIA 32)	**6GK1551-2AA00**
Connection cable between CP 5512 and PROFIBUS	**6ES7901-4BD00-0XA0**

Further information

The STARTER commissioning tool can also be downloaded from the Internet at
http://support.automation.siemens.com/WW/view/en/10804985/133100

Overview



Drive ES is the engineering system used to integrate functions of Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively in terms of communication, configuration and data management. The STEP 7 Manager user interface provides the basis for this procedure.

Various software packages are available for SINAMICS:

- **Drive ES Basic**
  for first-time users of the world of Totally Integrated Automation and the option for routing beyond network limits and the use of the SIMATIC TeleService.
  Drive ES Basic is the basic software program for setting the parameters of all drives online and offline.
  Drive ES enables both the automation system and drives to be handled via the SIMATIC Manager user interface.
  Drive ES Basic is the starting point for common archiving for complete projects and for extending the use of the SIMATIC TeleService to drives.
  Drive ES Basic provides the configuration tools for the new Motion Control functions slave-to-slave communication, equidistance and isochronous operation with PROFIBUS DP. The STARTER commissioning tool is an integral component of Drive ES Basic.
- **Drive ES SIMATIC**
  simple parameterization of the STEP 7 communication instead of programming.
  In order to use Drive ES SIMATIC, STEP 7 must be installed. It features a SIMATIC function block library, thereby making the programming of the PROFIBUS interface in the SIMATIC CPU for the drives easy and secure.
  There is no need for separate, time-consuming programming of the data exchange between the SIMATIC CPU and the drive.
  All Drive ES users need to remember is:
  Copy – Modify – Download – Ready.
  Customized, fully-developed function blocks are copied from the library into user-specific projects.
  Frequently-used functions are set to run in program format:
  - Read out complete diagnostics buffer automatically from the drive
  - Download complete parameter set automatically from the SIMATIC CPU to the drive, e.g. in the event of device being replaced
  - Load part parameter set (e.g. in the event of a recipe or product replacement) automatically from the SIMATIC CPU
  - Read back, i.e. update, complete parameterization or part parameter sets from the drive to the SIMATIC CPU.

In Version V5.4 SP1 and higher, Drive ES SIMATIC also supports representation of the Siemens drives in the PCS 7 Maintenance Station by a proxy concept.

- **Drive ES PCS 7**
  integrates drives with the PROFIBUS interface into the SIMATIC PCS 7 process control system.
  Drive ES PCS 7 can only be used with SIMATIC PCS 7 version 5.2 or higher.
  Drive ES PCS 7 provides a function block library with function blocks for the drives and the corresponding faceplates for the operator station, which enables the drives to be operated from the PCS 7 process control system.
  In PCS7 V6.1 and higher, the Drive ES blocks also support representation of Siemens drives in the PCS 7 Maintenance Station by a proxy concept.

For further information go to:

http://www.siemens.com/drivesolutions

Selection and ordering data

	Order No.
Drive ES Basic V5.4 SPx [1)]	
• Configuration software for the integration of drives into Totally Integrated Automation • Requirement: STEP 7 V5.3 or higher, SP3 • Supply format: CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation	
Single license	**6SW1700-5JA00-4AA0**
Multi-user license, 60 pieces	**6SW1700-5JA00-4AA1**
Software update service	**6SW1700-0JA00-0AB2**
Software update service for multi-user license	**6SW1700-0JA00-1AB2**
Upgrade from V5.x to V5.4	**6SW1700-5JA00-4AA4**
Drive ES SIMATIC V5.4 SPx [1)]	
• Function block library for SIMATIC for the parameterization of communication with the drives • Requirement: STEP 7 V5.3 or higher, SP3 • Supply format: CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation	
Single license, incl. 1 x Runtime license	**6SW1700-5JC00-4AA0**
Runtime license	**6SW1700-5JC00-1AC0**
Software update service for Single license	**6SW1700-0JC00-0AB2**
Upgrade from V5.x to V5.4	**6SW1700-5JC00-4AA4**
Drive ES PCS 7 V6.1 SPx [1)]	
• Function block library for PCS 7 for the integration of drives • Requirement: PCS 7 V6.1 • Supply format: CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation	
Single license, incl. 1 x Runtime license	**6SW1700-6JD00-1AA0**
Runtime license	**6SW1700-5JD00-1AC0**
Software update service for Single license	**6SW1700-0JD00-0AB2**
Upgrade from V5.x to V6.1	**6SW1700-6JD00-1AA4**
Drive ES PCS 7 V7.0 SPx [1)]	
• Function block library for PCS 7 for the integration of drives • Requirement: PCS 7 V7.0 • Supply format: CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation	
Single license, incl. 1 x Runtime license	**6SW1700-7JD00-0AA0**
Software update service for Single license	**6SW1700-0JD00-0AB2**
Upgrade from V5.x to V7.0	**6SW1700-7JD00-0AA4**

[1)] Orders are automatically delivered with the latest Service Pack (SP).

Overview

Drives with quadratic load torque

Drives with a quadratic load torque ($M \sim n^2$), such as drives for pumps and fans, require the full torque at the rated speed.

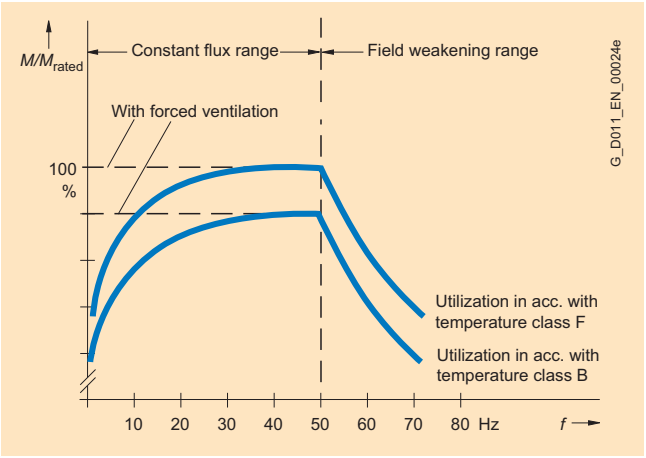
Increased starting torques or high load surges do not usually occur. It is therefore unnecessary to provide a higher overload capacity for the converter.

The following applies to selection of a suitable converter for drives with a quadratic load torque:

The rated current of the converter must be at least as large as the motor current at full torque at the required load point.

When using standard Siemens motors, these motors can also be loaded with the full rated power even in converter mode. They are then utilized to full advantage in accordance with temperature class F. However, if the motors may only be utilized to full advantage in accordance with temperature class B, the motor power must be reduced. Depending on the motor series, this reduction typically amounts to 10 to 15 %. The respective reduction factor is automatically taken into account when configuring with SIZER.

Selection of suitable motors and converters for a specific application is supported by the SIZER configuration tool.



Typical curve of the permissible torque with self-ventilated motors (e.g. 1LA) with a rated frequency of 50 Hz

Drives with constant load torque

The 1LG4/1LG6 and 1LA8 self-ventilated motors cannot provide their full rated torques throughout the complete speed range in continuous operation. The continuous permissible torque decreases as the speed decreases because of the reduced cooling effect (see diagram).

Depending on the speed range, the torque – and thus the power – must be reduced for the self-ventilated motors.

In the case of 1PQ8 and 1PQ4 forced-ventilated motors, it is not necessary to reduce the power, or only by a relatively small amount, depending on the speed range.

In the case of frequencies above rated frequency f_n (50 Hz in the diagram), the motors are driven in the field weakening range. The usable torque is reduced in this case by approx. f_{rated}/f, and the output remains constant. Especially in the control modes with *V/f* characteristic, a sufficient interval of ≥ 30 % from the breakdown torque must be observed, which is reduced by $(f_{rated}/f)^2$.

The selected base load current of the converter should therefore be at least as great as the motor current at full torque at the required load point.

Selection of suitable motors and converters for a specific application is supported by the SIZER configuration tool.

Rated current – permissible and non-permissible motor/converter combinations

Motor rated current greater than converter rated output current:

If a motor is used whose rated current is greater than the converter rated output current, this means that the motor can only be operated at partial load. The following limit must be observed:

The maximum possible converter current (overload current) should be greater than or equal to the rated current of the connected motor.

If this dimensioning is not observed, current peaks which can either lead to switching off or can cause a continuous reduction in power by the internal protection circuit can occur as a result of the low leakage inductance of larger motors.

Motor rated current much smaller than converter rated output current:

The motor rated current for the sensorless Vector Control used must be at least ¼ of the converter rated output current. With smaller motor currents, operation using the *V/f* mode is possible.

For more detailed information on drive dimensioning, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

Overview

It is generally recommendable to use the standard Siemens motors 1LA and 1LG.

With regard to the voltage stress, the standard insulation of the motors is designed such that operation on the converter is possible without limitation.

For detailed data about motor types 1LG4/1LG6 and 1LA8, please refer to Catalog D 81.1.

Self-ventilated motors with IP55 degree of protection (1LG4/1LG6 and 1LA8)

1LG4/1LG6 motors

1LA8 motors

The 1LG4/1LG6 and 1LA8 motors are self-ventilated motors with IP55 degree of protection.

Both the internal and external fans (which are fitted in each motor) have a fixed connection to the shaft.

The cooling effect is therefore directly dependent on the motor speed.

Other motors

In addition to the 1LA and 1LG motors, the 1PH7/1PL6 compact asynchronus (induction) motors can also be used. These are recommended for:

- Large speed range at high maximum speeds,
- Limited mounting space.

1PH7/1PL6 motors are on average 1 to 2 shaft heights smaller than comparable standard asynchronus (induction) motors with the same rated output.

Line voltages > 500 V for 1LA/1LG motors

The standard insulation of the 1LA and 1LG motors is designed such that operation without limitation is only possible on the converter at line voltages of 500 V +10 %. At higher voltages, the motors require greater insulation resistance.

1LA8/1PQ8 and 1LG6 motors are also available with a higher insulation resistance for converter-fed operation with voltages up to 690 V; no filters are required in this case. These motors are identified by an "M" in the 10th digit of the Order No. (e.g. 1LA8315-2P**M**).

With the reinforced insulating system, there is less space in the grooves for the same number of windings compared to the normal version, which slightly reduces the rated output of these motors.

For higher torque requirements, 1LA4 self-ventilated motors or 1PQ4 forced-ventilated motors (degree of protection IP55) from the H-compact II series are available for the upper power range.

Motor protection

A motor protection function can be implemented using the I^2t detection present in the converter software.

If precise motor protection is required, this can be afforded by direct temperature measurement using KTY84 sensors or PTC thermistors in the motor winding.

When using the KTY84 sensor, motor option **A23** must be specified when ordering 1LA8 and 1LG4/1LG6 motors. With 1PH7 and 1PL6 motors, the sensors are fitted as standard.

If PTC thermistors are required, motor option **A11** or **A12** must be specified when ordering 1LG4/1LG6 motors. With 1LA8/1PQ8 motors, the sensors are fitted as standard.

The KTY84 sensor and PTC thermistor can be evaluated by connecting to terminal –X41 on the Power Module in the converter chassis unit. Alternatively, the TM31 Terminal Module and SMC30 Sensor Module also feature inputs via which temperature sensors can be evaluated.

PT100 temperature sensors (resistance thermometers) are alternatively possible for the 1LA8 and 1LG4/1LG6 motors for monitoring the motor winding temperature. When ordering the motor, either option **A60** (3 × PT100) or **A61** (6 × PT100) must be selected.

With 1MJ flameproof motors, PTB-approved PTC thermistors and release mechanisms are absolutely essential.

Overview (continued)

Bearing currents

When operating multiphase induction machines on a converter, an electrical bearing stress results from a capacitive induced voltage via the bearing lubricating film, depending on the principle being used. The physical cause of this is the common-mode voltage at the converter output: the sum of the three phase-to-neutral voltages is not zero at all times, unlike with direct on-line operation. The high-frequency, pulse-shaped common-mode voltage brings about a residual current, which closes back to the converter's DC link via the machine's internal capacitance, the machine housing and the grounding circuit. The machine's internal capacitance includes the main insulation winding capacitance, the geometric capacitance between the rotor and stator, the lubricating film capacitance and the capacitance of any bearing insulation that may be present. The current level via the internal capacitance is proportional to the common-mode voltage regulation ($i(t) = C \times dv/dt$).

In order to apply currents to the motor which are sinusoidal as far as possible (smooth running, oscillation torques, stray losses), a high clock frequency is required for the converter's output voltage. The related (very steep) switching edges of the converter output voltage (and also, therefore, of the common-mode voltage) cause correspondingly high capacitive currents and voltages on the machine's internal capacitance.

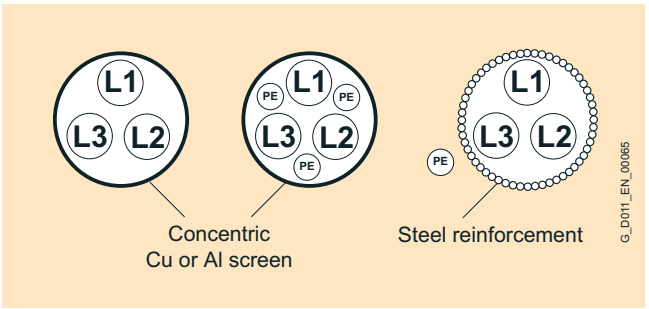
In the worst-case scenario, the capacitive voltage induced via the bearing can lead to random punctures of the bearing lubricating film, thus damaging the bearing/causing premature wear. The current pulses caused by the puncture in the lubricating film are referred to as EDM (Electrostatic Discharge Machining) currents, although this is not primarily a question of an electrostatic effect, but more of (partial) punctures of insulating material, i.e. of partial discharges.

This physical effect, which occurs in isolated cases, has mostly been observed in connection with larger motors.

EMC-compliant installation of the drive system is a basic prerequisite for preventing premature bearing damage by bearing currents.

The most important measures for reducing bearing currents:

- Insulated motor bearings at the non-drive end
  The insulated bearing is standard for all 1LA8 motors designated for converter operation. An insulated bearing at the non-drive end is available as an option for motors of the 1LG4/1LG6 series starting at frame size 280 (order code **L27**).
- Use of cables with a symmetrical cable cross-section:



- Use of motor reactors (option **L08**)
- Preference given to a line with insulated neutral point (IT system)
- Use of grounding cables with low impedance in a large frequency range (DC up to approximately 70 MHz): for example plaited copper ribbon cables, HF litz wires
- Separate HF equipotential-bonding cable between motor housing and driven machine
- Separate HF equipotential-bonding cable between motor housing and converter PE busbar
- 360° HF contacting of the cable shield on the motor housing and the converter PE busbar. This can be achieved using EMC screwed glands on the motor end and EMC shield clips on the converter end, for example.

Operation with and without feedback of the actual speed value

The control range of the drive must be taken into account with regard to the speed accuracy.

If the speed control range is above 5 % of the rated speed, the control accuracy of the sensorless Vector Control is approximately 0.2 × f_{slip}. Taking into account the slip values of standard motors in the power range from 75 kW to 1500 kW, this results in a speed accuracy of < 0.2 %. In the speed control range below 5 % of the rated speed, the control accuracy is approximately that of the slip frequency of the motor, i.e. approx. 1 %.

The SINAMICS G130 and G150 converters can be operated with or without feedback of the actual speed value.

Use of encoders to measure the actual speed value of the motor is recommended with:

- High dynamic response and torque accuracy requirements
- Very high speed accuracy
- Observation of a defined torque with speeds below 5 % of the rated motor speed.

Operation of motors with type of protection "d"

1MJ induction motors can be connected as explosion-proof motors with flameproof enclosure Ex de IIC both to the line and the converter.

In accordance with the test guidelines, the motors of the 1MJ series must be equipped with PTC thermistors.

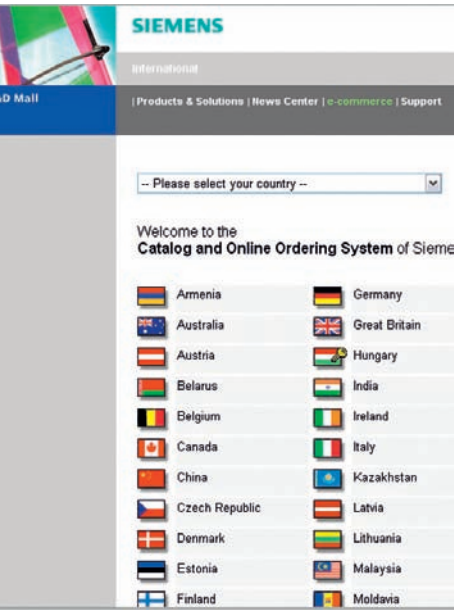
If 1MJ motors are connected to converters, their maximum permissible torque must be reduced, **depending on the load characteristic**, when utilized in accordance with temperature class B, just like the motors of the 1LA series with the same power.

1MJ motors have a terminal box with increased safety Ex e II as standard.

Detailed motor data can be found in Catalog D 81.1.

For more detailed information about operating motors on G130 and G150 drive systems, please refer to the Engineering Manual SINAMICS Low Voltage. The engineering manual is stored as a PDF file on the CD-ROM included with the catalog.

Appendix



Training

Faster and more applicable know-how: Hands-on training from the manufacturer

SITRAIN® – the Siemens Training for Automation and Industrial Solutions – provides you with comprehensive support in solving your tasks.

Training by the market leader in automation and plant engineering enables you to make independent decisions with confidence. Especially where the optimum and efficient use of products and plants are concerned. You can eliminate deficiencies in existing plants, and exclude expensive faulty planning right from the beginning.

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- Optimized production operations
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- Minimization of plant downtimes
- Flexible plant adaptation to market requirements
- Compliance with quality standards in production
- Increased employee satisfaction and motivation
- Shorter familiarization times following changes in technology and staff

Contact

Visit our site on the Internet at:

http://www.siemens.com/sitrain

or let us advise you personally. You can request our latest training catalog from:

SITRAIN Customer Support Germany:

Phone: +49 (0)1805 / 23 56 11
(0.14 €/min from the German landline network)

Fax: +49 (0)1805 / 23 56 12

SITRAIN highlights

Top trainers

Our trainers are skilled teachers with direct practical experience. Course developers have close contact with product development, and directly pass on their knowledge to the trainers.

Practical experience

The practical experience of our trainers enables them to teach theory effectively. But since theory can be pretty drab, we attach great importance to practical exercises which can comprise up to half of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. This training approach will give you all the confidence you need.

Wide variety

With a total of about 300 local attendance courses, we train the complete range of A&D products as well as interaction of the products in systems. Telecourses, teach-yourself software and seminars with a presenter on the Web supplement our classic range of courses.

Tailor-made training

We are only a short distance away. You can find us at more than 50 locations in Germany, and in 62 countries worldwide. You wish to have individual training instead of one of our 300 courses? Our solution: We will provide a program tailored exactly to your personal requirements. Training can be carried out in our Training Centers or at your company.

The right mixture: Blended learning

"Blended learning" means a combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a teach-yourself program as preparation or follow-up. Additional effect: Reduced traveling costs and periods of absence.

Design

SINAMICS G150/G130/S150 courses

Here you will find an overview of the training courses available for the SINAMICS G150/G130/S150.

The courses are modular in design and are inteded for 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.

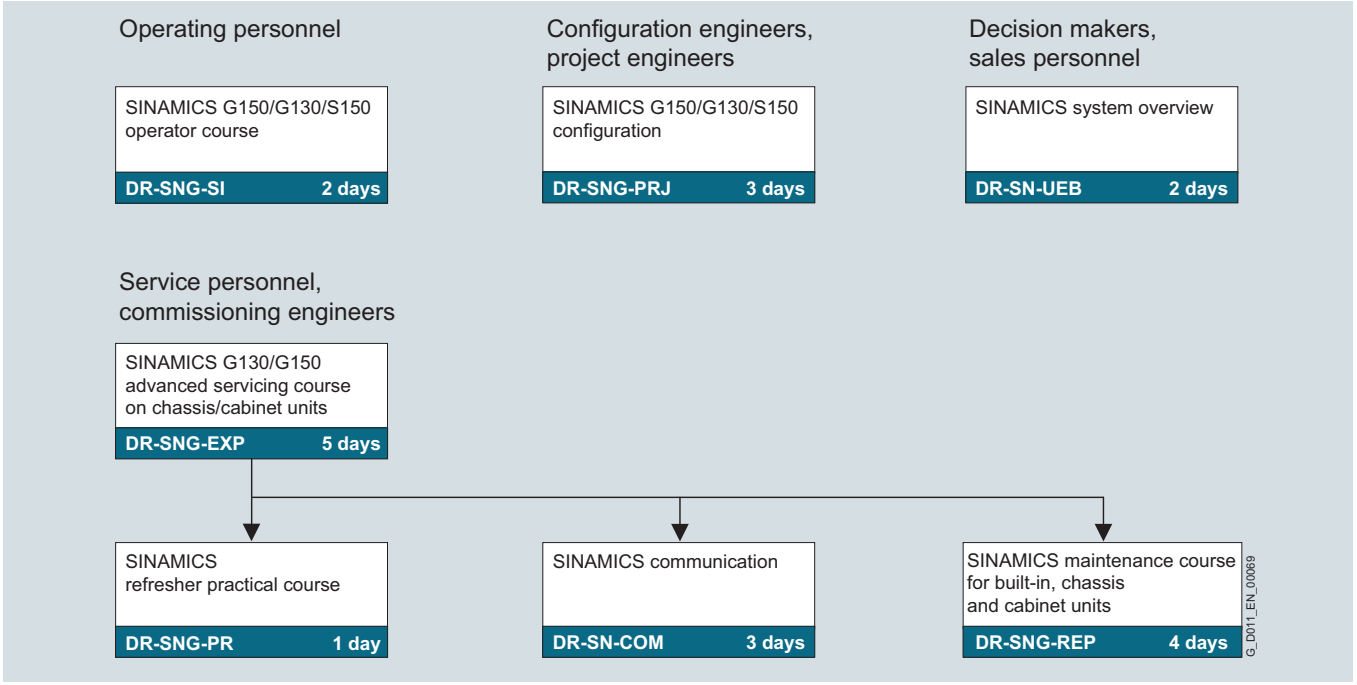
The planning course provides all the information you need to size the drive system.

The basic and follow-up courses are sure to provide all the technical knowledge servicing personnel will need for servicing/commissioning Motion Control applications, communication and cabinet units.

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

Title	Target group						Duration	Course code
	Decision makers, sales personnel	Configuration engineers, project engineers	Operating personnel	Commissioning engineers, configuration engineers	Service personnel	Maintenance personnel		
SINAMICS system overview	✓	✓					2 days	DR-SN-UEB
SINAMICS G150/G130/S150 configuration	✓	✓	✓	✓			3 days	DR-SNG-PRJ
SINAMICS G150/G130/S150 operator course			✓			✓	2 days	DR-SNG-SI
SINAMICS advanced servicing course on chassis/cabinet units				✓	✓	✓	5 days	DR-SNG-EXP
SINAMICS refresher practical course				✓	✓	✓	1 day	DR-SNG-PR
SINAMICS communication				✓	✓		3 days	DR-SN-COM

SINAMICS G150/G130/S150 learning path



Our Services for Every Phase of Your Project

In the face of harsh competition you need optimum conditions to keep ahead all the time:
A strong starting position. A sophisticated strategy and team for the necessary support - in every phase.
Service & Support from Siemens provides this support with a complete range of different services for automation and drives.

In every phase: from planning and startup to maintenance and upgrading.

Our specialists know when and where to act to keep the productivity and cost-effectiveness of your system running in top form.

Online Support

The comprehensive information system available round the clock via Internet ranging from Product Support and Service & Support services to Support Tools in the Shop.

http://www.siemens.com/automation/service&support

Technical Support

Competent consulting in technical questions covering a wide range of customer-oriented services for all our products and systems.

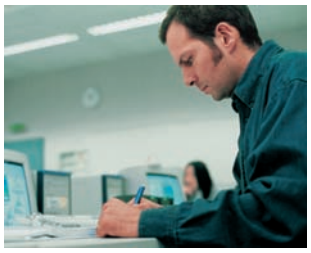
Tel.: +49 (0)180 50 50 222
Fax: +49 (0)180 50 50 223
(0.14 €/min from the German landline network)

http://www.siemens.com/automation/support-request

Technical Consulting

Support in the planning and designing of your project from detailed actual-state analysis, target definition and consulting on product and system questions right to the creation of the automation solution.[1)]

Configuration and Software Engineering



Support in configuring and developing with customer-oriented services from actual configuration to implementation of the automation project.[1)]

Service On Site

With Service On Site we offer services for startup and maintenance, essential for ensuring system availability.

In Germany
0180 50 50 444[1)]
(0.14 €/min from the German landline network)

Repairs and Spare Parts

In the operating phase of a machine or automation system we provide a comprehensive repair and spare parts service ensuring the highest degree of operating safety and reliability.

In Germany
0180 50 50 446[1)]
(0.14 €/min from the German landline network)

Optimization and Upgrading

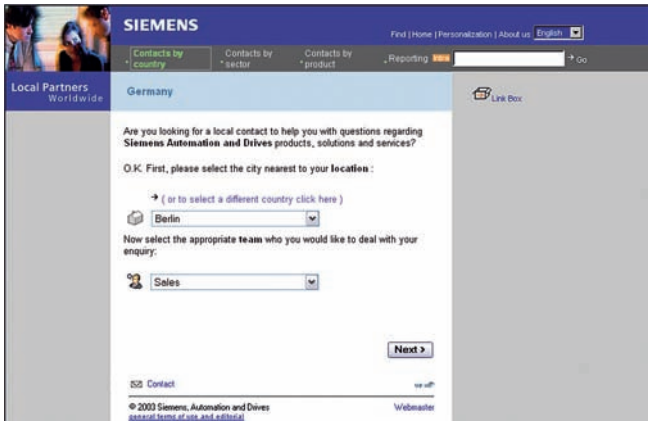
To enhance productivity and save costs in your project we offer high-quality services in optimization and upgrading.[1)]

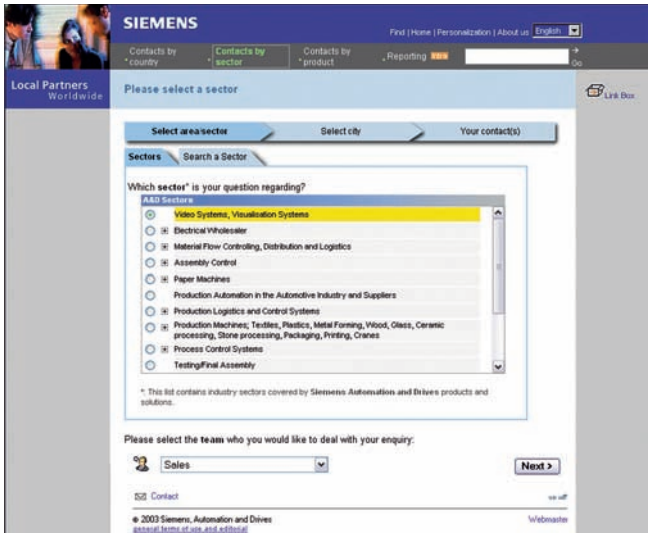
Product registration

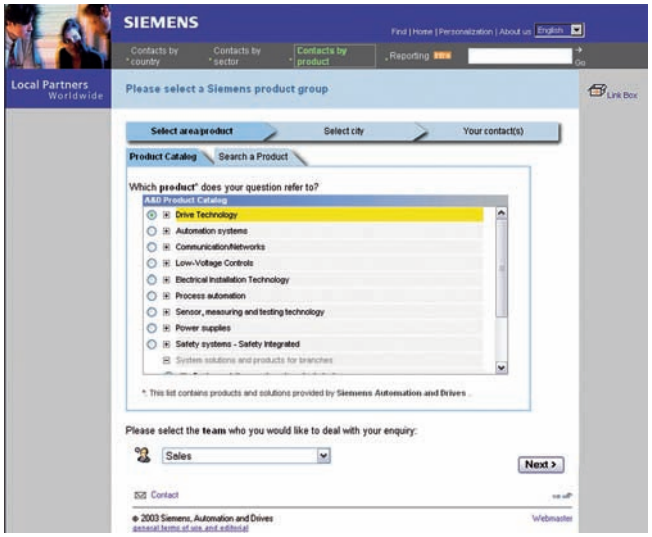
To guarantee our servicing performance (availability of spare parts, hotline function, readiness of personnel), we offer you product registration for our SINAMICS drive equipment. Feedback on the final destination (installation/operation location) and naming of contact partners allows a servicing response without delay. The feedback can be made either using a feedback form (enclosed with each converter) or via the internet:

http://www.siemens.com/reg

[1)] For country-specific telephone numbers go to our Internet site at: http://www.siemens.com/automation/service&support







At

http://www.siemens.com/automation/partner

you can find details of Siemens contact partners worldwide responsible for particular technologies.

You can obtain in most cases a contact partner for

- Technical Support,
- Spare parts/repairs,
- Service,
- Training,
- Sales or
- Consultation/engineering.

You start by selecting a

- Country,
- Product or
- Sector.

By further specifying the remaining criteria you will find exactly the right contact partner with his/her respective expertise.

Information and Ordering in the Internet and on CD-ROM

Siemens Industry Automation and Drive Technologies in the WWW

A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

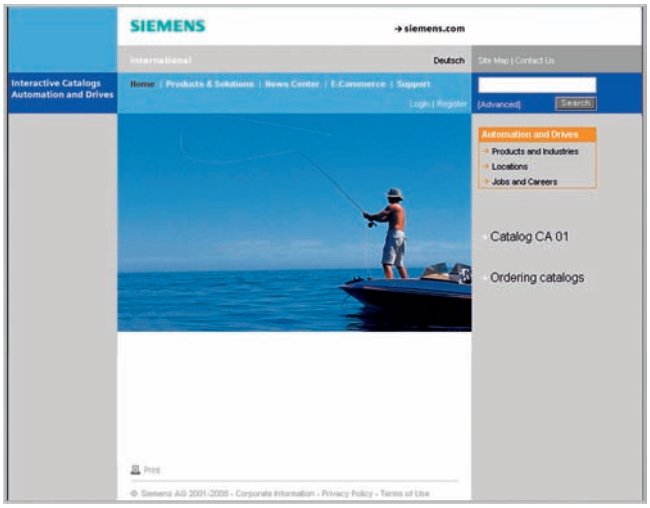
Siemens Industry Automation and Drive Technologies has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

http://www.siemens.com/automation

you will find everything you need to know about products, systems and services.

Product Selection Using the Offline Mall



Detailed information together with convenient interactive functions:
The Offline Mall CA 01 covers more than 80,000 products and thus provides a full summary of the Siemens Automation and Drives product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives.
All information is linked into a user interface which is easy to work with and intuitive.

After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the Offline Mall CA 01 can be found in the Internet under

http://www.siemens.com/automation/ca01

or on CD-ROM or DVD.

Easy Shopping with the A&D Mall

The A&D Mall is the virtual department store of Siemens AG in the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

Numerous functions are available to support you.

For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the A&D Mall on the Internet under:

http://www.siemens.com/automation/mall

Subject index

Subject index (continued)

Index of order numbers

Approvals

Many of the products in this catalog comply with UL/CSA and FM requirements and are labeled with the corresponding approval mark.

All approvals and certifications have been carried out for the associated system components as described in the catalogs and configuration manuals. They are therefore only valid if the system components described are used in the device or plant.

UL: Underwriters Laboratories
Independent public testing institution in North America

Approval marks:

- ㊊ for end-products, tested by UL in accordance with UL standard
- c㊊ for end-products, tested by UL in accordance with CSA standard
- c㊊us for end-products, tested by UL in accordance with UL and CSA standards
- for mounting parts in end-products, tested by UL in accordance with UL standard
- c for mounting parts in end-products, tested by UL in accordance with CSA standard
- c us for mounting parts in end-products, tested by UL in accordance with UL and CSA standards

Test standards:

- SIMOTION: Standard UL 508
- SINAMICS: Standard UL 508C
- SIMODRIVE: Standard UL 508C
- Motors: Standard UL 547

Product category/File-No.:

- SIMOTION: E164110
- SINAMICS: E192450
- SIMODRIVE: NMMS2/E192450
- Motors: E93429

TUV: TUV Rheinland of North America Inc.
Independent public testing institution in North America
National recognized testing laboratory (NRTL)

Approval mark:

- **cTUVus** tested by TUV in accordance with UL and CSA standards

CSA: Canadian Standards Association
Independent public testing institution in Canada

Approval mark:

- Ⓢ Tested by CSA in accordance with CSA standard

Test standard:

- Standard CAN/CSA-C22.2 No. 14-Industrial Control Equipment/No. 14-05/No. 14-M95/No. 142-M1987

Conditions of sale and delivery
Export regulations

Terms and Conditions of Sale and Delivery

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following terms apply exclusively for orders placed with Siemens AG.

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For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office in Germany" shall apply.

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For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

General

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches only apply to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

The prices are in € (Euro) ex works, exclusive packaging.

The sales tax (value added tax) is not included in the prices. It shall be debited separately at the respective rate according to the applicable legal regulations.

Prices are subject to change without prior notice. We will debit the prices valid at the time of delivery.

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold if the respective basic official prices for these metals are exceeded. These surcharges will be determined based on the official price and the metal factor of the respective product.

The surcharge will be calculated on the basis of the official price on the day prior to receipt of the order or prior to the release order. The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used. The metal factor, provided it is relevant, is included with the price information of the respective products.

An exact explanation of the metal factor and the text of the Comprehensive Terms and Conditions of Sale and Delivery are available free of charge from your local Siemens business office under the following Order Nos.:

- 6ZB5310-0KR30-0BA1
  (for customers based in Germany)
- 6ZB5310-0KS53-0BA1
  (for customers based outside Germany)

or download them from the Internet
http://www.siemens.de/automation/mall
(Germany: A&D Mall Online-Help System)

Export regulations

The products listed in this catalog may be subject to European/German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog:

AL	Number of the German Export List Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "AL" not equal to "N" are subject to a European or German export authorization when being exported out of the EU.
ECCN	Export Control Classification Number Products marked other than "N" are subject to a reexport license to specific countries. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "ECCN" not equal to "N" are subject to a US re-export authorization.

Even without a label or with an "AL: N" or "ECCN: N", authorization may be required due to the final destination and purpose for which the goods are to be used.

The deciding factors are the AL or ECCN export authorization indicated on order confirmations, delivery notes and invoices.

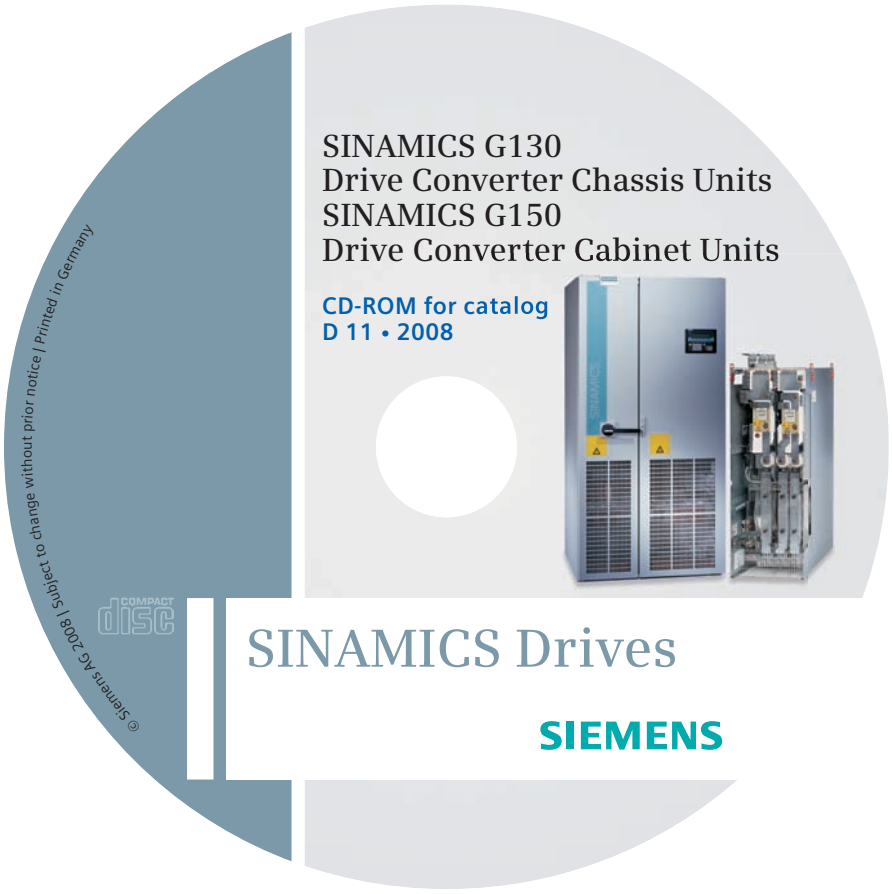
Errors excepted and subject to change without prior notice.

A&D/VuL_ohne MZ/En 05.09.06

CD-ROM for catalog D 11

The enclosed CD-ROM for catalog D 11 · 2008 contains the following information on planning/configuration:

- Dimensional drawings for the drive converter chassis units and cabinet units (PDF format)
- Catalog D 11 · 2008, SINAMICS G130/SINAMICS G150 (PDF format)
- Engineering Manual SINAMICS Low Voltage (PDF format)



Hardware and software requirements

- CD-ROM drive
- Windows 2000/XP and higher
- Acrobat Reader
- MS Internet Explorer V5.5 and higher

Start

Insert the CD into the CD-ROM drive. The program starts automatically. If the AutoRun function is not activated in your system, please start the "start.hta" file from the CD-ROM in Windows Explorer.

Note

No programs have to be installed to view the information on this CD-ROM.

Catalogs

Industry Automation, Drive Technologies and Electrical Installation Technology

Further information can be obtained from our branch offices listed in the appendix or at www.siemens.com/automation/partner

Automation and Drives	*Catalog*
Interactive catalog on DVD	CA 01

Drive Systems	
Variable-Speed Drives	
SINAMICS G110/SINAMICS G120 Inverter Chassis Units SINAMICS G120D Distributed Frequency Inverters	D 11.1
SINAMICS G130 Drive Converter Chassis Units, SINAMICS G150 Drive Converter Cabinet Units	D 11
SINAMICS GM150/SINAMICS SM150 Medium-Voltage Converters	D 12
SINAMICS S150 Drive Converter Cabinet Units	D 21.3
Asynchronous Motors Standardline	D 86.1
Synchronous Motors with Permanent-Magnet Technology, HT-direct	D 86.2
DC Motors	DA 12
SIMOREG DC MASTER 6RA70 Digital Chassis Converters	DA 21.1
SIMOREG K 6RA22 Analog Chassis Converters	DA 21.2
PDF: *SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units*	*DA 22*
SIMOVERT PM Modular Converter Systems	DA 45
SIEMOSYN Motors	DA 48
MICROMASTER 420/430/440 Inverters	DA 51.2
MICROMASTER 411/COMBIMASTER 411	DA 51.3
SIMOVERT MASTERDRIVES Vector Control	DA 65.10
SIMOVERT MASTERDRIVES Motion Control	DA 65.11
Synchronous and asynchronous servomotors for SIMOVERT MASTERDRIVES	DA 65.3
SIMODRIVE 611 universal and POSMO	DA 65.4
Low-Voltage Three-Phase-Motors	
IEC Squirrel-Cage Motors	D 81.1
IEC Squirrel-Cage Motors · New Generation 1LE1	D 81.1 N
MOTOX Geared Motors	D 87.1
Automation Systems for Machine Tools SIMODRIVE	NC 60
• Motors	
• Converter Systems SIMODRIVE 611/POSMO	
Automation Systems for Machine Tools SINAMICS	NC 61
• Motors	
• Drive System SINAMICS S120	
SIMOTION, SINAMICS S120 and Motors for Production Machines	PM 21
Drive and Control Components for Hoisting Equipment	HE 1
Mechanical Driving Machines	
Flender Standard Couplings	MD 10.1

Electrical Installation Technology	
PDF: *ALPHA Small Distribution Boards and Distribution Boards, Terminal Blocks*	*ET A1*
PDF: *ALPHA 8HP Molded-Plastic Distribution System*	*ET A3*
PDF: *BETA Low-Voltage Circuit Protection*	*ET B1*
PDF: *DELTA Switches and Socket Outlets*	*ET D1*
GAMMA Building Controls	ET G1

Human Machine Interface Systems SIMATIC HMI	ST 80

SIMATIC NET	*Catalog*
Industrial Communication	IK PI

Low-Voltage	
Controls and Distribution – SIRIUS, SENTRON, SIVACON	LV 1
Controls and Distribution – Technical Information SIRIUS, SENTRON, SIVACON	LV 1 T
SIDAC Reactors and Filters	LV 60
SIVENT Fans	LV 65
SIVACON 8PS Busbar Trunking Systems	LV 70

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