

SINAMICS S120 Chassis Format Units and Cabinet Modules

SINAMICS S150 Converter Cabinet Units

Catalog D 21.3 · 2009



SINAMICS Drives

Answers for industry.

SIEMENS

Related Catalogs

SINAMICS G130, D 11
Drive Converter Chassis Units
SINAMICS G150
Drive Converter Cabinet Units
E86060-K5511-A101-A4-7600



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



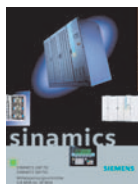
Low-Voltage Controls LV 1
and Distribution
SIRIUS · SENTRON · SIVACON
E86060-K1002-A101-A8-7600
Technical Information LV 1 T
included on CD in Catalog LV 1



Low-Voltage Motors D 81.1
IEC Squirrel-Cage Motors
Frame sizes 56 to 450
E86060-K5581-A111-A3-7600



SINAMICS GM150/SINAMICS SM150 D 12
Medium-Voltage Converters
0.8 MVA to 28 MVA
E86060-K5512-A101-A1-7600



SITRAIN ITC
Training for Automation and
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E86060-K6850-A101-B8 ¹⁾



Catalog CA 01 CA 01
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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
- EMC Installation Guideline
- 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
- Dimension Drawings

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

The first three chapters are devoted primarily to the fundamental physical principles of variable-speed electric drives and include EMC Installation Guidelines as well as 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 dimension drawings for equipment included in the manual.

The Engineering Manual SINAMICS Low Voltage is stored as a PDF file on the CD-ROM supplied with the catalog.

Note:

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

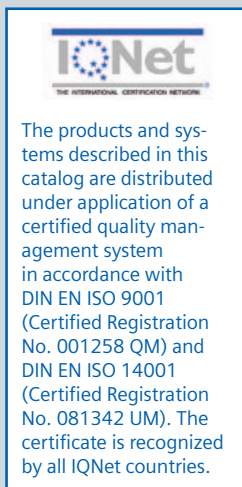
¹⁾ Language: German

SINAMICS Drives

SINAMICS S120
Chassis Format Units and Cabinet Modules

SINAMICS S150
Converter Cabinet Units

Catalog D 21.3 · 2009

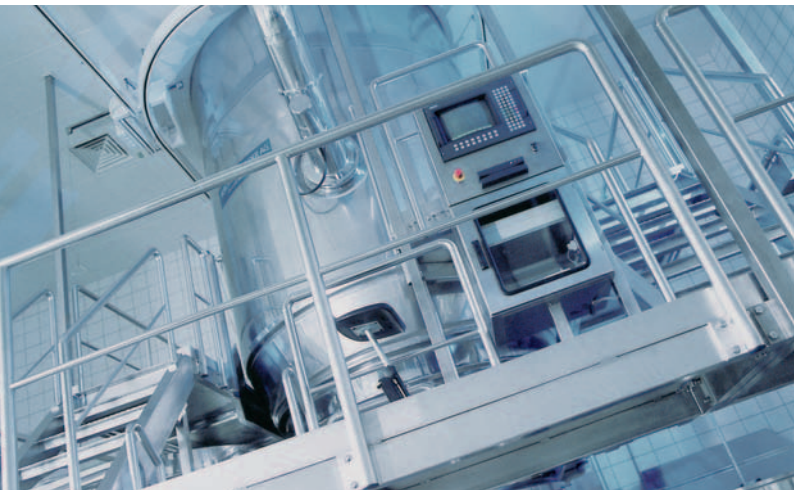


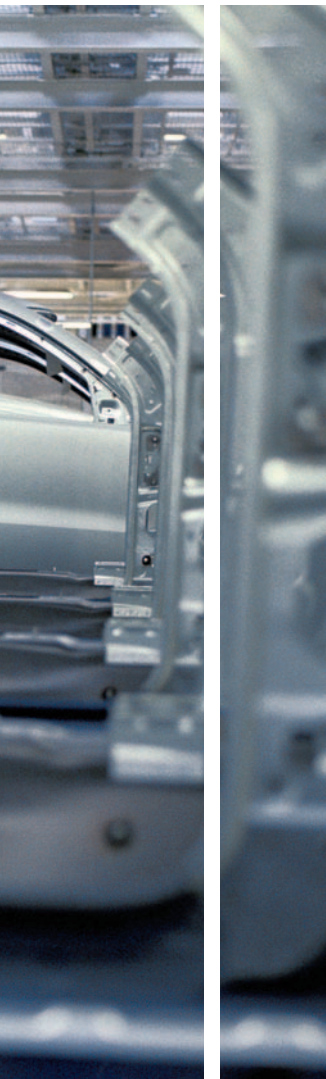
The products and systems described in this catalog are distributed under application of a certified quality management system in accordance with DIN EN ISO 9001 (Certified Registration No. 001258 QM) and DIN EN ISO 14001 (Certified Registration No. 081342 UM). The certificate is recognized by all IQNet countries.

Supersedes
Catalog D 21.3 · 2004

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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.

Management Level

MES – Manufacturing Execution Systems



Operations Level

SIMATIC PCS 7
Process Control (DCS)

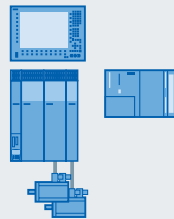


Control Level

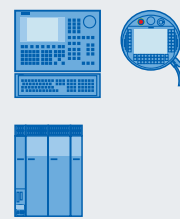
Industrial Software for

- Design and Engineering
- Installation and Commissioning
- Operation
- Maintenance
- Modernization and Upgrade
- Energy Management

SIMOTION
Motion Control System



SINUMERIK
Computer Numeric Control



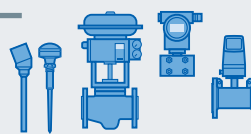
Field Level

PROFIBUS PA

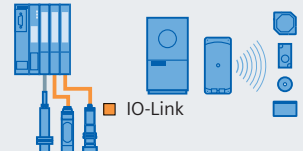


HART

Process Instrumentation



SIMATIC Sensors



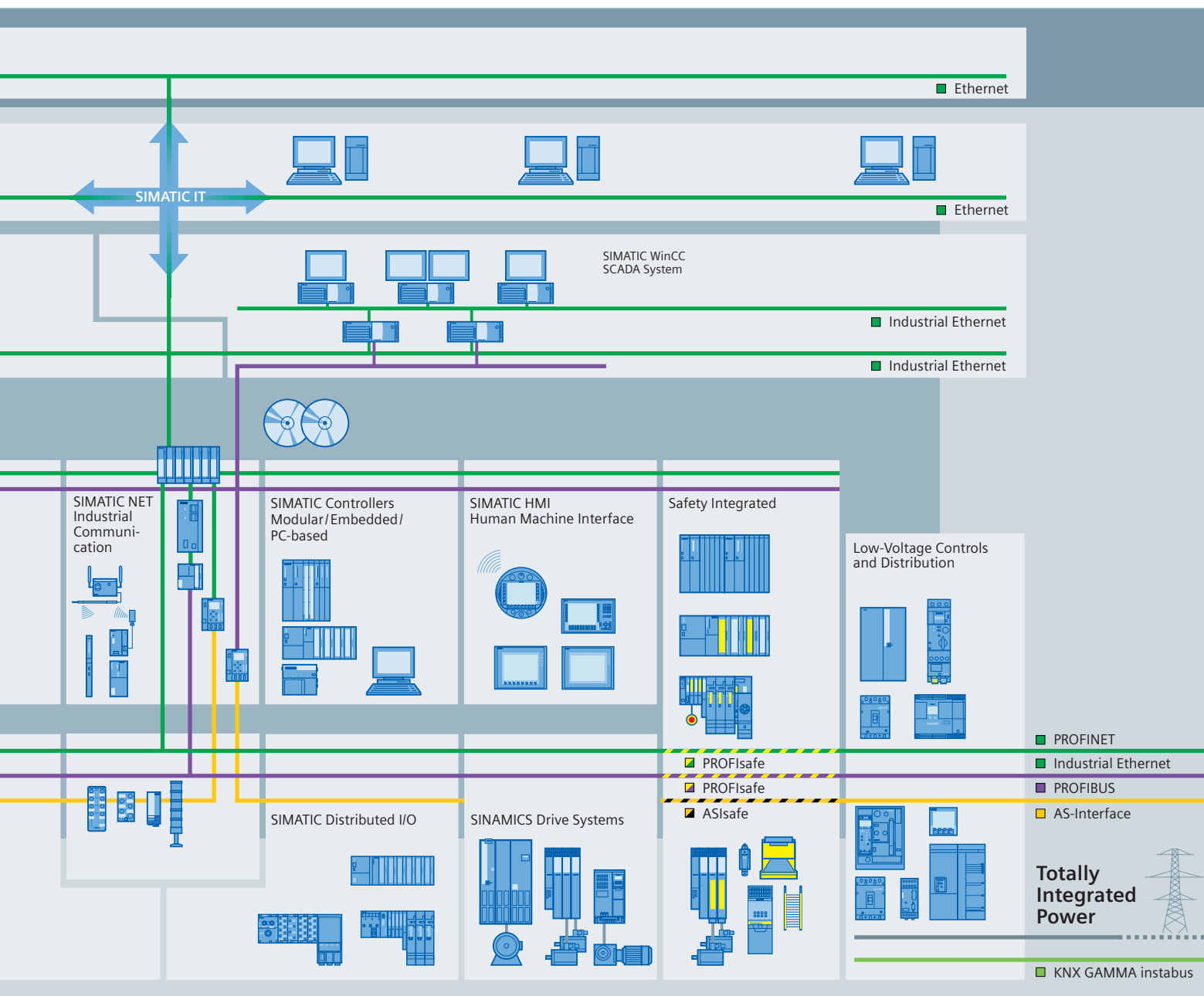
Totally
Integrated
Automation

02.03.2009

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.



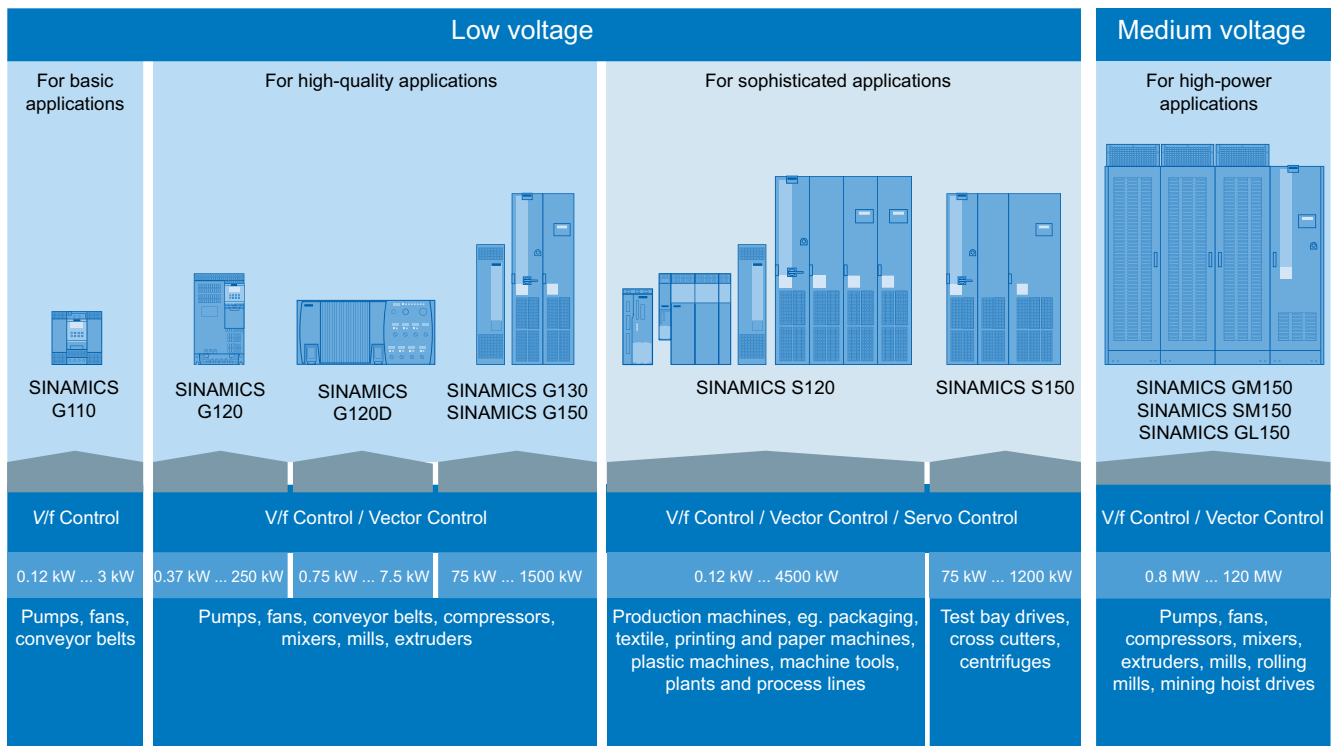
Introduction



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The SINAMICS drive family

1



G_D213_EN_00074

Application

SINAMICS is the new family of drives from Siemens designed for mechanical 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. These applications have less stringent requirements regarding dynamic response and motor speed accuracy.
- SINAMICS S handles complex drive tasks with synchronous and asynchronous (induction) motors and fulfills stringent requirements regarding
 - dynamic response 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. Common 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. The degree of integration of SINAMICS with respect to engineering, data management, and communication with the automation level means that solutions with the SIMOTION, SINUMERIK and SIMATIC control systems are easy to implement.

The SINAMICS drive family

Tailored to suit different application areas, the SINAMICS range encompasses the following products:

Low-voltage drive converters (line supply < 1000 V)

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

Medium-voltage drive converters (line supply > 1000 V)

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

The SINAMICS range is characterized by the following system properties:

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

SINAMICS G



Mixer/mills



Pumps/fans/compressors



Conveyor systems



Extrusion



Textiles



Metal forming technology



Woodworking

SINAMICS S



Rolling mills



Packaging



Machine tools

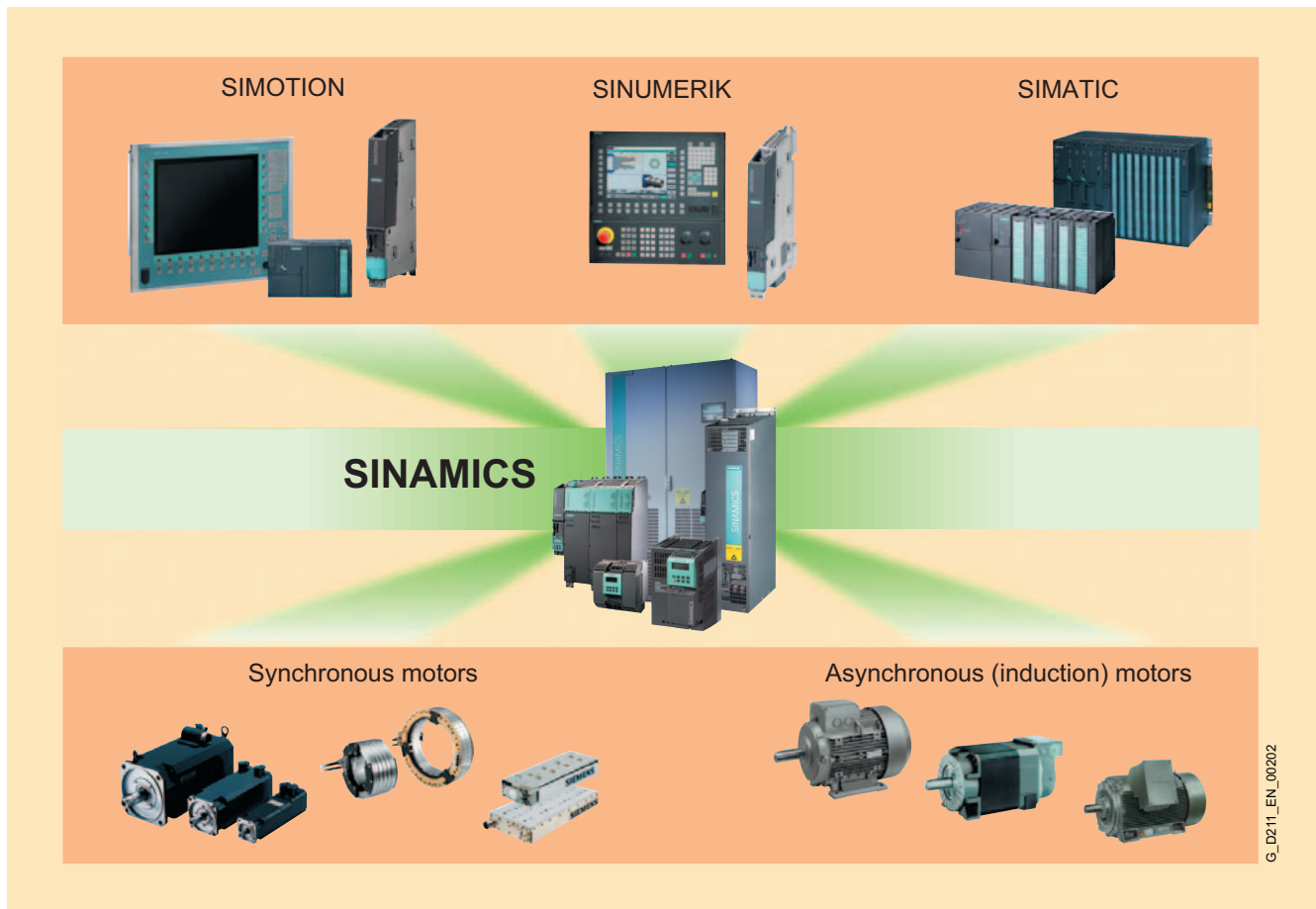


Printing and paper machines

Applications of the SINAMICS drive family

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The SINAMICS drive family



SINAMICS as part of the Siemens modular automation system

Quality according to DIN EN ISO 9001

SINAMICS satisfies the highest 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.

G_D211_EN_00202

SINAMICS low-voltage converters / inverters

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 with high degree of protection for installation without a control cabinet

Main applications

- Machines and plants for industrial and commercial applications
- Machines and plants for industrial and commercial applications (mechanical engineering, automotive, textiles, chemicals, printing, steel)
- Conveyor drive applications in an industrial environment, main focus on the automotive industry; also suitable for high-performance applications e.g. at airports and in the food, beverage 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

The members of the SINAMICS drive family

SINAMICS low-voltage converters / inverters

SINAMICS G130 / SINAMICS G150



The universal drive solution for high-power single drives without regenerative feedback

SINAMICS S120



The flexible, modular drive system for demanding drive tasks

SINAMICS S150



The drive solution for high-power single drives

Main applications

- Machines and plants in the process and production industry, water/waste, power stations, oil and gas, petrochemicals, chemical raw materials, paper, cement, stone, steel
- Machines and plants 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 plants in the process and production industry, food, beverages and tobacco, automotive and steel industry, mining/open-cast mining, shipbuilding, lifting equipment, conveyors

Application examples

- Pumps and fans
- Compressors
- Extruders and mixers
- Mills
- Motion control applications (positioning, synchronous operation)
- Numeric 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 rating, 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
- Air- and liquid-cooled versions
- Four-quadrant operation as standard
- High control accuracy and dynamic response
- Minimum harmonic effects on the supply system, 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 D 21.3 and PM 21

Catalog D 21.3

SINAMICS medium-voltage converters

SINAMICS GM150



The universal drive solution for single drives

SINAMICS SM150



The drive solution for sophisticated single and multi-motor drives

SINAMICS GL150



The drive solution for synchronous motors up to 100 MW

Main applications

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> • Machines and plants in the process industry | <ul style="list-style-type: none"> • Machines and plants, e.g. in the steel and mining industry | <ul style="list-style-type: none"> • Machines and plants in the process industry, especially in the oil, gas and petrochemicals sectors |
|---|--|--|

Application examples

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> • Pumps and fans • Compressors • Extruders and mixers • Mills • Marine drives | <ul style="list-style-type: none"> • Rolling mills • Conveyor baskets • Test bay drives • Conveyor belts | <ul style="list-style-type: none"> • Compressors • Pumps and fans • Extruders and mixers • Marine drives • Blast furnace blowers |
|---|--|---|

Highlights






- | | | |
|--|--|--|
| <ul style="list-style-type: none"> • Space-saving • Simple, fast commissioning • Ready-to-connect cabinet unit • Optimum interaction with SIMATIC • Air- and liquid-cooled versions | <ul style="list-style-type: none"> • Four-quadrant operation as standard • High efficiency and minimum load on the motor • High control accuracy and dynamic response • Minimum harmonic effects on the supply system • Option of reactive power compensation • Simple, fast commissioning • Ready-to-connect cabinet unit • Optimum interaction with SIMATIC • Air- and liquid-cooled versions | <ul style="list-style-type: none"> • 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 • Air- and liquid-cooled versions |
|--|--|--|

Catalog D 12

Catalog D 12

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Overview

Drive units for single-axis applications		Drive units for multi-axis applications		
				
Blocksize format	Chassis format	Booksize format (compact)	Chassis format	Cabinet Modules
Catalog PM 21	This Catalog, Part 2	Catalog PM 21	This Catalog, Part 2	This Catalog, Part 3

SINAMICS S120 is the modular drive system with vector and servo control that is ideal for sophisticated drive tasks in plant and machine construction.

Multi-axis drive solutions with higher-level motion control can be implemented with the modular SINAMICS S120 system just the same as solutions for single-axis drives.

Covering a power range from 0.12 kW to 4500 kW and various control units with a graduated range of functions, the modular SINAMICS S120 system can be used to simply and quickly create a precisely tailored drive configuration – for almost any sophisticated drive application.

On the SINAMICS S120, the drive intelligence is combined with closed-loop control functions into Control Units.

These units are capable of controlling drives in the vector, servo and V/f modes. They also perform the speed and torque control

functions plus other intelligent drive functions for all axes on the drive.

Using the available closed-loop control techniques, both synchronous as well as asynchronous (induction) motors can be operated, and therefore the complete range of low-voltage motors from Siemens AG.

Integrated PROFIBUS DP interfaces ensure easy integration into complete automation solutions. PROFINET is another of the field bus interfaces supported by the system.

SINAMICS S120 Cabinet Modules are available as a cabinet system specifically for use in plant construction. These can be combined to form drive cabinet line-ups with a total power rating of up to 4500 kW. Standardized interfaces enable the modules to be linked quickly to create a ready-to-connect drive solution for multi-axis applications.

Benefits

SINAMICS S120 is characterized by the following properties:

- Can be universally used in high-performance single and multi-axis applications
- Can be freely combined to create customized solutions
- Wide range of performance
- Wide range of functions
- SINAMICS Safety Integrated functions
- Supports various cooling types (air/liquid-cooled)
- Different infeed concepts
- Can be simply integrated into higher-level automation and IT environments
- User-friendly engineering
- Ease of handling
- Simple installation
- Practical connection system
- Auto-configuration with electronic rating plates

Applications

SINAMICS S120 vector control is recommended for drive solutions with continuous material webs, for example, wire-drawing machines, film and paper machines, as well as for hoisting gear, centrifuges and marine drives with harmonic, circular motion.

SINAMICS S120 with servo control and servo motors is employed for cyclic processes with both precise and highly dynamic closed-loop position control.

With SINAMICS S120, more performance is integrated into machines that are used in many sectors, for instance in:

- Packaging machines
- Plastics processing machines
- Textile machines
- Presses and punches
- Printing and paper machines
- Machines used in the woodworking, glass and ceramics industries
- Hoisting gear
- Handling and assembly systems
- Machine tools
- Rolling mill drives
- Vehicle and gearbox test stands

Design

Types of construction

Power Modules are available in blocksize and chassis formats. Motor Modules and Line Modules are available in booksize, booksize compact and chassis formats.

Catalog PM 21 provides precise details and ordering data for the booksize, booksize compact and blocksize formats.

Booksize format

Booksize format units are optimized for multi-axis applications and are mounted adjacent to one another. The connection for the common DC link is an integral feature.



Several cooling possibilities are available for the booksize format:

Internal air cooling

In this standard solution, the power loss from the electronics and power units of the drive components is removed by natural cooling or by a forced-ventilation system and dissipated to the environment.

External air cooling

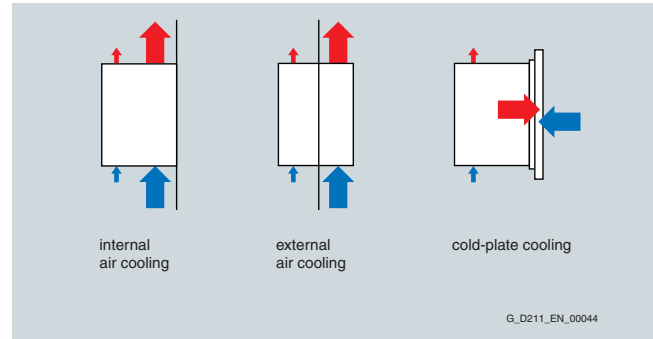
External air cooling uses the through-hole technology. The components' power unit heat sinks pass through the mounting surface in the control cabinet and can thus dissipate the power losses of the power circuit to a separate external cooling circuit.

The only power loss that remains in the cabinet is that emitted by the electronics. Degree of protection IP54 can be achieved at this "mechanical interface" – the external heat sink.

The heat sink, with its cooling fins and the fan unit (part of the scope of supply), protrudes through the back into a separate ventilation duct, which can also be open to the outside.

Cold plate cooling

Drive units using cold plate cooling are designed so that the power loss of the power unit can be dissipated to an external heat sink at the rear of the drive unit through a thermal interface. This external heat sink is water-cooled, for example.



Booksize compact format

Derived from the booksize format we developed the booksize compact format for machines with particularly high requirements for the compactness of their drives.

The booksize compact format combines all benefits of the booksize format and provides the same performance with an even smaller overall height and an extended overload capability.

The booksize compact format is thus particularly suitable for integration into machines requiring a high dynamic performance and where installation space is restricted.



The booksize compact format has the same design for the cooling methods of internal air cooling and cold plate cooling.

Blocksize format

Blocksize format units are optimized for single-axis applications and are supplied only as Power Modules.

The units are cooled by an internal air cooling circuit.



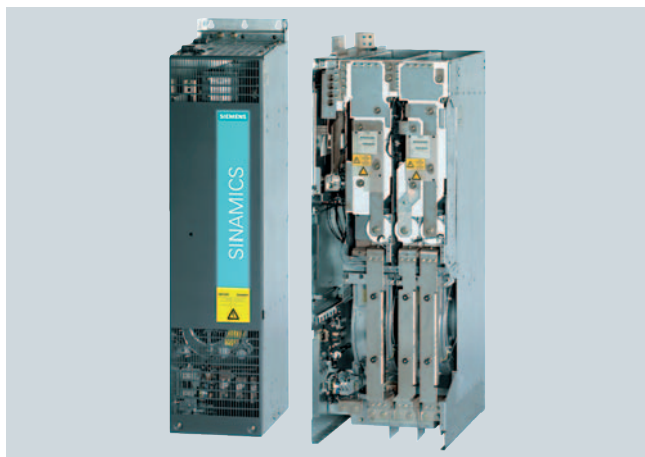
Design (continued)

Chassis format, air-cooled

Higher-output units (approximately 100 kW and above) are constructed in chassis format. These drive units are available as:

- Power Modules
- Basic Line Modules
- Smart Line Modules
- Active Line Modules
- Active Interface Modules
- Motor Modules

Chassis format units are cooled by an internal air cooling circuit as standard.



Power Module in chassis format, air-cooled

Chassis format, liquid-cooled

In addition to the air-cooled drive units, liquid-cooled units are also available:

- Power Modules
- Basic Line Modules
- Active Line Modules
- Motor Modules

These drive units provide excellent solutions for applications where a low space requirement is important – up to a 60 % smaller footprint when compared to air cooling – or low noise levels – < 56 dB(A). They are also admirably suited for applications in tough ambient conditions.



Power Module in chassis format, liquid-cooled

Cabinet Modules

SINAMICS S120 Cabinet Modules are a modular cabinet system for multi-motor drives with a central supply infeed and a common DC busbar, for example, as used in paper machines, rolling mills, test bays, and hoisting gear. The main components of the system are as follows:

- Line Connection Modules
- Basic Line Modules
- Smart Line Modules
- Active Line Modules
- Central Braking Modules
- Motor Modules
- Auxiliary Power Supply Modules



Cabinet Modules

Coated modules

The following drive units are equipped as standard with coated modules:

- Blocksize format units
- Booksize format units
- Chassis format units
- Control Units
- Sensor Modules
- Terminal Modules
- Advanced Operator Panel (AOP30)

The varnish coating protects the sensitive SMD components against corrosive gases, chemically active dust and moisture.

Nickel-plated busbars

All of the copper busbars used are nickel-plated in order to achieve the best possible immunity to environmental effects. Further, the contact cleaning required for bare copper connections is not necessary for customer connections.

Overview



SINAMICS S150 cabinet units are designed for variable-speed single drives in plant and machinery construction.

They are especially suitable where high demands are placed on the dynamic performance and speed precision – as well as for frequent braking cycles with high braking energies and four-quadrant operation. The drive converter cabinet units provide high performance speed control with a high precision and dynamic performance – and are available for a power range extending from 75 kW up to 1200 kW.

Benefits

- Regenerative feedback into the mains supply as standard permits four-quadrant operation without any restrictions
- Significant energy saving, particularly with frequent braking cycles
- Highly accurate and dynamic line infeed thanks to IGBTs – rugged against the effect of line fluctuations
- Almost sinusoidal line currents are impressed as a result of the fast current control
- The innovated Clean Power Filter ensures that the low-frequency harmonics fed back into the supply are largely negligible – and well below the stringent THD limit values as specified by IEEE 519 – therefore the losses in the low-voltage distribution and/or line transformers and in the line feeder cable caused by harmonic currents are avoided
- Reactive power compensation is possible (inductive or capacitive)
- Can be easily integrated in automation solutions thanks to the PROFIBUS interface (incorporated as standard), as well as a range of analog and digital interfaces.
- Increased plant availability thanks to quick and easy replaceability of individual modules and power components.
- Simple commissioning and parameterization using interactive menus on the AOP30 Advanced Operator Panel with graphic LCD and plain-text display.
- The drive system can be optimally adapted to specific requirements thanks to the wide range of electrical and mechanical options
- Extensive range of protective functions → "Safety Integrated"

Applications

SINAMICS S150 is predestined for use in all applications that place the highest demands on process operations with dynamic, reproducible processes. These include, for example:

- Test bay drives
- Centrifuges
- Elevators and cranes
- Cross cutters and shears
- Conveyor belts
- Presses
- Cable winches

Design

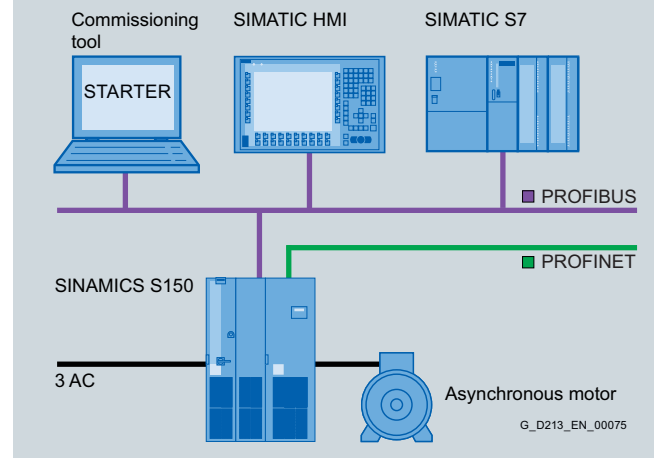
SINAMICS S150 systems are ready-to-connect converters accommodated in a standard control cabinet.

They can be optimally adapted to specific requirements as a result of a wide range of options.

Different variants allow the line and the motor connection to be made at the top or bottom. This ensures a high degree of flexibility regarding how the drive is installed.

The drive units can be supplied with cabinet widths starting from 1400 mm in grid dimension increments of 200 mm. As standard, the cabinets have degree of protection IP20, but this can be optionally extended up to IP54. The AOP30 Advanced Operator Panel is fitted as standard in the cabinet door.

Configuration example SINAMICS S150 with SIMATIC S7



Introduction

SINAMICS S150

Notes

1

SINAMICS S120 Chassis Format Units

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2/140 SMC10 Sensor Module

Cabinet-Mounted

2/141 SMC20 Sensor Module

Cabinet-Mounted

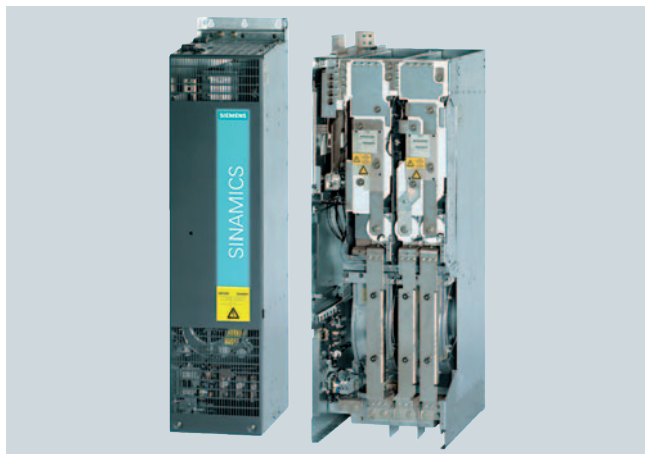
2/142 SMC30 Sensor Module

Cabinet-Mounted

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System overview

Overview



With its separate power unit and control module (Control Unit), the SINAMICS S120 drive system can be perfectly adapted to a wide variety of different drive tasks.

The control unit is selected according to the number of drives to be controlled and the required performance level, while the power unit must be rated to meet requirements regarding regenerative feedback capability or energy exchange. The connection between the Control Unit and power unit is made very simply using the digital system interface DRIVE-CLiQ.

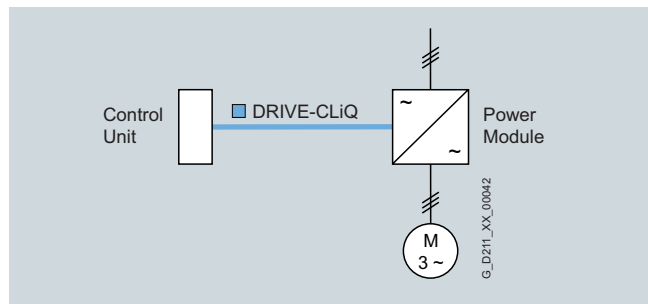
The following drive units are available in the chassis format:

- Power Modules
- Basic Line Modules
- Smart Line Modules (only available in the air-cooled version)
- Active Line Modules
- Active Interface Modules (only available in the air-cooled version)
- Motor Modules

Power Modules

The simplest variant of a SINAMICS S120 drive system comprises a CU310 Control Unit and a Power Module.

In Power Modules specifically designed for single drives without regenerative feedback into the mains supply, the line-side infeed and the motor-side power unit are combined in one unit.



Generated energy produced during braking is converted to heat via braking resistors.

The Control Unit is plugged onto the Power Module; in addition to the complete control intelligence, the Control Unit also has all the drive interfaces for communication with higher-level systems and interfacing of add-on components.

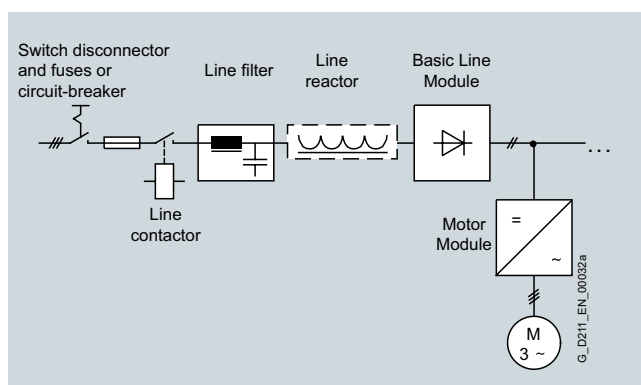
Line Modules

Line Modules include the central line infeed for the DC link. Various Line Modules are available for different application profiles:

- Basic Line Modules
- Smart Line Modules
- Active Line Modules

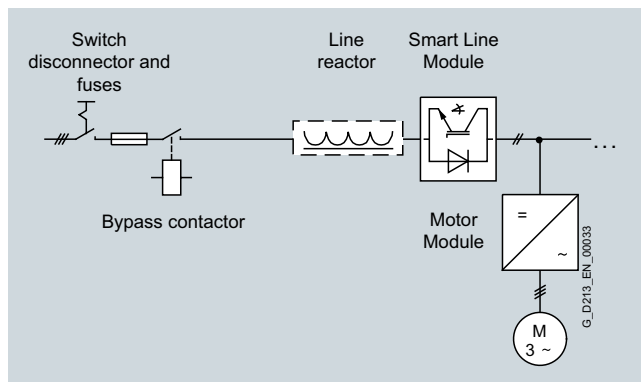
Basic Line Modules

Basic Line Modules are designed only for infeed operation, i.e. they are not capable of recovering energy to the mains supply. If regenerative energy is produced, e.g. when drives brake, it must be converted to heat by means of a Braking Module and a braking resistor. A line filter can be optionally installed in order to maintain the limit values according to EN 61800-3, Class C2.



Smart Line Modules

Smart Line Modules can supply energy and recover energy to the mains supply. A Braking Module and braking resistor are required only if the drives need to be decelerated in a controlled manner after a power failure (i.e. when energy cannot be recovered to the supply). When a Smart Line Module is used as the infeed, the matching line reactor must be installed.

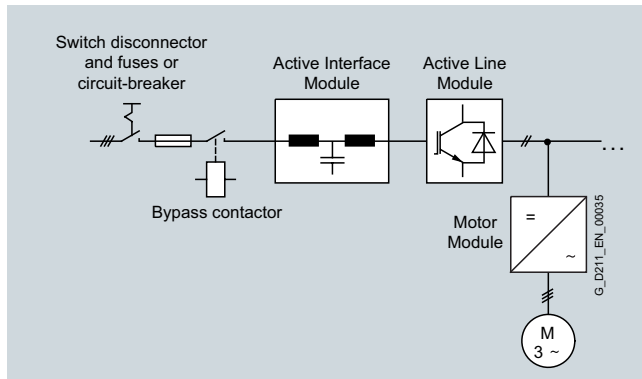


Overview (continued)

Active Line Modules

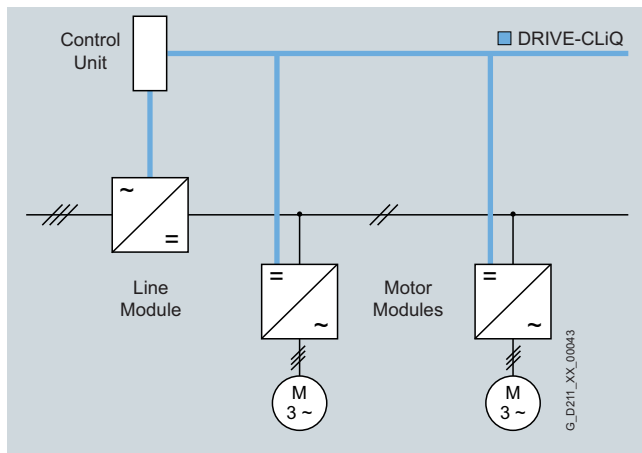
Active Line Modules can supply energy and return regenerative energy to the supply system. A Braking Module and braking resistor are required only if the drives need to be decelerated in a controlled manner after a power failure (i.e. when energy cannot be recovered to the supply).

In contrast to Basic Line Modules and Smart Line Modules, Active Line Modules generate a controlled DC voltage that is kept constant despite fluctuations in the line supply voltage if the line supply voltage fluctuates within the permitted tolerance range. Active Line Modules draw a virtually sinusoidal current from the supply which limits any harmful harmonics. All the components required to operate an Active Line Module are integrated in the Active Interface Module.



Motor Modules

A DC link and an inverter for supplying a motor are integrated in the Motor Module.



Motor Modules are designed for multi-axis drive systems and are controlled by either a CU320 or a SIMOTION D Control Unit. Motor Modules are interconnected through a common DC bus. One or several Motor Modules are supplied with energy for the motors via the DC link. Both synchronous and asynchronous (induction) motors can be operated.

Since the Motor Modules share the same DC link, they can exchange energy with one another, i.e. if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode. The DC link is supplied with line supply voltage by a Line Module.

Control Units

The control intelligence for all the drive axes integrated in the multi-axis group is combined in the Control Units. They also feature drive-related inputs/outputs and interfaces for communicating with higher-level controllers. Control Units are available with different ranges of functions and with different performance levels.

System components

The structure of the drive system is defined by selecting the Control Unit and Power Module or Line Module and Motor Module. The additional components provided allow optimum adaptation of the drive system to the application.

These components are subdivided into

- **Line-side components**, e.g. line reactors and line filters
- **DC link components** e.g. Braking Modules and braking resistors
- **Motor-side components**, e.g. motor reactors and dv/dt filters plus VPL, sine-wave filters
- **Supplementary system components**, e.g. Terminal Modules, operator panels and Communication Boards
- **Encoder system interface** for connecting various types of encoders to SINAMICS S120.

DRIVE-CLiQ system interface

All the SINAMICS S120 components are equipped with the high-performance DRIVE-CLiQ system interface.

Line and Motor Modules are connected to the Control Unit and Terminal and Sensor Modules to the drive system via DRIVE-CLiQ – simply and efficiently. Motors that also have this interface can be directly connected to the drive system.

System overview

Function

Communication with higher-level control and customer terminal block

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

This customer terminal block can be used to connect the system to the higher-level controller using analog and digital signals, or to connect additional units.

For more detailed information, please refer to the SINAMICS Low Voltage Engineering Manual. 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 includes a high-quality vector control with speed and current control (with and without encoder).

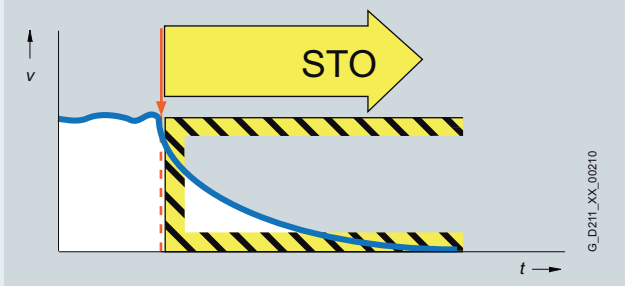
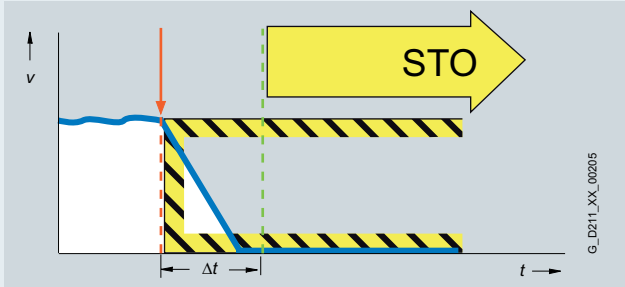
Software and protection functions

The software functions available as standard are described below:

Software and protection functions	Description
Setpoint input	The setpoint can be input both internally and externally. It is applied internally as a fixed setpoint, motorized potentiometer setpoint or jog setpoint and externally via the communications interface or an analog input on the customer terminal block. The internal fixed setpoint and the motorized potentiometer setpoint can be switched over or adjusted using control commands from any interface.
Motor identification	The automatic motor identification function makes commissioning faster and easier and optimizes closed-loop control of the drive.
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 operating behavior and as a result of the smooth starting, significantly reduces the wear on mechanical components. The ramp-down ramps can be parameterized separately for emergency stop.
Kinetic buffering (KIP)	For brief line supply failures, the kinetic energy of the rotating drive is used to buffer the DC link and therefore prevents fault trips. The drive converter remains operational as long as the drive can provide regenerative energy as a result of its motion and the DC link voltage does not drop below the trip threshold. When the line supply recovers within this time, the drive is again accelerated up to its setpoint speed.
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" function allows the converter to switch on to a motor that is still rotating.
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 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 S120 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 S120. 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 configuring).
$\hat{P} \ t$ detection for motor protection	The motor temperature is calculated in a motor model stored in the drive converter software. More exact sensing of the temperature, which also takes into account the influence of the ambient temperature, is possible by means of direct temperature sensing using KTY84 sensors in the motor winding.
Motor temperature evaluation	Motor protection by evaluating a KTY84 or PTC temperature sensor. When a temperature sensor is connected, the limit values can be set for alarm or shutdown. When a PTC thermistor is connected, the system reaction to triggering of the thermistor (alarm or shutdown) can be defined.
Motor blocking protection	A blocked motor is detected and protected against thermal overloading by a fault trip.

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

Function (continued)

Safety Integrated	Description
Safe Torque Off (STO)	<p><u>Function description</u></p> <p>This function is a mechanism that 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.</p> <p><u>Application, customer benefits</u></p> <p>STO has the immediate effect that the drive cannot supply any torque-generating energy. STO can be used wherever the drive will naturally reach a standstill due to load torque or friction in a sufficiently short time or when "coasting down" of the drive will not have any relevance for safety.</p> 
Safe Stop 1 (SS1)	<p><u>Function description</u></p> <p>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 independently brakes along a quick stop ramp (OFF3) and automatically activates Safe Torque Off when the parameterized safety delay timer has expired.</p> <p><u>Application, customer benefits</u></p> <p>This integrated self-braking function eliminates the need for complex external monitoring equipment. Furthermore, it is often possible to eliminate mechanical brakes which wear, or to lessen the load on them, so that maintenance costs and the stresses on the machine can be reduced.</p> <p>Safe Stop 1 is employed for applications which require monitored braking, e.g. on centrifuges or conveyor vehicles.</p>  <p>The safety functions integrated in SINAMICS S120 satisfy the requirements of</p> <ul style="list-style-type: none"> • Category 3 according to EN 954-1 or EN ISO 13849-1 • Safety Integrity Level (SIL) 2 according to EN 61508 • Performance Level (PL) d according to EN ISO 13849-1 <p>In addition, the Safety Integrated functions of the SINAMICS S120 are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office.</p>
Power unit protection	Description
Ground-fault monitoring at output end	A ground fault at the output end is detected by an aggregate current monitor and results in shutdown in grounded-neutral systems.
Electronic short-circuit protection at output end	A short-circuit (e.g. on the converter output terminals, in the motor cable or in the motor terminal box) is detected at the output end and the converter shuts down with a fault message.
Thermal overload protection	An alarm is issued first when the overtemperature threshold responds. If the temperature rises further, the unit either shuts down or independently adjusts the pulse frequency or output current so that a reduction in the thermal load is achieved. After the cause of the fault has been eliminated (e.g. improving the cooling), the drive system automatically returns to the original operating values.

SINAMICS S120 chassis units

Air-cooled drive units

Overview

Technical data

The following technical data describe the Directives and Standards of the chassis format units:

European directives	
2006/95/EC	Low-voltage directive: Legal guidelines of the EU member states concerning electrical equipment for use within specified voltage limits
2004/108/EC	EMC directive: Legal guidelines of the EU member states for electromagnetic compatibility
98/37/EC	Machinery directive: Legal guidelines of the EU member states for machines
European standards	
EN 954-1	Safety of machinery – safety-related parts of control systems; Part 1: General design principles
EN 61508-1	Functional safety of electrical/electronic/programmable electronic safety-related systems Part 1: General requirements
EN 60204-1	Electrical equipment of machines Part 1: General definitions
EN 61800-3	Variable-speed electric drives Part 3: EMC product standard including special test procedures
EN 61800-5-1	Adjustable-speed electrical power drive systems Part 5: Safety requirements Main section 1: Electrical and thermal requirements
EN 61800-3	The SINAMICS drive converter systems are not designed for connection to the public power network ("first environment"). RI suppression 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".
North American standards	
UL508C	Power Conversion Equipment
CSA C22.2 No. 14	Industrial Control Equipment
Approvals	
cULus, cURus	Testing by UL (Underwriters Laboratories, http://www.ul.com) according to UL and CSA standards

Test symbols:

(→ Part 7, Approvals)

Technical data

Unless specified otherwise, the following technical data are valid for all the following components of the air-cooled SINAMICS S120 drive system in the chassis format.

Electrical data	
Line voltages	<ul style="list-style-type: none"> • 380 ... 480 V 3 AC, $\pm 10\%$ ($-15\% < 1\text{ min}$) • 500 ... 690 V 3 AC, $\pm 10\%$ ($-15\% < 1\text{ min}$)
Electronics power supply	24 V DC, -15% $+20\%$ implemented as PELV circuit in accordance with EN 61800-5-1 Ground = negative pole grounded via the electronics
Mechanical data	
Vibratory load	
• Transport ¹⁾	EN 60721-3-2, Class 2M2
• Operation	Test values in accordance with EN 60068-2-6 test Fc: <ul style="list-style-type: none"> • 10 ... 58 Hz: Constant deflection, 0.075 mm • 58 ... 150 Hz: Constant acceleration = 9.81 m/s^2 ($1 \times g$)
Shock load	
• Transport ¹⁾	EN 60721-3-2, Class 2M2
• Operation	Test values in accordance with EN 60068-2-27 test Ea: 98 m/s^2 ($10 \times g$)/20 ms
Ambient conditions ²⁾	
Protection class	Class I (with protective conductor system) and Class III (PELV) according to EN 61800-5-1
Shock protection	DIN EN 50274 and BGV A 3 when used correctly
Type of cooling	Forced air cooling AF according to EN 60146
Permissible ambient/coolant temperature (air) during operation	
• Line-side components, Power Modules, Line Modules and Motor Modules	0 ... 40 °C without derating, > 40 ... 50 °C, see derating characteristics
• Control Units, supplementary components, DC link components and Sensor Modules	0 ... 50 °C
Installation altitude	<ul style="list-style-type: none"> • up to 2000 m above sea level without derating • > 2000 ... 4000 m above sea level, see derating characteristics
Climatic ambient conditions	
• Storage ¹⁾	Class 1K3 acc. to EN 60721-3-1, temperature -40 ... +70 °C
• Transport ¹⁾	Class 2K4 acc. to EN 60721-3-2, temperature -40 ... +70 °C max. air humidity, 95 % at 40 °C
• Operation	Class 3K3 acc. to EN 60721-3-3 Condensation, splash water and ice formation are not permitted (EN 60204, Part 1)
Environmental class/harmful chemical substances	
• Storage ¹⁾	Class 1C2 acc. to EN 60721-3-1
• Transport ¹⁾	Class 2C2 acc. to EN 60721-3-2
• Operation	Class 3C2 acc. to EN 60721-3-3
Organic/biological influences	
• Storage ¹⁾	Class 1B1 acc. to EN 60721-3-1
• Transport ¹⁾	Class 2B1 acc. to EN 60721-3-2
• Operation	Class 3B1 acc. to EN 60721-3-3
Degree of pollution	2 acc. to EN 61800-5-1

¹⁾ In transport packaging

²⁾ Coated modules to protect sensitive components against corrosive gases, chemically active dust and moisture.

SINAMICS S120 chassis units

Air-cooled drive units

Overview

Characteristic curves

Chassis current derating

If the SINAMICS S120 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 data. The specified values already include a permitted correction in respect of installation altitude and ambient temperature (incoming air temperature at the air intake into the drive unit).

Installation altitude above sea level	Current derating at an ambient temperature (incoming air 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	100 %				96.3 %	91.4 %	83.7 %
2501-3000				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 %	74.0 %

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

Chassis voltage derating

In addition to current derating, voltage derating must be taken into consideration according to the following tables for **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
0-2000						
2001-2250						96 %
2251-2500	100 %				98 %	94 %
2501-2750				98 %	94 %	90 %
2751-3000				95 %	91 %	88 %
3001-3250			97 %	93 %	89 %	85 %
3251-3500			98 %	93 %	89 %	82 %
3501-3750			95 %	91 %	87 %	79 %
3751-4000	96 %	92 %	87 %	83 %	80 %	76 %

Voltage derating as a function of the installation altitude for drive units with rated voltages between 380 V and 480 V.

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

Voltage derating as a function of the installation altitude for drive units with rated voltages between 500 V and 690 V.

Characteristic curves (continued)

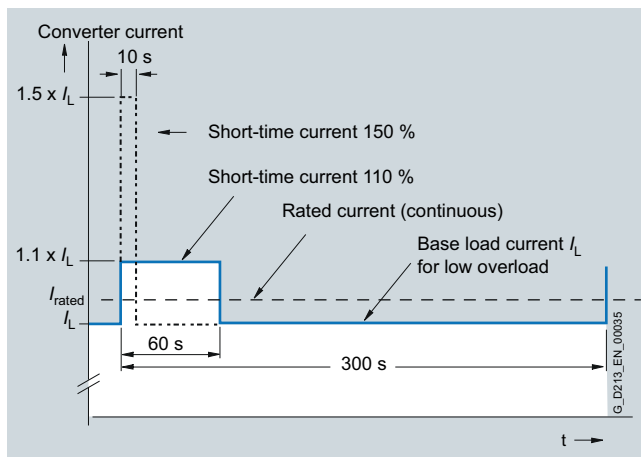
Overload capability

SINAMICS S120 chassis units have an overload reserve, e.g. to handle breakaway torques. 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 permissible overload levels are valid under the prerequisite that the drive units are operated with their base load current before and after the overload condition based on a duty cycle duration of 300 s.

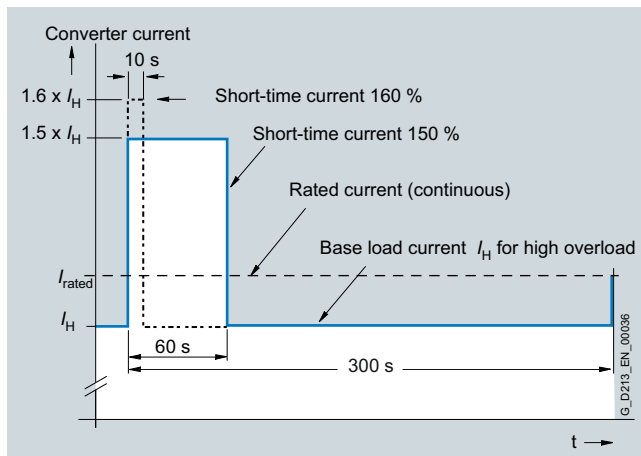
Power Modules and Motor Modules

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



Low overload

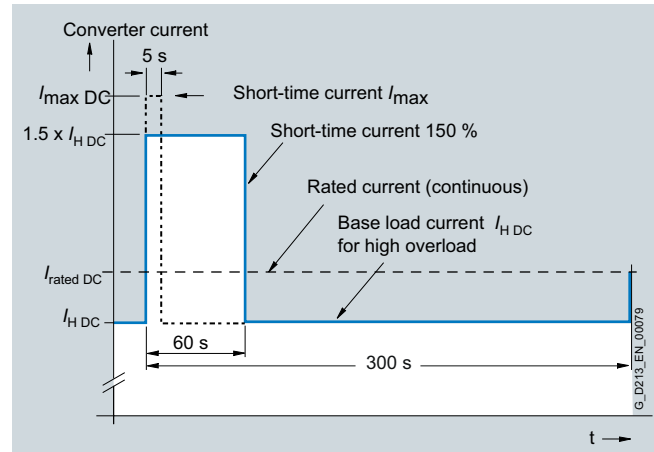
The base load current for a high overload I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s.



High overload

Line Modules

The base load current I_{HDC} for a high overload is based on a duty cycle of 150 % for 60 s or I_{maxDC} for 5 s.



High overload

SINAMICS S120 chassis units

Air-cooled drive units

Power Modules

Overview



The Power Module comprises a line rectifier, a DC link and an inverter to supply the motor.

Power Modules are designed for drives that are not capable of regenerating energy to the mains supply. Regenerative energy produced while braking is converted to heat using braking resistors.

Design

The Power Modules have the following interfaces as standard:

- 1 line supply connection
- 2 DC link connections for options, e.g. Braking Modules
- 3 DRIVE-CLiQ sockets
- 1 connection for Safety Integrated
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 connection for the 24 V DC electronics power supply
- 1 motor connection
- 2 x PE/protective conductor connections

The Power Modules are controlled by the CU310 Control Unit that can be integrated into the Power Module.

The scope of supply of the Power Modules includes:

- 1 DRIVE-CLiQ cable for connection to the CU310/SIMOTION D410 Control Unit
- 1 24 V DC connecting cable for the power supply to the CU310/SIMOTION D410 Control Unit
- 1 mounting plate for attaching the CU310/SIMOTION D410 Control Unit

Selection and ordering data

Type rating	Rated output current	Power Module
kW	A	Order No.
Line voltage 380 ... 480 V 3 AC		
110	210	6SL3310-1TE32-1AA0
132	260	6SL3310-1TE32-6AA0
160	310	6SL3310-1TE33-1AA0
200	380	6SL3310-1TE33-8AA0
250	490	6SL3310-1TE35-0AA0

Accessories

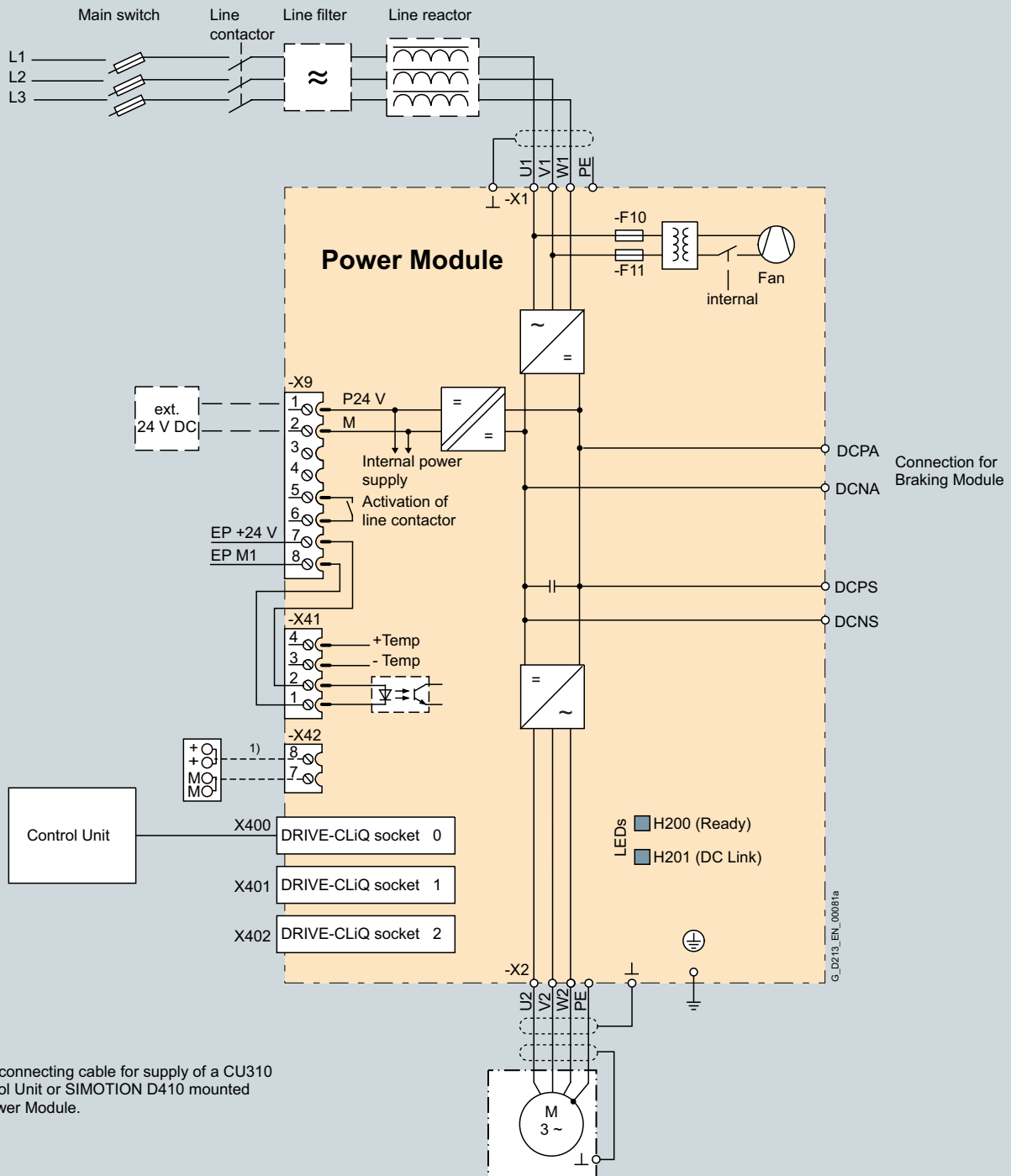
Description	Order No.
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: Chinese Simplified Dutch Danish Polish Finnish Portuguese/Brazilian French Russian Greek Swedish Italian Spanish Japanese Czech Korean Turkish	6SL3166-3AB00-0AA0

Line and motor-side components, Braking Modules as well as recommended line-side system components (→ system components).

Integration

The Power Modules communicate with the higher-level control unit via DRIVE-CLiQ. The control unit in this case could be a

CU310 or CU320 or a SIMOTION D Control Unit.



1) 24 V connecting cable for supply of a CU310 Control Unit or SIMOTION D410 mounted in Power Module.

Connection example of a Power Module

SINAMICS S120 chassis units

Air-cooled drive units

Power Modules

Technical data

General technical data

Electrical data	
Line supply voltage (up to 2000 m above sea level)	380 ... 480 V 3 AC $\pm 10\%$ ($-15\% < 1$ min)
Line frequency	47 ... 63 Hz
Line power factor for a three-phase AC line supply voltage and type rating	
• Basic fundamental ($\cos \varphi_1$)	> 0.96
• Total (λ)	0.75 ... 0.93
Overvoltage category acc. to EN 60664-1	Class III
DC link voltage, approx. ¹⁾	$1.35 \times \text{line voltage}$
Output voltage, approx.	$0.97 \times V_{\text{line}}$
Output frequency ²⁾	
• Control type Servo	0 ... 300 Hz
• Control type Vector	0 ... 300 Hz
• Control type V/f	0 ... 300 Hz
Line contactor control	
• Terminal block -X9/5-6	240 V AC, max. 8 A 30 V DC, max. 1 A
Radio interference suppression	
• Standard	Category C3 according to EN 61800-3
• With line filter and line reactor	Category C2 according to EN 61800-3
Certificates	
Conformity	CE
Approvals	cULus (File No.: 192450)

¹⁾ The DC link voltage is unregulated and load-dependent. For additional information, please refer to the SINAMICS Low Voltage Engineering Manual.

²⁾ Note the correlation between max. output frequency, pulse frequency and current derating; see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided. Higher output frequencies for specific configurations are available on request.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Power Modules				
		6SL3310-1TE32-1AA0	6SL3310-1TE32-6AA0	6SL3310-1TE33-1AA0	6SL3310-1TE33-8AA0	6SL3310-1TE35-0AA0
Type rating						
• at I_L (50 Hz 400 V) ¹⁾	kW	110	132	160	200	250
• at I_H (50 Hz 400 V) ¹⁾	kW	90	110	132	160	200
• at I_L (60 Hz 460 V) ²⁾	hp	150	200	250	300	400
• at I_H (60 Hz 460 V) ²⁾	hp	150	200	200	250	350
Output current						
• Rated current I_{NA}	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
• Maximum current $I_{max A}$	A	307	375	453	555	715
Input current						
• Rated current I_{NE}	A	229	284	338	395	509
• Maximum current $I_{max E}$	A	335	410	495	606	781
Current requirement						
• 24 V DC auxiliary power supply	A	0.8	0.8	0.9	0.9	0.9
Pulse frequency ⁵⁾						
• Rated frequency	kHz	2	2	2	2	2
• Pulse frequency, max.	kHz	2	2	2	2	2
- without current derating	kHz	2	2	2	2	2
- with current derating	kHz	8	8	8	8	8
Power loss, max. ⁶⁾						
• at 50 Hz 400 V	kW	2.46	3.27	4	4.54	5.78
• at 60 Hz 460 V	kW	2.54	3.36	4.07	4.67	5.96
Cooling-air requirement		m ³ /s	0.17	0.23	0.36	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	64/67	64/67	69/73	69/73
Line supply 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
Cable length, max. ⁷⁾						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
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
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	326	326	326	326	326
• Height	mm	1400	1400	1533	1533	1533
• Depth	mm	356 ⁸⁾	356 ⁸⁾	549	549	549
Weight, approx.		kg	104	162	162	162
Frame size		FX	FX	GX	GX	GX

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

⁸⁾ Depth = 421 mm including front cover when CU 310 Control Unit is installed.

SINAMICS S120 chassis units

Air-cooled drive units

Line Modules

Basic Line Modules

Overview



Basic Line Modules are available for applications in which no energy is returned to the supply or where the energy exchange between motor and generator axes takes place in the DC link. The connected Motor Modules are pre-charged via the thyristor gate control. Basic Line Modules are designed for connection to grounded-neutral (TN, TT) and non-grounded (IT) supply systems.

A Braking Module of the appropriate frame size can be integrated into a Basic Line Module in order to permit, in conjunction with an external braking resistor, regenerative operation of the drive system (→ DC link components).

Design

The Basic Line Modules have the following interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronics power supply
- 1 DC link connection (DCP, DCN) for supplying the connected Motor Modules
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 3 DRIVE-CLiQ sockets
- 1 PE/protective conductor connection

The status of the Basic Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Basic Line Modules includes:

- DRIVE-CLiQ cable for connecting to a CU320 or SIMOTION D4x5 Control Unit
- DRIVE-CLiQ cable to connect the Control Unit to the first Motor Module

Selection and ordering data

Rated power kW	Rated DC link current A	Basic Line Module Order No.
Line voltage 380 ... 480 V 3 AC		
200	420	6SL3330-1TE34-2AA0
250	530	6SL3330-1TE35-3AA0
400	820	6SL3330-1TE38-2AA0
560	1200	6SL3330-1TE41-2AA0
710	1500	6SL3330-1TE41-5AA0
Line voltage 500 ... 690 V 3 AC		
250	300	6SL3330-1TH33-0AA0
355	430	6SL3330-1TH34-3AA0
560	680	6SL3330-1TH36-8AA0
900	1100	6SL3330-1TH41-1AA0
1100	1400	6SL3330-1TH41-4AA0

Accessories

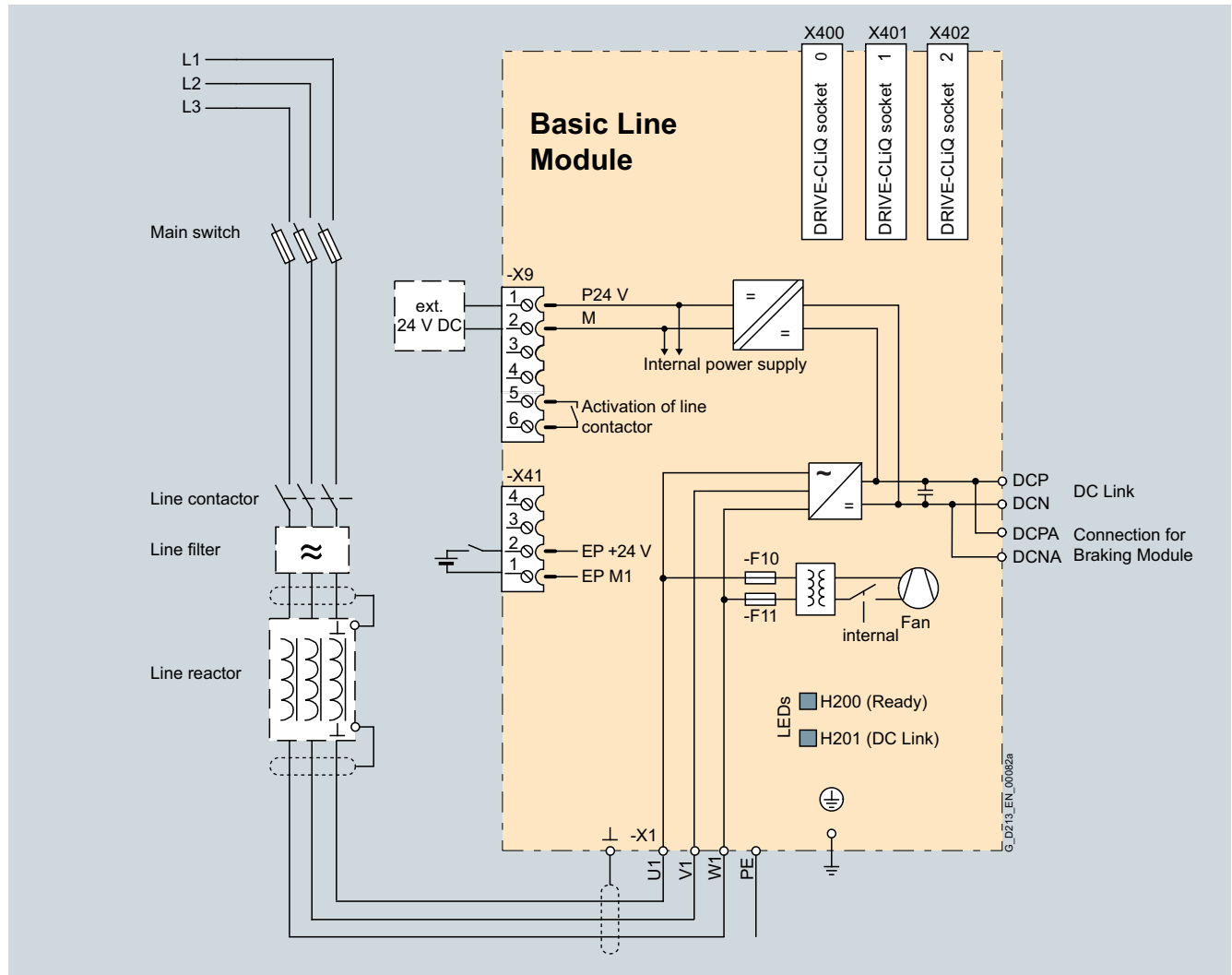
Description	Order No.
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: Chinese Simplified Dutch Danish Polish Finnish Portuguese/Brazilian French Russian Greek Swedish Italian Spanish Japanese Czech Korean Turkish	6SL3166-3AB00-0AA0

Line-side components as well as recommended line-side system components (→ system components).

Integration

The Basic Line Modules communicate with the higher-level control unit via DRIVE-CLiQ. This control unit can either be a CU320

or a SIMOTION D Control Unit. An external 24 V DC power supply is required to operate Basic Line Modules.



Connection example of a Basic Line Module

Technical data

General technical data

Electrical data	
Line supply voltage (up to 2000 m above sea level)	380 ... 480 V 3 AC $\pm 10\%$ (-15 % < 1 min) or 500 ... 690 V 3 AC $\pm 10\%$ (-15 % < 1 min)
Line frequency	47 ... 63 Hz
Line power factor with rated power	
• Basic fundamental ($\cos \varphi_1$)	> 0.96
• Total (λ)	0.75 ... 0.93
Overvoltage category acc. to EN 60664-1	Class III
DC link voltage, approx. ¹⁾	1.35 x Line voltage under partial load conditions 1.32 x line voltage under full load
Line contactor control	
• Terminal block -X9/5-6	240 V AC, max. 8 A 30 V DC, max. 1 A
Radio interference suppression	
• Standard	Category C3 acc. to EN 61800-3 up to a total cable length of 300 m
• with line filter	Category C2 according to EN 61800-3
Certificates	
Conformity	CE
Approvals	cULus (File No.: E192450), only for drive units connected to line voltages 380 ... 480 V 3 AC and 500 ... 600 V 3 AC

¹⁾ The DC link voltage is unregulated and load-dependent. For additional information, please refer to the SINAMICS Low Voltage Engineering Manual.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Basic Line Modules				
		6SL3330-1TE34-2AA0	6SL3330-1TE35-3AA0	6SL3330-1TE38-2AA0	6SL3330-1TE41-2AA0	6SL3330-1TE41-5AA0
Rated power						
• at I_{NDC} (50 Hz 400 V)	kW	200	250	400	560	710
• at I_{HDC} (50 Hz 400 V)	kW	160	200	315	450	560
• at I_{NDC} (60 Hz 460 V)	hp	305	385	615	860	1090
• at I_{HDC} (60 Hz 460 V)	hp	245	305	485	690	860
DC link current						
• Rated current I_{NDC}	A	420	530	820	1200	1500
• Base load current I_{HDC} ¹⁾	A	328	413	640	936	1170
• Maximum current I_{maxDC}	A	630	795	1230	1800	2250
Input current						
• Rated current I_{NE}	A	365	460	710	1010	1265
• Maximum current I_{maxE}	A	547	690	1065	1515	1897
Current requirement						
• 24 V DC auxiliary power supply	A	1.1	1.1	1.1	1.1	1.1
DC link capacitance						
• Basic Line Module	μF	7200	9600	14600	23200	29000
• Drive line-up, max.	μF	57600	76800	116800	185600	232000
Power loss, max. ²⁾						
• at 50 Hz 400 V	kW	1.9	2.1	3.2	4.6	5.5
• at 60 Hz 460 V	kW	1.9	2.1	3.2	4.6	5.5
Cooling-air requirement						
	m ³ /s	0.17	0.17	0.17	0.36	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz						
	dB(A)	66/68	66/68	66/68	71/73	71/73
Line supply connection U1, V1, W1						
• Conductor cross-section, max. (DIN VDE)	mm ²	M10 screw 2 × 240	M10 screw 2 × 240	M10 screw 2 × 240	3 × M12 screw 6 × 240	3 × M12 screw 6 × 240
DC link connection DCP, DCN						
• Conductor cross-section, max. (DIN VDE)	mm ²	M10 screw 2 × 240	M10 screw 2 × 240	M10 screw 2 × 240	3 × hole for M12 6 × 240	3 × hole for M12 6 × 240
PE/GND connection						
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × hole for M10 2 × 240	2 × hole for M10 2 × 240	2 × hole for M10 2 × 240	2 × hole for M12 4 × 240	2 × hole for M12 4 × 240
Cable length, max. ³⁾						
• Shielded	m	2600	2600	2600	4000	4000
• Unshielded	m	3900	3900	3900	6000	6000
Degree of protection						
		IP00	IP00	IP00	IP00	IP00
Dimensions						
• Width	mm	310	310	310	311	311
• Height	mm	1164	1164	1164	1653	1653
• Depth	mm	352	352	352	550	550
Weight, approx.						
	kg	96	96	96	214	214
Frame size						
		FB	FB	FB	GB	GB

¹⁾ The base load current I_{HDC} is based on a duty cycle of 150 % for 60 s or I_{maxDC} for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.
See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Line Modules

Basic Line Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Basic Line Modules				
		6SL3330-1TH33-0AA0	6SL3330-1TH34-3AA0	6SL3330-1TH36-8AA0	6SL3330-1TH41-1AA0	6SL3330-1TH41-4AA0
Rated power						
• at $I_{N\ DC}$ (50 Hz 690 V)	kW	250	355	560	900	1100
• at $I_{H\ DC}$ (50 Hz 690 V)	kW	195	280	440	710	910
• at $I_{N\ DC}$ (50 Hz 500 V)	kW	175	250	390	635	810
• at $I_{H\ DC}$ (50 Hz 500 V)	kW	165	235	365	595	755
• at $I_{N\ DC}$ (60 Hz 575 V)	hp	250	350	600	900	1250
• at $I_{H\ DC}$ (60 Hz 575 V)	hp	200	300	450	800	1000
DC link current						
• Rated current $I_{N\ DC}$	A	300	430	680	1100	1400
• Base load current $I_{H\ DC}$ ¹⁾	A	234	335	530	858	1092
• Maximum current $I_{max\ DC}$	A	450	645	1020	1650	2100
Input current						
• Rated current $I_{N\ E}$	A	260	375	575	925	1180
• Maximum current $I_{max\ E}$	A	390	563	863	1388	1770
Current requirement						
• 24 V DC auxiliary power supply	A	1.1	1.1	1.1	1.1	1.1
DC link capacitance						
• Basic Line Module	μF	3200	4800	7300	11600	15470
• Drive line-up, max.	μF	25600	38400	58400	92800	123760
Power loss, max. ²⁾						
• at 50 Hz 690 V	kW	1.5	2.1	3.0	5.4	5.8
• at 60 Hz 575 V	kW	1.5	2.1	3.0	5.4	5.8
Cooling-air requirement		m ³ /s	0.17	0.17	0.36	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	66/68	66/68	71/73	71/73
Line supply connection U1, V1, W1			M10 screw	M10 screw	M10 screw	3 x M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x 240	2 x 240	2 x 240	6 x 240	6 x 240
DC link connection DCP, DCN			M10 screw	M10 screw	M10 screw	3 x hole for M12
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x 240	2 x 240	2 x 240	6 x 240	6 x 240
PE/GND connection			2 x hole M10	2 x hole M10	2 x hole M10	2 x hole for M12
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x 240	2 x 240	2 x 240	4 x 240	4 x 240
Cable length, max. ³⁾						
• Shielded	m	1500	1500	1500	2250	2250
• Unshielded	m	2250	2250	2250	3375	3375
Degree of protection			IP00	IP00	IP00	IP00
Dimensions						
• Width	mm	310	310	310	311	311
• Height	mm	1164	1164	1164	1653	1653
• Depth	mm	352	352	352	550	550
Weight, approx.		kg	96	96	214	214
Frame size			FB	FB	GB	GB

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

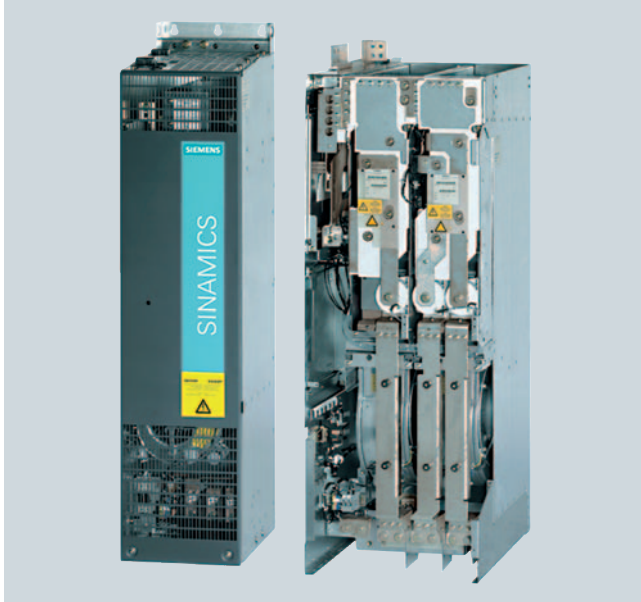
³⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.
See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Line Modules
Smart Line Modules

Overview



Smart Line Modules are stall-protected, line-commutated feed/feedback units with 100 % continuous regenerative feedback power. The regenerative capability of the modules can be deactivated by means of parameterization. Smart Line Modules are suitable for connection to grounded (TN, TT) and non-grounded (IT) line supply systems.

The DC link is pre-charged by means of integrated pre-charging resistors.

Design

The Smart Line Modules have the following interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronics power supply
- 1 DC link connection (DCP, DCN) for supplying the connected Motor Modules
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 3 DRIVE-CLiQ sockets
- 1 PE/protective conductor connection (2 connections for sizes HX and JX)

The status of the Smart Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable to connect to a CU320 or SIMOTION D4x5 Control Unit
- DRIVE-CLiQ cable for connection between the Control Unit and first Motor Module (type dependent)

Selection and ordering data

Rated power kW	Rated DC link current A	Smart Line Module Order No.
Line voltage 380 ... 480 V 3 AC		
250	550	6SL3330-6TE35-5AA0
355	730	6SL3330-6TE37-3AA0
500	1050	6SL3330-6TE41-1AA0
630	1300	6SL3330-6TE41-3AA0
800	1700	6SL3330-6TE41-7AA0
Line voltage 500 ... 690 V 3 AC		
450	550	6SL3330-6TG35-5AA0
710	900	6SL3330-6TG38-8AA0
1000	1200	6SL3330-6TG41-2AA0
1400	1700	6SL3330-6TG41-7AA0

Accessories

Description	Order No.
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: Chinese Simplified Dutch Danish Polish Finnish Portuguese/Brazilian French Russian Greek Swedish Italian Spanish Japanese Czech Korean Turkish	6SL3166-3AB00-0AA0

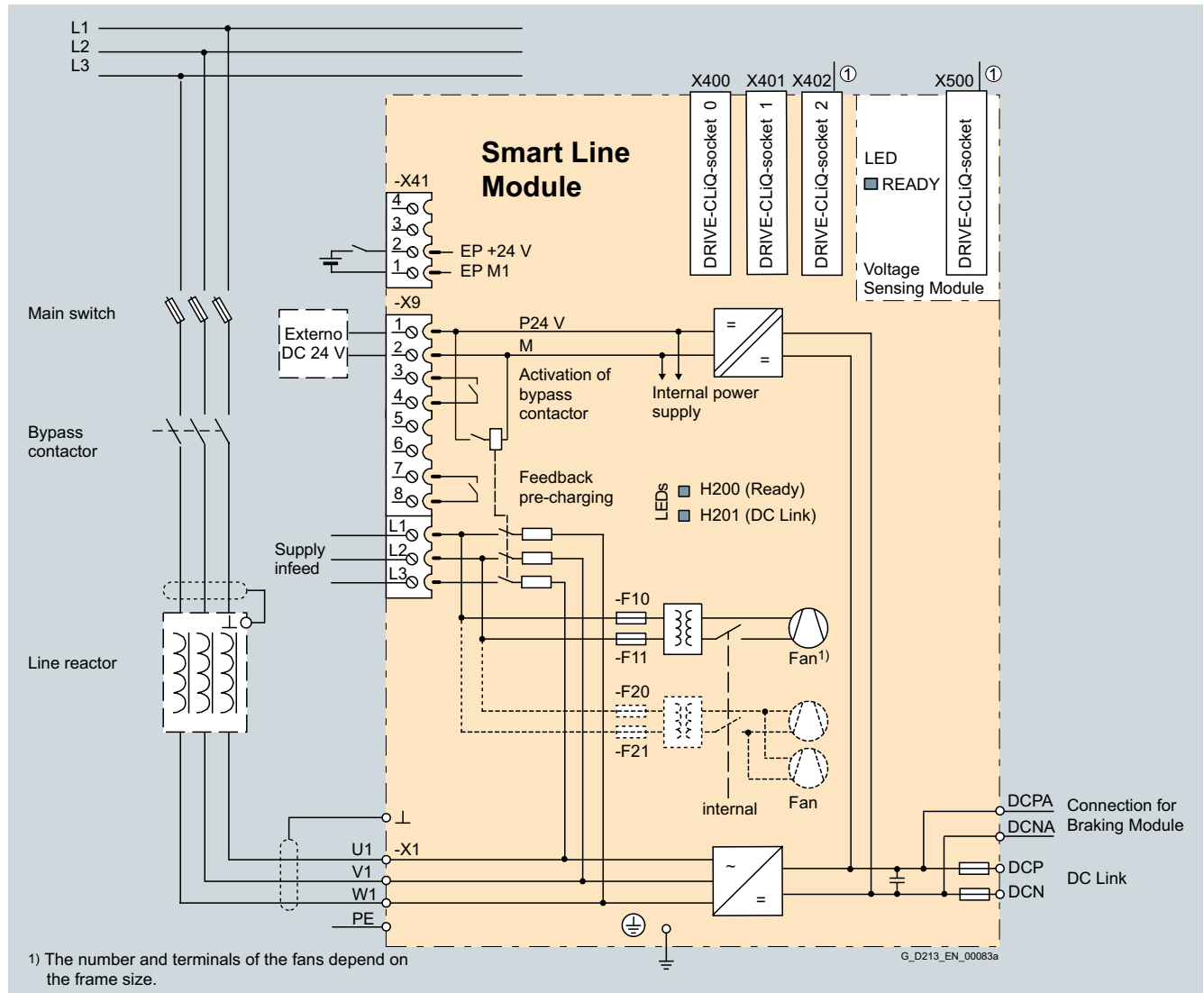
Line-side components, Braking Modules and recommended system components (→ system components).

Integration

The Smart Line Modules communicate with the higher-level control unit via DRIVE-CLiQ. This control unit can either

be a CU320 or a SIMOTION D Control Unit.

2



Connection example of a Smart Line Module

Technical data

General technical data

Electrical data	
Line supply voltage (up to 2000 m above sea level)	380 ... 480 V 3 AC $\pm 10\%$ (-15 % < 1 min) or 500 ... 690 V 3 AC $\pm 10\%$ (-15 % < 1 min)
Line frequency	47 ... 63 Hz
Line power factor at rated power	
• Basic fundamental ($\cos \varphi_1$)	> 0.96
• Total (λ)	0.75 ... 0.93
Overvoltage category acc. to EN 60664-1	Class III
DC link voltage, approx. ¹⁾	1.32 x Line voltage under partial load conditions 1.30 x line voltage under full load
Line contactor control	
• Terminal block -X9/5-6	240 V AC, max. 8 A 30 V DC, max. 1 A
Radio interference suppression	
• Standard	Category C3 according to EN 61800-3
Certificates	
Conformity	CE
Approvals	cULus (File No.: E192450), only for drive units connected to line voltages 380 ... 480 V 3 AC and 500 ... 600 V 3 AC

¹⁾ The DC link voltage is unregulated and load-dependent. For additional information, see SINAMICS Low Voltage Engineering Manual.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Smart Line Modules				
		6SL3330-6TE35-5AA0	6SL3330-6TE37-3AA0	6SL3330-6TE41-1AA0	6SL3330-6TE41-3AA0	6SL3330-6TE41-7AA0
Rated power						
• at $I_{N\ DC}$ (50 Hz 400 V)	kW	250	355	500	630	800
• at $I_{H\ DC}$ (50 Hz 400 V)	kW	235	315	450	555	730
• at $I_{N\ DC}$ (60 Hz 460 V)	hp	385	545	770	970	1230
• at $I_{H\ DC}$ (60 Hz 460 V)	hp	360	485	695	855	1125
DC link current						
• Rated current $I_{N\ DC}$	A	550	730	1050	1300	1700
• Base load current $I_{H\ DC}^{1)}$	A	490	650	934	1157	1513
• Maximum current $I_{max\ DC}$	A	825	1095	1575	1950	2550
Feed/feedback current						
• Rated current $I_{N\ E}$	A	463	614	883	1093	1430
• Maximum current $I_{max\ E}$	A	694	921	1324	1639	2145
Current requirement						
• 24 V DC auxiliary power supply	A	1.35	1.35	1.4	1.5	1.7
• 400 V AC	A	1.8	1.8	3.6	5.4	5.4
DC link capacitance						
• Smart Line Module	μF	8400	12000	16800	18900	28800
• Drive line-up, max.	μF	42000	60000	67200	75600	115200
Power loss, max. ²⁾						
• at 50 Hz 400 V	kW	3.7	4.7	7.1	11	11.5
• at 60 Hz 460 V	kW	3.7	4.7	7.1	11	11.5
Cooling-air requirement		m³/s	0.36	0.36	1.08	1.08
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	69/73	69/73	70/73	70/73
Line supply connection U1, V1, W1			M10 screw	M10 screw	2 x M12 screw	3 x M12 screw
• Conductor cross-section, max. (DIN VDE)	mm²	2 x 240	2 x 240	4 x 240	6 x 240	6 x 240
DC link connection DCP, DCN			M10 screw	M10 screw	4 x hole for M12	4 x hole for M12
• Conductor cross-section, max. (DIN VDE)	mm²	2 x 240	2 x 240	Busbar	Busbar	Busbar
PE/GND connection						
• Conductor cross-section, max. (DIN VDE)	mm²	Hole for M10 2 x 240	Hole for M10 2 x 240	-	-	-
PE1/GND connection						
• Conductor cross-section, max. (DIN VDE)	mm²	-	-	M12 screw 240	M12 screw 240	M12 screw 240
PE2/GND connection						
• Conductor cross-section, max. (DIN VDE)	mm²	-	-	2 x M12 screw 2 x 240	2 x M12 screw 2 x 240	2 x M12 screw 2 x 240
Cable length, max. ³⁾						
• Shielded	m	4000	4000	4800	4800	4800
• Unshielded	m	6000	6000	7200	7200	7200
Degree of protection			IP00	IP00	IP00	IP00
Dimensions						
• Width	mm	310	310	503	704	704
• Height	mm	1413	1413	1475	1480	1480
• Depth	mm	550	550	548	550	550
Weight, approx.		kg	150	150	294	458
Frame size			GX	GX	HX	JX

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.
See also SINAMICS Low Voltage Engineering Manual.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Smart Line Modules			
		6SL3330-6TG35-5AA0	6SL3330-6TG38-8AA0	6SL3330-6TG41-2AA0	6SL3330-6TG41-7AA0
Rated power					
• at $I_{N\ DC}$ (50 Hz 690 V)	kW	450	710	1000	1400
• at $I_{H\ DC}$ (50 Hz 690 V)	kW	405	665	885	1255
• at $I_{N\ DC}$ (50 Hz 500 V)	kW	320	525	705	995
• at $I_{H\ DC}$ (50 Hz 500 V)	kW	295	480	640	910
• at $I_{N\ DC}$ (60 Hz 575 V)	hp	500	790	1115	1465
• at $I_{H\ DC}$ (60 Hz 575 V)	hp	450	740	990	1400
DC link current					
• Rated current $I_{N\ DC}$	A	550	900	1200	1700
• Base load current $I_{H\ DC}$ ¹⁾	A	490	800	1068	1513
• Maximum current $I_{max\ DC}$	A	825	1350	1800	2550
Feed/feedback current					
• Rated current $I_{N\ E}$	A	463	757	1009	1430
• Maximum current $I_{max\ E}$	A	694	1135	1513	2145
Current requirement					
• 24 V DC aux. power supply	A	1.35	1.4	1.5	1.7
• 500 V AC or	A	1.4	2.9	4.3	4.3
• 690 V AC	A	1.0	2.1	3.1	3.1
DC link capacitance					
• Smart Line Module	μF	5600	7400	11100	14400
• Drive line-up, max.	μF	28000	29600	44400	57600
Power loss, max. ²⁾					
• at 50 Hz 690 V	kW	4.3	6.5	12	13.8
• at 60 Hz 575 V	kW	4.3	6.5	12	13.8
Cooling-air requirement		m ³ /s	0.36	0.78	1.08
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	69/73	70/73	70/73
Line supply connection U1, V1, W1		M10 screw	2 x M12 screw	3 x M12 screw	3 x M12 screw
• Conductor cross-section, max. (acc. to DIN VDE)	mm ²	2 x 240	4 x 240	6 x 240	6 x 240
DC link connection DCP, DCN I'		M10 screw	4 x hole for M12	4 x hole for M12	4 x hole for M12
• Conductor cross-section, max. (acc. to DIN VDE)	mm ²	2 x 240	Busbar	Busbar	Busbar
PE/GND connection		Hole for M10 2 x 240	-	-	-
• Conductor cross-section, max. (acc. to DIN VDE)	mm ²	-	-	-	-
PE1/GND connection		-	M12 screw 240	M12 screw 240	M12 screw 240
• Conductor cross-section, max. (acc. to DIN VDE)	mm ²	-	-	-	-
PE2/GND connection		-	2 x M12 screw 2 x 240	2 x M12 screw 2 x 240	2 x M12 screw 2 x 240
• Conductor cross-section, max. (acc. to DIN VDE)	mm ²	-	-	-	-
Cable length, max. ³⁾					
• Shielded	m	2250	2750	2750	2750
• Unshielded	m	3375	4125	4125	4125
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	310	503	704	704
• Height	mm	1413	1475	1480	1480
• Depth	mm	550	548	550	550
Weight, approx.		kg	150	294	458
Frame size		GX	HX	JX	JX

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.
See also SINAMICS Low Voltage Engineering Manual.

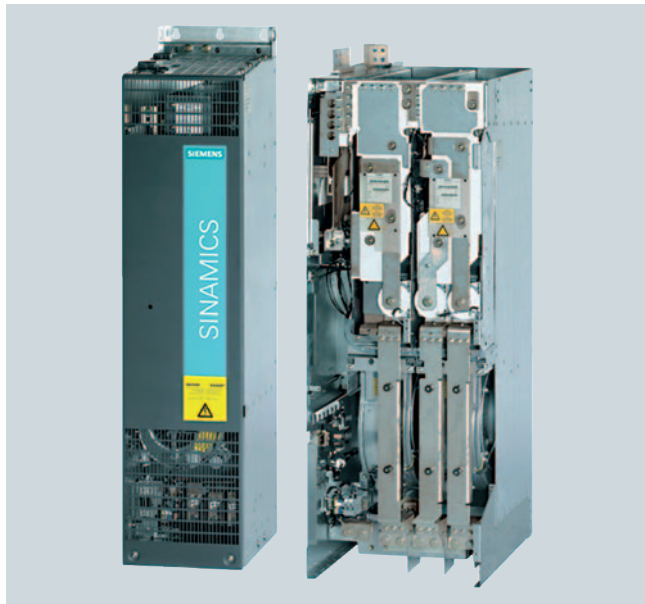
SINAMICS S120 chassis units

Air-cooled drive units

Line Modules

Active Line Modules

Overview



The self-commutated feed/feedback units with IGBTs generate a regulated DC link voltage. This means that the connected Motor Modules are decoupled from the line voltage. Line voltage fluctuations within the permissible supply tolerances have no effect on the motor voltage.

If required, the Active Line Modules can also provide reactive power compensation.

Active Line Modules are designed for connection to grounded (TN, TT) and non-grounded (IT) supply systems.

Active Line Modules are always operated together with the associated Active Interface Modules. These include the necessary pre-charging circuit as well as a Clean Power Filter.

Design

The Active Line Modules have the following interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronics power supply
- 1 DC link connection (DCP, DCN) for supplying the connected Motor Modules
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 3 DRIVE-CLiQ sockets
- 1 Temperature sensor input (KTY84-130 or PTC)
- 2 x PE/protective conductor connections

The status of the Active Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Active Line Modules includes:

- DRIVE-CLiQ cable for connecting to a CU320 or SIMOTION D4x5 Control Unit
- DRIVE-CLiQ cable for connection between the Control Unit and first Motor Module (type dependent)

Selection and ordering data

Rated power	Rated DC link current	Active Line Module
kW	A	Order No.
Line voltage 380 ... 480 V 3 AC		
132	235	6SL3330-7TE32-1AA0
160	291	6SL3330-7TE32-6AA0
235	425	6SL3330-7TE33-8AA0
300	549	6SL3330-7TE35-0AA0
380	678	6SL3330-7TE36-1AA0
500	940	6SL3330-7TE38-4AA0
630	1103	6SL3330-7TE41-0AA0
900	1574	6SL3330-7TE41-4AA0
Line voltage 500 ... 690 V 3 AC		
560	644	6SL3330-7TG35-8AA0
800	823	6SL3330-7TG37-4AA0
1100	1148	6SL3330-7TG41-0AA0
1400	1422	6SL3330-7TG41-3AA0

Accessories

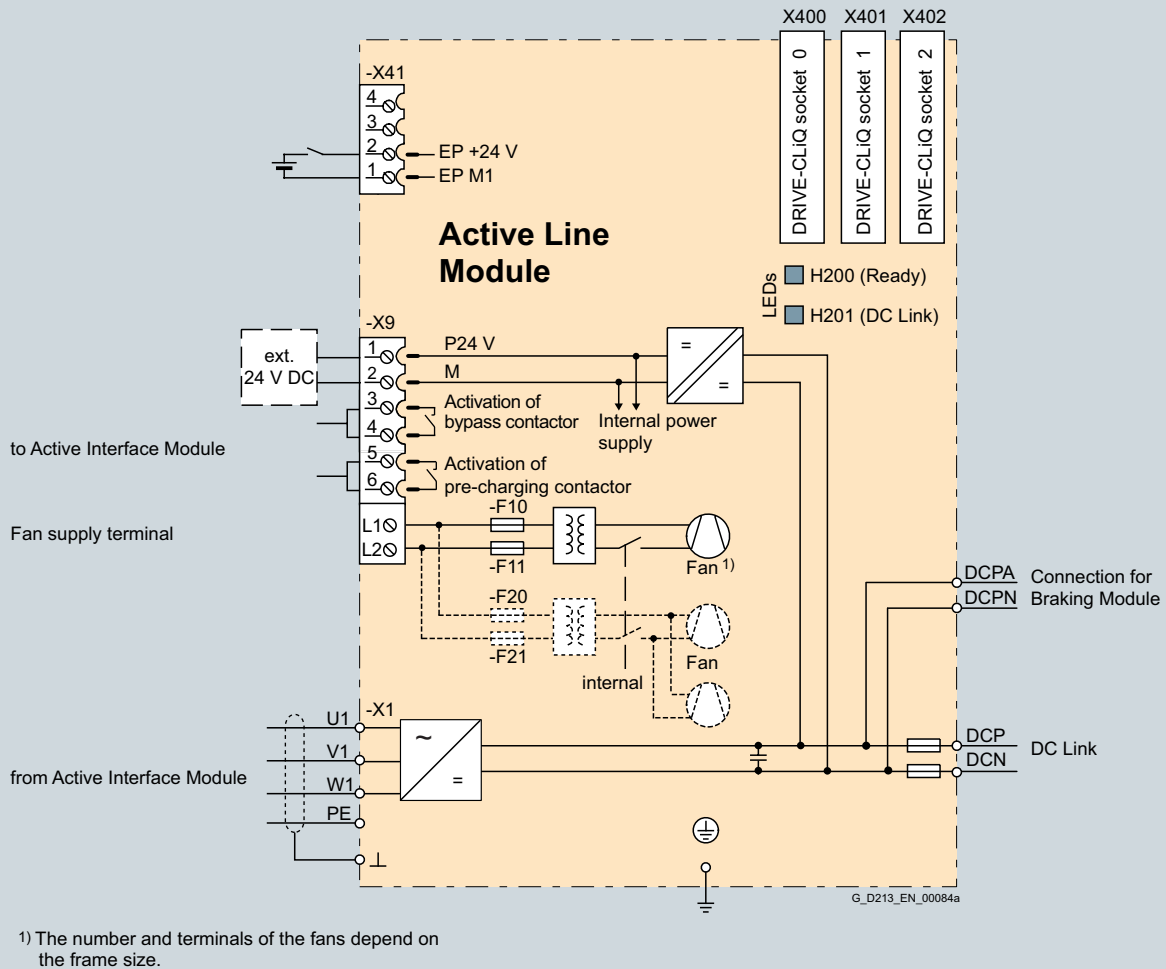
Description	Order No.
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set:	6SL3166-3AB00-0AA0
Chinese Simplified	
Danish	
Finnish	
French	
Greek	
Italian	
Japanese	
Korean	
Dutch	
Polish	
Portuguese/Brazilian	
Russian	
Swedish	
Spanish	
Czech	
Turkish	

Line-side components, Braking Modules and recommended line-side system components (→ system components).

Integration

The Active Line Modules communicate with the higher-level control unit via DRIVE-CLiQ. This control unit can either be a CU320

or a SIMOTION D4x5 Control Unit. An external 24 V DC power supply is required to operate the Active Line Modules.



Connection example of an Active Line Module

Technical data

General technical data

Electrical data	
Line supply voltage (up to 2000 m above sea level)	380 ... 480 V 3 AC $\pm 10\%$ (-15 % < 1 min) or 500 ... 690 V 3 AC $\pm 10\%$ (-15 % < 1 min)
Line frequency	47 ... 63 Hz
Line power factor • Basic fundamental ($\cos \varphi_1$) • Total (λ)	1.0 (factory setting), can be altered by input of a reactive current setpoint 1.0 (factory setting)
Overvoltage category acc. to EN 60664-1	Class III
DC link voltage	The DC link voltage is regulated and can be adjusted as a voltage decoupled from the line voltage. Factory setting for DC link voltage: $1.5 \times$ line voltage
Radio interference suppression	
Standard (with Active Interface Module)	Category C3 according to EN 61800-3
Certificates	
Conformity	CE
Approvals	cULus (File No.: E192450) only for drive units connected to line voltages 380 ... 480 V 3 AC and 500 ... 600 V 3 AC

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Active Line Modules			
		6SL3330-7TE32-1AA0	6SL3330-7TE32-6AA0	6SL3330-7TE33-8AA0	6SL3330-7TE35-0AA0
Rated power					
• at $I_{N\ DC}$ (50 Hz 400 V)	kW	132	160	235	300
• at $I_{H\ DC}$ (50 Hz 400 V)	kW	115	145	210	270
• at $I_{N\ DC}$ (60 Hz 460 V)	hp	200	250	400	500
• at $I_{H\ DC}$ (60 Hz 460 V)	hp	150	200	300	400
DC link current					
• Rated current $I_{N\ DC}$	A	235	291	425	549
• Base load current $I_{H\ DC}$ ¹⁾	A	209	259	378	489
• Maximum current $I_{max\ DC}$	A	352	436	637	823
Feed/feedback current					
• Rated current $I_{N\ E}$	A	210	260	380	490
• Maximum current $I_{max\ E}$	A	315	390	570	735
Current requirement					
• 24 V DC auxiliary power supply	A	1.1	1.1	1.35	1.35
• 400 V AC	A	0.63	1.13	1.8	1.8
DC link capacitance					
• Active Line Module	μF	4200	5200	7800	9600
• Drive line-up, max.	μF	41600	41600	76800	76800
Power loss, max. ²⁾					
• at 50 Hz 400 V	kW	2.2	2.7	3.9	4.8
• at 60 Hz 460 V	kW	2.3	2.9	4.2	5.1
Cooling-air requirement		m ³ /s	0.17	0.23	0.36
Sound pressure level L_{pA} ³⁾ (1 m) at 50/60 Hz		dB(A)	64/67	69/73	69/73
Line supply connection U1, V1, W1			M10 screw	M10 screw	M10 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × 185	2 × 185	2 × 240	2 × 240
DC link connection DCP, DCN			M10 screw	M10 screw	M10 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × 185	2 × 185	2 × 240	2 × 240
PE1/GND connection			M10 screw	M10 screw	M10 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × 185	2 × 185	2 × 240	2 × 240
PE2/GND connection			M10 screw	M10 screw	M10 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × 185	2 × 185	2 × 240	2 × 240
Cable length, max. ⁴⁾					
• Shielded	m	2700	2700	2700	2700
• Unshielded	m	4050	4050	4050	4050
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	326	326	326	326
• Height	mm	1400	1400	1533	1533
• Depth	mm	356	356	545	545
Weight, approx.		kg	95	136	136
Frame size		FX	FX	GX	GX

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ Total sound pressure level of Active Interface Module and Active Line Module.

⁴⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.
See also SINAMICS Low Voltage Engineering Manual.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Active Line Modules			
		6SL3330-7TE36-1AA0	6SL3330-7TE38-4AA0	6SL3330-7TE41-0AA0	6SL3330-7TE41-4AA0
Rated power					
• at $I_{N\ DC}$ (50 Hz 400 V)	kW	380	500	630	900
• at $I_{H\ DC}$ (50 Hz 400 V)	kW	335	465	545	780
• at $I_{N\ DC}$ (60 Hz 460 V)	hp	600	700	900	1250
• at $I_{H\ DC}$ (60 Hz 460 V)	hp	500	700	800	1000
DC link current					
• Rated current $I_{N\ DC}$	A	678	940	1103	1574
• Base load current $I_{H\ DC}^{1)}$	A	603	837	982	1401
• Maximum current $I_{max\ DC}$	A	1017	1410	1654	2361
Feed/feedback current					
• Rated current $I_{N\ E}$	A	605	840	985	1405
• Maximum current $I_{max\ E}$	A	907	1260	1477	2107
Current requirement					
• 24 V DC auxiliary power supply	A	1.4	1.4	1.5	1.7
• 400 V AC	A	3.6	3.6	5.4	5.4
DC link capacitance					
• Active Line Module	μF	12600	16800	18900	28800
• Drive line-up, max.	μF	134400	134400	230400	230400
Power loss, max. ²⁾					
• at 50 Hz 400 V	kW	6.2	7.7	10.1	13.3
• at 60 Hz 460 V	kW	6.6	8.2	10.8	14.2
Cooling-air requirement		m ³ /s	0.78	1.08	1.08
Sound pressure level $L_{pA}^{3)}$ (1 m) at 50/60 Hz		dB(A)	70/73	71/73	71/73
Line supply connection U1, V1, W1			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
DC link connection DCP, DCN			4 x hole for M12	4 x hole for M12	4 x hole for M12
• Conductor cross-section, max. (DIN VDE)	mm ²	Busbar	Busbar	Busbar	Busbar
PE1/GND connection			M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240
PE2/GND connection			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	3 x 240	3 x 240
Cable length, max. ⁴⁾					
• Shielded	m	3900	3900	3900	3900
• Unshielded	m	5850	5850	5850	5850
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	503	503	704	704
• Height	mm	1475	1475	1480	1480
• Depth	mm	540	540	550	550
Weight, approx.		kg	290	450	450
Frame size			HX	JX	JX

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ Total sound pressure level of Active Interface Module and Active Line Module.

⁴⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.
See also SINAMICS Low Voltage Engineering Manual.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Active Line Modules			
		6SL3330-7TG35-8AA0	6SL3330-7TG37-4AA0	6SL3330-7TG41-0AA0	6SL3330-7TG41-3AA0
Rated power					
• at $I_{N\ DC}$ (50 Hz 690 V)	kW	560	800	1100	1400
• at $I_{H\ DC}$ (50 Hz 690 V)	kW	550	705	980	1215
• at $I_{N\ DC}$ (50 Hz 500 V)	kW	435	560	780	965
• at $I_{H\ DC}$ (50 Hz 500 V)	kW	400	510	710	880
• at $I_{N\ DC}$ (60 Hz 575 V)	hp	600	900	1250	1500
• at $I_{H\ DC}$ (60 Hz 575 V)	hp	450	600	1000	1250
DC link current					
• Rated current $I_{N\ DC}$	A	644	823	1148	1422
• Base load current $I_{H\ DC}$ ¹⁾	A	573	732	1022	1266
• Maximum current $I_{max\ DC}$	A	966	1234	1722	2133
Feed/feedback current					
• Rated current $I_{N\ E}$	A	575	735	1025	1270
• Maximum current $I_{max\ E}$	A	862	1102	1537	1905
Current requirement					
• 24 V DC auxiliary power supply	A	1.4	1.5	1.7	1.7
• 500 V AC	A	3.0	4.4	4.4	4.4
• 690 V AC	A	2.1	3.1	3.1	3.1
DC link capacitance					
• Active Line Module	μF	7400	11100	14400	19200
• Drive line-up, max.	μF	59200	153600	153600	153600
Power loss, max. ²⁾					
• at 50 Hz 690 V	kW	6.8	10.2	13.6	16.5
• at 60 Hz 575 V	kW	6.2	9.6	12.9	15.3
Cooling-air requirement		m ³ /s	0.78	1.08	1.08
Sound pressure level L_{pA} ³⁾ (1 m) at 50/60 Hz		dB(A)	70/73	71/73	71/73
Line supply connection U1, V1, W1			2 x M12 screw	3 x M12 screw	3 x M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 240	6 x 240	6 x 240	6 x 240
DC link connection DCP, DCN			4 x hole for M12	4 x hole for M12	4 x hole for M12
• Conductor cross-section, max. (DIN VDE)	mm ²	Busbar	Busbar	Busbar	Busbar
PE1/GND connection			M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240
PE2/GND connection			2 x M12 screw	3 x M12 screw	3 x M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x 240	3 x 240	3 x 240	3 x 240
Cable length, max. ⁴⁾					
• Shielded	m	2250	2250	2250	2250
• Unshielded	m	3375	3375	3375	3375
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	503	704	704	704
• Height	mm	1475	1480	1480	1480
• Depth	mm	540	550	550	550
Weight, approx.		kg	290	450	450
Frame size		HX	JX	JX	JX

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ Total sound pressure level of Active Interface Module and Active Line Module.

⁴⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.
See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Line Modules Active Interface Modules

Overview



Active Interface Modules are used in conjunction with Active Line Modules. Active Interface Modules contain a Clean Power Filter with basic RI suppression, the pre-charging circuit for the Active Line Module, the line supply voltage sensing circuit and monitoring sensors. The bypass contactor is an integral component in frame sizes FI and GI, thereby making the module very compact. The bypass contactor must be provided separately for frame sizes HI and JI.

Line harmonics are largely suppressed by the Clean Power Filter.

Design

The scope of supply of the Active Interface Modules includes:

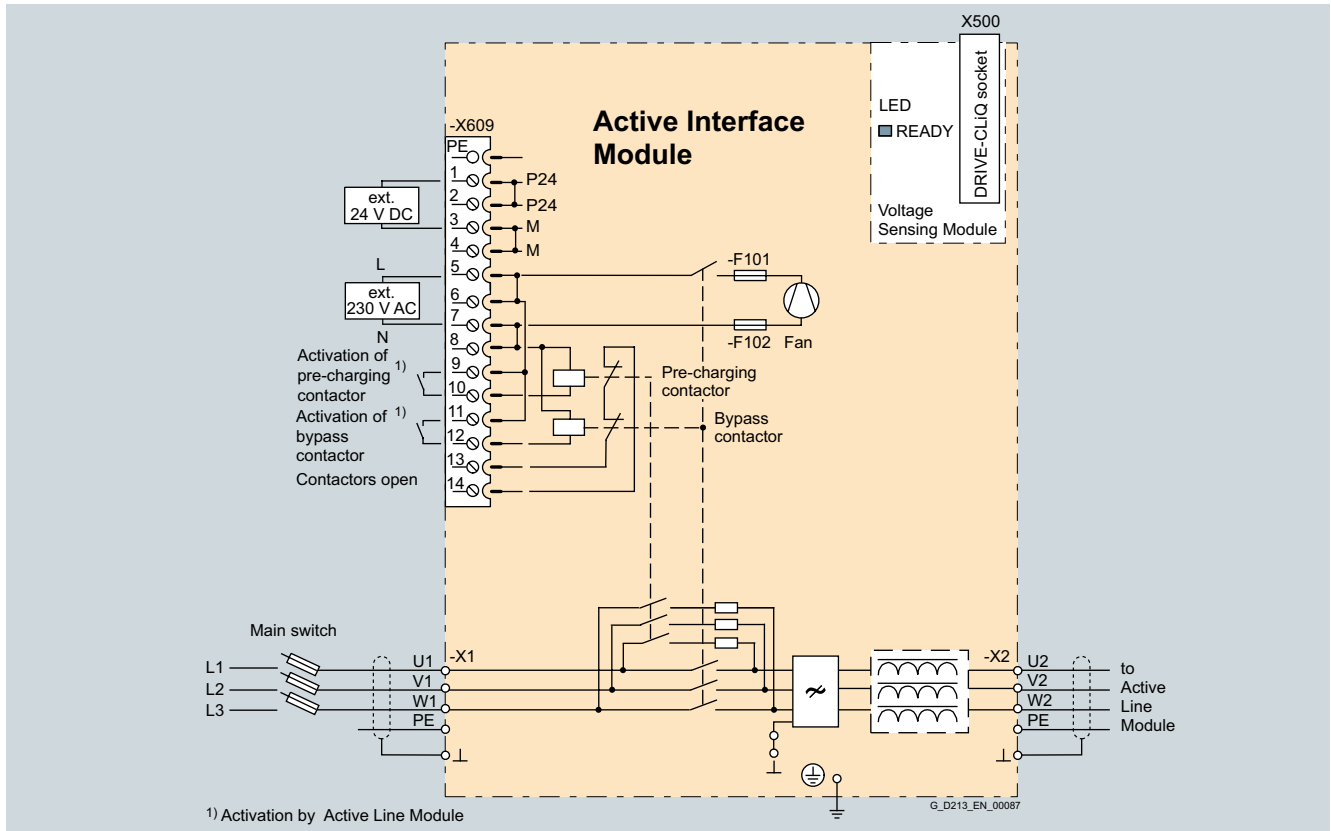
- DRIVE-CLiQ cable for the connection between Active Interface Module and Active Line Module
- DRIVE-CLiQ cable for the connection between the Control Unit and first Motor Module

Selection and ordering data

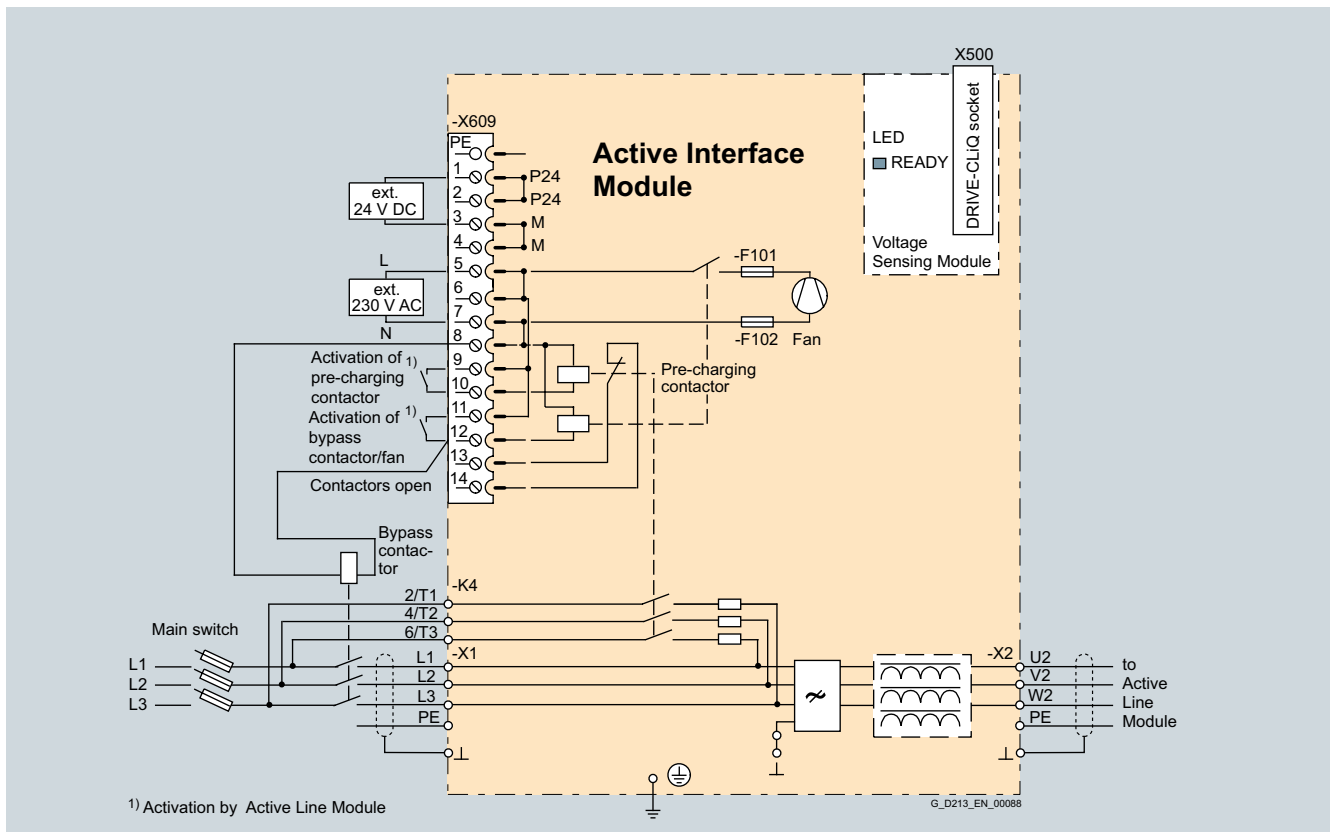
Suitable for Active Line Module Chassis format, air-cooled	Suitable for Active Line Module Chassis format, liquid-cooled	Rated power of the Active Line Module kW	Active Interface Module Order No.
Line voltage 380 ... 480 V 3 AC			
6SL3330-7TE32-1AA0	-	132	6SL3300-7TE32-6AA0
6SL3330-7TE32-6AA0	-	160	6SL3300-7TE32-6AA0
6SL3330-7TE33-8AA0	-	235	6SL3300-7TE33-8AA0
6SL3330-7TE35-0AA0	6SL3335-7TE35-0AA0	300	6SL3300-7TE35-0AA0
6SL3330-7TE36-1AA0	-	380	6SL3300-7TE38-4AA0
6SL3330-7TE38-4AA0	6SL3335-7TE38-4AA0	500	6SL3300-7TE38-4AA0
6SL3330-7TE41-0AA0	-	630	6SL3300-7TE41-4AA0
6SL3330-7TE41-4AA0	-	900	6SL3300-7TE41-4AA0
Line voltage 500 ... 690 V 3 AC			
6SL3330-7TG35-8AA0	6SL3335-7TG35-8AA0	560	6SL3300-7TG35-8AA0
6SL3330-7TG37-4AA0	-	800	6SL3300-7TG37-4AA0
6SL3330-7TG41-0AA0	-	1100	6SL3300-7TG41-3AA0
6SL3330-7TG41-3AA0	6SL3335-7TG41-3AA0	1400	6SL3300-7TG41-3AA0

Integration

2



Connection example of an Active Interface Module with integrated bypass contactor (frame sizes FI and GI)



Connection example of an Active Interface Module with externally mounted bypass contactor (frame sizes HI and JI)

SINAMICS S120 chassis units

Air-cooled drive units

Line Modules Active Interface Modules

Technical data

Line voltage 380 ... 480 V 3 AC		Active Interface Modules			
		6SL3300-7TE32-6AA0		6SL3300-7TE33-8AA0	6SL3300-7TE35-0AA0
Suitable for Active Line Module					
<ul style="list-style-type: none"> Rated power - Air-cooled - Liquid-cooled 	kW	132	160	235	300
		6SL3330-7TE32-1AA0	6SL3330-7TE32-6AA0	6SL3330-7TE33-8AA0	6SL3330-7TE35-0AA0
		-	-	-	6SL3335-7TE35-0AA0
Rated current	A	210	260	380	490
Bypass contactor		included	included	included	included
Current requirement					
<ul style="list-style-type: none"> 24 V DC auxiliary power supply 	A	0.17	0.17	0.17	0.17
<ul style="list-style-type: none"> 230 V 2 AC 					
- Making current	A	1.25	1.25	2.5	2.5
- Holding current	A	0.6	0.6	1.2	1.2
DC link capacitance of the drive line-up, max. ¹⁾	μF	41600	41600	76800	76800
Power loss, max. ²⁾					
<ul style="list-style-type: none"> at 50 Hz 400 V 	kW	2.1	2.2	3.0	3.9
<ul style="list-style-type: none"> at 60 Hz 460 V 	kW	2.1	2.2	3.0	3.9
Cooling-air requirement	m ³ /s	0.24	0.24	0.47	0.47
Line supply/load connection					
L1, L2, L3 / U2, V2, W2		M10 nut	M10 nut	M10 nut	M10 nut
<ul style="list-style-type: none"> Conductor cross-section, max. (DIN VDE) 	mm ²	2 × 185	2 × 185	2 × 185	2 × 185
PE/GND connection					
<ul style="list-style-type: none"> Conductor cross-section, max. (DIN VDE) 	mm ²	M10 nut 2 × 185	M10 nut 2 × 185	M10 nut 2 × 185	M10 nut 2 × 185
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
<ul style="list-style-type: none"> Width 	mm	325	325	325	325
<ul style="list-style-type: none"> Height 	mm	1400	1400	1533	1533
<ul style="list-style-type: none"> Depth 	mm	355	355	544	544
Weight, approx.	kg	135	135	190	190
Frame size		FI	FI	GI	GI

¹⁾ For higher capacitances, please refer to the information in the SINAMICS Low Voltage Engineering Manual.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Active Interface Modules			
		6SL3300-7TE38-4AA0		6SL3300-7TE41-4AA0	
Suitable for Active Line Module					
• Rated power	kW	380	500	630	900
- Air-cooled		6SL3330-7TE36-1AA0	6SL3330-7TE38-4AA0	6SL3330-7TE41-0AA0	6SL3330-7TE41-4AA0
- Liquid-cooled		-	6SL3335-7TE38-4AA0	-	-
Rated current	A	605	840	985	1405
Bypass contactor		3RT1476-6AP36	3WL1110-2BB34-4AN2-Z C22	3WL1112-2BB34-4AN2-Z C22	3WL1116-2BB34-4AN2-Z C22
Current requirement					
• 24 V DC auxiliary power supply	A	0.17	0.17	0.17	0.17
• 230 V 2 AC					
- Making current	A	9.9	9.9	10.5	10.5
- Holding current	A	4.6	4.6	4.9	4.9
DC link capacitance of the drive line-up, max. ¹⁾	μF	134400	134400	230400	230400
Power loss, max. ²⁾					
• at 50 Hz 400 V	kW	5.5	6.1	7.5	8.5
• at 60 Hz 460 V	kW	5.5	6.1	7.5	8.5
Cooling-air requirement	m ³ /s	0.4	0.4	0.4	0.4
Line supply/load connection L1, L2, L3 / U2, V2, W2					
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 240	4 x 240	6 x 240	6 x 240
PE connection					
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x M12 nut 2 x 240	2 x M12 nut 2 x 240	4 x M12 nut 4 x 240	4 x M12 nut 4 x 240
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	305	305	505	505
• Height	mm	1750	1750	1750	1750
• Depth	mm	544	544	544	544
Weight, approx.	kg	390	390	620	620
Frame size		HI	HI	JI	JI

¹⁾ For higher capacitances, please refer to the information in the SINAMICS Low Voltage Engineering Manual.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

SINAMICS S120 chassis units

Air-cooled drive units

Line Modules Active Interface Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Active Interface Modules			
		6SL3300-7TG35-8AA0	6SL3300-7TG37-4AA0	6SL3300-7TG41-3AA0	
Suitable for Active Line Module					
<ul style="list-style-type: none"> Rated power - Air-cooled - Liquid-cooled 	kW	560 6SL3330-7TG35-8AA0 6SL3335-7TG35-8AA0	800 6SL3330-7TG37-4AA0 -	1100 6SL3330-7TG41-0AA0 -	1400 6SL3330-7TG41-3AA0 6SL3335-7TG41-3AA0
Rated current	A	575	735	1025	1270
Bypass contactor		3RT1476-6AP36	3RT1476-6AP36 (3 x)	3WL1212-4BB34-4AN2-Z C22	3WL1216-4BB34-4AN2-Z C22
Current requirement					
<ul style="list-style-type: none"> 24 V DC auxiliary power supply 230 V 2 AC - Making current - Holding current 	A	0.17	0.17	0.17	0.17
<ul style="list-style-type: none"> 24 V DC auxiliary power supply 230 V 2 AC - Making current - Holding current 	A	9.9	10.5	10.5	10.5
	A	4.6	4.9	4.9	4.9
DC link capacitance of the drive line-up, max. ¹⁾	μF	59200	153600	153600	153600
Power loss, max. ²⁾					
<ul style="list-style-type: none"> at 50 Hz 690 V at 60 Hz 575 V 	kW	6.8	9.0	9.2	9.6
	kW	6.8	9.0	9.2	9.6
Cooling-air requirement	m ³ /s	0.4	0.4	0.4	0.4
Line supply/load connection					
<ul style="list-style-type: none"> L1, L2, L3 / U2, V2, W2 Conductor cross-section, max. (DIN VDE) 		4 x hole for M12	3 x hole for M12	3 x hole for M12	3 x hole for M12
	mm ²	4 x 240	6 x 240	6 x 240	6 x 240
PE connection					
<ul style="list-style-type: none"> Conductor cross-section, max. (DIN VDE) 	mm ²	2 x M12 nut 2 x 240	4 x M12 nut 4 x 240	4 x M12 nut 4 x 240	4 x M12 nut 4 x 240
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
<ul style="list-style-type: none"> Width Height Depth 	mm	305	505	505	505
	mm	1750	1750	1750	1750
	mm	544	544	544	544
Weight, approx.	kg	390	620	620	620
Frame size		HI	JI	JI	JI

¹⁾ For higher capacitances, please refer to the information in the SINAMICS Low Voltage Engineering Manual.

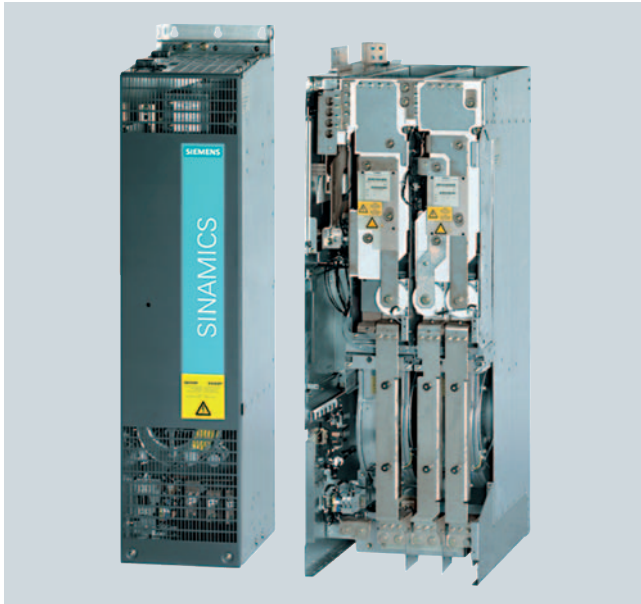
²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

SINAMICS S120 chassis units

Air-cooled drive units

Motor Modules

Overview



A Motor Module comprises a self-commutated inverter with IGBTs. It generates a variable voltage with variable frequency from the DC link voltage that feeds the connected motor.

Several Motor Modules can be interconnected through a common DC bus. This permits energy to be transferred between the Motor Modules.

This means that if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode.

Motor Modules are controlled by a Control Unit.

Design

The Motor Modules have the following interfaces as standard:

- 1 DC link connection (DCP, DCN) for connecting to the supply DC busbar
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 1 DC link connection (DCPS, DCNS) to connect a dv/dt filter
- 1 connection for the 24 V DC electronics power supply
- 3 DRIVE-CLiQ sockets
- 1 motor connection
- 1 connection for Safety Integrated
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 PE/protective conductor connection

The status of the Motor Modules is indicated via two multi-color LEDs.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable to connect to the CU320 or SIMOTION D4x5 Control Unit
- DRIVE-CLiQ cable for connection to the next Motor Module (dependent on the type)

Selection and ordering data

Type rating	Rated output current	Motor Module
kW	A	Order No.
Line voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)		
110	210	6SL3320-1TE32-1AA0
132	260	6SL3320-1TE32-6AA0
160	310	6SL3320-1TE33-1AA0
200	380	6SL3320-1TE33-8AA0
250	490	6SL3320-1TE35-0AA0
315	605	6SL3320-1TE36-1AA0
400	745	6SL3320-1TE37-5AA0
450	840	6SL3320-1TE38-4AA0
560	985	6SL3320-1TE41-0AA0
710	1260	6SL3320-1TE41-2AA0
800	1405	6SL3320-1TE41-4AA0
Line voltage 500 ... 690 V 3 AC (DC link voltage 675 ... 1035 V DC)		
75	85	6SL3320-1TG28-5AA0
90	100	6SL3320-1TG31-0AA0
110	120	6SL3320-1TG31-2AA0
132	150	6SL3320-1TG31-5AA0
160	175	6SL3320-1TG31-8AA0
200	215	6SL3320-1TG32-2AA0
250	260	6SL3320-1TG32-6AA0
315	330	6SL3320-1TG33-3AA0
400	410	6SL3320-1TG34-1AA0
450	465	6SL3320-1TG34-7AA0
560	575	6SL3320-1TG35-8AA0
710	735	6SL3320-1TG37-4AA0
800	810	6SL3320-1TG38-1AA0
900	910	6SL3320-1TG38-8AA0
1000	1025	6SL3320-1TG41-0AA0
1200	1270	6SL3320-1TG41-3AA0

Accessories

Description	Order No.
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: Chinese Simplified Dutch Danish Polish Finnish Portuguese/Brazilian French Russian Greek Swedish Italian Spanish Japanese Czech Korean Turkish	6SL3166-3AB00-0AA0

Motor-side components and Braking Modules
(→ system components).

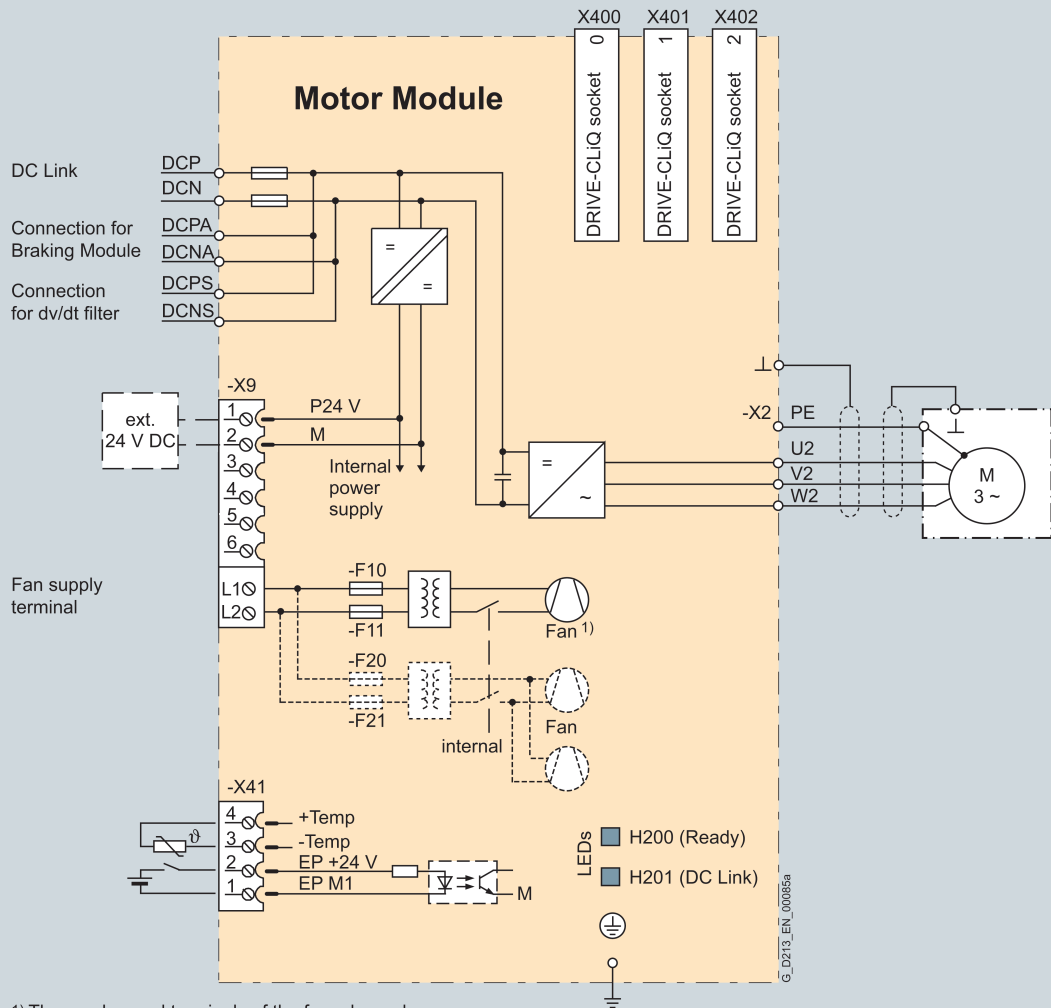
Air-cooled drive units

Motor Modules

Integration

The Motor Modules communicate with the higher-level control unit via DRIVE-CLiQ. This control unit can either be a CU320 or

a SIMOTION D Control Unit.



Connection example of a Motor Module

Technical data

General technical data

Electrical data	
DC link voltage (up to 2000 m above sea level)	510 ... 720 V DC (line supply voltage 380 ... 480 V 3 AC) or 675 ... 1035 V DC (line supply voltage 500 ... 690 V 3 AC)
Output frequency¹⁾ • Control type Servo • Control type Vector • Control type V/f	0 ... 300 Hz 0 ... 300 Hz 0 ... 300 Hz
Ambient conditions	
Type of cooling	Internal air cooling, power units with forced air cooling by built-in fans
Certificates	
Conformity	CE
Approvals (line supply voltage ≤ 600 V)	cULus (File No.: E192450)

1) Note the correlation between max. output frequency, pulse frequency and current derating. Higher output frequencies for specific configurations are available on request.
See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules				
		6SL3320-1TE32-1AA0	6SL3320-1TE32-6AA0	6SL3320-1TE33-1AA0	6SL3320-1TE33-8AA0	6SL3320-1TE35-0AA0
Type rating						
• at I_L (50 Hz 400 V) ¹⁾	kW	110	132	160	200	250
• at I_H (50 Hz 400 V) ¹⁾	kW	90	110	132	160	200
• at I_L (60 Hz 460 V) ²⁾	hp	150	200	250	300	400
• at I_H (60 Hz 460 V) ²⁾	hp	150	200	200	250	350
Output current						
• Rated current I_{NA}	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
• Maximum current $I_{max A}$	A	307	375	453	555	715
DC link current						
• Rated current $I_{N DC}$ when supplied from						
- Basic/Smart Line Module	A	252	312	372	456	588
- Active Line Module	A	227	281	335	411	529
• Base load current $I_L DC$ ³⁾ when supplied from						
- Basic/Smart Line Module	A	245	304	362	444	573
- Active Line Module	A	221	273	326	400	515
• Base load current $I_H DC$ ⁴⁾ when supplied from						
- Basic/Smart Line Module	A	224	277	331	405	523
- Active Line Module	A	202	250	298	365	470
Current requirement						
• 24 V DC auxiliary power supply	A	0.8	0.8	0.9	0.9	0.9
• 400 V AC	A	0.63	1.13	1.8	1.8	1.8
DC link capacitance	μF	4200	5200	6300	7800	9600
Pulse frequency ⁵⁾						
• Rated frequency	kHz	2	2	2	2	2
• Pulse frequency, max.						
- without current derating	kHz	2	2	2	2	2
- with current derating	kHz	8	8	8	8	8
Power loss, max. ⁶⁾						
• at 50 Hz 400 V	kW	1.86	2.5	2.96	3.67	4.28
• at 60 Hz 460 V	kW	1.94	2.6	3.1	3.8	4.5
Cooling-air requirement	m ³ /s	0.17	0.23	0.36	0.36	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	64/67	64/67	69/73	69/73	69/73
DC link connection DCP, DCN		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, V2, W2		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
Cable length, max. ⁷⁾						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules				
		6SL3320-1TE32-1AA0	6SL3320-1TE32-6AA0	6SL3320-1TE33-1AA0	6SL3320-1TE33-8AA0	6SL3320-1TE35-0AA0
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
Degree of protection		IP20	IP20	IP20	IP20	IP20
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	95	95	136	136	136
Frame size		FX	FX	GX	GX	GX

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules		
		6SL3320-1TE36-1AA0	6SL3320-1TE37-5AA0	6SL3320-1TE38-4AA0
Type rating				
• at I_L (50 Hz 400 V) ¹⁾	kW	315	400	450
• at I_H (50 Hz 400 V) ¹⁾	kW	250	315	400
• at I_L (60 Hz 460 V) ²⁾	hp	500	600	700
• at I_H (60 Hz 460 V) ²⁾	hp	350	450	600
Output current				
• Rated current I_{NA}	A	605	745	840
• Base load current I_L ³⁾	A	590	725	820
• Base load current I_H ⁴⁾	A	460	570	700
• Maximum current $I_{max A}$	A	885	1087	1230
DC link current				
• Rated current I_{NDC} when supplied from				
- Basic/Smart Line Module	A	726	894	1008
- Active Line Module	A	653	805	907
• Base load current I_{LDC} ³⁾ when supplied from				
- Basic/Smart Line Module	A	707	871	982
- Active Line Module	A	636	784	884
• Base load current I_{HDC} ⁴⁾ when supplied from				
- Basic/Smart Line Module	A	646	795	897
- Active Line Module	A	581	716	807
Current requirement				
• 24 V DC auxiliary power supply	A	1.0	1.0	1.0
• 400 V AC	A	3.6	3.6	3.6
DC link capacitance	μF	12600	15600	16800
Pulse frequency ⁵⁾				
• Rated frequency	kHz	1.25	1.25	1.25
• Pulse frequency, max.				
- without current derating	kHz	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5
Power loss, max. ⁶⁾				
• at 50 Hz 400 V	kW	5.84	6.68	7.15
• at 60 Hz 460 V	kW	6.3	7.3	7.8
Cooling-air requirement	m ³ /s	0.78	0.78	0.78
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	70/73	70/73	70/73
DC link connection DCP, DCN		4 x hole for M10 Busbar	4 x hole for M10 Busbar	4 x hole for M10 Busbar
Motor connection U2, V2, W2		2 x M12 screw	2 x M12 screw	2 x M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 240	4 x 240	4 x 240
Cable length, max. ⁷⁾				
• Shielded	m	300	300	300
• Unshielded	m	450	450	450

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules		
		6SL3320-1TE36-1AA0	6SL3320-1TE37-5AA0	6SL3320-1TE38-4AA0
PE1/GND connection		M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240
PE2/GND connection		2 x 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
Degree of protection		IP00	IP00	IP00
Dimensions				
• Width	mm	503	503	503
• Height	mm	1475	1475	1475
• Depth	mm	547	547	547
Weight, approx.	kg	290	290	290
Frame size		HX	HX	HX

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules		
		6SL3320-1TE41-0AA0	6SL3320-1TE41-2AA0	6SL3320-1TE41-4AA0
Type rating				
• at I_L (50 Hz 400 V) ¹⁾	kW	560	710	800
• at I_H (50 Hz 400 V) ¹⁾	kW	450	560	710
• at I_L (60 Hz 460 V) ²⁾	hp	800	1000	1150
• at I_H (60 Hz 460 V) ²⁾	hp	700	900	1000
Output current				
• Rated current I_N A	A	985	1260	1405
• Base load current I_L ³⁾	A	960	1230	1370
• Base load current I_H ⁴⁾	A	860	1127	1257
• Maximum current I_{max} A	A	1440	1845	2055
DC link current				
• Rated current I_{NDC} when supplied from				
- Basic/Smart Line Module	A	1182	1512	1686
- Active Line Module	A	1064	1361	1517
• Base load current I_{LDC} ³⁾ when supplied from				
- Basic/Smart Line Module	A	1152	1474	1643
- Active Line Module	A	1037	1326	1479
• Base load current I_{HDC} ⁴⁾ when supplied from				
- Basic/Smart Line Module	A	1051	1345	1500
- Active Line Module	A	946	1211	1350
Current requirement				
• 24 V DC auxiliary power supply	A	1.25	1.4	1.4
• 400 V AC	A	5.4	5.4	5.4
DC link capacitance	μF	18900	26100	28800
Pulse frequency ⁵⁾				
• Rated pulse frequency	kHz	1.25	1.25	1.25
• Pulse frequency, max.				
- without current derating	kHz	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5
Power loss, max. ⁶⁾				
• at 50 Hz 400 V	kW	9.5	11.1	12.0
• at 60 Hz 575 V	kW	10.2	12.0	13.0
Cooling-air requirement	m ³ /s	1.1	1.1	1.1
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	71/73	71/73	71/73
DC link connection DCP, DCN		4 x hole for M10 Busbar	4 x hole for M10 Busbar	4 x hole for M10 Busbar
Motor connection U2, V2, W2		3 x M12 screw	3 x M12 screw	3 x M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	6 x 240	6 x 240	6 x 240
Cable length, max. ⁷⁾				
• Shielded	m	300	300	300
• Unshielded	m	450	450	450

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules		
		6SL3320-1TE41-0AA0	6SL3320-1TE41-2AA0	6SL3320-1TE41-4AA0
PE1/GND connection		M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240
PE2/GND connection		3 x M12 screw	3 x M12 screw	3 x M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	3 x 240	3 x 240	3 x 240
Degree of protection		IP00	IP00	IP00
Dimensions				
• Width	mm	704	704	704
• Height	mm	1475	1475	1475
• Depth	mm	549	549	549
Weight, approx.	kg	450	450	450
Frame size		JX	JX	JX

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3320-1TG28-5AA0	6SL3320-1TG31-0AA0	6SL3320-1TG31-2AA0	6SL3320-1TG31-5AA0
Type rating					
• at I_L (50 Hz 690 V) ¹⁾	kW	75	90	110	132
• at I_H (50 Hz 690 V) ¹⁾	kW	55	75	90	110
• at I_L (50 Hz 500 V) ¹⁾	kW	55	55	75	90
• at I_H (50 Hz 500 V) ¹⁾	kW	45	55	75	90
• at I_L (60 Hz 575 V) ²⁾	hp	75	75	100	150
• at I_H (60 Hz 575 V) ²⁾	hp	75	75	100	125
Output current					
• Rated current I_{NA}	A	85	100	120	150
• Base load current I_L ³⁾	A	80	95	115	142
• Base load current I_H ⁴⁾	A	76	89	107	134
• Maximum current $I_{max A}$	A	120	142	172	213
DC link current					
• Rated current $I_{N DC}$ when supplied from					
- Basic/Smart Line Module	A	102	120	144	180
- Active Line Module	A	92	108	130	162
• Base load current I_L ³⁾ when supplied from					
- Basic/Smart Line Module	A	99	117	140	175
- Active Line Module	A	89	105	126	157
• Base load current I_H ⁴⁾ when supplied from					
- Basic/Smart Line Module	A	90	106	128	160
- Active Line Module	A	81	96	115	144
Current requirement					
• 24 V DC auxiliary power supply	A	0.8	0.8	0.8	0.8
• 500 V AC	A	0.7	0.7	0.7	0.7
• 690 V AC	A	0.4	0.4	0.4	0.4
DC link capacitance		μF	1200	1200	1600
Pulse frequency ⁵⁾					
• Rated pulse frequency	kHz	1.25	1.25	1.25	1.25
• Pulse frequency, max.					
- without current derating	kHz	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾					
• at 50 Hz 690 V	kW	1.17	1.43	1.89	1.80
• at 60 Hz 575 V	kW	1.1	1.3	1.77	1.62
Cooling-air requirement		m ³ /s	0.17	0.17	0.17
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	64/67	64/67	64/67
DC link connection DCP, DCN					
• Conductor cross-section, max. (DIN VDE)	mm ²	M10 screw 2 × 185	M10 screw 2 × 185	M10 screw 2 × 185	M10 screw 2 × 185
Motor connection U2, V2, W2					
• Conductor cross-section, max. (DIN VDE)	mm ²	M10 screw 2 × 185	M10 screw 2 × 185	M10 screw 2 × 185	M10 screw 2 × 185
Cable length, max. ⁷⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3320-1TG28-5AA0	6SL3320-1TG31-0AA0	6SL3320-1TG31-2AA0	6SL3320-1TG31-5AA0
PE1/GND connection		M10 screw	M10 screw	M10 screw	M10 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × 185	2 × 185	2 × 185	2 × 185
PE2/GND connection		M10 screw	M10 screw	M10 screw	M10 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × 185	2 × 185	2 × 185	2 × 185
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	326	326	326	326
• Height	mm	1400	1400	1400	1400
• Depth	mm	356	356	356	356
Weight, approx.	kg	95	95	95	95
Frame size		FX	FX	FX	FX

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules				
		6SL3320-1TG31-8AA0	6SL3320-1TG32-2AA0	6SL3320-1TG32-6AA0	6SL3320-1TG33-3AA0	
Type rating						
• at I_L (50 Hz 690 V) ¹⁾	kW	160	200	250	315	
• at I_H (50 Hz 690 V) ¹⁾	kW	132	160	200	250	
• at I_L (50 Hz 500 V) ¹⁾	kW	110	132	160	200	
• at I_H (50 Hz 500 V) ¹⁾	kW	90	110	132	160	
• at I_L (60 Hz 575 V) ²⁾	hp	150	200	250	300	
• at I_H (60 Hz 575 V) ²⁾	hp	150	200	200	250	
Output current						
• Rated current $I_{N A}$	A	175	215	260	330	
• Base load current I_L ³⁾	A	171	208	250	320	
• Base load current I_H ⁴⁾	A	157	192	233	280	
• Maximum current $I_{max A}$	A	255	312	375	480	
DC link current						
• Rated current $I_{N DC}$ when supplied from						
- Basic/Smart Line Module	A	210	258	312	396	
- Active Line Module	A	189	232	281	356	
• Base load current $I_L DC$ ³⁾ when supplied from						
- Basic/Smart Line Module	A	204	251	304	386	
- Active Line Module	A	184	226	273	347	
• Base load current $I_H DC$ ⁴⁾ when supplied from						
- Basic/Smart Line Module	A	186	229	277	352	
- Active Line Module	A	168	206	250	316	
Current requirement						
• 24 V DC auxiliary power supply	A	0.9	0.9	0.9	0.9	
• 500 V AC	A	1.5	1.5	1.5	1.5	
• 690 V AC	A	1.0	1.0	1.0	1.0	
DC link capacitance		μF	2800	2800	3900	4200
Pulse frequency ⁵⁾						
• Rated frequency	kHz	1.25	1.25	1.25	1.25	
• Pulse frequency, max.						
- without current derating	kHz	1.25	1.25	1.25	1.25	
- with current derating	kHz	7.5	7.5	7.5	7.5	
Power loss, max. ⁶⁾						
• at 50 Hz 690 V	kW	2.67	3.09	3.62	4.34	
• at 60 Hz 575 V	kW	2.5	2.91	3.38	3.98	
Cooling-air requirement		m ³ /s	0.36	0.36	0.36	
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	69/73	69/73	69/73	
DC link connection DCP, DCN						
• Conductor cross-section, max. (DIN VDE)	mm ²	M10 screw 2 × 240	M10 screw 2 × 240	M10 screw 2 × 240	M10 screw 2 × 240	
Motor connection U2, V2, W2						
• Conductor cross-section, max. (DIN VDE)	mm ²	M10 screw 2 × 240	M10 screw 2 × 240	M10 screw 2 × 240	M10 screw 2 × 240	
Cable length, max. ⁷⁾						
• Shielded	m	300	300	300	300	
• Unshielded	m	450	450	450	450	

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3320-1TG31-8AA0	6SL3320-1TG32-2AA0	6SL3320-1TG32-6AA0	6SL3320-1TG33-3AA0
PE1/GND connection		M10 screw	M10 screw	M10 screw	M10 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × 240	2 × 240	2 × 240	2 × 240
PE2/GND connection		M10 screw	M10 screw	M10 screw	M10 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 × 240	2 × 240	2 × 240	2 × 240
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	326	326	326	326
• Height	mm	1533	1533	1533	1533
• Depth	mm	545	545	545	545
Weight, approx.	kg	136	136	136	136
Frame size		GX	GX	GX	GX

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3320-1TG34-1AA0	6SL3320-1TG34-7AA0	6SL3320-1TG35-8AA0	6SL3320-1TG37-4AA0
Type rating					
• at I_L (50 Hz 690 V) ¹⁾	kW	400	450	560	710
• at I_H (50 Hz 690 V) ¹⁾	kW	315	400	450	630
• at I_L (50 Hz 500 V) ¹⁾	kW	250	315	400	500
• at I_H (50 Hz 500 V) ¹⁾	kW	200	250	315	450
• at I_L (60 Hz 575 V) ²⁾	hp	400	450	600	700
• at I_H (60 Hz 575 V) ²⁾	hp	350	450	500	700
Output current					
• Rated current I_{NA}	A	410	465	575	735
• Base load current I_L ³⁾	A	400	452	560	710
• Base load current I_H ⁴⁾	A	367	416	514	657
• Maximum current $I_{max A}$	A	600	678	840	1065
DC link current					
• Rated current $I_{N DC}$ when supplied from					
- Basic/Smart Line Module	A	492	558	690	882
- Active Line Module	A	443	502	621	794
• Base load current $I_L DC$ ³⁾ when supplied from					
- Basic/Smart Line Module	A	479	544	672	859
- Active Line Module	A	431	489	605	774
• Base load current $I_H DC$ ⁴⁾ when supplied from					
- Basic/Smart Line Module	A	437	496	614	784
- Active Line Module	A	394	446	552	706
Current requirement					
• 24 V DC auxiliary power supply	A	1.0	1.0	1.0	1.25
• 500 V AC	A	3.0	3.0	3.0	4.4
• 690 V AC	A	2.1	2.1	2.1	3.1
DC link capacitance		μF	7400	7400	7400
Pulse frequency ⁵⁾					
• Rated frequency	kHz	1.25	1.25	1.25	1.25
• Pulse frequency, max.					
- without current derating	kHz	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾					
• at 50 Hz 690 V	kW	6.13	6.80	10.3	10.9
• at 60 Hz 575 V	kW	5.71	6.32	9.7	10
Cooling-air requirement		m ³ /s	0.78	0.78	1.474
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	70/73	70/73	71/73
DC link connection DCP, DCN			4 x hole for M10 Busbar	4 x hole for M10 Busbar	4 x hole for M10 Busbar
Motor connection U2, V2, W2			2 x M12 screw	2 x M12 screw	2 x M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 240	4 x 240	4 x 240	6 x 240
Cable length, max. ⁷⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3320-1TG34-1AA0	6SL3320-1TG34-7AA0	6SL3320-1TG35-8AA0	6SL3320-1TG37-4AA0
PE1/GND connection		M12 screw	M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	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	2 x 240	2 x 240	2 x 240	3 x 240
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	503	503	503	704
• Height	mm	1475	1475	1475	1480
• Depth	mm	547	547	547	549
Weight, approx.	kg	290	290	290	450
Frame size		HX	HX	HX	JX

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3320-1TG38-1AA0	6SL3320-1TG38-8AA0	6SL3320-1TG41-0AA0	6SL3320-1TG41-3AA0
Type rating					
• at I_L (50 Hz 690 V) ¹⁾	kW	800	900	1000	1200
• at I_H (50 Hz 690 V) ¹⁾	kW	710	800	900	1000
• at I_L (50 Hz 500 V) ¹⁾	kW	560	630	710	900
• at I_H (50 Hz 500 V) ¹⁾	kW	500	560	630	800
• at I_L (60 Hz 575 V) ²⁾	hp	800	900	1000	1250
• at I_H (60 Hz 575 V) ²⁾	hp	700	800	900	1000
Output current					
• Rated current $I_{N A}$	A	810	910	1025	1270
• Base load current $I_{L 3)}$	A	790	880	1000	1230
• Base load current $I_{H 4)}$	A	724	814	917	1136
• Maximum current $I_{max A}$	A	1185	1320	1500	1845
DC link current					
• Rated current $I_{N DC}$ when supplied from					
- Basic/Smart Line Module	A	972	1092	1230	1524
- Active Line Module	A	875	983	1107	1372
• Base load current $I_{L DC 3)}$ when supplied from					
- Basic/Smart Line Module	A	947	1064	1199	1485
- Active Line Module	A	853	958	1079	1337
• Base load current $I_{H DC 4)}$ when supplied from					
- Basic/Smart Line Module	A	865	971	1094	1356
- Active Line Module	A	778	874	985	1221
Current requirement					
• 24 V DC auxiliary power supply	A	1.25	1.4	1.4	1.4
• 500 V AC	A	4.4	4.4	4.4	4.4
• 690 V AC	A	3.1	3.1	3.1	3.1
DC link capacitance		μF	11100	14400	14400
Pulse frequency ⁵⁾					
• Rated frequency	kHz	1.25	1.25	1.25	1.25
• Pulse frequency, max.					
- without current derating	kHz	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾					
• at 50 Hz 690 V	kW	11.5	11.7	13.2	16.0
• at 60 Hz 575 V	kW	10.5	10.6	12.0	14.2
Cooling-air requirement		m ³ /s	1.474	1.474	1.474
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	71/73	71/73	71/73
DC link connection DCP, DCN			4 x hole for M10 Busbar	4 x hole for M10 Busbar	4 x hole for M10 Busbar
Motor connection U2, V2, W2			3 x M12 screw	3 x M12 screw	3 x M12 screw
• Conductor cross-section, max. (acc. to DIN VDE)	mm ²	6 x 240	6 x 240	6 x 240	6 x 240
Cable length, max. ⁷⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Air-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3320-1TG38-1AA0	6SL3320-1TG38-8AA0	6SL3320-1TG41-0AA0	6SL3320-1TG41-3AA0
PE1/GND connection		M12 screw	M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (acc. to DIN VDE)	mm ²	240	240	240	240
PE2/GND connection		3 x M12 screw	3 x M12 screw	3 x M12 screw	3 x M12 screw
• Conductor cross-section, max. (acc. to DIN VDE)	mm ²	3 x 240	3 x 240	3 x 240	3 x 240
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	704	704	704	704
• Height	mm	1480	1480	1480	1480
• Depth	mm	549	549	549	549
Weight, approx.	kg	450	450	450	450
Frame size		JX	JX	JX	JX

Overview



The SINAMICS S120 liquid-cooled drive units are specifically designed to address the requirements relating to liquid cooling; they are characterized by their high power density and optimized footprint. Liquid cooling dissipates heat much more efficiently than air cooling systems. As a result, liquid-cooled units are much more compact than air-cooled units with the same power rating. Since the power losses generated by the electronic components are almost completely dissipated by the liquid coolant, only very small cooling fans are required. This makes the drive units extremely quiet in operation. Due to their compact dimensions and almost negligible cooling air requirement, liquid-cooled units are the preferred solution wherever installation space is restricted and/or the ambient operating conditions are rough.

Control cabinets with liquid cooling are easy to implement as hermetically sealed units with degrees of protection of IP54 or higher.

The product portfolio includes the following liquid-cooled SINAMICS S120 chassis units:

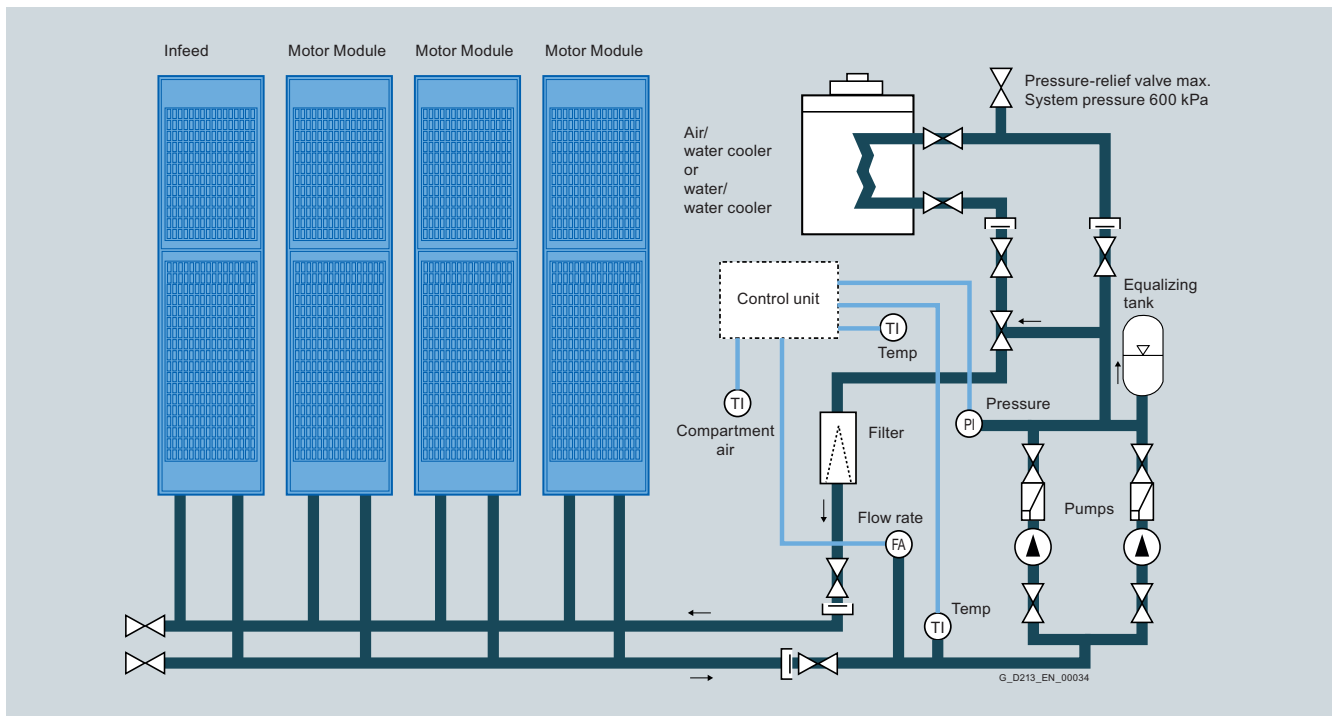
- Ready-to-connect AC/AC units:
 - Power Modules
- Infeed units:
 - Basic Line Modules
 - Active Line Modules
- Inverters (Motor Modules)

Highlights of the liquid-cooled units

- Up to a 60 % smaller footprint than air-cooled drive converters
- All main components such as power semiconductors, DC link capacitors and balancing resistors are cooled by the cooling circuit
- Only a low flow rate is required
- Uniform pressure drop of 0.7 bar
- Automatic protection functions
- Plated busbars
- Extremely quiet with < 56 dB(A)
- Compatible with all components and functions and tools of the SINAMICS system family
- The power rating can be extended by connecting units in parallel
- No equipment fans

Cabinet units in liquid-cooled version

Liquid-cooled SINAMICS S120 drive units are also available as cabinet units. These are tailored to the specific requirements and represent a tailor-made all-in-one solution for every drive task. You can obtain information about these units from your local Siemens office.



Example of a drive line-up with SINAMICS S120 liquid-cooled

SINAMICS S120 chassis units

Liquid-cooled drive units

Overview

Technical data

Unless explicitly specified otherwise, the following technical data are valid for all the following components of the SINAMICS S120 liquid-cooled drive system.

Electrical data	
Line voltages	<ul style="list-style-type: none"> • 380 ... 480 V 3 AC, $\pm 10\%$ ($-15\% < 1\text{ min}$) • 500 ... 690 V 3 AC, $\pm 10\%$ ($-15\% < 1\text{ min}$)
Electronics power supply	24 V DC, -15% $+20\%$ implemented as PELV circuit in accordance with EN 61800-5-1 Ground = negative pole grounded via the electronics
Mechanical data	
Vibratory load	
• Transport ¹⁾	EN 60721-3-2, Class 2M2
• Operation	Test values in accordance with EN 60068-2-6 test Fc: <ul style="list-style-type: none"> • 10 ... 58 Hz: Constant deflection, 0.075 mm • 58 ... 150 Hz: Constant acceleration = $9.81\text{ m/s}^2 (1 \times g)$
Shock load	
• Transport ¹⁾	EN 60721-3-2, Class 2M2
• Operation	Test values in accordance with EN 60068-2-27 test Ea: $98\text{ m/s}^2 (10 \times g)/20\text{ ms}$
Ambient conditions	
Degree of protection	IP00 acc. to EN 60529
Protection class	Class I (with protective conductor system) and Class III (PELV) according to EN 61800-5-1
Type of cooling	Liquid cooling
Cooling circuit	A detailed description of the cooling circuits and the recommended coolant can be found in the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided. 600 kPa
• Max. system pressure with respect to atmosphere	70 kPa
• Pressure drop at rated volumetric flow	80 ... 200 kPa
• Recommended pressure range	Dependent on the ambient temperature, condensation is not permitted • 0 ... 45 °C without derating, $> 45 \dots 50\text{ °C}$, see derating characteristics • (anti-freeze essential for a temperature range between 0 ... 5 °C; recommended anti-freeze agent: "Antifrogen N" supplied by Clariant)
• Inlet temperature of liquid coolant	
Permissible ambient temperature (air) in operation	Dependent on the inlet temperature of the liquid coolant, condensation is not permitted: • 0 ... 45 °C without derating • $> 45 \dots 50\text{ °C}$, refer to derating characteristics
Installation altitude	<ul style="list-style-type: none"> • $\leq 2000\text{ m}$ above sea level without derating • $> 2000\text{ m}$ above sea level, see derating characteristics
Climatic ambient conditions	
• Storage ¹⁾	Class 1K3 acc. to EN 60721-3-1, temperature $-40 \dots +70\text{ °C}$
• Transport ¹⁾	Class 2K4 acc. to EN 60721-3-2, temperature $-40 \dots +70\text{ °C}$, max. air humidity 95 % at $+40\text{ °C}$
• Operation	Class 3K3 acc. to EN 60721-3-3, condensation, splash water and ice formation are not permitted (EN 60204, Part 1)
Environmental class/harmful chemical substances	
• Storage ¹⁾	Class 1C2 acc. to EN 60721-3-1
• Transport ¹⁾	Class 2C2 acc. to EN 60721-3-2
• Operation	Class 3C2 acc. to EN 60721-3-3
Organic/biological influences	
• Storage ¹⁾	Class 1B1 acc. to EN 60721-3-1
• Transport ¹⁾	Class 2B1 acc. to EN 60721-3-2
• Operation	Class 3B1 acc. to EN 60721-3-3
Degree of pollution	2 acc. to EN 61800-5-1
Certificates	
Conformity	CE

The liquid-cooled SINAMICS S120 units are designed for either water or a water-Antifrogen N mixture as coolant. For a water-Antifrogen N mixture, the Antifrogen N percentage must equal between 20 and 45 %.

¹⁾ In transport packaging

Characteristic curves

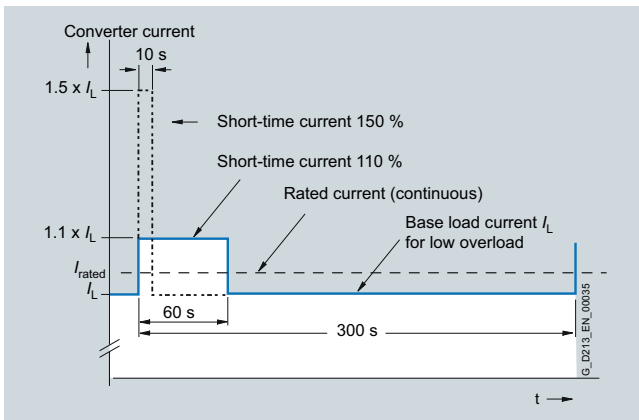
Overload capability

Liquid-cooled SINAMICS S120 units have an overload reserve, e.g. to handle breakaway torques. 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 permissible overload levels are valid under the prerequisite that the drive units are operated with their base load current before and after the overload condition based on a duty cycle duration of 300 s.

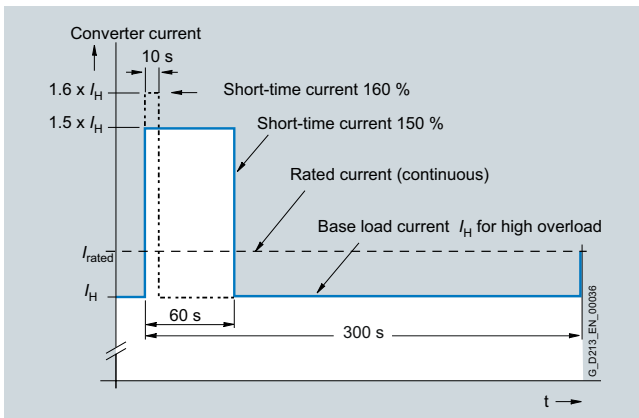
Power Modules and Motor Modules

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.



Low overload

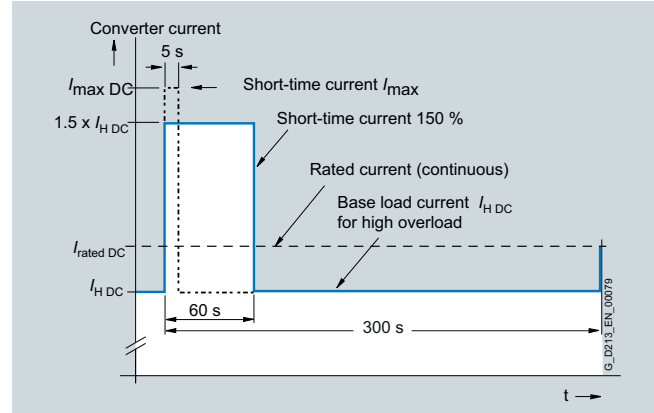
The base load current I_H for a high overload is based on a duty cycle of 150 % for 60 s or 160 % for 10 s.



High overload

Line Modules

The base load current I_{HDC} for a high overload is based on a duty cycle of 150 % for 60 s or I_{maxDC} for 5 s.



High overload

SINAMICS S120 chassis units

Liquid-cooled drive units

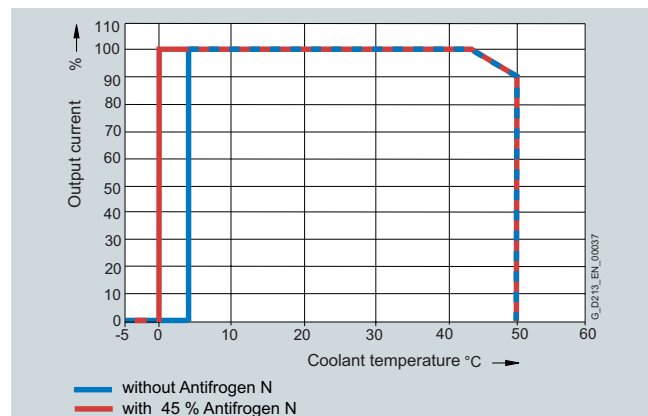
Overview

Characteristic curves (continued)

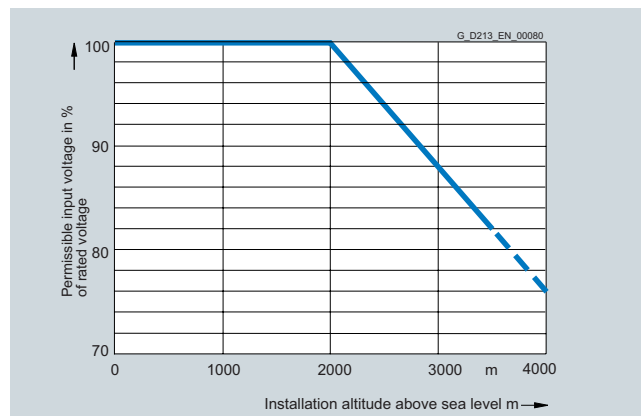
Derating factors

The following derating factors must be taken into account:

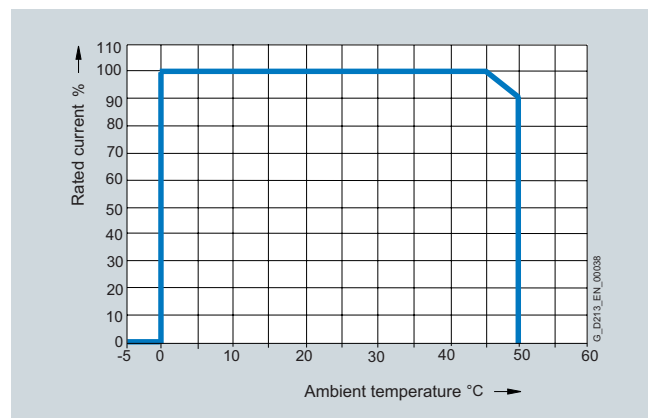
2



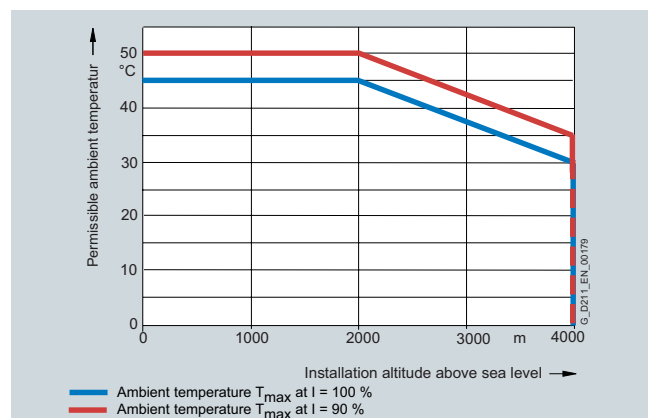
Current derating as a function of the temperature of the cooling liquid



Voltage derating as a function of installation altitude



Current derating as a function of ambient temperature



Permissible ambient temperature as a function of installation altitude

Overview



The Power Module comprises a line rectifier, a DC link and an inverter to supply the motor.

Power Modules are designed for drives that are not capable of regenerating energy to the mains supply. Regenerative energy produced while braking is converted to heat using braking resistors.

Liquid-cooled Power Modules are suitable for applications where space is restricted and for plants/machines that cannot be equipped with air-cooled units due to critical environmental conditions.

Design

The liquid-cooled Power Modules have the following interfaces as standard:

- 1 line supply connection
- 1 DC link connection
- 3 DRIVE-CLiQ sockets
- 1 connection for Safety Integrated
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 connection for the 24 V DC electronics power supply
- 1 motor connection
- 2 x PE/protective conductor connections

The CU310 Control Unit can be integrated in the Power Modules.

The scope of supply of the Power Modules includes:

- 1 DRIVE-CLiQ cable for connection to the CU310 Control Unit
- 1 CD-ROM with Equipment Manual in PDF format
- 2 seals for coolant connections

Selection and ordering data

Type rating	Rated output current	Power Module
kW	A	Order No.
Line voltage 380 ... 480 V 3 AC		
110	210	6SL3315-1TE32-1AA0
132	260	6SL3315-1TE32-6AA0
160	310	6SL3315-1TE33-1AA0
250	490	6SL3315-1TE35-0AA0

Accessories

Description	Order No.
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: Chinese Simplified Dutch Danish Polish Finnish Portuguese/Brazilian French Russian Greek Swedish Italian Spanish Japanese Czech Korean Turkish	6SL3166-3AB00-0AA0

Line and motor-side components (→ system components).

SINAMICS S120 chassis units

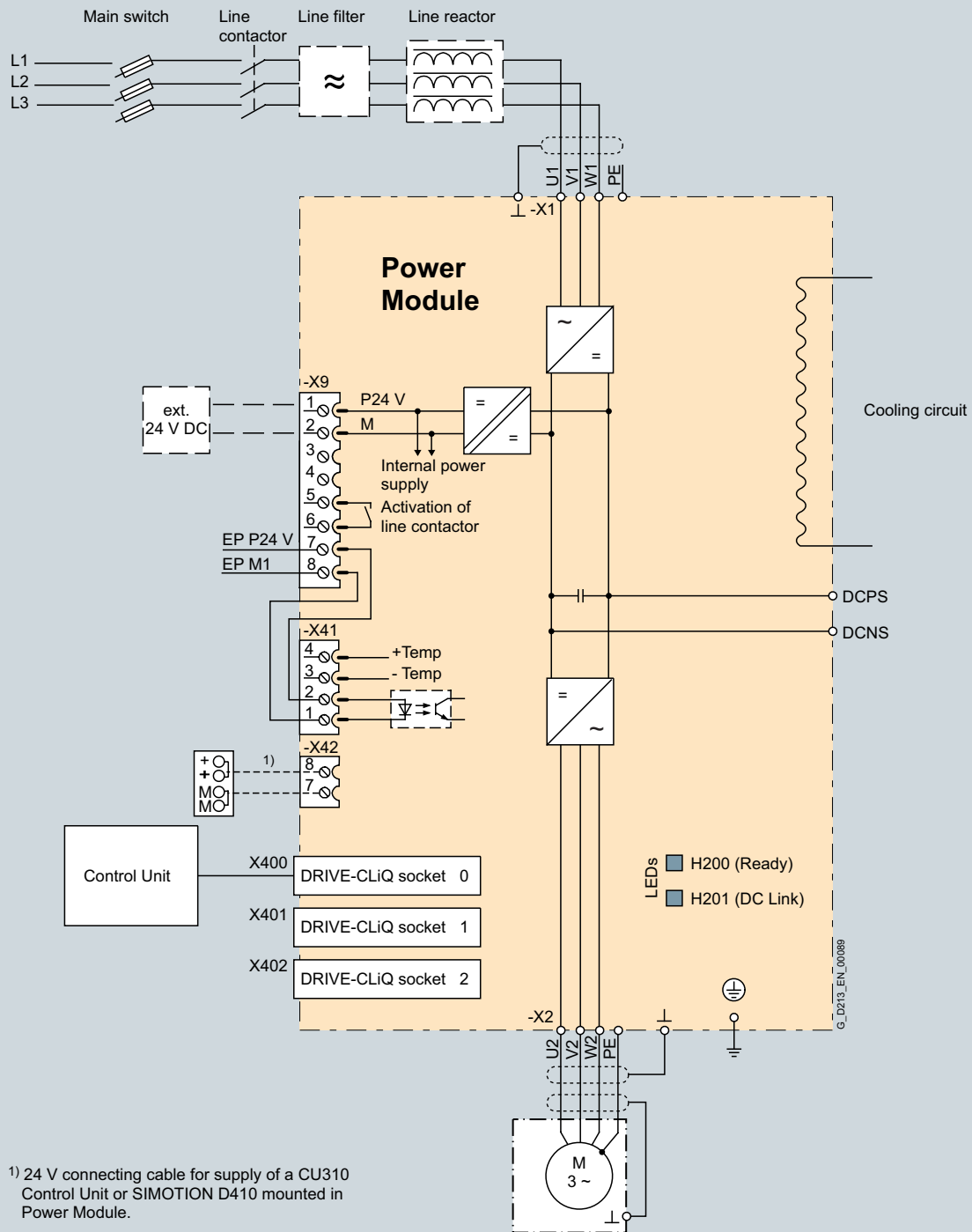
Liquid-cooled drive units

Power Modules

Integration

The Power Modules communicate with the higher-level control unit via DRIVE-CLiQ. The control unit in this case could be a CU310, CU320 or a SIMOTION D Control Unit. An external 24 V

DC power supply is required to operate liquid-cooled Power Modules.



Connection example of a liquid-cooled Power Module

Technical data

General technical data

Electrical data	
Line supply voltage (up to 2000 m above sea level)	380 ... 480 V 3 AC $\pm 10\%$ ($-15\% < 1\text{ min}$)
Line frequency	47 ... 63 Hz
Line power factor for a 3 AC line supply voltage and rated output	
• Basic fundamental ($\cos \varphi_1$)	> 0.96
• Total (λ)	0.75 ... 0.93
Overvoltage category acc. to EN 60664-1	Class III
DC link voltage, approx.	$1.35 \times \text{line voltage}$
Output voltage, approx.	0 to $0.97 \times \text{line voltage}$
Output frequency	
• Control type Servo	0 ... 300 Hz ¹⁾
• Control type Vector	0 ... 300 Hz ¹⁾
• Control type V/f	0 ... 300 Hz ¹⁾
Line contactor control Terminal block -X9/5-6	240 V AC, max. 8 A 30 V DC, max. 1 A
Radio interference suppression	
Standard	Category C3 according to EN 61800-3
Ambient conditions	
Type of cooling	Liquid cooling with integrated heat exchanger in stainless-steel version
Certificates	
Conformity	CE
Approvals	cULus (File No.: E192450)

¹⁾ Note the correlation between max. output frequency, pulse frequency and current derating. See SINAMICS Low Voltage Engineering Manual on the CD-ROM provided. Higher output frequencies for specific configurations are available on request.

SINAMICS S120 chassis units

Liquid-cooled drive units

Power Modules

Technical data (continued)

Line voltage 380 V ... 480 V 3 AC		Power Modules			
		6SL3315-1TE32-1AA0	6SL3315-1TE32-6AA0	6SL3315-1TE33-1AA0	6SL3315-1TE35-0AA0
Type rating					
• at I_L (50 Hz 400 V) ¹⁾	kW	110	132	160	250
• at I_H (50 Hz 400 V) ¹⁾	kW	90	110	132	200
• at I_L (60 Hz 460 V) ²⁾	hp	150	200	250	400
• at I_H (60 Hz 460 V) ²⁾	hp	150	200	200	350
Output current					
• Rated current I_{NA}	A	210	260	310	490
• Base load current I_L ³⁾	A	205	250	302	477
• Base load current I_H ⁴⁾	A	178	233	277	438
• Maximum current $I_{max A}$	A	307	375	453	715
Input current					
• Rated current I_{NE}	A	230	285	340	540
• Maximum current $I_{max E}$	A	336	411	496	788
Current requirement					
- 24 V DC auxiliary power supply	A	1.4	1.4	1.5	1.5
Pulse frequency ⁵⁾					
• Rated frequency	kHz	2	2	2	2
• Pulse frequency, max.					
- without current derating	kHz	2	2	2	2
- with current derating	kHz	8	8	8	8
Power loss, max. ⁶⁾					
• at 50 Hz 400 V	kW	2.42	3.04	3.4	5.43
• at 60 Hz 460 V	kW	2.6	3.2	3.6	5.7
Coolant flow rate ⁷⁾		l/min	9	12	12
Volume of liquid in the integrated heat exchanger		dm ³	0.52	0.88	0.88
Typ. pressure drop ⁸⁾ for volumetric flow		Pa	70000	70000	70000
Heat exchanger material			Stainless steel	Stainless steel	Stainless steel
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	52	52	52
Line supply connection U1, V1, W1 • Conductor cross-section, max. (DIN VDE)		mm ²	Hole for M12 2 x 95	Hole for M12 2 x 95	Hole for M12 2 x 240
Motor connection U2/T1, V2/T2, W2/T3 • Conductor cross-section, max. (DIN VDE)		mm ²	Hole for M12 2 x 95	Hole for M12 2 x 95	2 x hole for M12 2 x 240
Cable length, max. ⁹⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
PE/GND connection • Conductor cross-section, max. (DIN VDE)		mm ²	2 x hole for M12 2 x 95	2 x hole for M12 2 x 95	2 x hole for M12 2 x 240

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ The value applies to the following coolants water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁸⁾ This value applies to water as coolant; for other coolants, refer to the Equipment Manual.

⁹⁾ Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

SINAMICS S120 chassis units

Liquid-cooled drive units

Power Modules

Technical data (continued)

Line voltage 380 V ... 480 V 3 AC		Power Modules			
		6SL3315-1TE32-1AA0	6SL3315-1TE32-6AA0	6SL3315-1TE33-1AA0	6SL3315-1TE35-0AA0
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	265	265	265	265
• Height	mm	853	853	1001	1001
• Depth	mm	549	549	549	549
Weight	kg	77	77	108	108
Frame size		FL	FL	GL	GL

2

SINAMICS S120 chassis units

Liquid-cooled drive units

Line Modules

Basic Line Modules

Overview



Basic Line Modules are used for applications where energy is not fed back into the mains supply or where energy is exchanged in the DC link between axes operating in motor and generator modes. The connected Motor Modules are pre-charged via the thyristor gate control. Basic Line Modules are designed for connection to grounded-neutral (TN, TT) and non-grounded (IT) supply systems.

Liquid-cooled Basic Line Modules are especially suitable for applications where installation space is restricted and for critical environmental conditions.

Design

The liquid-cooled Basic Line Modules have the following interfaces as standard:

- 1 line supply connection
- 1 DC link connection (DCP, DCN) for supplying the connected Motor Modules
- 3 DRIVE-CLiQ sockets
- 1 connection for the 24 V DC electronics power supply
- 1 PE/protective conductor connection

The scope of supply of the Power Modules includes:

- 1 DRIVE-CLiQ cable to connect to the CU320 or SIMOTION D4x5 Control Unit
- 1 CD-ROM with Equipment Manual in PDF format
- 2 seals for coolant connections

Selection and ordering data

Rated power	Rated DC link current	Basic Line Module
kW	A	Order No.
Line voltage 380 ... 480 V 3 AC		
360	740	6SL3335-1TE37-4AA0
600	1220	6SL3335-1TE41-2AA0
830	1730	6SL3335-1TE41-7AA0
Line voltage 500 ... 690 V 3 AC		
355	420	6SL3335-1TG34-2AA0
630	730	6SL3335-1TG37-3AA0
1100	1300	6SL3335-1TG41-3AA0
1370	1650	6SL3335-1TG41-7AA0

Accessories

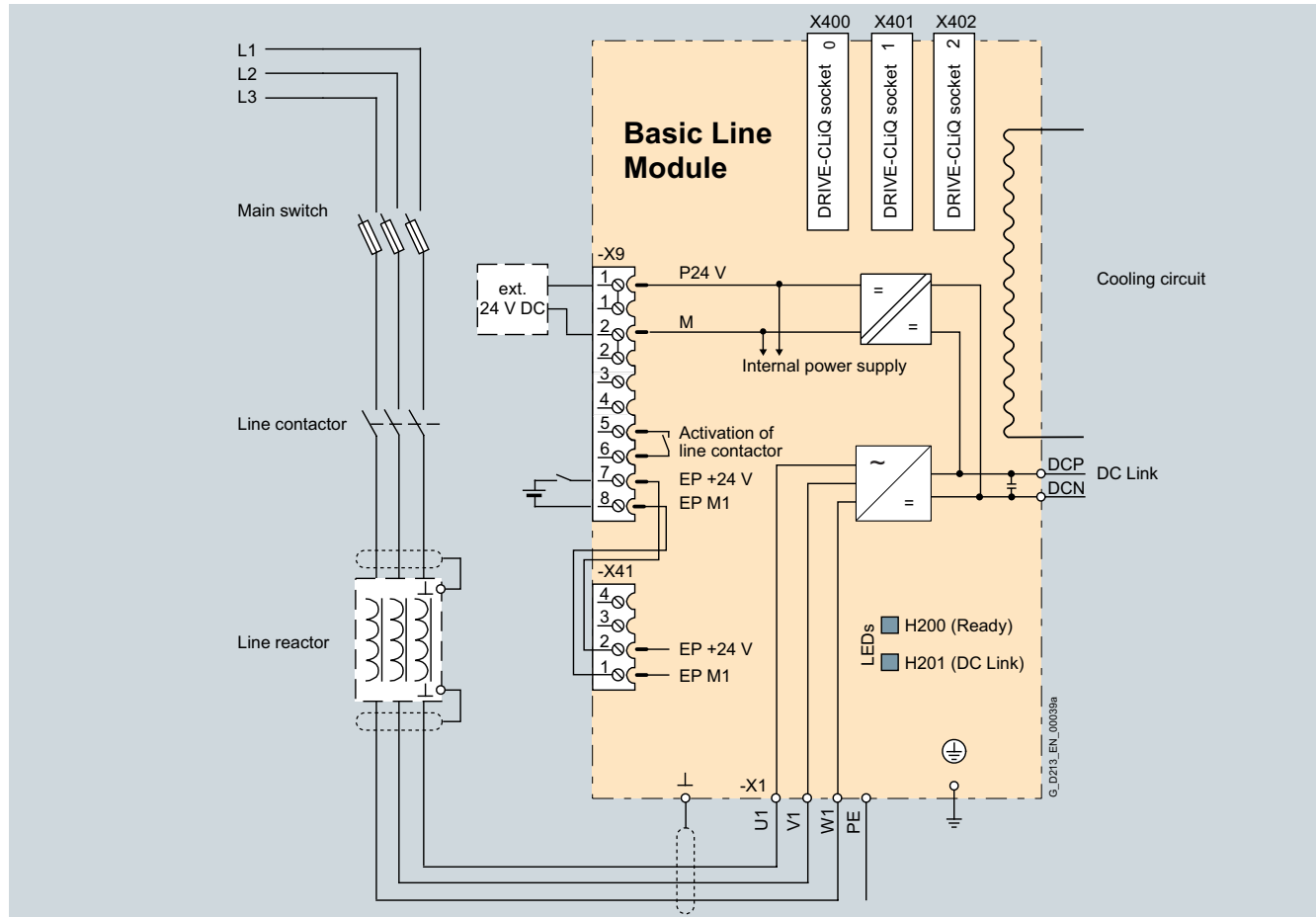
Description	Order No.																
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: <table><tr><td>Chinese Simplified</td><td>Dutch</td></tr><tr><td>Danish</td><td>Polish</td></tr><tr><td>Finnish</td><td>Portuguese/Brazilian</td></tr><tr><td>French</td><td>Russian</td></tr><tr><td>Greek</td><td>Swedish</td></tr><tr><td>Italian</td><td>Spanish</td></tr><tr><td>Japanese</td><td>Czech</td></tr><tr><td>Korean</td><td>Turkish</td></tr></table>	Chinese Simplified	Dutch	Danish	Polish	Finnish	Portuguese/Brazilian	French	Russian	Greek	Swedish	Italian	Spanish	Japanese	Czech	Korean	Turkish	6SL3166-3AB00-0AA0
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Danish	Polish																
Finnish	Portuguese/Brazilian																
French	Russian																
Greek	Swedish																
Italian	Spanish																
Japanese	Czech																
Korean	Turkish																

Line-side components (→ system components).

Integration

The liquid-cooled Basic Line Modules communicate with the higher-level control unit via DRIVE-CLiQ. This control unit can either be a CU320 or a SIMOTION D Control Unit. An external

24 V DC power supply is required to operate liquid-cooled Basic Line Modules.



Connection example of a Basic Line Module

Technical data

General technical data

Electrical data	
Line supply voltage (up to 2000 m above sea level)	380 ... 480 V 3 AC $\pm 10\%$ ($-15\% < 1\text{ min}$) or 500 ... 690 V 3 AC $\pm 10\%$ ($-15\% < 1\text{ min}$)
Line frequency	47 ... 63 Hz
Line power factor at rated power	
• Basic fundamental ($\cos \varphi_1$)	> 0.96
• Total (λ)	$0.75 \dots 0.93$
Overvoltage category acc. to EN 60664-1	Class III
DC link voltage, approx. ¹⁾	$1.35 \times \text{line voltage}$
Line contactor control Terminal block -X9/5-6	240 V AC, max. 8 A, 30 V DC, max. 1 A
Radio interference suppression	
Standard	Category C3 acc. to EN 61800-3 up to a total cable length of 300 m
Ambient conditions	
Type of cooling	Liquid cooling with integrated heat exchanger in an aluminum design
Certificates	
Conformity	CE
Approvals	cULus (in some cases, being prepared)

¹⁾ The DC link voltage is unregulated and load-dependent. For additional information, please refer to the SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Liquid-cooled drive units

Line Modules Basic Line Modules

Technical data (continued)

Line voltage 380 ... 480V 3 AC		Basic Line Modules		
		6SL3335-1TE37-4AA0	6SL3335-1TE41-2AA0	6SL3335-1TE41-7AA0
Rated power				
• at $I_{N\ DC}$ (50 Hz 400 V)	kW	360	600	830
• at $I_{H\ DC}$ (50 Hz 400 V)	kW	280	450	650
• at $I_{N\ DC}$ (60 Hz 460 V)	hp	555	925	1280
• at $I_{H\ DC}$ (60 Hz 460 V)	hp	430	690	1000
DC link current				
• Rated current $I_{N\ DC}$	A	740	1220	1730
• Base load current $I_{H\ DC}^{1)}$	A	578	936	1350
• Maximum current $I_{max\ DC}$	A	1110	1830	2595
Input current				
• Rated current $I_{N\ E}$	A	610	1000	1420
• Maximum current $I_{max\ E}$	A	915	1500	2130
Current requirement				
• 24 V DC auxiliary power supply	A	0.7	0.7	0.7
DC link capacitance				
• Basic Line Module	μF	12000	20300	26100
• Drive line-up, max.	μF	96000	162400	208800
Power loss, max. ²⁾				
• at 50 Hz 400 V	kW	2.95	4.77	6.39
• at 60 Hz 460 V	kW	2.95	4.77	6.39
Coolant flow rate ³⁾		l/min	9	12
Volume of liquid in the integrated heat exchanger		dm ³	0.45	0.79
Typ. pressure drop ⁴⁾ for volumetric flow		Pa	70000	70000
Heat exchanger material		Aluminum	Aluminum	Aluminum
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	54	56
Line supply connection U1, V1, W1 • Conductor cross-section, max. (DIN VDE)		mm ²	2 x M12 nut 4 x 240	2 x M12 nut 4 x 240
DC link connection DCP, DCN			2 x M12 nut Busbar	2 x M12 nut Busbar
PE/GND connection • Conductor cross-section, max. (DIN VDE)		mm ²	2 x M12 nut 4 x 240	2 x M12 nut 4 x 240
Cable length, max. ⁵⁾				
• Shielded	m	2600	4000	4800
• Unshielded	m	3900	6000	7200
Degree of protection		IP00	IP00	IP00
Dimensions				
• Width	mm	160	160	160
• Height	mm	1137	1137	1562
• Depth	mm	545	545	545
Weight		kg	108	185
Frame size		FBL	FBL	GBL

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ The value applies to the coolants water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁴⁾ The value applies to the coolant water; for other coolants, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁵⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Basic Line Modules			
		6SL3335-1TG34-2AA0	6SL3335-1TG37-3AA0	6SL3335-1TG41-3AA0	6SL3335-1TG41-7AA0
Rated power					
• at $I_{N\ DC}$ (50 Hz 690 V)	kW	355	630	1100	1370
• at $I_{H\ DC}$ (50 Hz 690 V)	kW	275	475	840	1070
• at $I_{N\ DC}$ (50 Hz 500 V)	kW	245	420	750	950
• at $I_{H\ DC}$ (50 Hz 500 V)	kW	200	345	610	775
• at $I_{N\ DC}$ (60 Hz 575 V)	hp	395	705	1230	1530
• at $I_{H\ DC}$ (60 Hz 575 V)	hp	305	530	940	1195
DC link current					
• Rated current $I_{N\ DC}$	A	420	730	1300	1650
• Base load current $I_{H\ DC}$ ¹⁾	A	328	570	1014	1287
• Maximum current $I_{max\ DC}$	A	630	1095	1950	2475
Input current					
• Rated current $I_{N\ E}$	A	340	600	1070	1350
• Maximum current $I_{max\ E}$	A	510	900	1605	2025
Current requirement					
• 24 V DC auxiliary power supply	A	0.7	0.7	0.7	0.7
DC link capacitance					
• Basic Line Module	μF	4800	7700	15500	19300
• Drive line-up, max.	μF	38400	61600	124000	154400
Power loss, max. ²⁾					
• at 50 Hz 690 V	kW	1.76	3.09	5.09	6.25
• at 60 Hz 575 V	kW	1.76	3.09	5.09	6.25
Coolant flow rate ³⁾		l/min	9	12	12
Volume of liquid in the integrated heat exchanger		dm ³	0.45	0.79	0.79
Typ. pressure drop ⁴⁾ for volumetric flow		Pa	70000	70000	70000
Heat exchanger material		Aluminum	Aluminum	Aluminum	Aluminum
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	54	56	56
Line supply connection U1, V1, W1					
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x M12 nut 4 x 240	2 x M12 nut 4 x 240	2 x M12 nut 4 x 240	2 x M12 nut 4 x 240
DC link connection DCP, DCN		2 x M12 nut Busbar	2 x M12 nut Busbar	2 x M12 nut Busbar	2 x M12 nut Busbar
PE/GND connection					
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x M12 nut 4 x 240	2 x M12 nut 4 x 240	2 x M12 nut 4 x 240	2 x M12 nut 4 x 240
Cable length, max. ⁵⁾					
• Shielded	m	1500	1500	2250	2250
• Unshielded	m	2250	2250	3375	3375
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	160	160	160	160
• Height	mm	1137	1137	1562	1562
• Depth	mm	545	545	545	545
Weight		kg	108	185	185
Frame size		FBL	FBL	GBL	GBL

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ The value applies to the coolants water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁴⁾ The value applies to the coolant water; for other coolants, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁵⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

SINAMICS S120 chassis units

Liquid-cooled drive units

Line Modules

Active Line Modules

Overview



The self-commutated feed/feed-back units (with IGBTs in rectifier and regenerative directions) generate a regulated DC link voltage. This means that the connected Motor Modules are decoupled from the line voltage. Line voltage fluctuations within the permissible supply tolerances have no effect on the motor voltage.

If required, the Active Line Modules can also provide reactive power compensation.

Active Line Modules are designed for connection to grounded (TN, TT) and non-grounded (IT) supply systems.

Liquid-cooled Active Line Modules are especially suitable for applications where installation space is restricted and for critical environmental conditions.

Active Line Modules are always operated together with the associated Active Interface Modules. These include the necessary pre-charging circuit as well as a Clean Power Filter.

See also selection and ordering data in Section Chassis format, air-cooled → Active Interface Module.

Design

The liquid-cooled Active Line Modules have the following interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronics power supply
- 1 DC link connection (DCP, DCN) for supplying the connected Motor Modules
- 3 DRIVE-CLiQ sockets
- 1 PE/protective conductor connection

The following are included in the scope of supply of the Active Line Modules:

- 1 DRIVE-CLiQ cable to connect to the CU320 or SIMOTION D4x5 Control Unit
- 1 CD-ROM with Equipment Manual in PDF format
- 2 seals for coolant connections

Selection and ordering data

Rated power	Rated DC link current	Active Line Module
kW	A	Order No.
Line voltage 380 ... 480 V 3 AC		
300	549	6SL3335-7TE35-0AA0
500	940	6SL3335-7TE38-4AA0
Line voltage 500 ... 690 V 3 AC		
560	644	6SL3335-7TG35-8AA0
1400	1422	6SL3335-7TG41-3AA0

Accessories

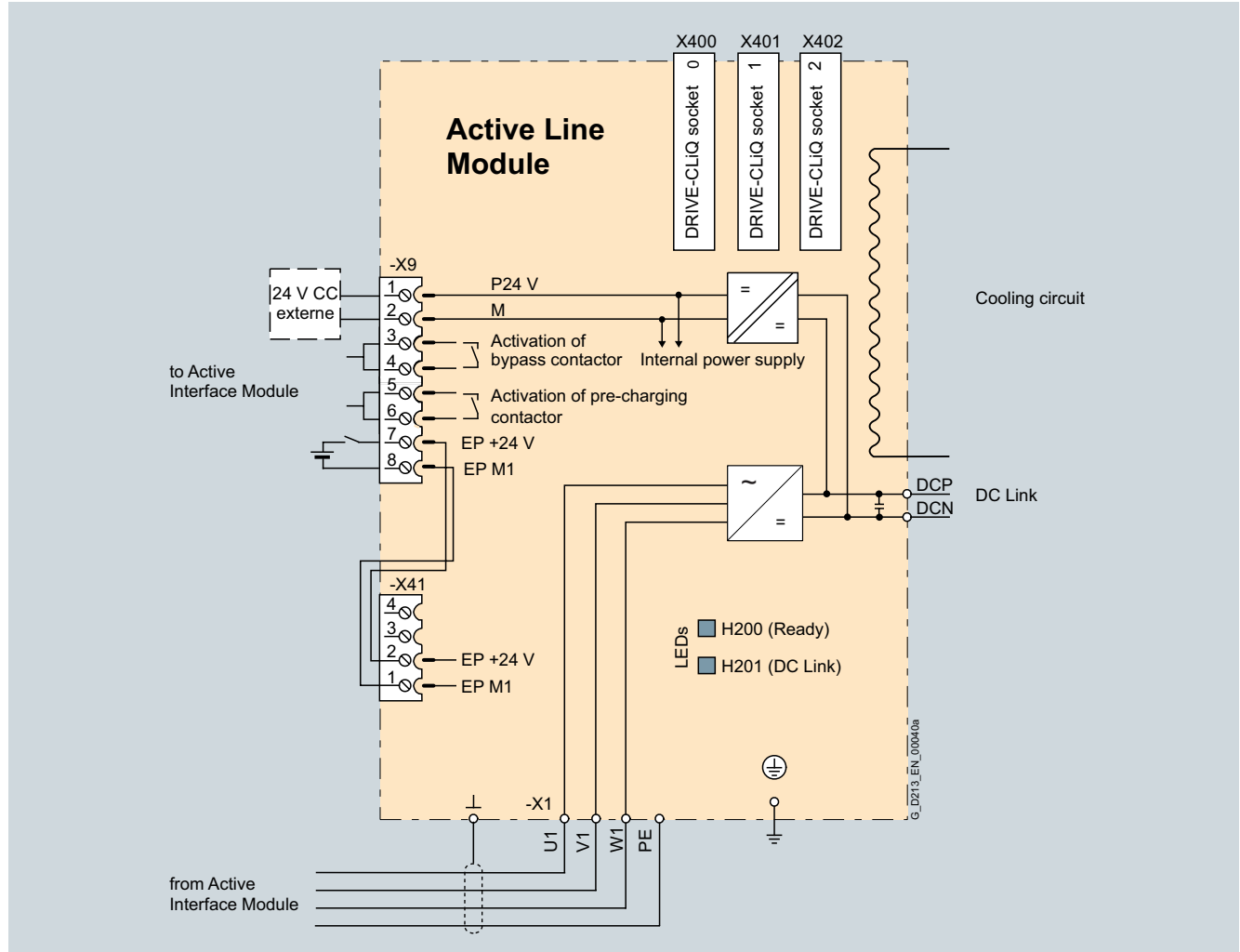
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French	Russian																
Greek	Swedish																
Italian	Spanish																
Japanese	Czech																
Korean	Turkish																

Line-side components (→ system components).

Integration

Active Line Modules are always operated together with the associated Active Interface Modules. Active Interface Modules contain a Clean Power Filter with basic RI suppression, the pre-charging circuit for the Active Line Module, line supply voltage sensing circuit and monitoring sensors.

The liquid-cooled Active Line Modules communicate with the higher-level control unit via DRIVE-CLiQ. This control unit can either be a CU320 or a SIMOTION D Control Unit. An external 24 V DC power supply is required to operate the Active Line Modules.



Connection example of an Active Line Module

Technical data

General technical data

Electrical data	
Line supply voltage (up to 2000 m above sea level)	380 ... 480 V 3 AC $\pm 10\%$ (-15 % < 1 min) or 500 ... 690 V 3 AC $\pm 10\%$ (-15 % < 1 min)
Line frequency	47 ... 63 Hz
Line power factor • Basic fundamental ($\cos \varphi_1$) • Total (λ)	1.0 (factory setting), can be altered by input of a reactive current setpoint 1.0 (factory setting)
Overvoltage category acc. to EN 60664-1	Class III
DC link voltage, approx.	The DC link voltage is regulated and can be adjusted as a voltage decoupled from the line voltage. Factory setting for DC link voltage: $1.5 \times$ line voltage
Line contactor control Terminal block -X9/5-6	240 V AC, max. 8 A 30 V DC, max. 1 A
Radio interference suppression	
Standard	Category C3 according to EN 61800-3
Ambient conditions	
Type of cooling	Liquid cooling with integrated heat exchanger in either an aluminum or stainless-steel design (type dependent)
Certificates	
Conformity	CE
Approvals	cULus (File No.: E192450) only for drive units connected to line voltages 380 ... 480 V 3 AC and 500 ... 600 V 3 AC

Technical data (continued)

Line voltage 380 V ... 480 V 3 AC		Active Line Modules	
		6SL3335-7TE35-0AA0	6SL3335-7TE38-4AA0
Rated power			
• at $I_{N\ DC}$ (50 Hz 400 V)	kW	300	500
• at $I_{H\ DC}$ (50 Hz 400 V)	kW	270	465
• at $I_{N\ DC}$ (60 Hz 460 V)	hp	500	700
• at $I_{H\ DC}$ (60 Hz 460 V)	hp	400	700
DC link current			
• Rated current $I_{N\ DC}$	A	549	941
• Base load current $I_{H\ DC}$ ¹⁾	A	489	837
• Maximum current $I_{max\ DC}$	A	823	1410
Feed/feedback current			
• Rated current $I_{N\ E}$	A	490	840
• Maximum current $I_{max\ E}$	A	735	1260
Current requirement			
• 24 V DC auxiliary power supply	A	1.5	1.6
DC link capacitance			
• Active Line Module	μF	9600	17400
Power loss, max. ²⁾			
• at 50 Hz 400 V	kW	3.1	5.3
• at 60 Hz 460 V	kW	3.36	5.75
Coolant flow rate ³⁾		l/min	12
Volume of liquid in the integrated heat exchanger		dm ³	0.91
Typ. pressure drop ⁴⁾ for volumetric flow		Pa	70000
Heat exchanger material		Stainless steel	Aluminum
Sound pressure level L_{pA} ⁵⁾ (1 m) at 50/60 Hz		dB(A)	52
Line supply connection U1, V1, W1 • Conductor cross-section, max. (DIN VDE)		mm ²	M12 thread 2 x 240
DC link connection DCP, DCN			2 x M12 thread Busbar
PE/GND connection • Conductor cross-section, max. (DIN VDE)		mm ²	2 x M12 thread 2 x 240
Cable length, max. ⁶⁾			
• Shielded	m	2700	3900
• Unshielded	m	4050	5850
Degree of protection		IP00	IP00
Dimensions			
• Width	mm	150	265
• Height	mm	1172	1002
• Depth	mm	545	545
Weight		kg	80
Frame size		GXL	HXL

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ The value applies to the coolants water – water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁴⁾ The value applies to the coolant water; for other coolants, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁵⁾ Total sound pressure level of Active Interface Module and Active Line Module.

⁶⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Liquid-cooled drive units

Line Modules

Active Line Modules

Technical data (continued)

Line voltage 500 V ... 690 V 3 AC		Active Line Modules	
		6SL3335-7TG35-8AA0	6SL3335-7TG41-3AA0
Rated power			
• at $I_{N\ DC}$ (50 Hz 690 V)	kW	560	1400
• at $I_{H\ DC}$ (50 Hz 690 V)	kW	550	1215
• at $I_{N\ DC}$ (50 Hz 500 V)	kW	435	965
• at $I_{H\ DC}$ (50 Hz 500 V)	kW	400	880
• at $I_{N\ DC}$ (60 Hz 575 V)	hp	600	1500
• at $I_{H\ DC}$ (60 Hz 575 V)	hp	450	1250
DC link current			
• Rated current $I_{N\ DC}$	A	644	1422
• Base load current $I_{H\ DC}$ ¹⁾	A	573	1266
• Maximum current $I_{max\ DC}$	A	966	2133
Feed/feedback current			
• Rated current $I_{N\ E}$	A	575	1270
• Maximum current $I_{max\ E}$	A	862	1905
Current requirement			
• 24 V DC auxiliary power supply	A	1.6	1.46
DC link capacitance			
• Active Line Module	μF	9670	19330
Power loss, max. ²⁾			
• at 50 Hz 690 V	kW	5.6	13.5
• at 60 Hz 575 V	kW	5.1	12.6
Coolant flow rate ³⁾		l/min	16
Volume of liquid in the integrated heat exchanger		dm ³	0.74
Typ. pressure drop ⁴⁾ for volumetric flow		Pa	70000
Heat exchanger material		Aluminum	Aluminum
Sound pressure level L_{pA} (1 m) at 50/60 Hz ⁵⁾		dB(A)	54
Line supply connection U1, V1, W1		2 x M12 thread	2 x M12 thread
• Conductor cross-section, max. (DIN VDE)		4 x 185	4 x 240
DC link connection DCP, DCN		2 x M12 thread	2 x M12 thread
		Busbar	Busbar
PE/GND connection		2 x M12 thread	2 x M12 thread
• Conductor cross-section, max. (DIN VDE)		4 x 185	4 x 240 or busbar
Cable length, max. ⁶⁾			
• Shielded	m	2250	2250
• Unshielded	m	3375	3375
Degree of protection		IP00	IP00
Dimensions			
• Width	mm	265	295
• Height	mm	1002	1516
• Depth	mm	545	545
Weight		kg	110
Frame size		HXL	JXL

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ The value applies to the coolants water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁴⁾ The value applies to the coolant water; for other coolants, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁵⁾ Total sound pressure level of Active Interface Module and Active Line Module.

⁶⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual.

SINAMICS S120 chassis units

Liquid-cooled drive units

Motor Modules

Overview



A Motor Module comprises a self-commutated inverter with IGBTs. It generates a variable voltage with variable frequency from the DC link voltage that feeds the connected motor.

Several Motor Modules can be interconnected through a common DC bus. This permits energy to be transferred between the Motor Modules.

This means that if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode.

Motor Modules are controlled by a Control Unit.

Liquid-cooled Motor Modules are available for applications where installation space is restricted and for plant or machines that cannot be equipped with air-cooled drive units as a result of critical environmental conditions.

Design

The liquid-cooled Motor Modules have the following interfaces as standard:

- 1 motor connection
- 1 DC link connection (DCP, DCN) for connecting to the supply DC busbar
- 1 connection for Safety Integrated
- 1 temperature sensor input (KTY84-130 or PTC)
- 3 DRIVE-CLiQ sockets
- 1 connection for the 24 V DC electronics power supply
- 2 x PE/protective conductor connections

The scope of supply of the Motor Modules includes:

- 1 DRIVE-CLiQ cable to connect to the CU320 or SIMOTION D4x5 Control Unit
- 1 CD-ROM with Equipment Manual in PDF format
- 2 seals for coolant connections

Selection and ordering data

Type rating	Rated output current	Motor Module
kW	A	Order No.
Line voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)		
110	210	6SL3325-1TE32-1AA0
132	260	6SL3325-1TE32-6AA0
160	310	6SL3325-1TE33-1AA0
250	490	6SL3325-1TE35-0AA0
315	605	6SL3325-1TE36-1AA0
450	840	6SL3325-1TE38-4AA0
560	985	6SL3325-1TE41-0AA0
800	1405	6SL3325-1TE41-4AA0
Line voltage 500 ... 690 V 3 AC (DC link voltage 675 ... 1035 V DC)		
90	100	6SL3325-1TG31-0AA0
132	150	6SL3325-1TG31-5AA0
200	215	6SL3325-1TG32-2AA0
315	330	6SL3325-1TG33-3AA0
560	575	6SL3325-1TG35-8AA0
800	810	6SL3325-1TG38-1AA0
1000	1025	6SL3325-1TG41-0AA0
1200	1270	6SL3325-1TG41-3AA0

Accessories

Description	Order No.
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: Chinese Simplified Dutch Danish Polish Finnish Portuguese/Brazilian French Russian Greek Swedish Italian Spanish Japanese Czech Korean Turkish	6SL3166-3AB00-0AA0

Motor-side components (→ system components).

SINAMICS S120 chassis units

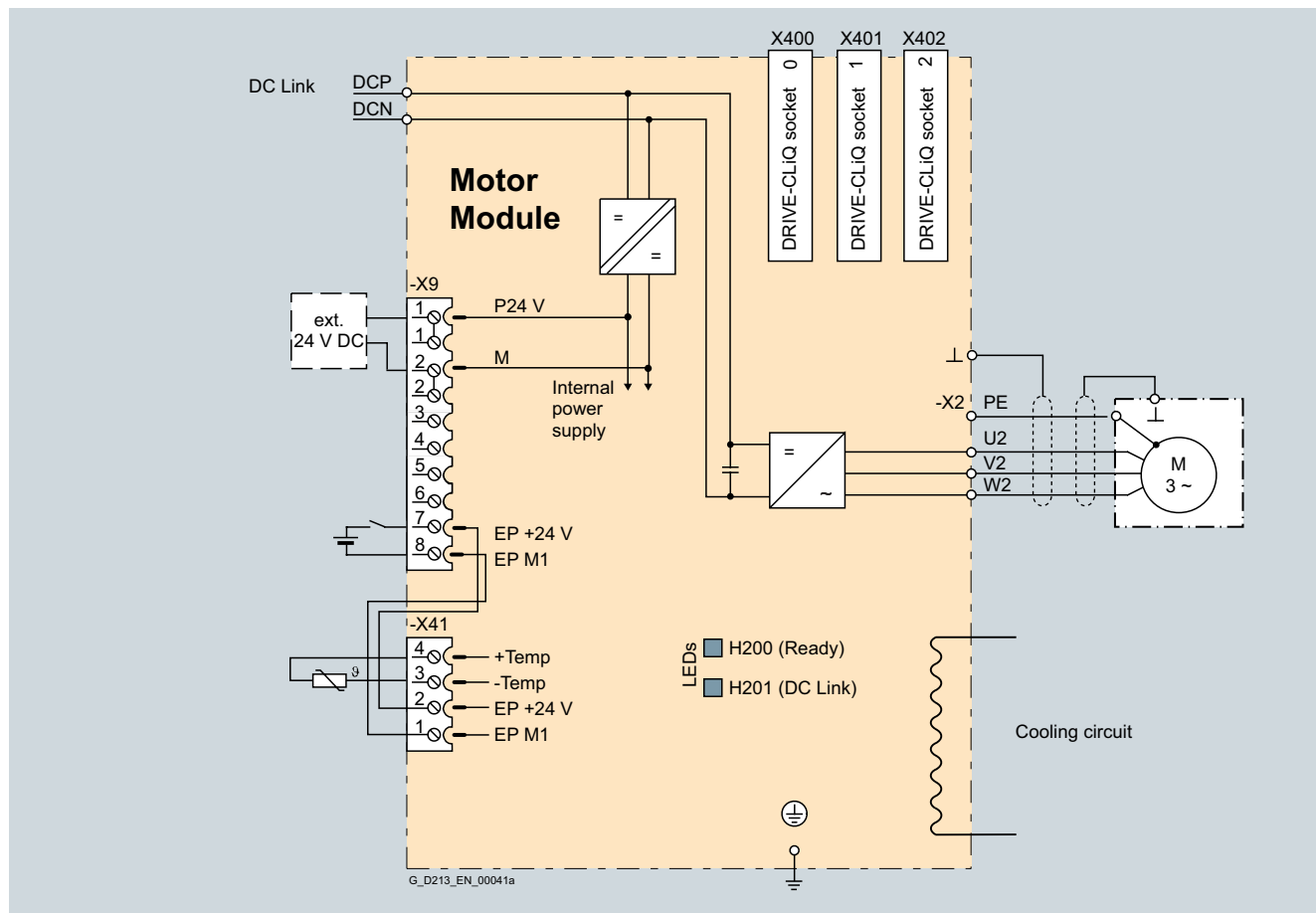
Liquid-cooled drive units

Motor Modules

Integration

The liquid-cooled Motor Modules communicate with the higher-level control unit via DRIVE-CLiQ. This control unit can either be

a CU320 or a SIMOTION D Control Unit.



Connection example of a Motor Module

Technical data

General technical data

Electrical data	
DC link voltage (up to 2000 m above sea level)	510 ... 720 V DC (line supply voltage 380 ... 480 V 3 AC) or 675 ... 1035 V DC (line supply voltage 500 ... 690 V 3 AC)
Output frequency ¹⁾	
• Control type Servo	0 ... 300 Hz
• Control type Vector	0 ... 300 Hz
• Control type V/f	0 ... 300 Hz
Ambient conditions	
Type of cooling	Liquid cooling with integrated heat exchanger in either an aluminum or stainless-steel design (type dependent)
Certificates	
Conformity	CE
Approvals (line supply voltage ≤ 600 V)	cULus (File No.: E192450)

¹⁾ Note the correlation between max. output frequency, pulse frequency and current derating. See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided. Higher output frequencies for specific configurations are available on request.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules			
		6SL3325-1TE32-1AA0	6SL3325-1TE32-6AA0	6SL3325-1TE33-1AA0	6SL3325-1TE35-0AA0
Type rating					
• at I_L (50 Hz 400 V) ¹⁾	kW	110	132	160	250
• at I_H (50 Hz 400 V) ¹⁾	kW	90	110	132	200
• at I_L (60 Hz 460 V) ²⁾	hp	150	200	250	400
• at I_H (60 Hz 460 V) ²⁾	hp	150	200	200	350
Output current					
• Rated current I_{NA}	A	210	260	310	490
• Base load current I_L ³⁾	A	205	250	302	477
• Base load current I_H ⁴⁾	A	178	233	277	438
• Maximum current $I_{max A}$	A	307	375	453	715
DC link current					
• Rated current $I_{N DC}$ when supplied from					
- Basic Line Module	A	256	317	380	600
- Active Line Module	A	230	287	340	538
• Base load current $I_L DC$ ³⁾ when supplied from					
- Basic Line Module	A	250	305	368	581
- Active Line Module	A	225	274	331	522
• Base load current $I_H DC$ ⁴⁾ when supplied from					
- Basic Line Module	A	227	284	338	534
- Active Line Module	A	195	255	303	480
Current requirement					
• 24 V DC auxiliary power supply	A	1.4	1.4	1.5	1.5
DC link capacitance		μF	4800	5800	8400
Pulse frequency ⁵⁾					
• Rated frequency	kHz	2	2	2	2
• Pulse frequency, max.					
- without current derating	kHz	2	2	2	2
- with current derating	kHz	8	8	8	8
Power loss, max. ⁶⁾					
• at 50 Hz 400 V	kW	1.54	1.8	2.2	3.4
• at 60 Hz 460 V	kW	1.67	1.95	2.38	3.74
Coolant flow rate ⁷⁾		l/min	9	12	12
Volume of liquid in the integrated heat exchanger		dm ³	0.31	0.91	0.91
Typ. pressure drop ⁸⁾ for volumetric flow		Pa	70000	70000	70000
Heat exchanger material			Stainless steel	Stainless steel	Stainless steel
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	52	52	52
DC link connection DCP, DCN			2 x hole for M12 Busbar	2 x hole for M12 Busbar	2 x hole for M12 Busbar
Motor connection U2, V2, W2					
• Conductor cross-section, max. (DIN VDE)	mm ²	Hole for M12 2 x 95	Hole for M12 2 x 95	Hole for M12 2 x 240	Hole for M12 2 x 240
Cable length, max. ⁹⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ The value applies to the coolants water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁸⁾ The value applies to the coolant water; for other coolants, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁹⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

SINAMICS S120 chassis units

Liquid-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules			
		6SL3325-1TE32-1AA0	6SL3325-1TE32-6AA0	6SL3325-1TE33-1AA0	6SL3325-1TE35-0AA0
PE/GND connection • Conductor cross-section, max. (DIN VDE)	mm ²	2 x hole for M12 2 x 95	2 x hole for M12 2 x 95	2 x hole for M12 2 x 240	2 x hole for M12 2 x 240
Degree of protection		IP00	IP00	IP00	IP00
Dimensions • Width • Height • Depth	mm mm mm	150 746 545	150 746 545	150 1172 545	150 1172 545
Weight	kg	41	41	80	80
Frame size		FXL	FXL	GXL	GXL

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules			
		6SL3325-1TE36-1AA0	6SL3325-1TE38-4AA0	6SL3325-1TE41-0AA0	6SL3325-1TE41-4AA0
Type rating					
• at I_L (50 Hz 400 V) ¹⁾	kW	315	450	560	800
• at I_H (50 Hz 400 V) ¹⁾	kW	250	400	450	710
• at I_L (60 Hz 460 V) ²⁾	hp	500	700	800	1000
• at I_H (60 Hz 460 V) ²⁾	hp	350	600	700	1000
Output current					
• Rated current I_{NA}	A	605	840	985	1405
• Base load current I_L ³⁾	A	590	820	960	1370
• Base load current I_H ⁴⁾	A	460	700	860	1257
• Maximum current $I_{max A}$	A	885	1230	1440	2055
DC link current					
• Rated current $I_{N DC}$ when supplied from					
- Basic Line Module	A	738	1025	1202	1714
- Active Line Module	A	664	922	1080	1544
• Base load current $I_L DC$ ³⁾ when supplied from					
- Basic Line Module	A	719	1000	1170	1670
- Active Line Module	A	646	898	1051	1500
• Base load current $I_H DC$ ⁴⁾ when supplied from					
- Basic Line Module	A	561	853	1048	1532
- Active Line Module	A	504	767	942	1377
Current requirement					
• 24 V DC auxiliary power supply	A	1.6	1.6	1.46	1.46
DC link capacitance		μF	12600	17400	21000
Pulse frequency ⁵⁾					
• Rated frequency	kHz	1.25	1.25	1.25	1.25
• Pulse frequency, max.					
- without current derating	kHz	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾					
• at 50 Hz 400 V	kW	4.7	5.5	7.6	9.6
• at 60 Hz 460 V	kW	4.99	5.98	8.42	10.79
Coolant flow rate ⁷⁾		l/min	16	27	27
Volume of liquid in the integrated heat exchanger		dm ³	0.74	1.56	1.56
Typ. pressure drop ⁸⁾ for volumetric flow		Pa	70000	70000	70000
Heat exchanger material			Aluminum	Aluminum	Aluminum
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	54	54	56
DC link connection DCP, DCN			2 x hole for M12 Busbar	2 x hole for M12 Busbar	2 x hole for M12 Busbar
Motor connection U2, V2, W2			2 x hole for M12	2 x hole for M12	2 x hole for M12
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 185	4 x 185	4 x 240	4 x 240
Cable length, max. ⁹⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ The value applies to the coolants water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁸⁾ The value applies to the coolant water; for other coolants, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁹⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

SINAMICS S120 chassis units

Liquid-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules			
		6SL3325-1TE36-1AA0	6SL3325-1TE38-4AA0	6SL3325-1TE41-0AA0	6SL3325-1TE41-4AA0
PE/GND connection		2 x M12 thread	2 x M12 thread	2 x M12 thread	2 x M12 thread
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 185	4 x 185	4 x 240 or busbar	4 x 240 or busbar
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm	265	265	295	295
• Height	mm	1002	1002	1516	1516
• Depth	mm	545	545	545	545
Weight	kg	110	110	220	220
Frame size		HXL	HXL	JXL	JXL

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3325-1TG31-0AA0	6SL3325-1TG31-5AA0	6SL3325-1TG32-2AA0	6SL3325-1TG33-3AA0
Type rating					
• at I_L (50 Hz 690 V) ¹⁾	kW	90	132	200	315
• at I_H (50 Hz 690 V) ¹⁾	kW	75	110	160	250
• at I_L (50 Hz 500 V) ¹⁾	kW	55	90	132	200
• at I_H (50 Hz 500 V) ¹⁾	kW	55	90	132	200
• at I_L (60 Hz 575 V) ²⁾	hp	75	150	200	300
• at I_H (60 Hz 575 V) ²⁾	hp	75	125	200	250
Output current					
• Rated current I_{NA}	A	100	150	215	330
• Base load current I_L ³⁾	A	95	142	208	320
• Base load current I_H ⁴⁾	A	89	134	192	280
• Maximum current $I_{max A}$	A	142	213	312	480
DC link current					
• Rated current $I_{N DC}$ when supplied from					
- Basic Line Module	A	122	183	263	403
- Active Line Module	A	110	165	237	363
• Base load current $I_{L DC}$ ³⁾ when supplied from					
- Basic Line Module	A	116	173	253	390
- Active Line Module	A	105	156	229	352
• Base load current $I_{H DC}$ ⁴⁾ when supplied from					
- Basic Line Module	A	108	163	234	341
- Active Line Module	A	98	147	211	308
Current requirement					
• 24 V DC auxiliary power supply	A	1	1	1.5	1.5
DC link capacitance		μF	2800	2800	4200
Pulse frequency ⁵⁾					
• Rated frequency	kHz	1.25	1.25	1.25	1.25
• Pulse frequency, max.					
- without current derating	kHz	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾					
• at 50 Hz 690 V	kW	1.15	1.65	2.24	3.38
• at 60 Hz 575 V	kW	1	1.45	2	3.05
Coolant flow rate ⁷⁾		l/min	9	9	12
Volume of liquid in the integrated heat exchanger		dm ³	0.31	0.31	0.91
Typ. pressure drop ⁸⁾ for volumetric flow		Pa	70000	70000	70000
Heat exchanger material			Stainless steel	Stainless steel	Stainless steel
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	52	52	52
DC link connection DCP, DCN			2 x hole for M12 Busbar	2 x hole for M12 Busbar	2 x hole for M12 Busbar
Motor connection U2, V2, W2					
• Conductor cross-section, max. (DIN VDE)	mm ²		Hole for M12 2 x 95	Hole for M12 2 x 95	Hole for M12 2 x 240
Cable length, max. ⁹⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ The value applies to the coolants water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁸⁾ The value applies to the coolant water; for other coolants, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁹⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

SINAMICS S120 chassis units

Liquid-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3325-1TG31-0AA0	6SL3325-1TG31-5AA0	6SL3325-1TG32-2AA0	6SL3325-1TG33-3AA0
PE/GND connection • Conductor cross-section, max. (DIN VDE)	mm ²	2 x hole for M12 2 x 95	2 x hole for M12 2 x 95	2 x hole for M12 2 x 240	2 x hole for M12 2 x 240
Degree of protection		IP00	IP00	IP00	IP00
Dimensions • Width • Height • Depth	mm mm mm	150 746 545	150 746 545	150 1172 545	150 1172 545
Weight	kg	41	41	80	80
Frame size		FXL	FXL	GXL	GXL

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3325-1TG35-8AA0	6SL3325-1TG38-1AA0	6SL3325-1TG41-0AA0	6SL3325-1TG41-3AA0
Type rating					
• at I_L (50 Hz 690 V) ¹⁾	kW	560	800	1000	1200
• at I_H (50 Hz 690 V) ¹⁾	kW	450	710	900	1000
• at I_L (50 Hz 500 V) ¹⁾	kW	400	560	710	900
• at I_H (50 Hz 500 V) ¹⁾	kW	315	560	630	800
• at I_L (60 Hz 575 V) ²⁾	hp	600	800	1000	1250
• at I_H (60 Hz 575 V) ²⁾	hp	500	700	900	1000
Output current					
• Rated current I_{NA}	A	575	810	1025	1270
• Base load current I_L ³⁾	A	560	790	1000	1230
• Base load current I_H ⁴⁾	A	514	724	917	1136
• Maximum current $I_{max A}$	A	840	1185	1500	1845
DC link current					
• Rated current $I_{N DC}$ when supplied from					
- Basic Line Module	A	702	990	1250	1550
- Active Line Module	A	632	891	1125	1395
• Base load current $I_{L DC}$ ³⁾ when supplied from					
- Basic Line Module	A	683	963	1219	1500
- Active Line Module	A	616	869	1100	1353
• Base load current $I_{H DC}$ ⁴⁾ when supplied from					
- Basic Line Module	A	627	883	1118	1384
- Active Line Module	A	565	796	1009	1250
Current requirement					
• 24 V DC auxiliary power supply	A	1.6	1.46	1.46	1.46
DC link capacitance		μF	9670	14000	16000
Pulse frequency ⁵⁾					
• Rated frequency	kHz	1.25	1.25	1.25	1.25
• Pulse frequency, max.					
- without current derating	kHz	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾					
• at 50 Hz 690 V	kW	5.6	9.56	10.87	13.48
• at 60 Hz 575 V	kW	5.1	9	10.1	12.6
Coolant flow rate ⁷⁾		l/min	16	27	27
Volume of liquid in the integrated heat exchanger		dm ³	0.74	1.56	1.56
Typ. pressure drop ⁸⁾ for volumetric flow		Pa	70000	70000	70000
Heat exchanger material			Aluminum	Aluminum	Aluminum
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	54	56	56
DC link connection DCP, DCN			2 x hole for M12 Busbar	2 x hole for M12 Busbar	2 x hole for M12 Busbar
Motor connection U2, V2, W2					
• Conductor cross-section, max. (DIN VDE)	mm ²		2 x hole for M12 4 x 185	2 x hole for M12 4 x 240	2 x hole for M12 4 x 240
Cable length, max. ⁹⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ The value applies to the coolants water and water/Antifrogen N mixture with 45 % Antifrogen N.

⁸⁾ The value applies to the coolant water; for other coolants, see SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

⁹⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

SINAMICS S120 chassis units

Liquid-cooled drive units

Motor Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Motor Modules			
		6SL3325-1TG35-8AA0	6SL3325-1TG38-1AA0	6SL3325-1TG41-0AA0	6SL3325-TG41-3AA0
PE/GND connection • Conductor cross-section, max. (DIN VDE)	mm ²	2 x hole for M12 4 x 185	2 x hole for M12 4 x 240 or busbar	2 x hole for M12 4 x 240 or busbar	2 x hole for M12 4 x 240 or busbar
Degree of protection		IP00	IP00	IP00	IP00
Dimensions • Width • Height • Depth	mm mm mm	265 1002 545	295 1516 545	295 1516 545	295 1516 545
Weight	kg	110	220	220	220
Frame size		HXL	JXL	JXL	JXL

Overview



In conjunction with line reactors and a logically consistent configuration of the plant or system, line filters limit the interference conducted by the Basic Line Modules and Power Modules to the limit values of Category C2 according to EN 61800-3.

The line filters are designed for connection to grounded-neutral systems (TN or TT networks).

2

Selection and ordering data

Line filters for Power Modules

Suitable for air-cooled Power Modules in chassis format	Type rating of the Power Module kW	Rated input current of the Power Module A	Line filter Order No.
Line voltage 380 ... 480 V 3 AC			
6SL3310-1TE32-1AA0	110	229	6SL3000-0BE32-5AA0
6SL3310-1TE32-6AA0	132	284	6SL3000-0BE34-4AA0
6SL3310-1TE33-1AA0	160	338	
6SL3310-1TE33-8AA0	200	395	
6SL3310-1TE35-0AA0	250	509	6SL3000-0BE36-0AA0

Line filters for Basic Line Modules

Suitable for air-cooled Basic Line Modules in chassis format	Rated power of the Basic Line Module kW	Rated input current of the Basic Line Module A	Line filter Order No.
Line voltage 380 ... 480 V 3 AC			
6SL3330-1TE34-2AA0	200	365	6SL3000-0BE34-4AA0
6SL3330-1TE35-3AA0	250	460	6SL3000-0BE36-0AA0
6SL3330-1TE38-2AA0	400	710	6SL3000-0BE41-2AA0
6SL3330-1TE41-2AA0	560	1010	
6SL3330-1TE41-5AA0	710	1265	6SL3000-0BE41-6AA0
Line voltage 500 ... 690 V 3 AC			
6SL3330-1TH33-0AA0	250	260	6SL3000-0BG34-4AA0
6SL3330-1TH34-3AA0	355	375	
6SL3330-1TH36-8AA0	560	575	6SL3000-0BG36-0AA0
6SL3330-1TH41-1AA0	900	925	6SL3000-0BG41-2AA0
6SL3330-1TH41-4AA0	1100	1180	

Note: Line filters are not available for liquid-cooled drive units.

SINAMICS S120 chassis units

System components

Line-side components

Line filters

Technical data

Line voltage 380 ... 480 V 3 AC		Line filter				
		6SL3000-0BE32-5AA0	6SL3000-0BE34-4AA0	6SL3000-0BE36-0AA0	6SL3000-0BE41-2AA0	6SL3000-0BE41-6AA0
Rated current	A	250	440	600	1200	1600
Power loss ¹⁾ at 50/60 Hz	kW	0.049	0.049	0.055	0.137	0.182
Load/line supply connection		1 x hole for M10 Provided for busbar connection	1 x hole for M10 Provided for busbar connection	1 x hole for M10 Provided for busbar connection	1 x hole for M12 Provided for busbar connection	2 x hole for M12 Provided for busbar connection
PE connection		Hole for M8	Hole for M8	Hole for M10	Hole for M10	Hole for M10
Degree of protection		IP00	IP00	IP00	IP00	IP00
Dimensions						
• Width	mm	360	360	400	425	505
• Height	mm	240	240	265	265	265
• Depth	mm	116	116	140	145	145
Weight, approx.	kg	12.3	12.3	19.0	25.2	28.8
Conformity		CE	CE	CE	CE	CE
Approvals		cURus (File No.: E1283)	cURus (File No.: E1283)	cURus (File No.: E1283)	cURus (File No.: E1283)	cURus (File No.: E1283)

Suitable for Power Module in chassis format

- Air-cooled

6SL3310-1TE32-1AA0 (110 kW)	6SL3310-1TE32-6AA0 (132 kW)	6SL3310-1TE35-0AA0 (250 kW)
	6SL3310-1TE33-1AA0 (160 kW)	
	6SL3310-1TE33-8AA0 (200 kW)	

Suitable for Basic Line Module in chassis format

- Air-cooled

6SL3330-1TE34-2AA0 (200 kW)	6SL3330-1TE35-3AA0 (250 kW)	6SL3330-1TE38-2AA0 (400 kW)	6SL3330-1TE41-5AA0 (710 kW)
		6SL3330-1TE41-2AA0 (560 kW)	

Line voltage 500 ... 690 V 3 AC		Line filter		
		6SL3000-0BG34-4AA0	6SL3000-0BG36-0AA0	6SL3000-0BG41-2AA0
Rated current	A	440	600	1200
Power loss ¹⁾ at 50/60 Hz	kW	0.049	0.055	0.137
Load/line supply connection		1 x hole for M10 Provided for busbar connection	1 x hole for M10 Provided for busbar connection	1 x hole for M12 Provided for busbar connection
PE connection		Hole for M8	Hole for M10	Hole for M10
Degree of protection		IP00	IP00	IP00
Dimensions				
• Width	mm	360	400	425
• Height	mm	240	265	265
• Depth	mm	116	140	145
Weight, approx.	kg	12.3	19.0	25.2
Conformity		CE	CE	CE
Approvals		cURus (File No.: E1283)	cURus (File No.: E1283)	cURus (File No.: E1283)

Suitable for Basic Line Module in chassis format

- Air-cooled

6SL3330-1TH33-0AA0 (250 kW)	6SL3330-1TH36-8AA0 (560 kW)	6SL3330-1TH41-1AA0 (900 kW)
6SL3330-1TH34-3AA0 (355 kW)		6SL3330-1TH41-4AA0 (1100 kW)

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Overview



With a high system short-circuit power (i.e. low mains supply cable inductance) a line reactor is required in order to

- protect the drive converter itself from excessively high harmonic currents and therefore overload
- limit the harmonics to permissible values. The harmonic currents are limited by the total inductance comprising the line reactor and mains supply cable inductance.

See also SINAMICS Low Voltage Engineering Manual.

2

Selection and ordering data

Line reactors for SINAMICS S120 Power Modules

Suitable for air-cooled Power Modules in chassis format	Suitable for liquid-cooled Power Modules in chassis format	Type rating of the Power Module	Rated input current of the Power Module	Line reactor
		kW	A	Order No.
Line voltage 380 ... 480 V 3 AC				
6SL3310-1TE32-1AA0	6SL3315-1TE32-1AA0	110	229/230	6SL3000-0CE32-3AA0
6SL3310-1TE32-6AA0	6SL3315-1TE32-6AA0	132	284/285	6SL3000-0CE32-8AA0
6SL3310-1TE33-1AA0	6SL3315-1TE33-1AA0	160	338/340	6SL3000-0CE33-3AA0
6SL3310-1TE33-8AA0	-	200	395	6SL3000-0CE35-1AA0
6SL3310-1TE35-0AA0	6SL3315-1TE35-0AA0	250	509/540	

Line reactors for SINAMICS S120 Basic Line Modules

Suitable for air-cooled Basic Line Modules in chassis format	Suitable for liquid-cooled Basic Line Modules in chassis format	Rated power of the Basic Line Module	Rated input current of the Basic Line Module	Line reactor
		kW	A	Order No.
Line voltage 380 ... 480 V 3 AC				
6SL3330-1TE34-2AA0	-	200	365	6SL3000-0CE35-1AA0
6SL3330-1TE35-3AA0	-	250	460	
-	6SL3335-1TE37-4AA0	360	610	6SL3000-0CE36-3AA0
6SL3330-1TE38-2AA0	-	400	710	6SL3000-0CE37-7AA0
6SL3330-1TE41-2AA0	-	560	1010	6SL3000-0CE41-0AA0
-	6SL3335-1TE41-2AA0	600	1000	
6SL3330-1TE41-5AA0	-	710	1265	6SL3000-0CE41-5AA0
-	6SL3335-1TE41-7AA0	830	1420	
Line voltage 500 ... 690 V 3 AC				
6SL3330-1TH33-0AA0	-	250	260	6SL3000-0CH32-7AA0
-	6SL3335-1TG34-2AA0	355	340	6SL3000-0CH33-4AA0
6SL3330-1TH34-3AA0	-	355	375	6SL3000-0CH34-8AA0
6SL3330-1TH36-8AA0	-	560	575	6SL3000-0CH36-0AA0
-	6SL3335-1TG37-3AA0	630	600	
6SL3330-1TH41-1AA0	-	900	925	6SL3000-0CH41-2AA0
-	6SL3335-1TG41-3AA0	1100	1070	
6SL3330-1TH41-4AA0	-	1100	1180	
-	6SL3335-1TG41-7AA0	1370	1350	6SL3000-0CH41-6AA0

SINAMICS S120 chassis units

System components

Line-side components

Line reactors

Selection and ordering data (continued)

Line reactors for SINAMICS S120 Smart Line Modules

Suitable for Smart Line Modules in chassis format	Rated power of the Smart Line Module	Rated input current of the Smart Line Module	Line reactor
	kW	A	Order No.
Line voltage 380 ... 480 V 3 AC			
6SL3330-6TE35-5AA0	250	463	6SL3000-0EE36-2AA0
6SL3330-6TE37-3AA0	355	614	
6SL3330-6TE41-1AA0	500	883	6SL3000-0EE38-8AA0
6SL3330-6TE41-3AA0	630	1093	6SL3000-0EE41-4AA0
6SL3330-6TE41-7AA0	800	1430	
Line voltage 500 ... 690 V 3 AC			
6SL3330-6TG35-5AA0	450	463	6SL3000-0EH34-7AA0
6SL3330-6TG38-8AA0	710	757	6SL3000-0EH37-6AA0
6SL3330-6TG41-2AA0	1000	1009	6SL3000-0EH41-4AA0
6SL3330-6TG41-7AA0	1400	1430	

Technical data

Line voltage 380 ... 480 V 3 AC		Line reactor					
		6SL3000-0CE32-3AA0	6SL3000-0CE32-8AA0	6SL3000-0CE33-3AA0	6SL3000-0CE35-1AA0	6SL3000-0CE36-3AA0	6SL3000-0CE37-7AA0
Rated current	A	224	278	331	508	628	773
Nominal inductance L_{rated}	μH	76	62	52	42	27	22
Power loss ¹⁾ at 50/60 Hz	kW	0.274	0.247	0.267	0.365	0.368	0.351
Line supply/load connection		1 x hole for M10 Provided for bus-bar connection	1 x hole for M10 Provided for bus-bar connection	1 x hole for M10 Provided for bus-bar connection	1 x hole for M12 Provided for bus-bar connection	1 x hole for M12 Provided for bus-bar connection	1 x hole for M12 Provided for bus-bar connection
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00
Dimensions							
• Width	mm	270	270	270	300	300	300
• Height	mm	248	248	248	269	269	269
• Depth	mm	200	200	200	212	212	212
Weight, approx.	kg	24.5	26	27.8	38.0	41.4	51.3
Conformity		CE	CE	CE	CE	CE	CE
Approvals		cURus (File No.: E257859)	cURus (File No.: E257859)	cURus (File No.: E257859)	cURus (File No.: E257859)	cURus (File No.: E257859)	cURus (File No.: E257859)

Suitable for Power Module in chassis format

• Air-cooled	6SL3310-1TE32-1AA0 (110 kW)	6SL3310-1TE32-6AA0 (132 kW)	6SL3310-1TE33-1AA0 (160 kW)	6SL3310-1TE33-8AA0 (200 kW) 6SL3310-1TE35-0AA0 (250 kW)	
• Liquid-cooled	6SL3315-1TE32-1AA0 (110 kW)	6SL3315-1TE32-6AA0 (132 kW)	6SL3315-1TE33-1AA0 (160 kW)	6SL3315-1TE35-0AA0 (250 kW)	

Suitable for Basic Line Module in chassis format

• Air-cooled				6SL3330-1TE34-2AA0 (200 kW) 6SL3330-1TE35-3AA0 (250 kW)		6SL3330-1TE38-2AA0 (400 kW)
• Liquid-cooled					6SL3335-1TE37-4AA0 (360 kW)	

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Line reactor				
		6SL3000- 0CE41-0AA0	6SL3000- 0CE41-5AA0	6SL3000- 0EE36-2AA0	6SL3000- 0EE38-8AA0	6SL3000- 0EE41-4AA0
Rated current	A	1022	1458	615	885	1430
Nominal inductance L_{rated}	μH	16	13	55	35	25
Power loss ¹⁾ at 50/60 Hz	kW	0.498	0.776	0.56	0.81	1.08
Line supply/load connection		1 x hole for M12 Provided for busbar connection	2 x hole for M12 Provided for busbar connection	1 x hole for M10 Provided for busbar connection	1 x hole for M10 Provided for busbar connection	1 x hole for M10 Provided for busbar connection
PE connection		M6 screw	M6 screw	M6 thread	M6 thread	M6 thread
Degree of protection		IP00	IP00	IP00	IP00	IP00
Dimensions						
• Width	mm	350	460	300	442	544
• Height	mm	321	435	264	376	386
• Depth	mm	211	235	203	263	232
Weight, approx.	kg	69.6	118	57	85.5	220
Conformity		CE	CE	CE	CE	CE
Approvals		cURus (File No.: E257859)	cURus (File No.: E257859)	-	-	-
Suitable for Basic Line Module in chassis format						
• Air-cooled		6SL3330- 1TE41-2AA0 (560 kW)	6SL3330- 1TE41-5AA0 (710 kW)			
• Liquid-cooled		6SL3335- 1TE41-2AA0 (600 kW)	6SL3335- 1TE41-7AA0 (830 kW)			
Suitable for Smart Line Module in chassis format						
• Air-cooled				6SL3330- 6TE35-5AA0 (250 kW) 6SL3330- 6TE37-3AA0 (355 kW)	6SL3330- 6TE41-1AA0 (500 kW)	6SL3330- 6TE41-3AA0 (630 kW) 6SL3330- 6TE41-7AA0 (800 kW)

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

SINAMICS S120 chassis units

System components

Line-side components

Line reactors

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Line reactor					
		6SL3000-0CH32-7AA0	6SL3000-0CH33-4AA0	6SL3000-0CH34-8AA0	6SL3000-0CH36-0AA0	6SL3000-0CH41-2AA0	6SL3000-0CH41-6AA0
Rated current	A	270	342	482	597	1167	1600
Nominal inductance L_{rated}	μH	100	81	65	46	30	17
Power loss ¹⁾ at 50/60 Hz	kW	0.277	0.27	0.48	0.485	0.783	0.977
Line supply/load connection		1 x hole for M10 Provided for bus- bar connection	1 x hole for M10 Provided for bus- bar connection	1 x hole for M12 Provided for bus- bar connection	1 x hole for M12 Provided for bus- bar connection	2 x hole for M12 Provided for bus- bar connection	2 x hole for M12 Provided for bus- bar connection
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00
Dimensions							
• Width	mm	270	270	350	350	460	416
• Height	mm	248	248	321	321	435	435
• Depth	mm	200	200	232	232	235	250
Weight, approx.	kg	27.9	38.9	55.6	63.8	147	134
Conformity		CE	CE	CE	CE	CE	CE
Approvals		cURus (File No.: E257859)	cURus (File No.: E257859)	cURus (File No.: E257859)	cURus (File No.: E257859)	cURus (File No.: E257859)	cURus (File No.: E257859)

Suitable for Basic Line Module in chassis format

• Air-cooled	6SL3330-1TH33-0AA0 (250 kW)	6SL3330-1TH34-3AA0 (355 kW)	6SL3330-1TH36-8AA0 (560 kW)	6SL3330-1TH41-1AA0 (900 kW)	6SL3330-1TH41-4AA0 (1100 kW)
• Liquid-cooled	6SL3335-1TG34-2AA0 (355 kW)	6SL3335-1TG37-3AA0 (630 kW)	6SL3335-1TG41-3AA0 (1100 kW)	6SL3335-1TG41-7AA0 (1370 kW)	

Line voltage 500 ... 690 V 3 AC		Line reactor		
		6SL3000-0EH34-7AA0	6SL3000-0EH37-6AA0	6SL3000-0EH41-4AA0
Rated current	A	465	760	1430
Nominal inductance L_{rated}	μH	115	70	40
Power loss ¹⁾ at 50/60 Hz	kW	0.82	0.95	1.85
Line supply/load connection		1 x hole for M10 Provided for busbar connection	1 x hole for M10 Provided for busbar connection	2 x hole for M10 Provided for busbar connection
PE connection		M6 nut	M6 nut	M6 nut
Degree of protection		IP00	IP00	IP00
Dimensions				
• Width	mm	360	442	655
• Height	mm	325	370	383
• Depth	mm	229	303	288
Weight, approx.	kg	58	145	239
Conformity		CE	CE	CE

Suitable for Smart Line Module in chassis format

• Air-cooled	6SL3330-6TG35-5AA0 (450 kW)	6SL3330-6TG38-8AA0 (710 kW)	6SL3330-6TG41-2AA0 (1000 kW) 6SL3330-6TG41-7AA0 (1400 kW)
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¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

SINAMICS S120 chassis units

System components

Line-side components Recommended line-side system components

Overview

Appropriate line-side power components are assigned depending on the power rating of the Power Modules, Basic Line Modules, Smart Line Modules or Active Line Modules.

Further information about the specified line contactors, switch disconnectors, fuses and circuit breakers can be found in the Catalogs LV 1, LV 1 T and ET B1.

Assignment

Assignment of line-side power components to air-cooled and liquid-cooled Power Modules in chassis format

Type rating	Rated input current		Suitable for Power Module in chassis format	Line contactor	Switch disconnector without handle and shaft	Switch disconnector with handle and shaft
	Air-cooled	Liquid-cooled				
kW	A	A	6SL3310-6SL3315-	Order No.	Order No.	Order No.
Line voltage 380 ... 480 V 3 AC						
110	229	230	1TE32-1AA0	3RT1064-6AP36	3KL5530-1AB01	3KL5530-1EB01
132	284	285	1TE32-6AA0	3RT1065-6AP36	3KL5730-1AB01	3KL5730-1EB01
160	338	340	1TE33-1AA0	3RT1066-6AP36	–	
200	395	–	1TE33-8AA0	3RT1075-6AP36	–	
250	509	540	1TE35-0AA0	3RT1076-6AP36	3KL6130-1AB02	3KL6130-1EB01

Type rating	Rated input current		Suitable for Power Module in chassis format	Cable protection fuse		Cable protection fuse incl. semiconductor protection	
	Air-cooled	Liquid-cooled		Rated current		Rated current	
kW	A	A	6SL3310-6SL3315-	Order No.	A	Order No.	A
Line voltage 380 ... 480 V 3 AC							
110	229	230	1TE32-1AA0	3NA3144	250	3NE1230-2	315
132	284	285	1TE32-6AA0	3NA3250	300	3NE1331-2	350
160	338	340	1TE33-1AA0	3NA3254	355	3NE1333-2	450
200	395	–	1TE33-8AA0	3NA3260	400		
250	509	540	1TE35-0AA0	3NA3372	630	3NE1230-2 or 3NE1436-2	2 x 315/630

Assignment of line-side power components to air-cooled and liquid-cooled Basic Line Modules in chassis format

Rated power	Rated input current	Suitable for Basic Line Module	Line contactor	Fixed-mounted circuit breaker	Switch disconnector without handle and shaft	Switch disconnector with handle and shaft
kW	A		Order No.	Order No.	Order No.	Order No.
Line voltage 380 ... 480 V 3 AC						
200	365	6SL3330-1TE34-2AA0 ¹⁾	3RT1075-...	–	3KL6130-1AB02	3KL6130-1EB02
250	460	6SL3330-1TE35-3AA0 ¹⁾	3RT1076-...	–	3KL6130-1AB02	3KL6130-1EB02
360	610	6SL3335-1TE37-4AA0 ²⁾	3RT1076-...	–	3KL6130-1AB02	3KL6130-1EB02
400	710	6SL3330-1TE38-2AA0 ¹⁾	3RT1066-... (3 units)	–	3KL6230-1AB02	3KL6230-1EB02
560	1010	6SL3330-1TE41-2AA0 ¹⁾	–	3WL1112-2BB34-4AN2-Z C22	–	–
600	1000	6SL3335-1TE41-2AA0 ²⁾	–	3WL1112-2BB34-4AN2-Z C22	–	–
710	1265	6SL3330-1TE41-5AA0 ¹⁾	–	3WL1116-2BB34-4AN2-Z C22	–	–
830	1420	6SL3335-1TE41-7AA0 ²⁾	–	3WL1116-2BB34-4AN2-Z C22	–	–

¹⁾ 6SL3330-... is the air-cooled version

²⁾ 6SL3335-... is the liquid-cooled version

SINAMICS S120 chassis units

System components

Line-side components Recommended line-side system components

Assignment (continued)

Assignment of line-side power components to air-cooled and liquid-cooled Basic Line Modules in chassis format

Rated power	Rated input current	Suitable for Basic Line Module	Line contactor	Fixed-mounted circuit breaker	Switch disconnector without handle and shaft	Switch disconnector with handle and shaft
kW	A		Order No.	Order No.	Order No.	Order No.
Line voltage 500 ... 690 V 3 AC						
250	260	6SL3330-1TH33-0AA0 ²⁾	3RT1066-...	–	3KL5730-1AB01	3KL5730-1EB01
355	375	6SL3330-1TH34-3AA0 ²⁾	3RT1075-...	–	3KL6130-1AB02	3KL6130-1EB02
	340	6SL3335-1TG34-2AA0 ³⁾				
560	575	6SL3330-1TH36-8AA0 ²⁾	3RT1076-...	–	3KL6130-1AB02	3KL6130-1EB02
630	600	6SL3335-1TG37-3AA0 ³⁾	3RT1076-...	–	3KL6130-1AB02	3KL6130-1EB02
900	925	6SL3330-1TH41-1AA0 ²⁾	–	3WL1210-4BB34-4AN2-Z C22	–	–
1100	1180	6SL3330-1TH41-4AA0 ²⁾	–	3WL1212-4BB34-4AN2-Z C22	–	–
	1070	6SL3335-1TG41-3AA0 ³⁾				
1370	1350	6SL3335-1TG41-7AA0 ³⁾	–	3WL1216-4BB34-4AN2-Z C22	–	–

Rated power	Rated input current	Suitable for Basic Line Module	Cable protection fuse		Cable protection fuse incl. semiconductor protection	
kW	A		Order No.	Rated current A	Order No.	Rated current A
Line voltage 380 ... 480 V 3 AC						
200	365	6SL3330-1TE34-2AA0 ²⁾	3NA3365	500	3NE1333-2	450
250	460	6SL3330-1TE35-3AA0 ²⁾	3NA3372	630	3NE1334-2	500
360	610	6SL3335-1TE37-4AA0 ³⁾	3NA3352 (2 units)	2 x 315	3NE1333-2 (2 units)	2 x 450
400	710	6SL3330-1TE38-2AA0 ²⁾	3NA3475	800	3NE1438-2 ¹⁾	800
560	1010	6SL3330-1TE41-2AA0 ²⁾	3NA3482	1250	3NE1435-2 (2 units)	2 x 560
600	1000	6SL3335-1TE41-2AA0 ³⁾	3NA3365 (2 units)	2 x 500	3NE1435-2 (2 units)	2 x 560
710	1265	6SL3330-1TE41-5AA0 ²⁾	3NA3475 (2 units)	2 x 800	3NE1437-2 (2 units)	2 x 710
830	1420	6SL3335-1TE41-7AA0 ³⁾	3NA3365 (3 units)	3 x 500	3NE1438-2 (2 units)	2 x 800
Line voltage 500 ... 690 V 3 AC						
250	260	6SL3330-1TH33-0AA0 ²⁾	3NA3252-6	315	3NE1230-2	315
355	375	6SL3330-1TH34-3AA0 ²⁾	3NA3365-6	500	3NE1333-2 ¹⁾	450
	340	6SL3335-1TG34-2AA0 ³⁾	3NA3354-6	355		
560	575	6SL3330-1TH36-8AA0 ²⁾	3NA3252-6 (2 units)	2 x 315	3NE1436-2 ¹⁾	630
630	600	6SL3335-1TG37-3AA0 ³⁾	3NA3250-6 (2 units)	2 x 300	3NE1331-2 (2 units)	2 x 350
900	925	6SL3330-1TH41-1AA0 ²⁾	3NA3365-6 (2 units)	2 x 500	3NE1334-2 (2 units)	2 x 500
1100	1180	6SL3330-1TH41-4AA0 ²⁾	3NA3365-6 (3 units)	3 x 500	3NE1436-2 ¹⁾ (2 units)	2 x 630
	1070	6SL3335-1TG41-3AA0 ³⁾	3NA3360-6 (3 units)	3 x 400	3NE1447-2 (2 units)	2 x 670
1370	1350	6SL3335-1TG41-7AA0 ³⁾	3NA3365-6 (3 units)	3 x 500	3NE1435-2 (3 units)	3 x 560

¹⁾ No semiconductor protection.

²⁾ 6SL3330-... is the air-cooled version.

³⁾ 6SL3335-... is the liquid-cooled version.

Assignment (continued)

Assignment of line-side power components to Smart Line Modules in chassis format

Rated power kW	Rated input current A	Suitable for Smart Line Module	Line contactor Order No.	Fixed-mounted circuit breaker Order No.	Switch disconnect- tor without handle and shaft Order No.	Switch disconnect- tor with handle and shaft Order No.
Line voltage 380 ... 480 V 3 AC						
250	463	6SL3330-6TE35-5AA0	3RT1476-6AP36	–	3KL6130-1AB02	3KL6130-1EB02
355	614	6SL3330-6TE37-3AA0	3RT1476-6AP36	–	3KL6230-1AB02	3KL6230-1EB02
500	883	6SL3330-6TE41-1AA0	–	3WL1210-4CB34-4AN2-Z C22	–	–
630	1093	6SL3330-6TE41-3AA0	–	3WL1212-4CB34-4AN2-Z C22	–	–
800	1430	6SL3330-6TE41-7AA0	–	3WL1216-4CB34-4AN2-Z C22	–	–
Line voltage 500 ... 690 V 3 AC						
450	463	6SL3330-6TG35-5AA0	3RT1466-6AP36	–	3KL6130-1AB02	3KL6130-1EB02
710	757	6SL3330-6TG38-8AA0	3RT1466-6AP36 (3 units)	–	3KL6230-1AB02	3KL6230-1EB02
1000	1009	6SL3330-6TG41-2AA0	–	3WL1212-4CB34-4AN2-Z C22	–	–
1400	1430	6SL3330-6TG41-7AA0	–	3WL1216-4CB34-4AN2-Z C22	–	–

Rated power kW	Rated input current A	Suitable for Smart Line Module	Cable protection fuse Order No.	Rated current A	Cable protection fuse incl. semiconductor protection Order No.	Rated current A
Line voltage 380 ... 480 V 3 AC						
250	463	6SL3330-6TE35-5AA0	3NA3365	500	3NE1435-2	560
355	614	6SL3330-6TE37-3AA0	3NA3372	630	3NE1437-2	710
500	883	6SL3330-6TE41-1AA0	3NA3480	1000	3NE1334-2 (2 units)	2 × 500
630	1093	6SL3330-6TE41-3AA0	3NA3482	1250	3NE1436-2 (2 units)	2 × 630
800	1430	6SL3330-6TE41-7AA0	3NA3475 (2 units)	2 × 800	3NE1448-2 (2 units)	2 × 850
Line voltage 500 ... 690 V 3 AC						
450	463	6SL3330-6TG35-5AA0	3NA3365-6	500	3NE1435-2	560
710	757	6SL3330-6TG38-8AA0	3NA3360-6 (2 units)	2 × 400	3NE1448-2	850
1000	1009	6SL3330-6TG41-2AA0	3NA3354-6 (3 units)	3 × 355	3NE1435-2 (2 units)	2 × 560
1400	1430	6SL3330-6TG41-7AA0	3NA3365-6 (3 units)	3 × 500	3NE1448-2 (2 units)	2 × 850

Assignment (continued)

Assignment of line-side power components to air-cooled and liquid-cooled Active Line Modules or Active Interface Modules in chassis format

Rated power kW	Rated input current A	Suitable for Active Interface Module	Suitable for Active Line Module	Bypass contactor Order No.
Line voltage 380 ... 480 V 3 AC				
132	210	6SL3300-7TE32-6AA0	6SL3330-7TE32-1AA0	included in Active Interface Module
160	260	6SL3300-7TE32-6AA0	6SL3330-7TE32-6AA0	included in Active Interface Module
235	380	6SL3300-7TE33-8AA0	6SL3330-7TE33-8AA0	included in Active Interface Module
300	490	6SL3300-7TE35-0AA0	6SL3330-7TE35-0AA0 6SL3335-7TE35-0AA0	included in Active Interface Module
380	605	6SL3300-7TE38-4AA0	6SL3330-7TE36-1AA0	3RT1476-6AP36
500	840	6SL3300-7TE38-4AA0	6SL3330-7TE38-4AA0 6SL3335-7TE38-4AA0	3WL1110-2BB34-4AN2-Z C22
630	985	6SL3300-7TE41-4AA0	6SL3330-7TE41-0AA0	3WL1112-2BB34-4AN2-Z C22
900	1405	6SL3300-7TE41-4AA0	6SL3330-7TE41-4AA0	3WL1116-2BB34-4AN2-Z C22
Line voltage 500 ... 690 V 3 AC				
560	575	6SL3300-7TG35-8AA0	6SL3330-7TG35-8AA0 6SL3335-7TG35-8AA0	3RT1476-6AP36
800	735	6SL3300-7TG37-4AA0	6SL3330-7TG37-4AA0	3RT1476-6AP36 (3 units)
1100	1025	6SL3300-7TG41-3AA0	6SL3330-7TG41-0AA0	3WL1212-4BB34-4AN2-Z C22
1400	1270	6SL3300-7TG41-3AA0	6SL3330-7TG41-3AA0 6SL3335-7TG41-3AA0	3WL1216-4BB34-4AN2-Z C22

SINAMICS S120 chassis units

System components

Line-side components Recommended line-side system components

Assignment (continued)

Assignment of line-side power components to air-cooled and liquid-cooled Active Line Modules or Active Interface Modules in chassis format

Rated out- put	Rated input current	Suitable for Active Interface Module	Suitable for Active Line Module	Switch discon- nector without handle and shaft	Switch discon- nector with handle and shaft	Cable protection fuse	Rated current	Cable protection fuse incl. semiconductor protection	Rated current
kW	A	6SL3300-	6SL3330- 6SL3335-	Order No.	Order No.	Order No.	A	Order No.	A
Line voltage 380 ... 480 V 3 AC									
132	210	7TE32-6AA0	7TE32-1AA0	3KL5530-1AB01	3KL5530-1EB01	3NA3252	315	3NE1230-2	315
160	260	7TE32-6AA0	7TE32-6AA0	3KL5730-1AB01	3KL5730-1EB01	3NA3254	355	3NE1331-2	350
235	380	7TE33-8AA0	7TE33-8AA0	3KL5730-1AB01	3KL5730-1EB01	3NA3365	500	3NE1334-2	500
300	490	7TE35-0AA0	7TE35-0AA0 7TE35-0AA0 ¹⁾	3KL6130-1AB02	3KL6130-1EB02	3NA3372	630	3NE1436-2	630
380	605	7TE38-4AA0	7TE36-1AA0	3KL6230-1AB02	3KL6230-1EB02	3NA3475	800	3NE1438-2	800
500	840	7TE38-4AA0	7TE38-4AA0 7TE38-4AA0 ¹⁾	–	–	3NA3362 (2 units)	2 × 425	3NE1334-2 (2 units)	2 × 500
630	985	7TE41-4AA0	7TE41-0AA0	–	–	3NA3365 (2 units)	2 × 500	3NE1436-2 (2 units)	2 × 630
900	1405	7TE41-4AA0	7TE41-4AA0	–	–	3NA3365 (3 units)	3 × 500	3NE1448-2 (2 units)	2 × 850
Line voltage 500 ... 690 V 3 AC									
560	575	7TG35-8AA0	7TG35-8AA0 7TG35-8AA0 ¹⁾	3KL6130-1AB02	3KL6130-1EB02	3NA3352-6 (2 units)	2 × 315	3NE1447-2	670
800	735	7TG37-4AA0	7TG37-4AA0	3KL6230-1AB02	3KL6230-1EB02	3NA3360-6 (2 units)	2 × 400	3NE1448-2	850
1100	1025	7TG41-3AA0	7TG41-0AA0	–	–	3NA3354-6 (3 units)	3 × 355	3NE1436-2 (2 units)	2 × 630
1400	1270	7TG41-3AA0	7TG41-3AA0 7TG41-3AA0 ¹⁾	–	–	3NA3365-6 (3 units)	3 × 500	3NE1438-2 (2 units)	2 × 800

¹⁾ Liquid-cooled version, 6SL3335-....

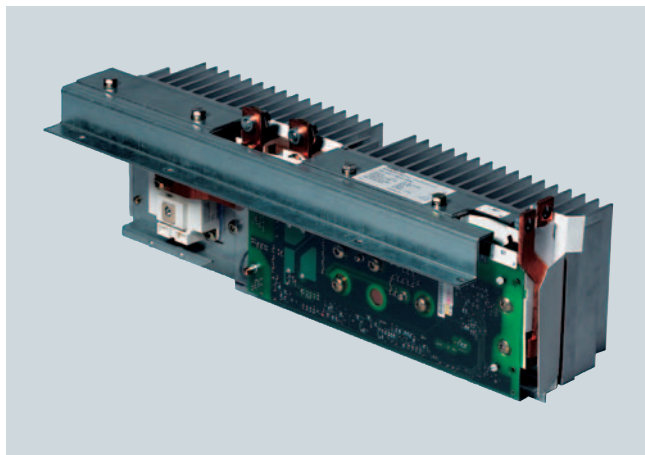
SINAMICS S120 chassis units

System components

DC link components

Braking Modules

Overview



A Braking Module and the matching external braking resistor are required to bring drives to a controlled standstill in the event of a power failure (e.g. with an EMERGENCY STOP) or to limit the DC link voltage for brief periods of regenerative operation, e.g. if the Line Module is not capable of energy recovery.

The Braking Module houses the power electronics and the associated control circuit. During operation, the DC link energy is converted to power loss in an external braking resistor.

The Braking Module works independently of the closed-loop control.

Several Braking Modules can be operated in parallel, but a separate braking resistor must be connected to each Braking Module.

Braking Modules are designed to be integrated into air-cooled Motor Modules, Line Modules or Power Modules and are cooled by the fans on these modules. The supply voltage for the electronics is drawn from the DC link. The Braking Modules are connected to the DC link by means of the busbar sets included in the scope of supply or flexible cables and, in the case of Basic Line Modules of frame size GB, using a separate cable harness set.

The activation threshold of the Braking Module can be adjusted by means of a DIP switch. The braking power values specified in the technical data apply to the upper activation threshold.

Design

The Braking Modules have the following interfaces as standard:

- 1 DC link connection
- 1 braking resistor connection
- 1 digital input (inhibit Braking Module/acknowledge error)
- 1 digital output (Braking Module inhibited)
- 1 DIP switch for adjusting the activation threshold

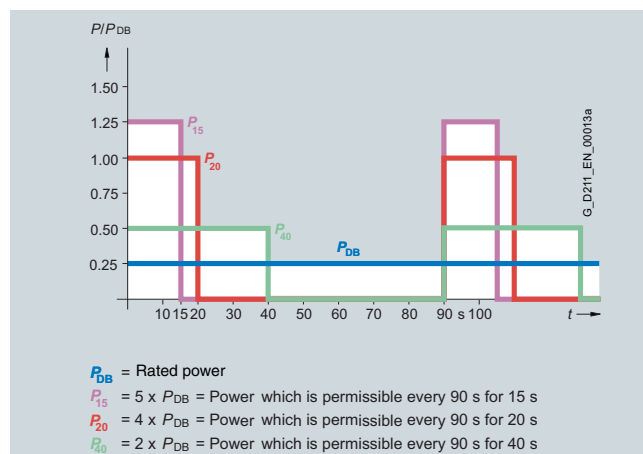
Selection and ordering data

Rated power P_{DB} kW	Peak power P_{15} kW	Frame sizes	Braking Module Order No.
Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC			
25	125	FX/FB	6SL3300-1AE31-3AA0
50	250	GX/GB	6SL3300-1AE32-5AA0
50	250	HX/JX	6SL3300-1AE32-5BA0
Line voltage 500 ... 600 V 3 AC DC link voltage 675 ... 900 V DC			
25	125	FX/FB	6SL3300-1AF31-3AA0
50	250	GX/GB	6SL3300-1AF32-5AA0
50	250	HX/JX	6SL3300-1AF32-5BA0
Line voltage 660 ... 690 V 3 AC DC link voltage 890 ... 1035 V DC			
25	125	FX/FB	6SL3300-1AH31-3AA0
50	250	GX/GB	6SL3300-1AH32-5AA0
50	250	HX/JX	6SL3300-1AH32-5BA0

Accessories

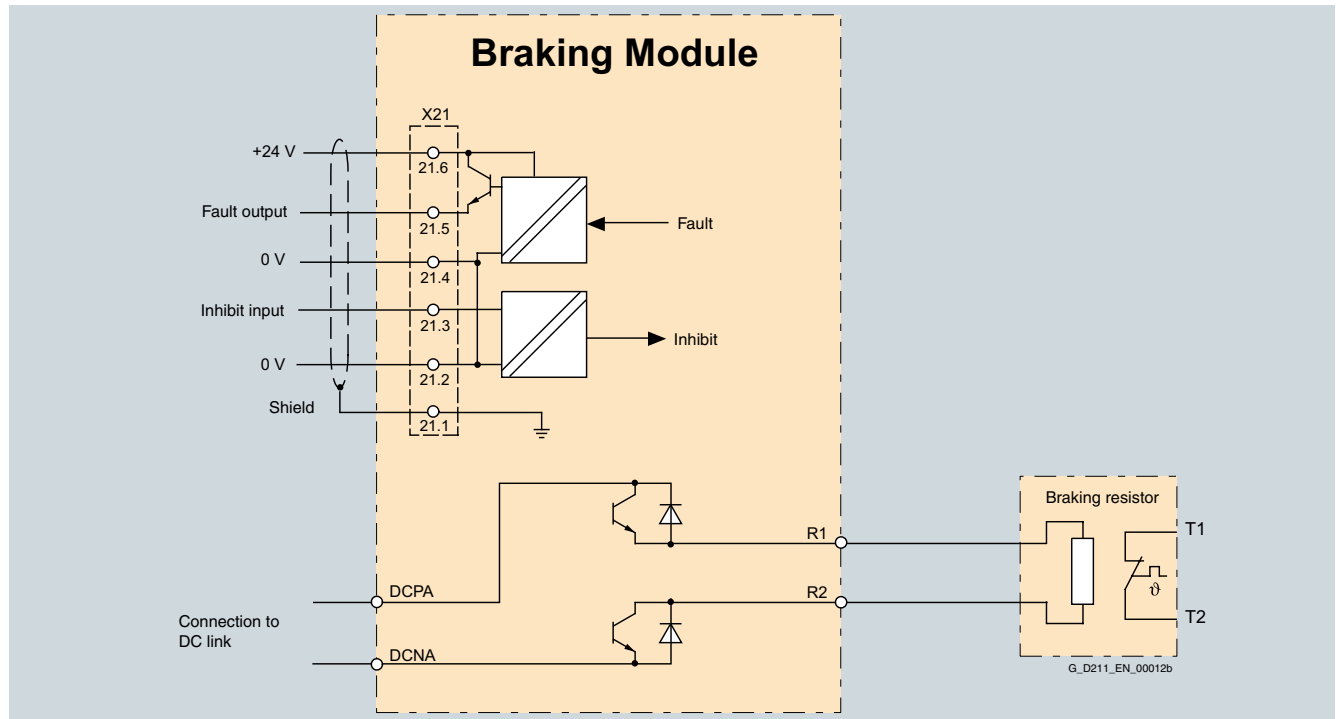
Description	Order No.
Cable harness set For mounting a Braking Module of frame size GX into a Basic Line Module of frame size GB	6SL3366-2NG00-0AA0
Warning labels in foreign languages This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: Chinese Simplified Dutch Danish Polish Finnish Portuguese/Brazilian French Russian Greek Swedish Italian Spanish Japanese Czech Korean Turkish	6SL3166-3AB00-0AA0

Characteristic curves



Load diagram for Braking Modules and braking resistor

Integration



Connection example of a Braking Module

Technical data

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Braking Module		
		6SL3300-1AE31-3AA0	6SL3300-1AE32-5AA0	6SL3300-1AE32-5BA0
Power				
• Rated power P_{DB}	kW	25	50	50
• Peak power P_{15}	kW	125	250	250
• Power P_{20}	kW	100	200	200
• Power P_{40}	kW	50	100	100
Activation thresholds (adjustable via DIP switch)	V	774 (factory setting) or 673	774 (factory setting) or 673	774 (factory setting) or 673
Digital inputs in accord. with IEC 61131-2 Type 1				
• Voltage	V	24	24	24
• Low level (an open digital input is interpreted as "low")	V	-3 ... +5	-3 ... +5	-3 ... +5
• High level	V	15 ... 30	15 ... 30	15 ... 30
• Current consumption at 24 V DC, typ.	mA	10	10	10
• Conductor cross-section, max.	mm ²	1.5	1.5	1.5
Digital outputs (sustained-short-circuit-proof)				
• Voltage	V	24	24	24
• Load current per digital output, max.	mA	500	500	500
• Conductor cross-section, max.	mm ²	1.5	1.5	1.5
R1/R2 connection		M8 nut	M8 nut	M8 nut
• Conductor cross-section, max.	mm ²	35	50	50
Weight, approx.	kg	3.6	7.3	7.5
Conformity		CE	CE	CE
Approvals		cURus (File No.: E192450)	cURus (File No.: E192450)	cURus (File No.: E192450)
Suitable for installation in air-cooled Motor Modules, Active Line Modules, Basic Line Modules and Smart Line Modules				
	Frame size	FX/FB	GX/GB ¹⁾	HX/JX

¹⁾ Cable harness set 6SL3366-2NG00-0AA0 is required to connect the Braking Module to a Basic Line Module of frame size GB.

Technical data (continued)

Line voltage 500 ... 600 V 3 AC DC link voltage 675 ... 900 V DC		Braking Module		
		6SL3300-1AF31-3AA0	6SL3300-1AF32-5AA0	6SL3300-1AF32-5BA0
Power				
• Rated power P_{DB}	kW	25	50	50
• Peak power P_{15}	kW	125	250	250
• Power P_{20}	kW	100	200	200
• Power P_{40}	kW	50	100	100
Activation thresholds (adjustable via DIP switch)	V	967 (factory setting) or 841	967 (factory setting) or 841	967 (factory setting) or 841
Digital inputs in accord. with IEC 61131-2 Type 1				
• Voltage	V	24	24	24
• Low level (an open digital input is interpreted as "low")	V	-3 ... +5	-3 ... +5	-3 ... +5
• High level	V	15 ... 30	15 ... 30	15 ... 30
• Current consumption at 24 V DC, typ.	mA	10	10	10
• Conductor cross-section, max.	mm ²	1.5	1.5	1.5
Digital outputs (sustained-short-circuit-proof)				
• Voltage	V	24	24	24
• Load current per digital output, max.	mA	500	500	500
• Conductor cross-section, max.	mm ²	1.5	1.5	1.5
R1/R2 connection				
• Conductor cross-section, max.	mm ²	M8 nut 35	M8 nut 50	M8 nut 50
Weight, approx.	kg	3.6	7.3	7.5
Conformity		CE	CE	CE
Approvals		cURus (File No.: E192450)	cURus (File No.: E192450)	cURus (File No.: E192450)
Suitable for installation in air-cooled Motor Modules, Active Line Modules, Basic Line Modules and Smart Line Modules				
	Frame size	FX/FB	GX/GB ¹⁾	HX/JX

¹⁾ Cable harness set 6SL3366-2NG00-0AA0 is required to connect the Braking Module to a Basic Line Module of frame size GB.

Technical data (continued)

Line voltage 660 ... 690 V 3 AC DC link voltage 890 ... 1035 V DC		Braking Module		
		6SL3300-1AH31-3AA0	6SL3300-1AH32-5AA0	6SL3300-1AH32-5BA0
Power				
• Rated power P_{DB}	kW	25	50	50
• Peak power P_{15}	kW	125	250	250
• Power P_{20}	kW	100	200	200
• Power P_{40}	kW	50	100	100
Activation thresholds (adjustable via DIP switch)	V	1153 (factory setting) or 1070	1153 (factory setting) or 1070	1153 (factory setting) or 1070
Digital inputs in accord. with IEC 61131-2 Type 1				
• Voltage	V	24	24	24
• Low level (an open digital input is interpreted as "low")	V	-3 ... +5	-3 ... +5	-3 ... +5
• High level	V	15 ... 30	15 ... 30	15 ... 30
• Current consumption at 24 V DC, typ.	mA	10	10	10
• Conductor cross-section, max.	mm ²	1.5	1.5	1.5
Digital outputs (sustained-short-circuit-proof)				
• Voltage	V	24	24	24
• Load current per digital output, max.	mA	500	500	500
• Conductor cross-section, max.	mm ²	1.5	1.5	1.5
R1/R2 connection		M8 nut	M8 nut	M8 nut
• Conductor cross-section, max.	mm ²	35	50	50
Weight, approx.	kg	3.6	7.3	7.5
Conformity		CE	CE	CE
Approvals		cURus (File No.: E192450)	cURus (File No.: E192450)	cURus (File No.: E192450)
Suitable for installation in air-cooled Motor Modules, Active Line Modules, Basic Line Modules and Smart Line Modules				
	Frame size	FX/FB	GX/GB ¹⁾	HX/JX

¹⁾ Cable harness set 6SL3366-2NG00-0AA0 is required to connect the Braking Module to a Basic Line Module of frame size GB.

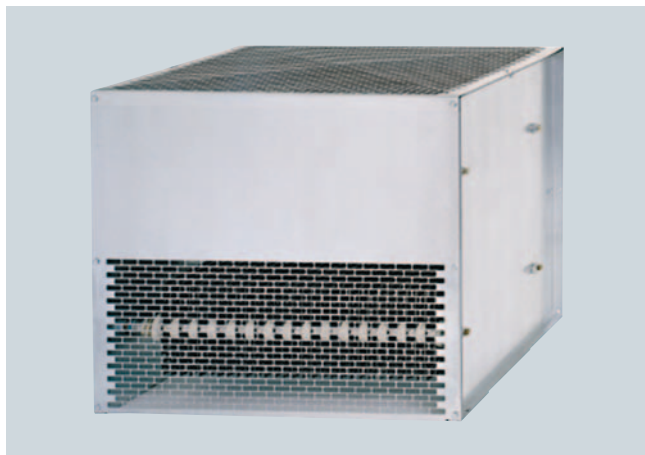
SINAMICS S120 chassis units

System components

DC link components

Braking resistors

Overview



The excess energy of the DC link is dissipated via the braking resistor.

The braking resistor is connected to a Braking Module.

By positioning the braking resistor outside the cabinet or switch-gear room, it is possible to extract the power losses away from the Line Modules / Motor Modules, thereby reducing the level of air conditioning required.

The maximum permissible cable length between the Braking Module and braking resistor is 100 m.

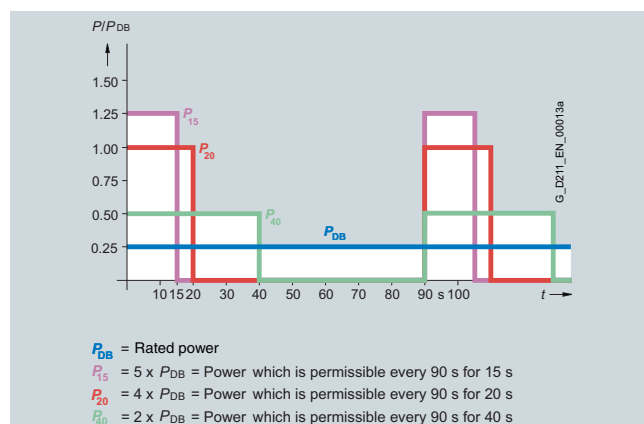
2 braking resistors with different rated and peak power values are available for the units.

The braking resistor is monitored on the basis of the duty cycle. 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

P_{DB} rated power kW	Suitable for Braking Module	Braking resistor Order No.
Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		
25	6SL3300-1AE31-3AA0	6SL3000-1BE31-3AA0
50	6SL3300-1AE32-5. A0	6SL3000-1BE32-5AA0
Line voltage 500 ... 600 V 3 AC DC link voltage 675 ... 900 V DC		
25	6SL3300-1AF31-3AA0	6SL3000-1BF31-3AA0
50	6SL3300-1AF32-5. A0	6SL3000-1BF32-5AA0
Line voltage 660 ... 690 V 3 AC DC link voltage 890 ... 1035 V DC		
25	6SL3300-1AH31-3AA0	6SL3000-1BH31-3AA0
50	6SL3300-1AH32-5. A0	6SL3000-1BH32-5AA0

Characteristic curves



Load diagram for Braking Modules and braking resistor

Technical data

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Braking resistor	
		6SL3000-1BE31-3AA0	6SL3000-1BE32-5AA0
Resistance	Ω	4.4 ($\pm 7.5\%$)	2.2 ($\pm 7.5\%$)
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
Power connection • Conductor cross-section, max. (DIN VDE)	mm ²	M10 stud 50	M10 stud 70
Degree of protection		IP20	IP20
Dimensions			
• Width	mm	740	810
• Height	mm	605	1325
• Depth	mm	485	485
Weight, approx.	kg	50	120
Conformity		CE	CE
Approvals		cURus (File.: E192450)	cURus (File.: E192450)
Suitable for Braking Module		6SL3300-1AE31-3AA0	6SL3300-1AE32-5.A0

Technical data (continued)

Line voltage 500 ... 600 V 3 AC DC link voltage 675 ... 900 V DC		Braking resistor	
		6SL3000-1BF31-3AA0	6SL3000-1BF32-5AA0
Resistance	Ω	6.8 (±7.5 %)	3.4 (±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	255
Power connection • Conductor cross-section, max. (DIN VDE)	mm ²	M10 stud 50	M10 stud 70
Degree of protection		IP20	IP20
Dimensions			
• Width	mm	740	810
• Height	mm	605	1325
• Depth	mm	485	485
Weight, approx.	kg	50	120
Conformity		CE	CE
Approvals		cURus (File No.: E192450)	cURus (File No.: E192450)
Suitable for Braking Module		6SL3300-1AF31-3AA0	6SL3300-1AF32-5.A0

Line voltage 660 ... 690 V 3 AC DC link voltage 890 ... 1035 V DC		Braking resistor	
		6SL3000-1BH31-3AA0	6SL3000-1BH32-5AA0
Resistance	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
Power connection • Conductor cross-section, max. (DIN VDE)	mm ²	M10 stud 50	M10 stud 70
Degree of protection		IP20	IP20
Dimensions			
• Width	mm	740	810
• Height	mm	605	1325
• Depth	mm	485	485
Weight, approx.	kg	50	120
Conformity		CE	CE
Approvals		cURus (File No.: E192450)	cURus (File No.: E192450)
Suitable for Braking Module		6SL3300-1AH31-3AA0	6SL3300-1AH32-5.A0

SINAMICS S120 chassis units

System components

Motor-side components

Motor reactors

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 place an additional load on 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 Motor Module or Power Module. Up to 2 motor reactors can be connected in series.

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

Selection and ordering data

Suitable for Power Module		Suitable for Motor Module		Type rating	Rated output current	Motor reactor
Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled	kW	A	Order No.
Line voltage 380 ... 480 V 3 AC						
6SL3310-1TE32-1AA0	6SL3315-1TE32-1AA0	6SL3320-1TE32-1AA0	6SL3325-1TE32-1AA0	110	210	6SL3000-2BE32-1AA0
6SL3310-1TE32-6AA0	6SL3315-1TE32-6AA0	6SL3320-1TE32-6AA0	6SL3325-1TE32-6AA0	132	260	6SL3000-2BE32-6AA0
6SL3310-1TE33-1AA0	6SL3315-1TE33-1AA0	6SL3320-1TE33-1AA0	6SL3325-1TE33-1AA0	160	310	6SL3000-2BE33-2AA0
6SL3310-1TE33-8AA0	-	6SL3320-1TE33-8AA0	-	200	380	6SL3000-2BE33-8AA0
6SL3310-1TE35-0AA0	6SL3315-1TE35-0AA0	6SL3320-1TE35-0AA0	6SL3325-1TE35-0AA0	250	490	6SL3000-2BE35-0AA0
-	-	6SL3320-1TE36-1AA0	6SL3325-1TE36-1AA0	315	605	6SL3000-2AE36-1AA0
-	-	6SL3320-1TE37-5AA0	-	400	745	6SL3000-2AE38-4AA0
-	-	6SL3320-1TE38-4AA0	6SL3325-1TE38-4AA0	450	840	6SL3000-2AE41-0AA0 6SL3000-2AE41-4AA0
-	-	6SL3320-1TE41-0AA0	6SL3325-1TE41-0AA0	560	985	
-	-	6SL3320-1TE41-2AA0	-	710	1260	
-	-	6SL3320-1TE41-4AA0	6SL3325-1TE41-4AA0	800	1405	

Selection and ordering data (continued)

Suitable for Motor Module		Type rating	Rated output current		Motor reactor
Air-cooled	Liquid-cooled	kW	A		Order No.
Line voltage 500 ... 690 V 3 AC					
6SL3320-1TG28-5AA0	-	75	85		6SL3000-2AH31-0AA0
6SL3320-1TG31-0AA0	6SL3325-1TG31-0AA0	90	100		
6SL3320-1TG31-2AA0	-	110	120		6SL3000-2AH31-5AA0
6SL3320-1TG31-5AA0	6SL3325-1TG31-5AA0	132	150		
6SL3320-1TG31-8AA0	-	160	175		6SL3000-2AH31-8AA0
6SL3320-1TG32-2AA0	6SL3325-1TG32-2AA0	200	215		6SL3000-2AH32-4AA0
6SL3320-1TG32-6AA0	-	250	260		6SL3000-2AH32-6AA0
6SL3320-1TG33-3AA0	6SL3325-1TG33-3AA0	315	330		6SL3000-2AH33-6AA0
6SL3320-1TG34-1AA0	-	400	410		6SL3000-2AH34-5AA0
6SL3320-1TG34-7AA0	-	450	465		6SL3000-2AH34-7AA0
6SL3320-1TG35-8AA0	6SL3325-1TG35-8AA0	560	575		6SL3000-2AH35-8AA0
6SL3320-1TG37-4AA0	-	710	735		6SL3000-2AH38-1AA0
6SL3320-1TG38-1AA0	6SL3325-1TG38-1AA0	800	810		
6SL3320-1TG38-8AA0	-	900	910		6SL3000-2AH41-0AA0
6SL3320-1TG41-0AA0	6SL3325-1TG41-0AA0	1000	1025		6SL3000-2AH41-1AA0
6SL3320-1TG41-3AA0	6SL3325-1TG41-3AA0	1200	1270		6SL3000-2AH41-3AA0

Technical data

Line voltage 380 ... 480 V 3 AC		Motor reactor (for pulse frequencies of 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, max. ¹⁾	kW	0.486		0.5		0.47		0.5		0.5	
Line supply/load connection		1 x hole for M10		1 x hole for M10		1 x hole for M10		1 x hole for M10		1 x hole for M10	
PE connection		M8 screw		M8 screw		M8 screw		M8 screw		M8 screw	
Cable length, max. between the motor reactor and motor											
(number of reactors in series)		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
• Shielded	m	300	525	300	525	300	525	300	525	300	525
• Unshielded	m	450	787	450	787	450	787	450	787	450	787
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	66		66		66		73		100	
Conformity		CE		CE		CE		CE		CE	
Approvals		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)	

Suitable for Power Module

	6SL3310-1TE32-1AA0	6SL3310-1TE32-6AA0	6SL3310-1TE33-1AA0	6SL3310-1TE33-8AA0	6SL3310-1TE35-0AA0
	6SL3315-1TE32-1AA0	6SL3315-1TE32-6AA0	6SL3315-1TE33-1AA0		6SL3315-1TE35-0AA0

Suitable for Motor Module

		6SL3320-1TE32-1AA0	6SL3320-1TE32-6AA0	6SL3320-1TE33-1AA0	6SL3320-1TE33-8AA0	6SL3320-1TE35-0AA0
		6SL3325-1TE32-1AA0	6SL3325-1TE32-6AA0	6SL3325-1TE33-1AA0		6SL3325-1TE35-0AA0
• Rated current of the Motor Module or Power Module	A	210	260	310	380	490
• Type rating of the Motor Module or Power Module	kW	110	132	160	200	250

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Motor reactor (for pulse frequencies of 1.25 kHz to 2.5 kHz)											
		6SL3000-2AE36-1AA0		6SL3000-2AE38-4AA0				6SL3000-2AE41-0AA0				6SL3000-2AE41-4AA0	
Rated current	A	605		840		840		985		1405		1405	
Power loss, max. ¹⁾	kW	0.9		0.84		0.943		1.062		0.9		1.054	
Line supply/load connection		1 x hole for M12		1 x hole for M12		1 x hole for M12		1 x hole for M12		2 x hole for M12		2 x hole for M12	
PE connection		M10 screw		M10 screw		M10 screw		M10 screw		M10 screw		M10 screw	
Cable length, max. between the motor reactor and motor (number of reactors in series)		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
• Shielded	m	300	525	300	525	300	525	300	525	300	525	300	525
• Unshielded	m	450	787	450	787	450	787	450	787	450	787	450	787
Degree of protection		IP00		IP00		IP00		IP00		IP00		IP00	
Dimensions													
• Width	mm	410		410		410		410		460		460	
• Height	mm	392		392		392		392		392		392	
• Depth	mm	292		292		292		302		326		326	
Weight, approx.	kg	130		140		140		146		179		179	
Conformity		CE		CE		CE		CE		CE		CE	
Approvals		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)	
Suitable for Motor Module		6SL3320-1TE36-1AA0 6SL3325-1TE36-1AA0		6SL3320-1TE37-5AA0		6SL3320-1TE38-4AA0 6SL3325-1TE38-4AA0		6SL3320-1TE41-0AA0 6SL3325-1TE41-0AA0		6SL3320-1TE41-2AA0		6SL3320-1TE41-4AA0 6SL3325-1TE41-4AA0	
• Rated current of the Motor Module	A	605		745		840		985		1260		1405	
• Type rating of the Motor Module	kW	315		400		450		560		710		800	

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Motor reactor (for pulse frequencies of 1.25 kHz to 2.5 kHz)											
		6SL3000-2AH31-0AA0				6SL3000-2AH31-5AA0				6SL3000-2AH31-8AA0		6SL3000-2AH32-4AA0	
Rated current	A	100		100		150		150		175		240	
Power loss, max. ¹⁾	kW	0.257		0.3		0.318		0.335		0.4		0.425	
Line supply/load connection		Flat connector for M10 screw		Flat connector for M10 screw		Flat connector for M10 screw		Flat connector for M10 screw		Flat connector for M10 screw		Flat connector for M10 screw	
PE connection		M6 screw		M6 screw		M6 screw		M6 screw		M6 screw		M6 screw	
Cable length, max. between the motor reactor and motor (number of reactors in series)													
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
• Shielded	m	300	525	300	525	300	525	300	525	300	525	300	525
• Unshielded	m	450	787	450	787	450	787	450	787	450	787	450	787
Degree of protection		IP00		IP00		IP00		IP00		IP00		IP00	
Dimensions													
• Width	mm	270		270		270		270		300		300	
• Height	mm	248		248		248		248		285		285	
• Depth	mm	200		200		200		200		212		212	
Weight, approx.	kg	25		25		25.8		25.8		34		34	
Conformity		CE		CE		CE		CE		CE		CE	
Approvals		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)	

Suitable for Motor Module

		6SL3320-1TG28-5AA0	6SL3320-1TG31-0AA0 6SL3325-1TG31-0AA0	6SL3320-1TG31-2AA0	6SL3320-1TG31-5AA0 6SL3325-1TG31-5AA0	6SL3320-1TG31-8AA0	6SL3320-1TG32-2AA0 6SL3325-1TG32-2AA0
• Rated current of the Motor Module	A	85	100	120	150	175	215
• Type rating of the Motor Module	kW	75	90	110	132	160	200

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Motor reactor (for pulse frequencies of 1.25 kHz to 2.5 kHz)											
		6SL3000-2AH32-6AA0		6SL3000-2AH33-6AA0		6SL3000-2AH34-5AA0		6SL3000-2AH34-7AA0		6SL3000-2AH35-8AA0		6SL3000-2AH38-1AA0	
Rated current	A	260		360		450		465		575		810	
Power loss, max. ¹⁾	kW	0.44		0.45		0.545		0.72		0.8		0.96	
Line supply/load connection		Flat connector for M10 screw		Flat connector for M10 screw		Flat connector for M12 screw		Flat connector for M12 screw		Flat connector for M12 screw		Flat connector for M12 screw	
PE connection		M6 screw		M6 screw		M8 screw		M8 screw		M8 screw		M8 screw	
Cable length, max. between the motor reactor and motor													
(number of reactors in series)		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
• Shielded	m	300	525	300	525	300	525	300	525	300	525	300	525
• Unshielded	m	450	787	450	787	450	787	450	787	450	787	450	787
Degree of protection		IP00		IP00		IP00		IP00		IP00		IP00	
Dimensions													
• Width	mm	300		300		350		410		410		410	
• Height	mm	285		285		330		392		392		392	
• Depth	mm	212		212		215		292		292		279	
Weight, approx.	kg	40		46		68		80		80		146	
Conformity		CE		CE		CE		CE		CE		CE	
Approvals		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)		cURus (File No.: E257859)	
Suitable for Motor Module													
		6SL3320-1TG32-6AA0		6SL3320-1TG33-3AA0 6SL3325-1TG33-3AA0		6SL3320-1TG34-1AA0		6SL3320-1TG34-7AA0		6SL3320-1TG35-8AA0 6SL3325-1TG35-8AA0		6SL3320-1TG37-4AA0	
• Rated current of the Motor Module	A	260		330		410		465		575		735	
• Type rating of the Motor Module	kW	250		315		400		450		560		710	

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

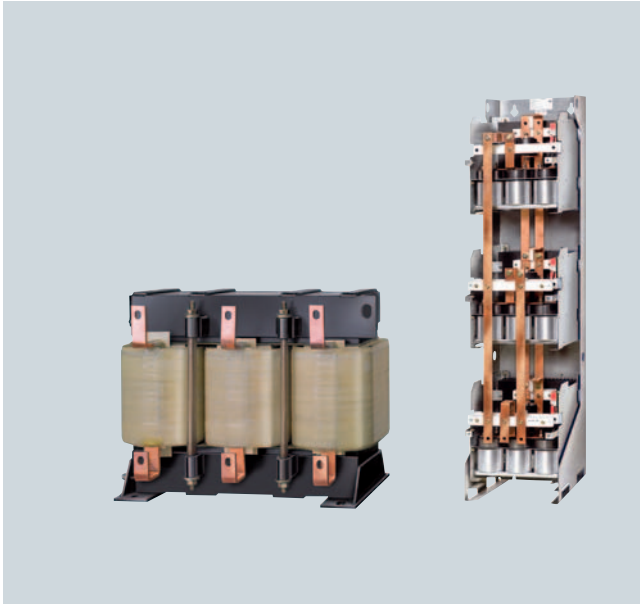
Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Motor reactor (for pulse frequencies of 1.25 kHz to 2.5 kHz)							
		6SL3000-2AH38-1AA0		6SL3000-2AH41-0AA0		6SL3000-2AH41-1AA0		6SL3000-2AH41-3AA0	
Rated current	A	810		910		1025		1270	
Power loss, max. ¹⁾	kW	1.0		0.97		1.05		0.95	
Line supply/load connection		Flat connector for M12 screw		Flat connector for M12 screw		Flat connector for M12 screw		Flat connector for M12 screw	
PE connection		M8 screw		M8 screw		M8 screw		M8 screw	
Cable length, max. between the motor reactor and motor									
(number of reactors in series)		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
• Shielded	m	300	525	300	525	300	525	300	525
• Unshielded	m	450	787	450	787	450	787	450	787
Degree of protection		IP00		IP00		IP00		IP00	
Dimensions									
• Width	mm	410		410		410		460	
• Height	mm	392		392		392		392	
• Depth	mm	279		279		317		296	
Weight, approx.	kg	146		150		163		153	
Conformity		CE		CE		CE		CE	
Approvals		cURus (File No.:E257859)		cURus (File No.:E257859)		cURus (File No.:E257859)		cURus (File No.:E257859)	
Suitable for Motor Module									
		6SL3320-1TG38-1AA0 6SL3325-1TG38-1AA0		6SL3320-1TG38-8AA0		6SL3320-1TG41-0AA0 6SL3325-1TG41-0AA0		6SL3320-1TG41-3AA0 6SL3325-1TG41-3AA0	
• Rated current of the Motor Module	A	810		910		1025		1270	
• Type rating of the Motor Module	kW	800		900		1000		1200	

Note: Additional information on motor reactors can be found in the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Overview



A 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 where the withstand voltage of the insulation system is unknown or insufficient. Standard 1LA5, 1LA6 and 1LA8 motors only require them in cases where the motor insulation has not been specifically designed for operation with a drive 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 $< 500 \text{ V}/\mu\text{s}$ and the typical voltage peaks to the values below (with motor cable lengths of $< 150 \text{ m}$):

$< 1000 \text{ V}$ at $V_{\text{line}} < 575 \text{ V}$

$< 1250 \text{ V}$ at $660 \text{ V} < V_{\text{line}} < 690 \text{ V}$

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

Selection and ordering data

Suitable for Power Module		Suitable for Motor Module		Type rating	Rated output current	dv/dt filter plus VPL
Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled	kW	A	Order No.
Line voltage 380 ... 480 V 3 AC						
6SL3310-1TE32-1AA0	6SL3315-1TE32-1AA0	6SL3320-1TE32-1AA0	6SL3325-1TE32-1AA0	110	210	6SL3000-2DE32-6AA0
6SL3310-1TE32-6AA0	6SL3315-1TE32-6AA0	6SL3320-1TE32-6AA0	6SL3325-1TE32-6AA0	132	260	
6SL3310-1TE33-1AA0	6SL3315-1TE33-1AA0	6SL3320-1TE33-1AA0	6SL3325-1TE33-1AA0	160	310	
6SL3310-1TE33-8AA0	-	6SL3320-1TE33-8AA0	-	200	380	6SL3000-2DE35-0AA0
6SL3310-1TE35-0AA0	6SL3315-1TE35-0AA0	6SL3320-1TE35-0AA0	6SL3325-1TE35-0AA0	250	490	
-	-	6SL3320-1TE36-1AA0	6SL3325-1TE36-1AA0	315	605	
-	-	6SL3320-1TE37-5AA0	-	400	745	6SL3000-2DE38-4AA0
-	-	6SL3320-1TE38-4AA0	6SL3325-1TE38-4AA0	450	840	
-	-	6SL3320-1TE41-0AA0	6SL3325-1TE41-0AA0	560	985	
-	-	6SL3320-1TE41-2AA0	-	710	1260	6SL3000-2DE41-4AA0
-	-	6SL3320-1TE41-4AA0	6SL3325-1TE41-4AA0	800	1405	

SINAMICS S120 chassis units

System components

Motor-side components dv/dt filters plus VPL

Selection and ordering data (continued)

Suitable for Motor Module		Type rating	Rated output current	dv/dt filter plus VPL
Air-cooled	Liquid-cooled	kW	A	Order No.
Line voltage 500 ... 690 V 3 AC				
6SL3320-1TG28-5AA0	-	75	85	6SL3000-2DH31-0AA0
6SL3320-1TG31-0AA0	6SL3325-1TG31-0AA0	90	100	
6SL3320-1TG31-2AA0	-	110	120	6SL3000-2DH31-5AA0
6SL3325-1TG31-5AA0	6SL3320-1TG31-5AA0	132	150	
6SL3320-1TG31-8AA0	-	160	175	6SL3000-2DH32-2AA0
6SL3320-1TG32-2AA0	6SL3325-1TG32-2AA0	200	215	
6SL3320-1TG32-6AA0	-	250	260	6SL3000-2DH33-3AA0
6SL3320-1TG33-3AA0	6SL3325-1TG33-3AA0	315	330	
6SL3320-1TG34-1AA0	-	400	410	6SL3000-2DH34-1AA0
6SL3320-1TG34-7AA0	-	450	465	6SL3000-2DH35-8AA0
6SL3320-1TG35-8AA0	6SL3325-1TG35-8AA0	560	575	
6SL3320-1TG37-4AA0	-	710	735	6SL3000-2DH38-1AA0
6SL3320-1TG38-1AA0	6SL3325-1TG38-1AA0	800	810	
6SL3320-1TG38-8AA0	-	900	910	6SL3000-2DH41-3AA0
6SL3320-1TG41-0AA0	6SL3325-1TG41-0AA0	1000	1025	
6SL3320-1TG41-3AA0	6SL3325-1TG41-3AA0	1200	1270	

2

Technical data

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
Conformity		CE	CE	CE	CE
Approvals		cURus (File No.: E148698)	cURus (File No.: E148698)	cURus (File No.: E148698)	cURus (File No.: E148698)

dv/dt reactor

Power loss, max. ²⁾	kW	0.78	0.963	1.226	1.23
Connections					
• to the Power / Motor 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, max. ²⁾	kW	0.104	0.152	0.302	0.525
Connections					
• to dv/dt reactor		M8 nut	70 mm ² terminals	1 × M8 hole	1 × M10 hole
• to DC link		M8 nut	70 mm ² terminals	1 × M8 hole	1 × M10 hole
• PE		M8 stud	35 mm ² terminals	M8 stud	M8 stud
Dimensions					
• Width	mm	263	392	309	309
• Height	mm	265	285	1312.5	1312.5
• Depth	mm	188	210	400	392
Weight, approx.	kg	6	16	48	72

Suitable for Power Module

6SL3310-1TE32-1AA0 (110 kW)	6SL3310-1TE33-1AA0 (160 kW)		
6SL3315-1TE32-1AA0 (110 kW)	6SL3315-1TE33-1AA0 (160 kW)		
6SL3310-1TE32-6AA0 (132 kW)	6SL3310-1TE33-8AA0 (200 kW)		
6SL3315-1TE32-6AA0 (132 kW)	6SL3310-1TE35-0AA0 (250 kW)		
	6SL3315-1TE35-0AA0 (250 kW)		

Suitable for Motor Module

6SL3320-1TE32-1AA0 (110 kW)	6SL3320-1TE33-1AA0 (160 kW)	6SL3320-1TE36-1AA0 (605 kW)	6SL3320-1TE41-0AA0 (985 kW)
6SL3325-1TE32-1AA0 (110 kW)	6SL3325-1TE33-1AA0 (160 kW)	6SL3325-1TE36-1AA0 (605 kW)	6SL3325-1TE41-0AA0 (985 kW)
6SL3320-1TE32-6AA0 (132 kW)	6SL3320-1TE33-8AA0 (200 kW)	6SL3320-1TE37-5AA0 (745 kW)	6SL3320-1TE41-2AA0 (1260 kW)
6SL3325-1TE32-6AA0 (132 kW)	6SL3320-1TE35-0AA0 (250 kW)	6SL3320-1TE38-4AA0 (840 kW)	6SL3320-1TE41-4AA0 (1405 kW)
	6SL3325-1TE35-0AA0 (250 kW)	6SL3325-1TE38-4AA0 (840 kW)	6SL3325-1TE41-4AA0 (1405 kW)

Note: For power ratings 560 kW (380 ... 480 V) or 710 kW (500 ... 690 V) and higher, a filter includes two dv/dt reactors. The listed technical data refer to one dv/dt reactor. Additional information on the dv/dt filters can be found in the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

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

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 500 ... 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
Conformity		CE	CE	CE	CE
Approvals		cURus (File No.: E148698)	cURus (File No.: E148698)	cURus (File No.: E148698)	cURus (File No.: E148698)
dv/dt reactor					
Power loss, max. ²⁾	kW	0.541	0.436	0.645	0.661
Connections					
• to the Power / Motor 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, max. ²⁾	kW	0.053	0.071	0.113	0.152
Connections					
• to dv/dt reactor		M8 nut	M8 nut	70 mm ² terminals	70 mm ² terminals
• to DC link		M8 nut	M8 nut	70 mm ² terminals	70 mm ² terminals
• PE		M8 stud	M8 stud	35 mm ² terminals	35 mm ² terminals
Dimensions					
• Width	mm	263	263	392	392
• Height	mm	265	265	285	285
• Depth	mm	188	188	210	210
Weight, approx.	kg	6	6	16	16
Suitable for Motor Module					
		6SL3320-1TG28-5AA0 (75 kW)	6SL3320-1TG31-2AA0 (110 kW)	6SL3320-1TG31-8AA0 (160 kW)	6SL3320-1TG32-6AA0 (250 kW)
		6SL3320-1TG31-0AA0 (90 kW)	6SL3320-1TG31-5AA0 (132 kW)	6SL3320-1TG32-2AA0 (200 kW)	6SL3320-1TG33-3AA0 (315 kW)
		6SL3325-1TG31-0AA0 (90 kW)	6SL3325-1TG31-5AA0 (132 kW)	6SL3325-1TG32-2AA0 (200 kW)	6SL3325-1TG33-3AA0 (315 kW)

Note: For power ratings 560 kW (380 ... 480 V) or 710 kW (500 ... 690 V) and higher, a filter includes two dv/dt reactors. The listed technical data refer to one dv/dt reactor. Additional information on the dv/dt filters can be found in the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

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

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		dv/dt filter plus VPL			
		6SL3000-2DH34-1AA0	6SL3000-2DH35-8AA0	6SL3000-2DH38-1AA0	6SL3000-2DH41-3AA0
I_{thmax}	A	410	575	810	1270
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
Conformity		CE	CE	CE	CE
Approvals		cURus (File No.: E148698)	cURus (File No.: E148698)	cURus (File No.: E148698)	cURus (File No.: E148698)
dv/dt reactor					
Power loss, max. ²⁾	kW	0.884	0.964	0.927	0.966
Connections • to the Power / Motor Module • to load • PE		1 × M12 hole 1 × M12 hole M6 screw	1 × M12 hole 1 × M12 hole M6 screw	2 × M12 hole 2 × M12 hole M6 screw	2 × M12 hole 2 × M12 hole M6 screw
Dimensions • Width • Height • Depth	mm	460 385 312	460 385 312	445 385 312	445 385 312
Weight, approx.	kg	147	172	160	164
Voltage Peak Limiter (VPL)					
Power loss, max. ²⁾	kW	0.189	0.241	0.372	0.535
Connections • to dv/dt reactor • to DC link • PE		1 × M8 hole 1 × M8 hole M8 stud	1 × M8 hole 1 × M8 hole M8 stud	1 × M10 hole 1 × M10 hole M8 stud	1 × M10 hole 1 × M10 hole M8 stud
Dimensions • Width • Height • Depth	mm	309 1313 400	309 1313 400	309 1313 392	309 1313 392
Weight, approx.	kg	48	48	72	73
Suitable for Motor Module					
		6SL3320-1TG34-1AA0 (400 kW)	6SL3320-1TG34-7AA0 (450 kW) 6SL3320-1TG35-8AA0 (560 kW) 6SL3325-1TG35-8AA0 (560 kW)	6SL3320-1TG37-4AA0 (710 kW) 6SL3320-1TG38-1AA0 (800 kW) 6SL3325-1TG38-1AA0 (800 kW)	6SL3320-1TG38-8AA0 (900 kW) 6SL3320-1TG41-0AA0 (1000 kW) 6SL3325-1TG41-0AA0 (1000 kW) 6SL3320-1TG41-3AA0 (1200 kW) 6SL3325-1TG41-3AA0 (1200 kW)

Note: For power ratings 560 kW (380 ... 480 V) or 710 kW (500 ... 690 V) and higher, a filter includes two dv/dt reactors. The listed technical data refer to one dv/dt reactor. Additional information on the dv/dt filters can be found in the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

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

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

SINAMICS S120 chassis units

System components

Motor-side components

Sine-wave filters

Overview



If a sine-wave filter is connected to the output of the Power Module or Motor Module, the voltage between the motor terminals is virtually sinusoidal. This reduces the voltage load on the motor windings and prevents motor noise induced by the pulse frequency.

The pulse frequency of the modules must be set to 4 kHz for the sine-wave filters.

As a result, the max. possible output current and the max. achievable output voltage of the units is reduced. The voltage drops across the sine-wave filter, a factor which must also be taken into account in the drive design.

A sine-wave filter must be installed as close as possible to the Motor Module or Power Module.

Additional information on sine-wave filters can be found in the SINAMICS Low Voltage Engineering Manual on the CD-ROM provided.

Selection and ordering data

Suitable for Power Module		Suitable for Motor Module		Type rating	Rated output current	Sine-wave filter
Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled	kW	A	Order No.
Line voltage 380 ... 480 V 3 AC						
6SL3310-1TE32-1AA0	6SL3315-1TE32-1AA0	6SL3320-1TE32-1AA0	6SL3325-1TE32-1AA0	110	210	6SL3000-2CE32-3AA0
6SL3310-1TE32-6AA0	6SL3315-1TE32-6AA0	6SL3320-1TE32-6AA0	6SL3325-1TE32-6AA0	132	260	
6SL3310-1TE33-1AA0	6SL3315-1TE33-1AA0	6SL3320-1TE33-1AA0	6SL3325-1TE33-1AA0	160	310	6SL3000-2CE32-8AA0
6SL3310-1TE33-8AA0	-	6SL3320-1TE33-8AA0	-	200	380	6SL3000-2CE33-3AA0
6SL3310-1TE35-0AA0	6SL3315-1TE35-0AA0	6SL3320-1TE35-0AA0	6SL3325-1TE35-0AA0	250	490	6SL3000-2CE34-1AA0

Technical data

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, max. ¹⁾	kW	0.6	0.69	0.53	0.7
Line supply connection		Flat connector for M10 screw	Flat connector for M10 screw	Flat connector for M10 screw	Flat connector for M10 screw
Load connection		Flat connector for M10 screw	Flat connector for M10 screw	Flat connector for M10 screw	Flat connector for M10 screw
PE connection		1 x hole M10	1 x hole M10	1 x hole M10	1 x hole M10
Cable length, max. between the sine-wave filter and motor					
• 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
Conformity		CE	CE	CE	CE
Approvals		cURus (File No.:E219022)	cURus (File No.:E219022)	cURus (File No.:E219022)	cURus (File No.:E219022)

Suitable for Power Module

6SL3310-1TE32-1AA0	6SL3310-1TE32-6AA0	6SL3310-1TE33-1AA0	6SL3310-1TE33-8AA0	6SL3310-1TE35-0AA0
6SL3315-1TE32-1AA0	6SL3315-1TE32-6AA0	6SL3315-1TE33-1AA0		6SL3315-1TE35-0AA0

Suitable for Motor Module

		6SL3320-1TE32-1AA0	6SL3320-1TE32-6AA0	6SL3320-1TE33-1AA0	6SL3320-1TE33-8AA0	6SL3320-1TE35-0AA0
		6SL3325-1TE32-1AA0	6SL3325-1TE32-6AA0	6SL3325-1TE33-1AA0		6SL3325-1TE35-0AA0
• Rated current of the Motor Module or Power Module at a pulse frequency of 4 kHz	A	170	215	270	330	380
• Type rating of the Motor Module or Power Module at a pulse frequency of 4 kHz	kW	90	110	132	160	200

¹⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

SINAMICS S120 chassis units

System components

Control Units

Overview



New system architecture with a central Control Unit

In multi-axis drives, the individual drives are controlled from the higher-level control systems in such a way as to achieve the desired coordinated movement. This requires cyclic data exchange between the controller and the drives. In previous drive designs, this exchange took place via a field bus, requiring complex installation and configuration. SINAMICS takes a new approach in this respect: A central Control Unit controls the drives for all connected axes and also establishes the technological links between the drives and/or axes. Since all the

required data is stored in the central Control Unit, it does not need to be transferred. Inter-axis connections can be established within a Control Unit and easily configured in the STARTER commissioning tool using a mouse.

- The SINAMICS Control Unit can handle simple technological tasks by itself
- For single drives, both the **CU320** Control Unit as well as the **CU310 DP** or the **CU310 PN** Control Unit are used.
- The **CU320** Control Unit is used for multi-axis applications and in cabinet units.
- Sophisticated motion control tasks can be implemented with the support of the more powerful, performance-graded Control Units **D410**, **D425**, **D435** and **D445** of **SIMOTION D**. Refer to Catalog PM 21 for information on SIMOTION

Each of these Control Units is based on an object-oriented SINAMICS standard firmware, which contains all the most popular control modes and can be scaled to meet even the most advanced performance requirements.

The drive controls are supplied as ready-to-configure drive objects:

- "Vector control"
 - Speed-controlled drives with high speed and torque stability in general mechanical engineering systems
 - Particularly suitable for asynchronous (induction) motors
- "Servo control"
 - Drives with highly dynamic motion control
 - Angular-locked synchronism with isochronous PROFIBUS
 - For use in machine tools and clocked production machines

The most commonly used V/f control modes are stored in the "Vector control" drive object and are ideal for implementing even simple applications such as group drives with SIEMOSYN motors.

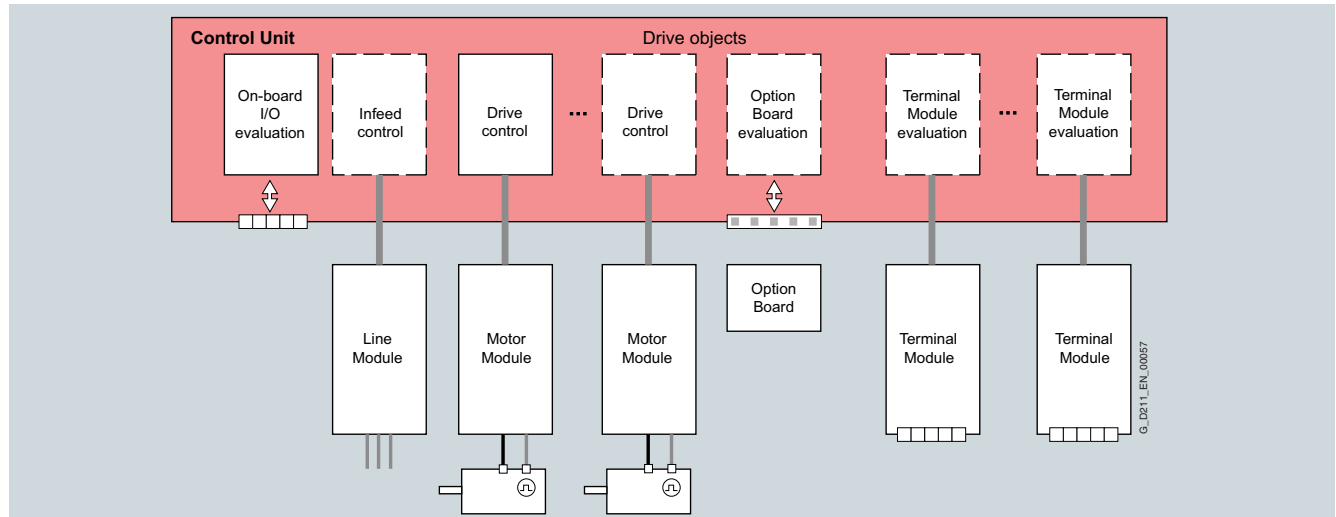
Overview of key open-loop and closed-loop control functions

	Closed-loop control types S120	Open-loop control types S120	Main functions S120 for booksize/chassis	Comment, note
Vector control	<ul style="list-style-type: none"> • Asynchronous (induction) motor <ul style="list-style-type: none"> - Torque control with/without encoder - Speed control with/without encoder • Torque motor <ul style="list-style-type: none"> - Torque control with encoder - Speed control with/without encoder • For asynchronous (induction) and torque motors <ul style="list-style-type: none"> - Position control with encoder 	<ul style="list-style-type: none"> - Linear/V/f characteristic - Fixed-frequency V/f characteristic (textile) - Independent voltage setpoint input 	<ul style="list-style-type: none"> • Data set changeover • Extended setpoint input • Motor identification • Current/speed controller optimization • Technology controller • Basic positioner • Automatic restart • Flying restart with/without encoder • Kinetic buffering • Synchronization • Droop • Brake control 	<p>Mixed operation with V/f control modes is possible; it is for this reason that the V/f control modes are stored only once in the "Vector control" drive object</p> <p>Position control can be selected as a function module from both Servo and Vector mode.</p>
Servo control	<ul style="list-style-type: none"> • Asynchronous (induction) motor <ul style="list-style-type: none"> - Torque control with/without encoder - Speed control with/without encoder • Synchronous motor, linear motor and torque motor <ul style="list-style-type: none"> - Torque control with encoder - Speed control with encoder • For all motors <ul style="list-style-type: none"> - Position control with encoder 	<ul style="list-style-type: none"> - Linear/V/f characteristic - Fixed-frequency V/f characteristic (textile) - Independent voltage setpoint input 	<ul style="list-style-type: none"> • Data set changeover • Setpoint input • Motor identification • Damping application • Technology controller • Basic positioner • Brake control 	<p>Mixed operation with V/f control modes is possible; it is for this reason that the V/f control modes are stored only once in the "Vector control" drive object</p> <p>Position control can be selected as a function module from both Servo and Vector mode.</p>

Overview (continued)

Drive objects

A drive object is a self-contained software function with its own parameters and, if necessary, its own fault messages and alarms.



Comprehensive package of open-loop and closed-loop control functions

A wide variety of standard functions such as setpoint input, data set changeover, controller optimization, kinetic buffering, etc. ensure a high degree of functional reliability and excellent flexibility of application.

BICO technology

Every drive object contains a large number of input and output variables which can be freely and independently interconnected using Binector Connector Technology (BICO). A binector is a logic signal which can assume the value 0 or 1. A connector is a numerical value, e.g. the actual speed or current setpoint.

Drive Control Chart (DCC)

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

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.

CompactFlash card

The functions of the drives are stored on a CompactFlash card. This card contains the firmware and parameter settings for all drives in the form of a project. The CompactFlash card can also hold additional projects, which means that the correct project can be accessed immediately when series machines of different types are commissioned. When the Control Unit has booted, the data on the CompactFlash card is read and loaded to the RAM.

The firmware is organized in objects. Drive objects are used to implement open-loop and closed-loop control functions for Line Modules, Motor Modules, Power Modules and other system components connected by DRIVE-CLiQ.

Integral safety functions (Safety Integrated)

The Control Units include an extensive range of safety functions (if these are also supported by the power unit). The integrated safety functions are the Safety Integrated Basic functions

- STO = Safe Torque Off
- SBC = Safe Brake Control
- SS1 = Safe Stop 1

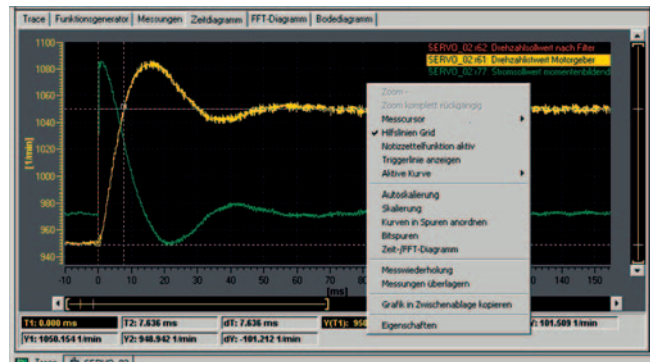
and the Safety Integrated Extended functions that require a license

- SS2 = Safe Stop 2
- SOS = Safe Operating Stop
- SLS = Safely Limited Speed
- SSM = Safe Speed Monitor

If the integrated safety functions are used, licenses, supplementary system components such as TM54F Terminal Modules, or suitable safety controls will be necessary.

Diagnostics optimally supported by trace function

The time characteristics of input and output variables associated with drive objects can be measured by the integrated trace function and displayed using the STARTER commissioning tool. Several signals can be simultaneously traced. A recording can be triggered as a function of freely selectable boundary conditions, e.g. the value of an input or output variable.



SINAMICS S120 chassis units

System components

Control Units CU320 Control Unit

Overview



CU320 Control Unit, with and without guard cover

The communication, open-loop and closed-loop control functions for one or more Motor Modules and the Line Module are executed in a CU320 Control Unit. For SINAMICS S120 chassis units, the CU320 is always used if several axes have to be controlled. The CU320 is used as standard for SINAMICS S150 and SINAMICS S120 Cabinet Modules.

Selection and ordering data

Description	Order No.
CU320 Control Unit (without CompactFlash card)	6SL3040-0MA00-0AA1

Accessories

Description	Order No.
PROFIBUS connector	
• Without programming device/PC connection	6ES7972-0BA41-0XA0
• With programming device/PC connection	6ES7972-0BB41-0XA0
Spacers (2 units) For increasing the depth of the CU320 Control Unit to 270 mm if the brackets on the side are not to be used, but the depth still has to be 270 mm.	6SL3064-1BB00-0AA0
STARTER commissioning tool	6SL3072-0AA00-0AG0

Design

The CU320 Control Unit features the following interfaces as standard:

- 4 DRIVE-CLiQ sockets for communication with other DRIVE-CLiQ devices, e.g. Motor Modules, Line Modules, Sensor Modules, Terminal Modules
- 1 PROFIBUS interface with PROFIdrive V4 profile
- 8 parameterizable digital inputs (floating)
- 8 parameterizable bidirectional digital inputs/digital outputs (non-floating), of which 6 are high-speed digital inputs
- 1 serial RS232 interface (e.g. to connect the AOP30 Advanced Operator Panel)
- 1 interface for the BOP20 Basic Operator Panel
- 1 slot for the CompactFlash card on which firmware and parameters are stored
- 1 slot for mounting an option module (e.g. TB30 Terminal Board)
- 3 test sockets and one reference ground for commissioning support
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 PE/protective conductor connection
- 1 ground connection

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

The existing option slot allows the number of interfaces to be extended, e.g. number of terminals or communication. The status of the CU320 Control Unit is displayed using multi-color LEDs.

A BOP20 Basic Operator Panel can also be snapped directly onto the CU320 Control Unit for diagnostic purposes.

As the firmware and parameter settings are stored on a plug-in CompactFlash card, the Control Unit can be changed without the need for software tools.

The CU320 Control Unit can be mounted on the side of the Line Module in booksize format via brackets integrated in a Line Module. The CU320 Control Unit can also be fixed to the wall of the control cabinet using the integrated fixing lugs. As the CU320 Control Unit is not as deep as the Line Modules, suitable spacers are available to increase the depth of the CU320 Control Unit to 270 mm.

Integration

DRIVE-CLiQ components such as Motor Modules and Active Line Modules can be connected to a CU320 Control Unit. The number of modules depends on the performance required, including duty type and additional functions.

The CU320 Control Unit and other connected components are commissioned and diagnosed using the STARTER commissioning tool or the AOP30 Advanced Operator Panel.

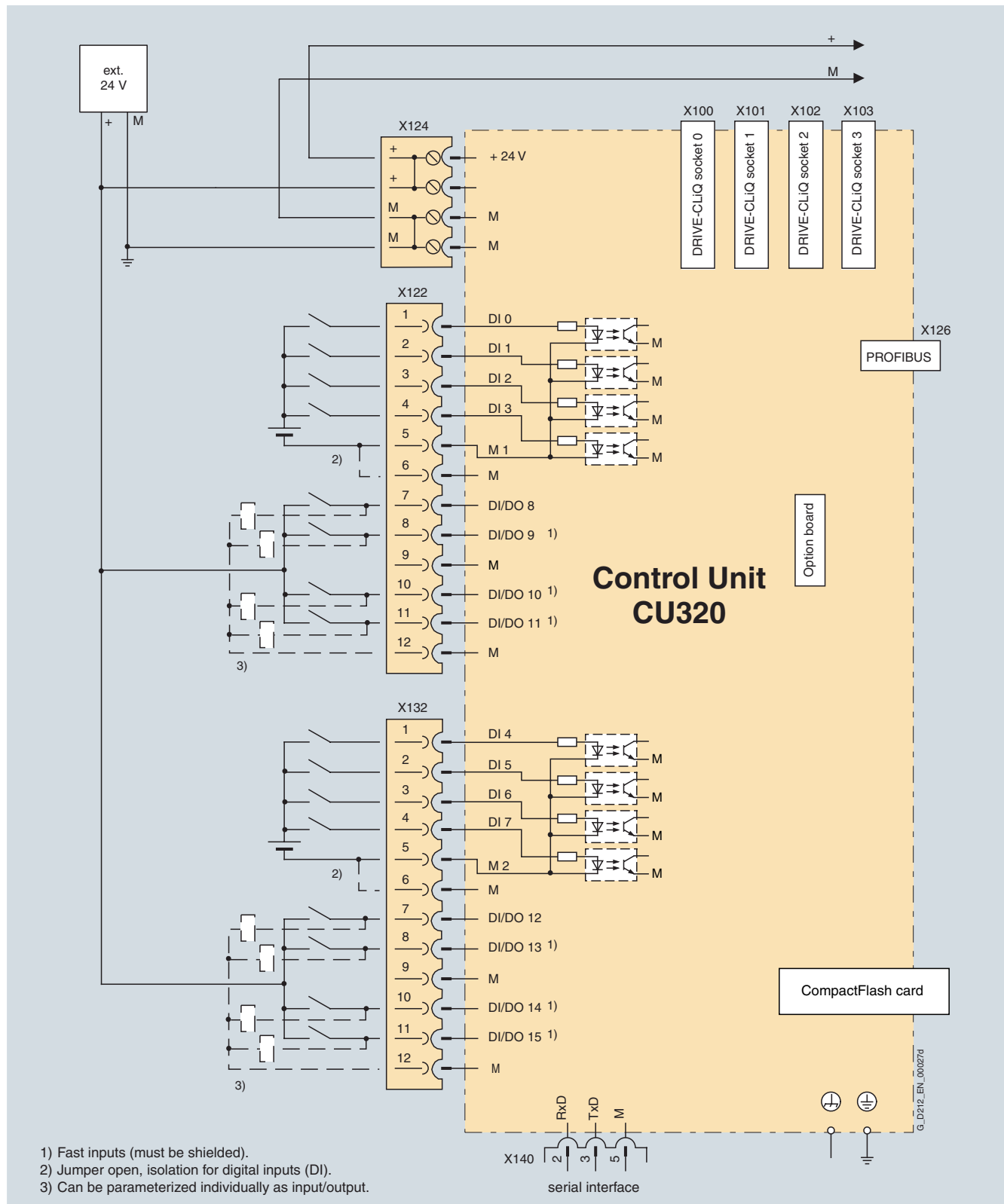
The BOP20 panel can also be snapped onto the CU320 Control Unit during operation to perform troubleshooting procedures.

A CU320 Control Unit communicates with the components connected to it via DRIVE-CLiQ.

If an application requires more than one Control Unit, the number can be increased accordingly. The Control Units are then interconnected on a higher-level controller via PROFIBUS according to the PROFIdrive V4 profile.

Integration (continued)

2



Connection example of CU320 Control Unit

Technical data

CU320 Control Unit	
Current requirement at 24 V DC, max. without taking account of digital outputs, expansion option slot and DRIVE-CLiQ supply	0.8 A
Conductor cross-section, max.	2.5 mm ²
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1 8 floating digital inputs 8 bidirectional non-floating digital inputs/digital outputs
• 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, approx. ¹⁾	
- L → H	50 μs
- H → L	100 μs
• Delay time of high-speed digital inputs ¹⁾ , approx. (high-speed digital inputs can be used for position detection)	
- L → H	5 μs
- H → L	50 μs
• Conductor cross-section, max.	0.5 mm ²
Digital outputs (sustained-short-circuit-proof)	8 bidirectional non-floating digital inputs/digital outputs
• Voltage	24 V DC
• Load current per digital output, max.	500 mA
• Delay time, approx. ¹⁾	150 μs
• 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
Conformity	CE
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 or output is processed.

Overview



The CU310 DP Control Unit for the communication and open-loop/closed-loop control functions of a Power Module is combined with the Power Module to create a powerful single drive.

Selection and ordering data

Description	Order No.
CU310 DP Control Unit (without CompactFlash card)	6SL3040-0LA00-0AA1

Accessories

Description	Order No.
PROFIBUS connector	
• Without programming device/PC connection	6ES7972-0BA41-0XA0
• With programming device/PC connection	6ES7972-0BB41-0XA0
STARTER commissioning tool	6SL3072-0AA00-0AG0

Design

The CU310 DP Control Unit has the following interfaces as standard:

- 1 DRIVE-CLiQ socket to allow communication with other DRIVE-CLiQ nodes
- 1 PM-IF interface for communication with Power Modules in blocksize format
- 1 interface to the BOP20 Basic Operator Panel
- 1 PROFIBUS interface with PROFIdrive V4 profile
- 1 encoder evaluation
 - The following encoder signals can be evaluated:
 - Incremental encoder TTL/HTL
 - SSI encoder without incremental signals
- 4 parameterizable digital inputs (floating)
- 4 parameterizable bidirectional digital inputs/digital outputs (non-floating)
- 1 serial RS232 interface
- 1 slot for the CompactFlash card on which firmware and parameters are stored
- 3 test sockets and one reference ground for commissioning support
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 PE/protective conductor connection
- 1 connection for Safety Integrated
- 1 temperature sensor input (KTY84-130 or PTC)

The status of the CU310 DP Control Unit is indicated via multi-color LEDs.

A BOP20 Basic Operator Panel can, for example, be snapped directly onto the CU310 DP Control Unit for diagnostic purposes.

As the firmware and parameter settings are stored on a plug-in CompactFlash card, the Control Unit can be changed without the need for software tools.

Integration

Power Modules in the chassis format are controlled from the CU310 DP Control Unit via the DRIVE-CLiQ interface. Sensor Modules and Terminal Modules must be connected to the free DRIVE-CLiQ sockets of the Power Module.

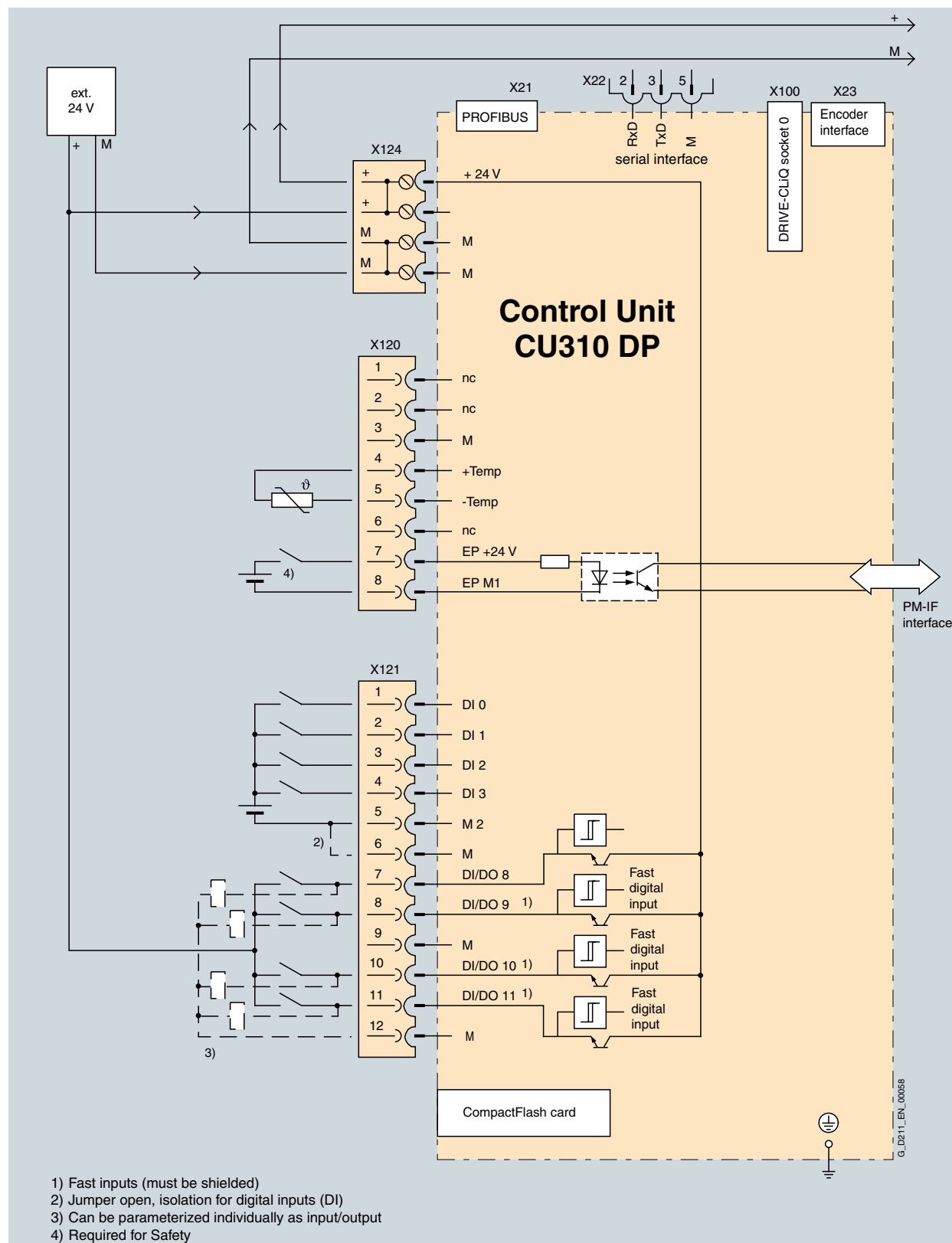
Parameter settings can be changed with the BOP20 Basic Operator Panel. The BOP20 Basic Operator Panel can also be snapped onto the CU310 DP Control Unit during operation to perform troubleshooting procedures.

The CU310 DP Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool.

A CU310 DP Control Unit communicates with the higher-level control system using PROFIBUS and the PROFIdrive V4 profile.

Integration (continued)

2



Connection example of a CU310 DP Control Unit

Technical data

CU310 DP Control Unit

Current requirement at 24 V DC, max. without taking account of digital outputs and DRIVE-CLiQ supply	0.35 A for CU310 DP
Conductor cross-section, max.	2.5 mm ²
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1 4 floating digital inputs 4 bidirectional non-floating digital inputs/digital outputs
• 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, approx. ¹⁾	
- L → H	50 μs
- H → L	100 μs
• Delay time of high-speed digital inputs, approx. ¹⁾ (high-speed digital inputs can be used for position detection)	
- L → H	5 μs
- H → L	50 μs
• Conductor cross-section, max.	0.5 mm ²
Digital outputs (sustained-short-circuit-proof)	4 bidirectional non-floating digital inputs/digital outputs
• Voltage	24 V DC
• Load current per digital output, max. ²⁾	500 mA
• Delay time, approx. ¹⁾	150 μs
• Conductor cross-section, max.	0.5 mm ²
Encoder evaluation	<ul style="list-style-type: none"> • Incremental encoder TTL/HTL • 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
• Resolution absolute position SSI	30 bit
• Cable length, max.	
- TTL encoder	100 m (only bipolar signals permitted) ³⁾
- HTL encoder	100 m for unipolar signals 300 m for bipolar signals ³⁾
- SSI encoder	100 m
Power loss	< 20 W
PE connection	M5 screw
Dimensions	
• Width	73 mm
• Height	183.2 mm
• Depth	89.6 mm
Weight, approx.	0.95 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 or output is processed.

²⁾ In order to use the digital outputs, an external 24 V power supply must be connected to terminal X124.

³⁾ Signal cables twisted in pairs and shielded.

SINAMICS S120 chassis units

System components

Control Units

CU310 PN Control Unit

Overview



The CU310 PN Control Unit for the communication and open-loop/closed-loop control functions of a Power Module is combined with the Power Module to create a powerful single drive. It communicates with the higher-level control via PROFINET IO.

Selection and ordering data

Description	Order No.
CU310 PN Control Unit (without CompactFlash card)	6SL3040-0LA01-0AA1

Accessories

Description	Order No.
STARTER commissioning tool	6SL3072-0AA00-0AG0
Industrial Ethernet FC	
• RJ45 Plug 180 (1 unit)	6GK1901-1BB10-2AA0
• RJ45 Plug 180 (10 units)	6GK1901-1BB10-2AB0
• 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, refer to Catalog IK PI.

Design

CU310 PN Control Units feature the following interfaces as standard:

- 1 DRIVE-CLiQ socket to allow communication with other DRIVE-CLiQ nodes
- 1 PM-IF interface for communication with Power Modules in blocksize format
- 1 interface to the BOP20 Basic Operator Panel
- 1 PROFINET interface with 2 ports (RJ45 sockets) with PROFINET V4 profile

- 1 encoder evaluation
The following encoder signals can be evaluated:
 - Incremental encoder TTL/HTL
 - SSI encoder without incremental signals
- 4 parameterizable digital inputs (floating)
- 4 parameterizable bidirectional digital inputs/digital outputs (non-floating)
- 1 serial RS232 interface
- 1 slot for the CompactFlash card on which firmware and parameters are stored
- 3 test sockets and one reference ground for commissioning support
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 connection for Safety Integrated
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 PE/protective conductor connection

The status of the CU310 PN Control Unit is indicated via multi-color LEDs.

A BOP20 Basic Operator Panel can, for example, be snapped directly onto the CU310 PN Control Unit for diagnostic purposes. As the firmware and parameter settings are stored on a plug-in CompactFlash card, the Control Unit can be changed without the need for software tools.

Integration

Power Modules in the chassis format are controlled from the CU310 DP Control Unit via the DRIVE-CLiQ interface. Sensor Modules and Terminal Modules must be connected to the free DRIVE-CLiQ sockets of the Power Module.

Parameter settings can be changed with the BOP20 Basic Operator Panel. The BOP20 Basic Operator Panel can also be snapped onto the CU310 PN Control Unit during operation to perform troubleshooting procedures.

The CU310 PN Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool.

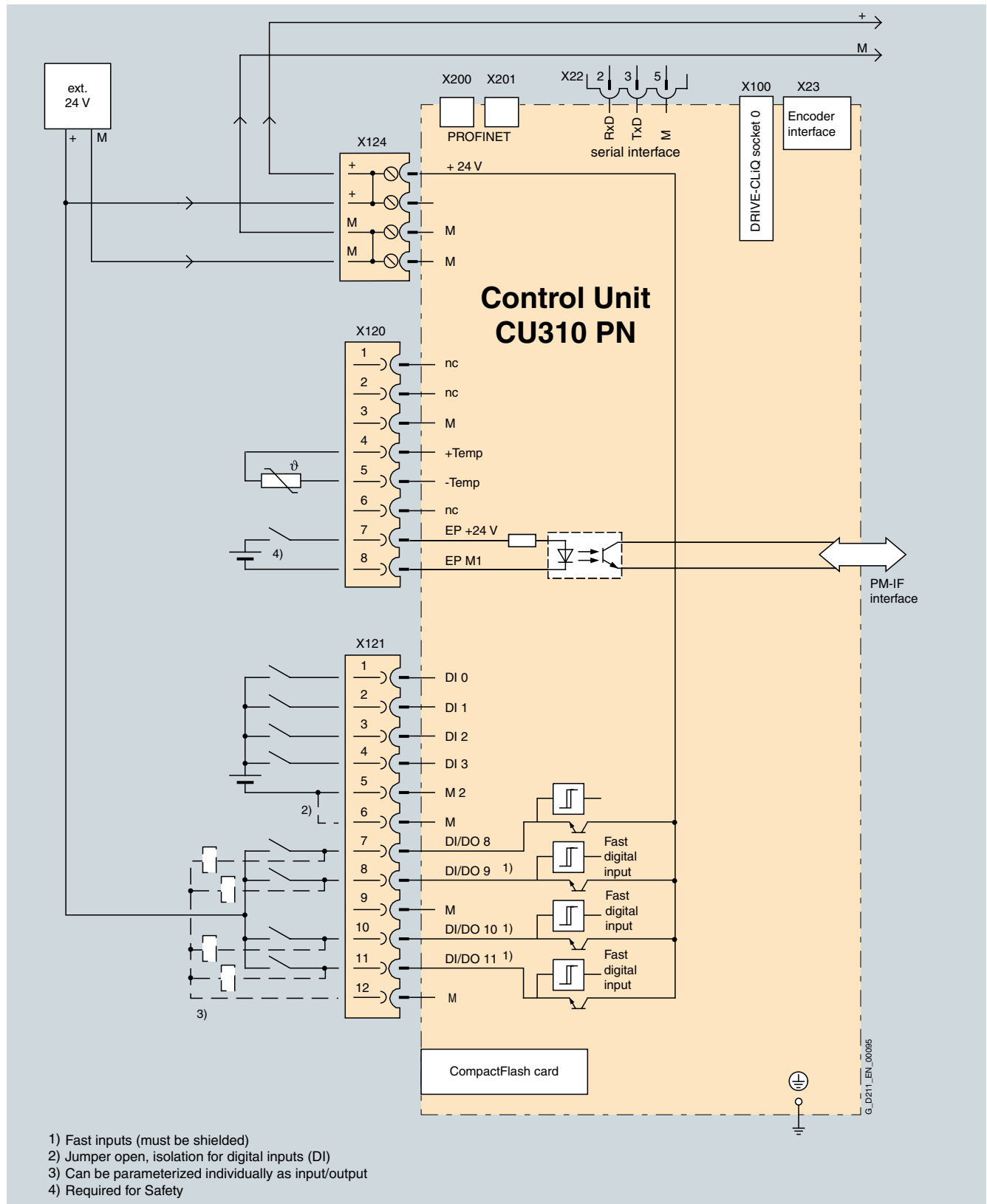
A CU310 PN Control Unit communicates with the higher-level control system using PROFINET IO and the PROFINET V4 profile.

The SINAMICS S120 drive system with CU310 PN then assumes the function of a PROFINET IO device and can perform the following functions:

- 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 PROFINET IO devices in accordance with PROFINET according to Specification V4
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 2-port switch with 2 RJ45 sockets based on the ERTEC ASIC. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

Integration (continued)

2



Connection example of a CU310 PN Control Unit

SINAMICS S120 chassis units

System components

Control Units CU310 PN Control Unit

Technical data

CU310 PN Control Unit	
Current requirement at 24 V DC, max. without taking account of digital outputs and DRIVE-CLiQ supply	0.4 A for CU310 PN
Conductor cross-section, max.	2.5 mm ²
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1 4 floating digital inputs 4 bidirectional non-floating digital inputs/digital outputs
• 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, approx. ¹⁾	
- L → H	50 μs
- H → L	100 μs
• Delay time of high-speed digital inputs, approx. ¹⁾ (high-speed digital inputs can be used for position detection)	
- L → H	5 μs
- H → L	50 μs
• Conductor cross-section, max.	0.5 mm ²
Digital outputs (sustained-short-circuit-proof)	4 bidirectional non-floating digital inputs/digital outputs
• Voltage	24 V DC
• Load current per digital output, max. ²⁾	500 mA
• Delay time, approx. ¹⁾	150 μs
• Conductor cross-section, max.	0.5 mm ²
Encoder evaluation	• Incremental encoder TTL/HTL • 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
• Resolution absolute position SSI	30 bit
• Cable length, max.	
- TTL encoder	100 m (only bipolar signals permitted) ³⁾
- HTL encoder	100 m for unipolar signals 300 m for bipolar signals ³⁾
- SSI encoder	100 m
Power loss	< 20 W
PE connection	M5 screw
Dimensions	
• Width	73 mm
• Height	183.2 mm
• Depth	89.6 mm
Weight, approx.	0.95 kg
Conformity	CE
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 or output is processed.

²⁾ In order to use the digital outputs, an external 24 V power supply must be connected to terminal X124.

³⁾ Signal cables twisted in pairs and shielded.

Overview



The CompactFlash card contains the firmware and parameter settings. It is inserted into the appropriate slot on the CU310 or CU320 Control Unit. The matching CompactFlash card together with the CU320 are supplied for the SINAMICS S150 and SINAMICS S120 Cabinet Modules drive units. The CompactFlash cards described below can be selected for SINAMICS S120 chassis units.

Design

A CU320 Control Unit can perform the communication, open-loop and closed-loop control functions for several power units. The computing capacity requirement increases in proportion to the number of power units and system components and in relation to the dynamic response required. The full computing capacity of the CU320 Control Unit is only available on systems with performance expansion 1.

The CU310 Control Unit has been designed to control a single axis. Performance expansion 1 is not required in this case.

In addition to the firmware, the CompactFlash card also contains licensing codes, which are required to enable firmware options - currently performance expansion 1 and the *Safety Integrated Extended* functions ("Safe Stop 2", "Safe Operating Stop", "Safely Limited Speed", "Safe Speed Monitor").

The computing capacity requirement and utilization of the CU320 Control Unit can be calculated with the SIZER engineering tool.

The firmware options can also be enabled on-site, for example, if the performance expansions required are not known at the time of ordering or the *Safety Integrated Extended* functions are to be enabled retrospectively. You will need the serial number of the CompactFlash card and the order number of the firmware option to be enabled. With this information, the relevant license code can be purchased from a license database and the firmware option enabled. The license code is only valid for the CompactFlash card declared and cannot be transferred to other CompactFlash cards.

Selection and ordering data

CompactFlash card SINAMICS S120	
Description	Order No.
CompactFlash card SINAMICS S120 for Control Units CU310 DP, CU310 PN, CU320 with current firmware version including Certificate of License	
• without performance expansion	6SL3054-0AA00-1AA0
• with performance expansion 1 firmware option	6SL3054-0AA01-1AA0
Firmware license	
• Performance expansion 1 including Certificate of License for upgrading the license of a CompactFlash card	6SL3074-0AA01-0AA0

Further information

Firmware version

The firmware version is encoded in the order number of the CompactFlash card supplied. If the CompactFlash card with Order No. 6SL3054-0AA0.-1AA0 is ordered for the current firmware version, its order number is different to the order number of the CompactFlash card supplied.

The firmware version is encoded as follows in the order number printed on the CompactFlash card:

Order No.	6SL3054- 0□□0□-1AA0
Firmware version	↑
	1 B
	2 C
	3 D
	4 E
	↑
	.1 B
	.2 C
	.3 D
	.4 E
	.5 F
	.6 G
	↑
without performance expansion	0
with performance expansion 1	1

SINAMICS S120 chassis units

System components

Supplementary system components

BOP20 Basic Operator Panel

Overview



BOP20 Basic Operator Panel

The BOP20 Basic Operator Panel can be snapped onto any CU310 or CU320 Control Unit and may be used to acknowledge faults, set parameters and read diagnostic information (e.g. alarm and fault messages).

Design

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

The integrated plug connector on the rear side of the BOP20 Basic Operator Panel provides the power to the BOP20 Basic Operator Panel and the communication with the CU310 or CU320 Control Unit.

Selection and ordering data

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

Integration



CU310 DP Control Unit with attached BOP20 Basic Operator Panel



CU320 Control Unit with attached BOP20 Basic Operator Panel

SINAMICS S120 chassis units

System components

Supplementary system components AOP30 Advanced Operator Panel

Overview



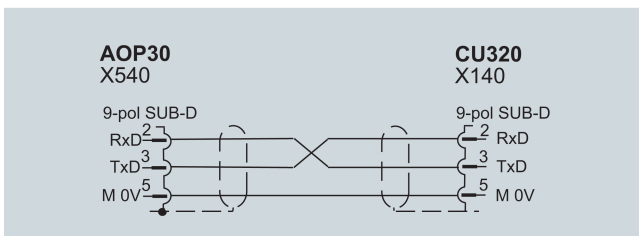
The AOP30 Advanced Operator Panel is an input/output device for the SINAMICS series, preferably for cabinet mounting.

It has the following features and characteristics:

- Graphical backlit LCD display for plain text display and a bar display of process variables
- LEDs for display of operating modes
- 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 terminal block/PROFIBUS)
- 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 the keyboard lock so that only parameter values and process variables can be displayed on the operating panel. A password can be used to prevent the unauthorized modification of converter parameters.
- Degree of protection IP 55 (when mounted)

If a Control Unit is responsible for more than just one power unit (multi-motor operation), then the system can be parameterized so that parameters, alarms and faults relating to all the devices connected to the CU320 can be simultaneously displayed. The AOP30 and the SINAMICS drive communicate via the serial RS 232 interface with 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 RS 232 interface on the CU320 Control Unit. In this case, an external 24 V power supply (max. current requirement 200 mA) is required.



Assignment of the serial plug-in cable

Design

The AOP30 is an operator panel with graphical display and membrane keyboard. The device can be installed in a cabinet door (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
- RS 232 interface
- Time and date memory with internal battery backup
- 4 LEDs to signal the operating state of the drive:
 - RUN green
 - ALARM yellow
 - FAULT red
 - Local/Remote green

Function

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

Chinese, German, English, French, Italian and Spanish are stored on the CU320 Control Unit CompactFlash card as operator panel languages. The desired language must be downloaded to the AOP30 prior to commissioning.

On request, Russian, Polish, and Czech are available in addition to these languages installed as standard.

Selection and ordering data

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

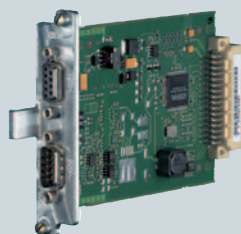
The AOP30 is installed as standard in the cabinet door of the SINAMICS S150. For the SINAMICS S120 Cabinet Modules system, it can be ordered as an option by specifying order code **K08**.

No further connections need to be made and no other materials are required.

Accessories

RS 232 plug-in cable for connecting the AOP to the CU320	Order No.
1 m long	6FX8002-1AA01-1AB0
2 m long	6FX8002-1AA01-1AC0
3 m long	6FX8002-1AA01-1AD0
4 m long	6FX8002-1AA01-1AE0
5 m long	6FX8002-1AA01-1AF0
6 m long	6FX8002-1AA01-1AG0
7 m long	6FX8002-1AA01-1AH0
8 m long	6FX8002-1AA01-1AJ0
9 m long	6FX8002-1AA01-1AK0
10 m long	6FX8002-1AA01-1BA0

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
- Signals the operating state according to 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 data

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
Conformity	CE
Approvals	cULus (File No.: E164110)

Selection and ordering data

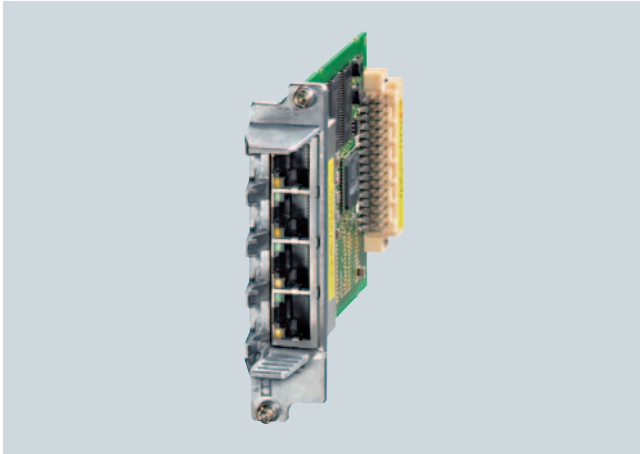
Description	Order No.
CBC10 Communication Board	6SL3055-0AA00-2CA0

For the series SINAMICS S150 and SINAMICS S120 Cabinet Modules, the CBC10 is ordered as an option by specifying order code **G20**.

Accessories

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

Overview



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

In the PROFINET context, SINAMICS then assumes the function of a PROFINET IO device and can perform the following functions:

- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
 - RT (Real-Time)
 - IRT (Isochronous Real-Time), minimum send cycle 500 µs
- Connection to control systems as PROFINET IO devices in accordance with PROFIdrive according to 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.

Design

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

Technical data

Communication Board CBE20	
Current requirement at 24 V DC	0.16 A
Ambient temperature, permissible	
• Storage and transport	-40 ... +70 °C
• Operation	0 ... 55 °C
Dimensions	130 mm × 78 mm
Weight, approx.	76 g
Conformity	CE
Approvals	cULus (File No.: E164110)

Selection and ordering data

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

For the series SINAMICS S150 and SINAMICS S120 Cabinet Modules, the CBE20 is ordered as an option by specifying order code **G33**.

Accessories

The PROFINET cables and connectors listed below are recommended:

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, refer to Catalog IK PI.

SINAMICS S120 chassis units

System components

Supplementary system components

DMC20 DRIVE-CLiQ Hub Module

Overview



The DMC20 DRIVE-CLiQ Hub Module is used to implement a star-shaped configuration of a DRIVE-CLiQ line. Two DMC20 DRIVE-CLiQ Hub Modules can be connected in series (cascaded).

Selection and ordering data

Description	Order No.
DMC20 DRIVE-CLiQ Hub Module (without DRIVE-CLiQ cable)	6SL3055-0AA00-6AA0

Design

The following are located on the DMC20 DRIVE-CLiQ Hub Module:

- 6 DRIVE-CLiQ sockets for connecting 5 DRIVE-CLiQ devices
- 1 connection for the electronics power supply via the 24 V DC supply connector

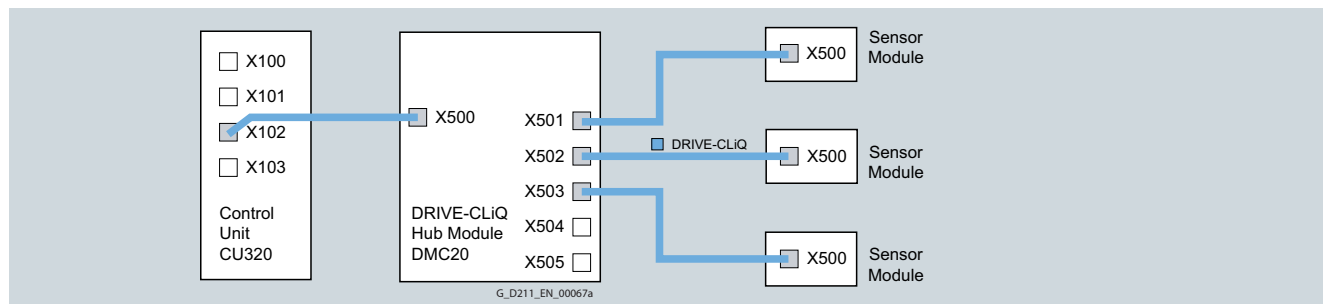
The status of the DMC20 DRIVE-CLiQ Hub Module is indicated via a multi-color LED.

Technical data

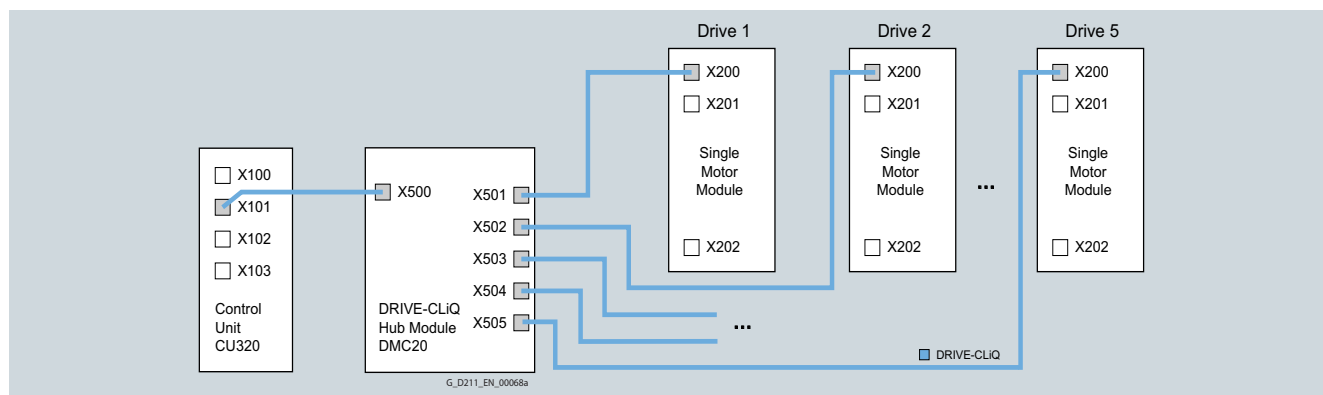
DMC20 DRIVE-CLiQ Hub Module	
Current requirement, max. at 24 V DC without DRIVE-CLiQ supply	0.15 A
• Conductor cross-section, max.	2.5 mm ²
Dimensions	
• Width	50 mm
• Height	150 mm
• Depth	111 mm
Weight, approx.	0.8 kg
Conformity	CE
Approvals	cULus (File No.: E164110)

Integration

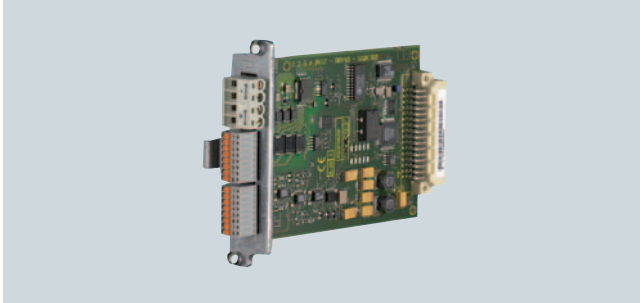
Signals from more than one encoder can be collected with the DRIVE-CLiQ DMC20 Hub Module and forwarded to the Control Unit through a single DRIVE-CLiQ cable.



The DRIVE-CLiQ DMC20 Hub Module allows individual DRIVE-CLiQ devices to be removed without interrupting the data exchange with the remaining devices in the DRIVE-CLiQ line.



Overview



The TB30 Terminal Board supports the addition of digital inputs/digital outputs and analog inputs/analog outputs to the CU320 Control Unit.

Design

The following are located on the TB30 Terminal Board:

- Power supply for digital inputs/digital outputs
- 4 digital inputs
- 4 digital outputs
- 2 analog inputs
- 2 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 Control Unit.

Selection and ordering data

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

Technical data

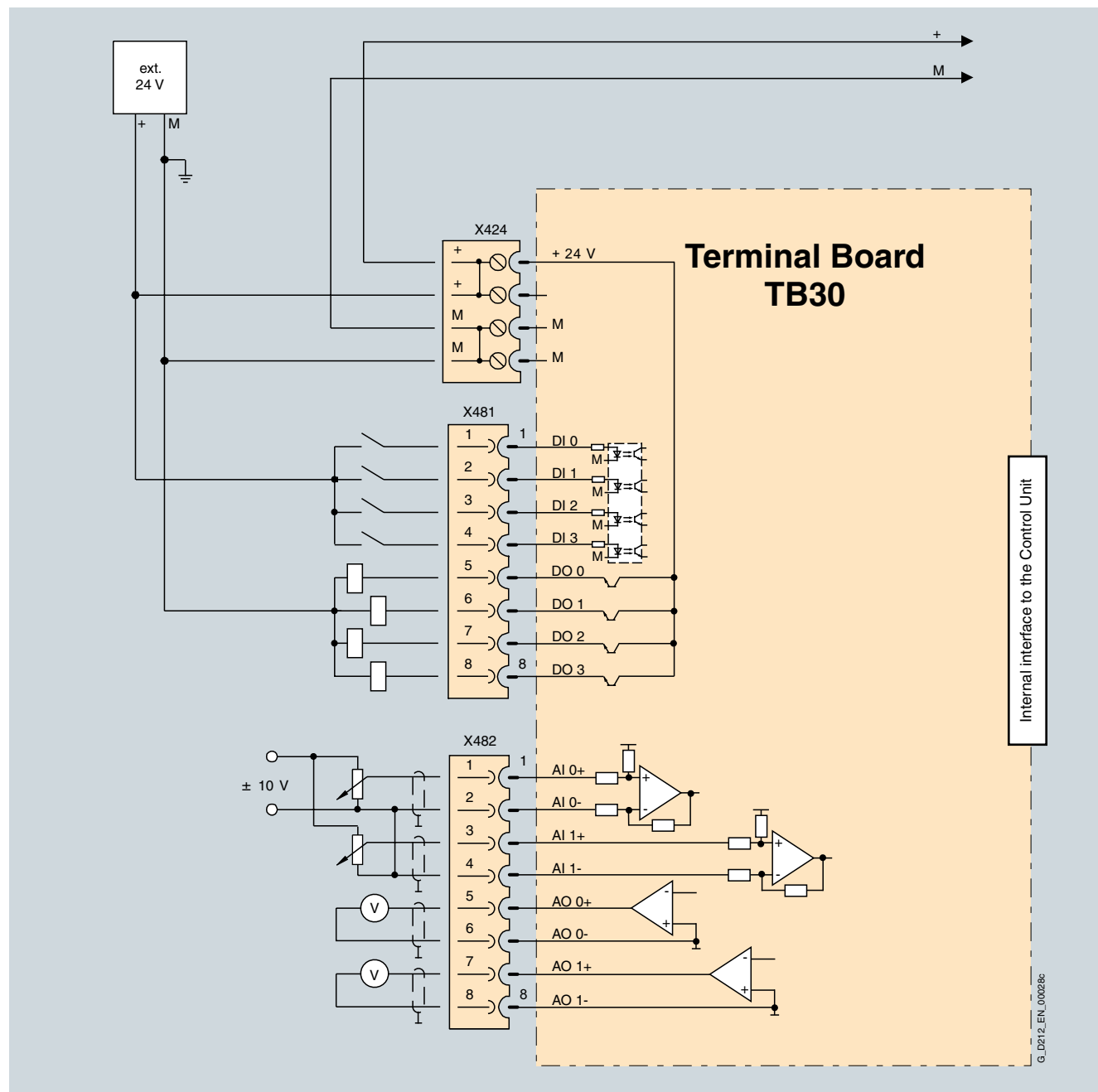
TB30 Terminal Board	
Current requirement, max. at 24 V DC via CU320 Control Unit without taking account of digital outputs	0.05 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
Digital inputs In accordance with IEC 61131-2 Type 1	
• Voltage	-3 ... +30 V
• Low level (an open digital 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 (sustained-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 (sustained-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
Conformity	CE
Approvals	cULus (File No.: E164110)

¹⁾ The specified delay times refer to the hardware. The actual reaction time depends on the time slot in which the digital input is processed.

²⁾ If the analog input is to be operated as a quasi signal processor with continuously variable input voltage, the sampling frequency $f_a = 1/t_{\text{time slice}}$ must be at least twice the value of the highest signal frequency f_{max} .

Integration

2



Connection example of a TB30 Terminal Board

Overview



The number of available digital inputs and outputs within a drive system can be expanded with the TM15 Terminal Module.

Design

The following are located on the TM15 Terminal Module:

- 24 bidirectional digital inputs/outputs (isolation in 3 groups with 8 channels each)
- 24 green status LEDs for indicating the logical signal status of the relevant terminal
- 2 DRIVE-CLiQ sockets
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 PE/protective conductor connection

The TM15 Terminal Module can be snapped onto a TH 35 top-hat rail to EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM15 Terminal Module via a shield connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1. The shield connection terminal must not be used for strain relief.

The status of the TM15 Terminal Module is indicated via a multi-color LED.

Selection and ordering data

Description	Order No.
TM15 Terminal Module (without DRIVE-CLiQ cable)	6SL3055-0AA00-3FA0

Technical data

TM15 Terminal Module	
Current requirement, max. with 24 V DC without load	0.15 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
Number of DRIVE-CLiQ sockets	2
I/O devices	
• Digital inputs/outputs	Channelwise parameterizable as DI or DO
• Number of digital inputs/outputs	24
• Galvanic isolation	Yes, in groups of 8
• Connection system	Plug-in screw-type terminals
• Conductor cross-section, max.	1.5 mm ²
Digital inputs	
• Voltage	-30 ... +30 V
• Low level (an open digital input is interpreted as "low")	-30 ... +5 V
• High level	15 ... 30 V
• Current consumption at 24 V DC	5 ... 11 mA
• Delay times ¹⁾ of digital inputs, typical	
- L → H	50 μs
- H → L	100 μs
Digital outputs (sustained-short-circuit-proof)	
• Voltage	24 V DC
• Load current per digital output, max.	0.5 A
• Delay times (resistive load) ¹⁾	
- L → H, typ.	50 μs
- L → H, max.	100 μs
- H → L, typ.	150 μs
- H → L, max.	225 μs
• Aggregate current of outputs (per group), max.	
- up to 60 °C	2 A
- up to 50 °C	3 A
- up to 40 °C	4 A
Power loss	< 3 W
PE connection	M4 screw
Dimensions	
• Width	50 mm
• Height	150 mm
• Depth	111 mm
Weight, approx.	0.86 kg
Conformity	CE
Approvals	cULus (File No.: E164110)

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

SINAMICS S120 chassis units

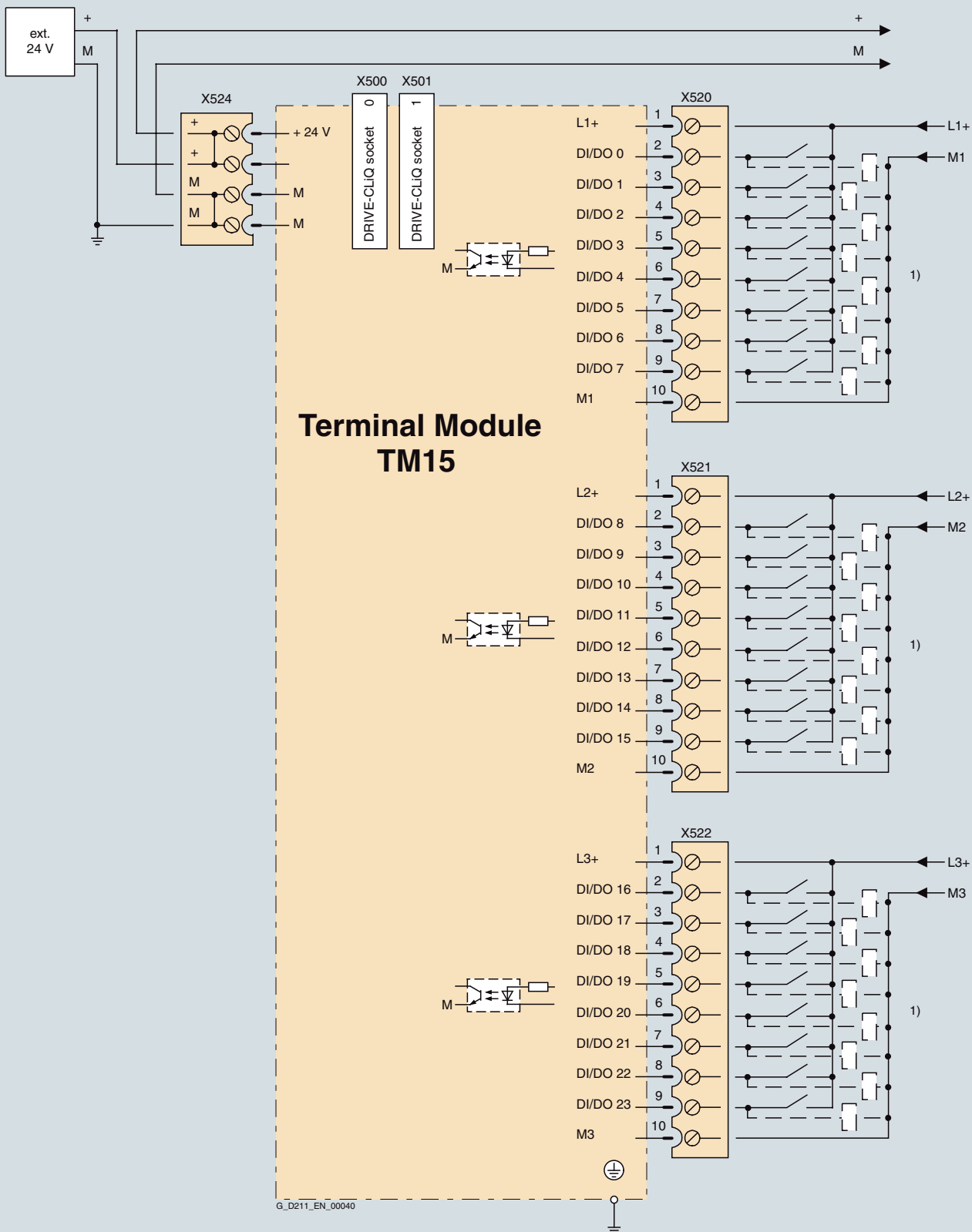
System components

Supplementary system components

TM15 Terminal Module

Integration

The TM15 Terminal Module communicates with the CU310 or CU320 Control Unit via DRIVE-CLiQ.



Connection example of a TM15 Terminal Module

Overview



The TM31 Terminal Module can be used to increase the number of available digital inputs and outputs and the number of analog input and outputs within a drive system. The TM31 Terminal Module also features relay outputs with changeover contact and a temperature sensor input.

Design

The following are located on the TM31 Terminal Module:

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

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

The signal cable shield can be connected to the TM31 Terminal Module via a shield connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1. 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 data

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

TM31 Terminal Module

Digital inputs

in accordance with IEC 61131-2 Type 1

- Voltage
- Low level (an open digital input is interpreted as "low")
- High level
- Current consumption at 24 V DC, typ.
- Delay times of digital inputs, approx. ¹⁾
 - L → H
 - H → L
- Conductor cross-section, max.

-3 ... +30 V
-3 ... +5 V
15 ... 30 V
10 mA
50 µs
100 µs
1.5 mm²

Digital outputs

(sustained-short-circuit-proof)

- Voltage
- Load current per digital output, max.
- Aggregate current of digital outputs, max.
- Delay times of digital outputs ¹⁾
 - typ.
 - max.
- Conductor cross-section, max.

24 V DC
100 mA
400 mA
150 µs at 0.5 A resistive load
500 µs
1.5 mm²

Analog inputs

(a switch is used to toggle between voltage and current input)

- As voltage input
 - Voltage range
 - Internal resistance R_i
- As current input
 - Current range
 - Internal resistance R_i
 - Resolution ²⁾
- Conductor cross-section, max.

-10 ... +10 V
100 kΩ
4 ... 20 mA,
-20 ... +20 mA,
0 ... 20 mA
250 Ω
11 bit + sign
1.5 mm²

Analog outputs (sustained-short-circuit-proof)

- Voltage range
- Load current, max.
- Current range

-10 ... +10 V
-3 ... +3 mA
4 ... 20 mA,
-20 ... +20 mA,
0 ... 20 mA
500 Ω for outputs in the range
-20 ... +20 mA
11 bit + sign
1.5 mm²

- Load resistance, max.

- Resolution

- Conductor cross-section, max.

Relay outputs (changeover contacts)

- Load current, max.
- Operating voltage, max.
- Switching capacity, max.
 - at 250 V AC
 - at 30 V DC

8 A
250 V AC, 30 V DC
2000 VA (cos φ = 1)
750 VA (cos φ = 0.4)
240 W (resistive load)
100 mA
2.5 mm²

- Required minimum current
- Conductor cross-section, max.

Power loss

< 10 W

PE connection

M4 screw

Dimensions

- Width
- Height
- Depth

50 mm
150 mm
111 mm

Weight, approx.

0.87 kg

Conformity

CE

Approvals

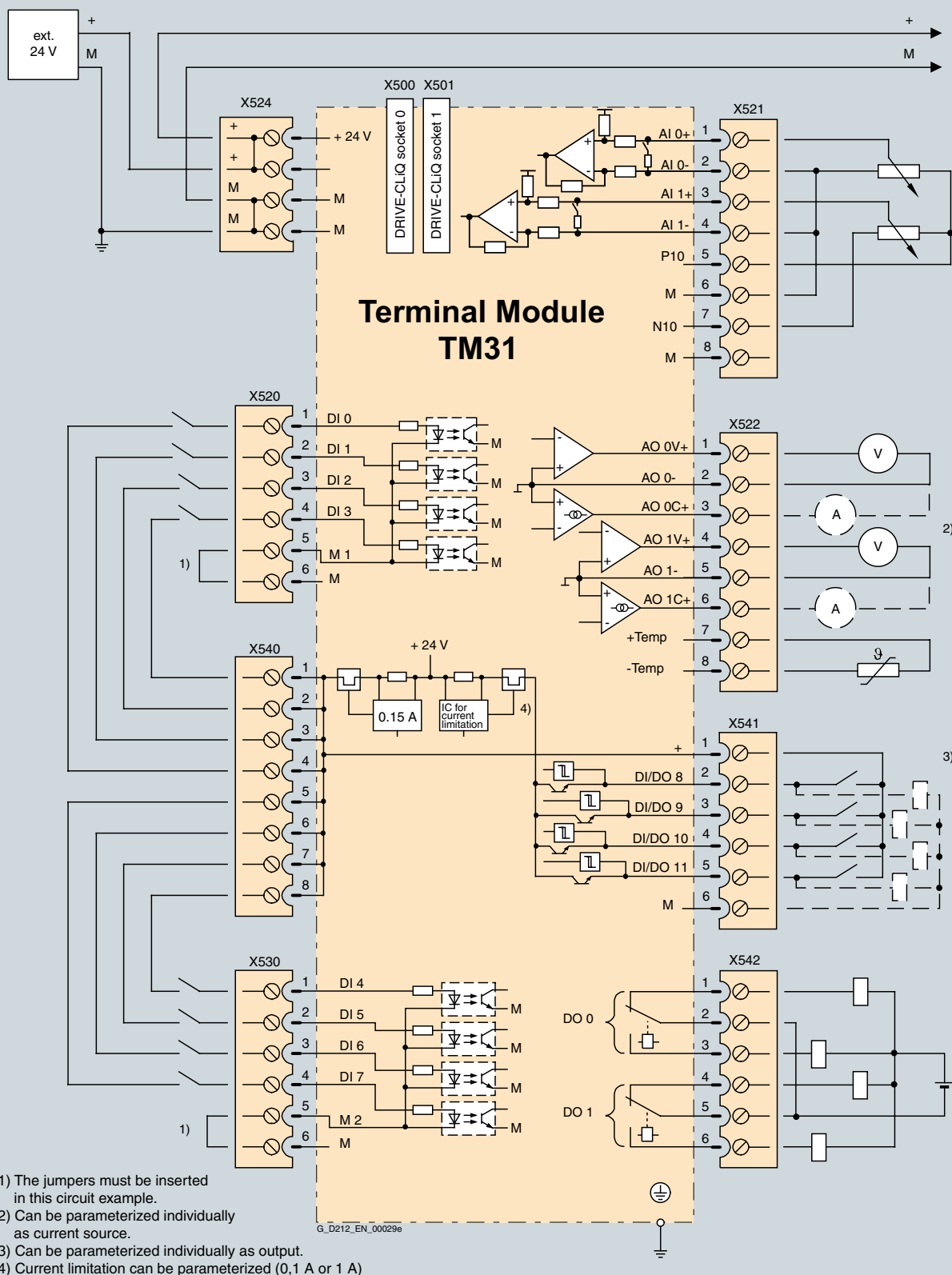
cULus
(File No.: 164110)

¹⁾ The specified delay times refer to the hardware. The actual reaction time depends on the time slot in which the digital input is processed.

²⁾ If the analog input is to be operated as a quasi signal processor with continuously variable input voltage, the sampling frequency $f_a = 1/t_{\text{time slice}}$ must be at least twice the value of the highest signal frequency f_{max} .

Integration

The TM31 Terminal Module communicates with the CU310 or CU320 Control Unit via DRIVE-CLiQ.



Connection example of a TM31 Terminal Module

Overview



The TM41 Terminal Module supplies TTL signals which emulate an incremental encoder, e.g. to a higher-level control. The encoder interface (incremental encoder emulation) can be linked to an encoder signal from the Control Unit, e.g. incremental encoder sin/cos, by parameter assignment.

The TM41 Terminal Module increases the number of digital inputs/outputs and analog inputs that are available in the drive system.

Design

The following are located on the TM41 Terminal Module:

- 4 bidirectional digital inputs/outputs
- 4 digital inputs (with electrical isolation)
- 1 analog input
- 1 interface for emulation of TTL incremental encoder (RS422)
- 1 LED for signaling zero mark detection for encoder interface
- 2 DRIVE-CLiQ sockets
- 1 connection for the 24 V DC supply of the digital outputs
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 PE/protective conductor connection

The TM41 Terminal Module can be snapped onto a TH 35 top-hat rail to EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM41 Terminal Module via a shield connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1. The shield connection terminal must not be used for strain relief.

The status of the TM41 Terminal Module is indicated via a multi-color LED.

An LED next to the interface for TTL pulse encoder emulation is illuminated as soon as a zero mark is detected.

Selection and ordering data

Description	Order No.
TM41 Terminal Module (without DRIVE-CLiQ cable)	6SL3055-0AA00-3PA0

Technical data

TM41 Terminal Module	
Current requirement (X524 at 24 V DC) without DRIVE-CLiQ supply or digital outputs (X514)	0.2 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
I/O devices	
• Digital inputs/outputs	Individually parameterizable as DI or DO
• Number of digital inputs/outputs	4
• Number of digital input/outputs (with isolation)	4
• Connection system	Plug-in screw-type terminals
• Conductor cross-section, max.	1.5 mm ²
Digital inputs	
• Voltage	-3 ... +30 V (digital inputs without isolation) -30 ... +30 V (digital inputs with isolation) -3 ... +5 V (digital inputs without isolation) -30 ... +5 V (digital inputs with isolation)
• Low level (an open digital input is interpreted as "low")	15 ... 30 V
• High level	< 9 mA
• Current consumption at 24 V DC, typ.	
• Delay times of digital inputs, max. ¹⁾	
- L → H	3 ms
- H → L	3 ms
Digital outputs (sustained-short-circuit-proof)	
• Voltage	24 V DC
• Load current per digital output, max.	0.5 A
• Delay times (resistive load) ¹⁾	
- L → H, typ.	50 μs
- L → H, max.	100 μs
- H → L, typ.	75 μs
- H → L, max.	150 μs
Analog input (difference)	
• Voltage range	-10 ... +10 V
• Internal resistance	≥ 40 kΩ
• Resolution ²⁾	13 bit + sign
Pulse encoder emulation	
• Level	TTL (RS422), A+, A-, B+, B-, zero track N+, N-
• Limit frequency f_{max} .	256 kHz
• Ratio	1 : 1 for incremental encoder sin/cos and TTL/HTL (evaluation for resolver being prepared)
Encoder pulses: Encoder emulation	
PE connection	
• Width	M4 screw
• Height	50 mm
• Depth	150 mm
	111 mm
Weight, approx.	0.85 kg
Conformity	CE
Approvals	cULus (File No.: E164110)

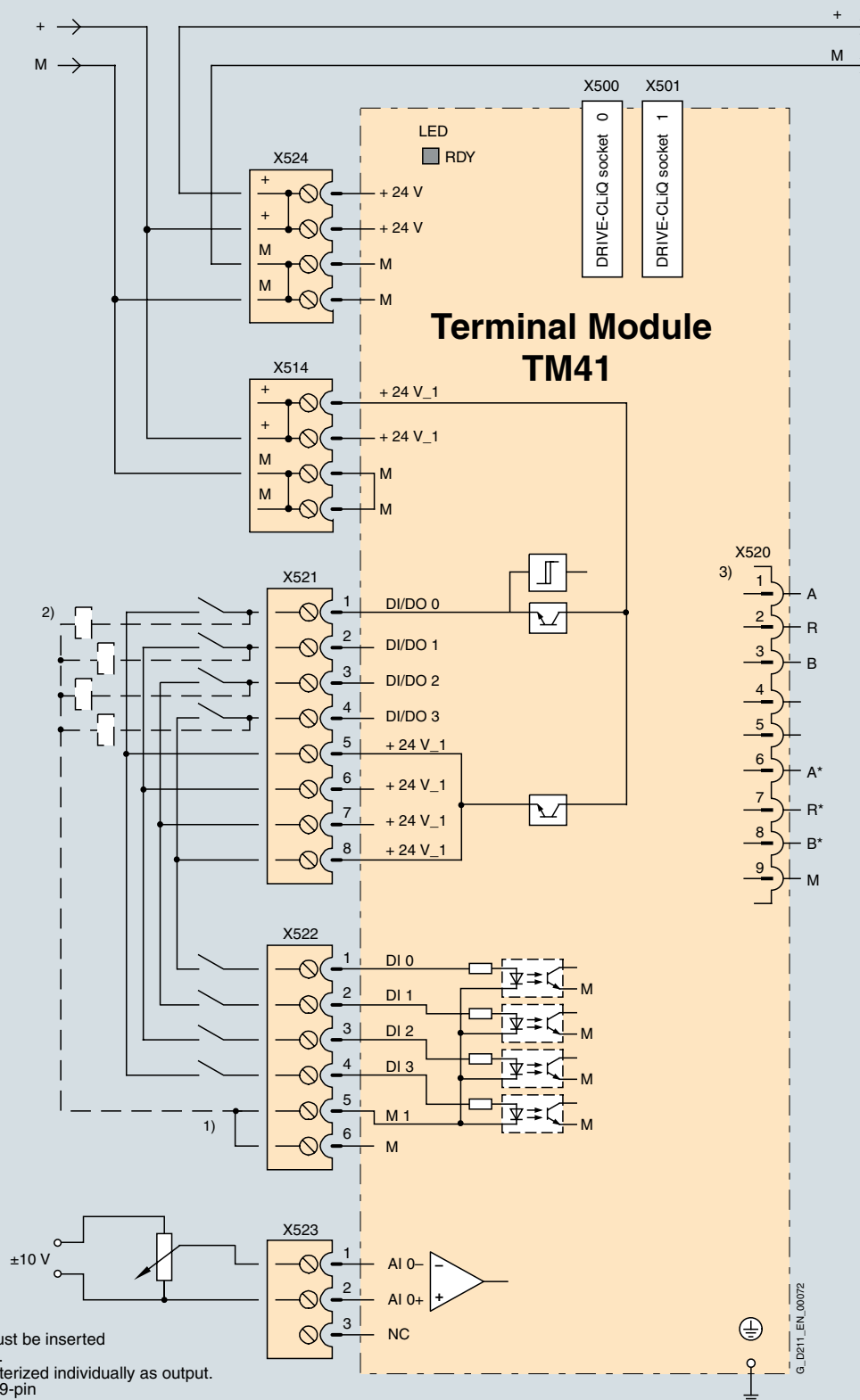
¹⁾ The specified delay times refer to the hardware. The actual reaction time depends on the time slot in which the digital input/output is processed.

²⁾ If the analog input is to be operated as a quasi signal processor with continuously variable input voltage, the sampling frequency $f_{\Delta} = 1/t_{\text{time slice}}$ must be at least twice the value of the highest signal frequency f_{max} .

Integration

The TM41 Terminal Module communicates with the CU310 or CU320 Control Unit via DRIVE-CLiQ.

2



Connection example of a TM41 Terminal Module

Overview



The TM54F Terminal Module is a dual-processor I/O interface with 4 fail-safe digital outputs and 10 fail-safe digital inputs for utilization of the Safety Integrated functions of the SINAMICS S120 drive system in conjunction with external actuators and sensors.

The Safety Integrated basic functions (STO, SBC and SS1) can either be controlled over the existing terminals on the Motor Module and the CU320 or CU310 Control Unit or over the TM54F Terminal Module.

The Safety Integrated Extended functions (SS2, SOS, SLS and SSM) can only be controlled over the TM54F Terminal Module or PROFIsafe.

The fail-safe digital inputs and outputs have two channels and are redundantly configured with an internal data cross-check using the two processors. A fail-safe digital output consists of one current sourcing and one current sinking output as well as a digital input for reading back the switching state. A fail-safe digital input consists of two digital inputs.

Safety sensors can be connected over two switchable 24 V sensor supplies and evaluated via the fail-safe digital inputs. The switchable 24 V sensor supply ensures that the fail-safe digital inputs can be dynamized to detect dormant errors (fault checking procedure). An non-switchable 24 V sensor supply is additionally provided by the TM54F Terminal Module for connecting safety sensors that cannot be dynamized.

One TM54F Terminal Module can be connected to a CU310, CU320, SIMOTION D or SIMOTION CX32 Control Unit over DRIVE-CLiQ. Additional devices can be operated on the same DRIVE-CLiQ line, e.g. Terminal Modules, Sensor Modules and Motor Modules (but not an additional TM54F Terminal Module).

Design

The following are located on the TM54F Terminal Module:

- 4 fail-safe digital outputs
- 10 fail-safe digital inputs
- 4 LEDs, single color for indicating the status of the read back channel of the fail-safe digital outputs
- 4 LEDs, dual-color for indicating the status of the fail-safe digital outputs
- 20 LEDs, dual-color for indicating the status of the fail-safe digital inputs
- 3 LEDs, single color for indicating the status of the 24 V sensor supplies
- 2 DRIVE-CLiQ sockets
- 2 connections for 24 V sensor supply, switchable
- 1 connection for 24 V sensor supply, non-switchable
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 connection for the 24 V power supply to digital outputs and sensors
- 1 PE/protective conductor connection

The TM54F Terminal Module can be snapped onto a TH 35 top-hat rail according to EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM54F Terminal Module via a shield connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1. The shield connection terminal must not be used for strain relief.

The status of the TM54F Terminal Module is indicated via a multi-color LED.

Pins for connector coding are supplied with the TM54F Terminal Module.

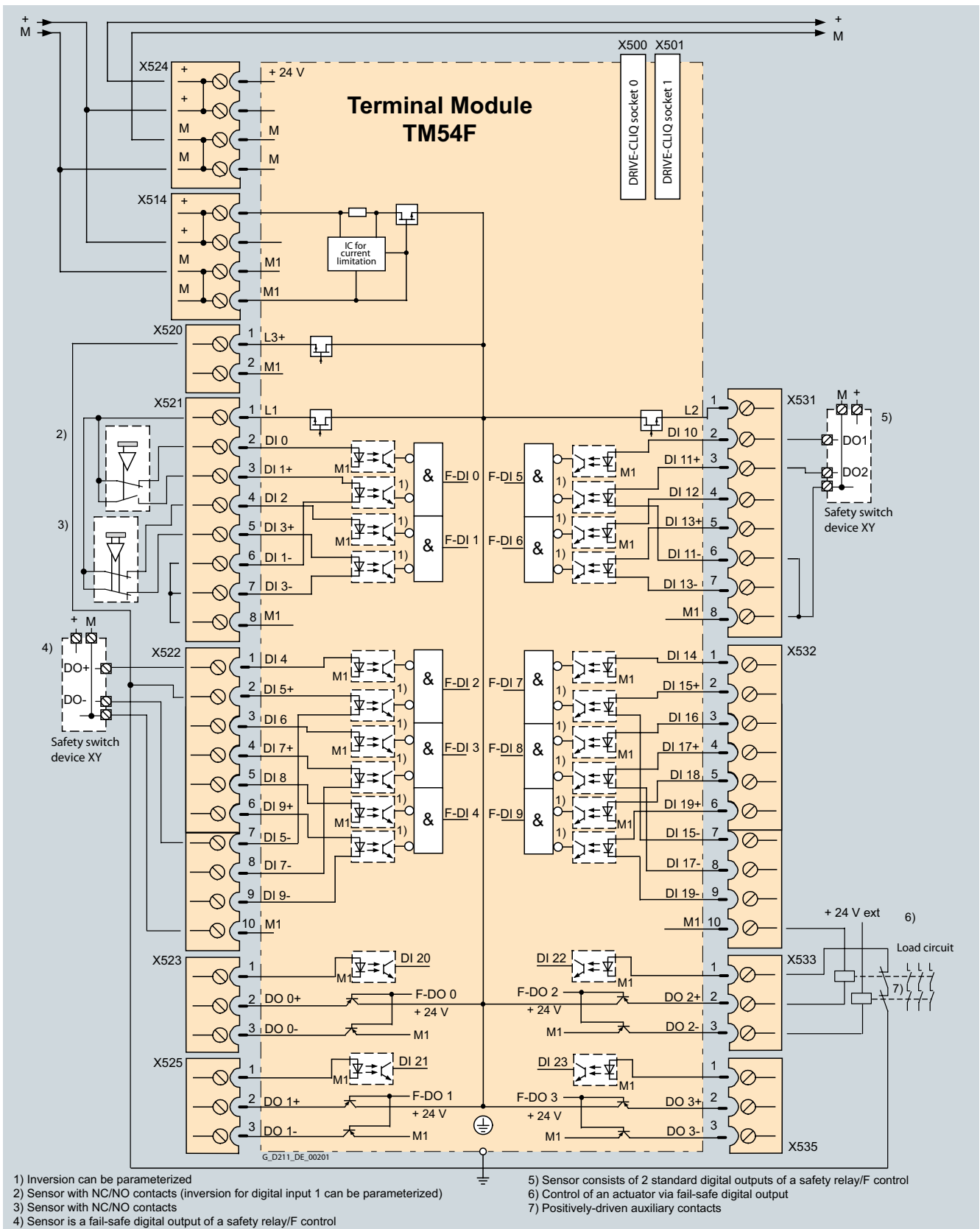
Selection and ordering data

Description	Order No.
TM54F Terminal Module (without DRIVE-CLiQ cable)	6SL3055-0AA00-3BA0

Integration

The TM54F Terminal Module communicates with the CU310 or CU320 Control Unit via DRIVE-CLiQ.

2



Connection example of a TM54F Terminal Module

Technical data

TM54F Terminal Module	
Current requirement (X524 at 24 V DC) without DRIVE-CLiQ supply	0.2 A
<ul style="list-style-type: none"> Conductor cross-section, max. Fuse protection, max. 	2.5 mm ² 20 A
Max. current requirement ext. 24 V for supplying the digital outputs and 24 V sensor supply (X514 at 24 V DC)	4 A
<ul style="list-style-type: none"> Conductor cross-section, max. Fuse protection, max. 	2.5 mm ² 20 A
I/O devices <ul style="list-style-type: none"> Number of fail-safe digital inputs Number of fail-safe digital outputs 24 V sensor supply Connection system Conductor cross-section, max. 	10 4 3, of which 2 can be temporarily shut down using a safety function for dynamizing fail-safe digital inputs, current carrying capacity 0.5 A each Plug-in screw-type terminals 1.5 mm ²
Digital inputs (with electrical isolation) <ul style="list-style-type: none"> Voltage Low level (an open digital input is interpreted as "low") High level Current consumption at 24 V DC, typ. Delay time of digital inputs, approx.¹⁾ Safe state 	-30 ... +30 V -30 ... +5 V 15 ... 30 V 3.7 mA 150 μs Low level (for inputs that can be inverted: without inversion)
Digital outputs (sustained-short-circuit-proof) <ul style="list-style-type: none"> Voltage Load current per fail-safe digital output, max.²⁾ Delay times (resistive load)¹⁾ Safe state 	24 V DC 0.5 A 150 μs Output switched off
Scanning cycle t_{SI} for fail-safe digital inputs or fail-safe digital outputs	4 ... 25 ms (adjustable)
Response time <ul style="list-style-type: none"> Fail-safe digital input → Motor Module Motor Module → Fail-safe digital output 	$2 \times t_{SI} + 1 \text{ ms} + 3 \times \text{DRIVE-CLiQ cycle}$ $2 \times t_{SI} + 3 \times \text{DRIVE-CLiQ cycle}$
PE connection	M4 screw
Dimensions <ul style="list-style-type: none"> Width Height Depth 	50 mm 150 mm 111 mm
Weight, approx.	0.9 kg
Conformity	CE
Approvals	cULus (File No.: E164110)
Safety Integrated	Safety Integrity Level 2 (SIL2) acc. to IEC 61508, Control Category 3 acc. to EN 954-1, Category 3 and Performance Level d acc. to EN ISO 13849-1

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

²⁾ The total current of all fail-safe digital outputs must not exceed 5.33 A.

SINAMICS S120 chassis units

System components

Encoder system connection VSM10 Voltage Sensing Module

Overview



The VSM10 Voltage Sensing Module allows the line supply or motor voltage characteristic to be precisely sensed. Further, the VSM10 can be used to switch the drive converter onto a rotating synchronous motor ("flying restart" function).

The VSM10 Voltage Sensing Module is integrated in chassis format Active Interface Modules and in the chassis format Smart Line Modules.

Design

The VSM10 Voltage Sensing Module has the follow. interfaces:

- 1 connection for direct voltage sensing up to 690 V
- 1 connection for voltage sensing using voltage transformers, maximum voltage 100 V
- 2 analog inputs (reserved for resonance monitoring in Active Interface Modules in chassis format)
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 DRIVE-CLiQ socket
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 PE/protective conductor 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.

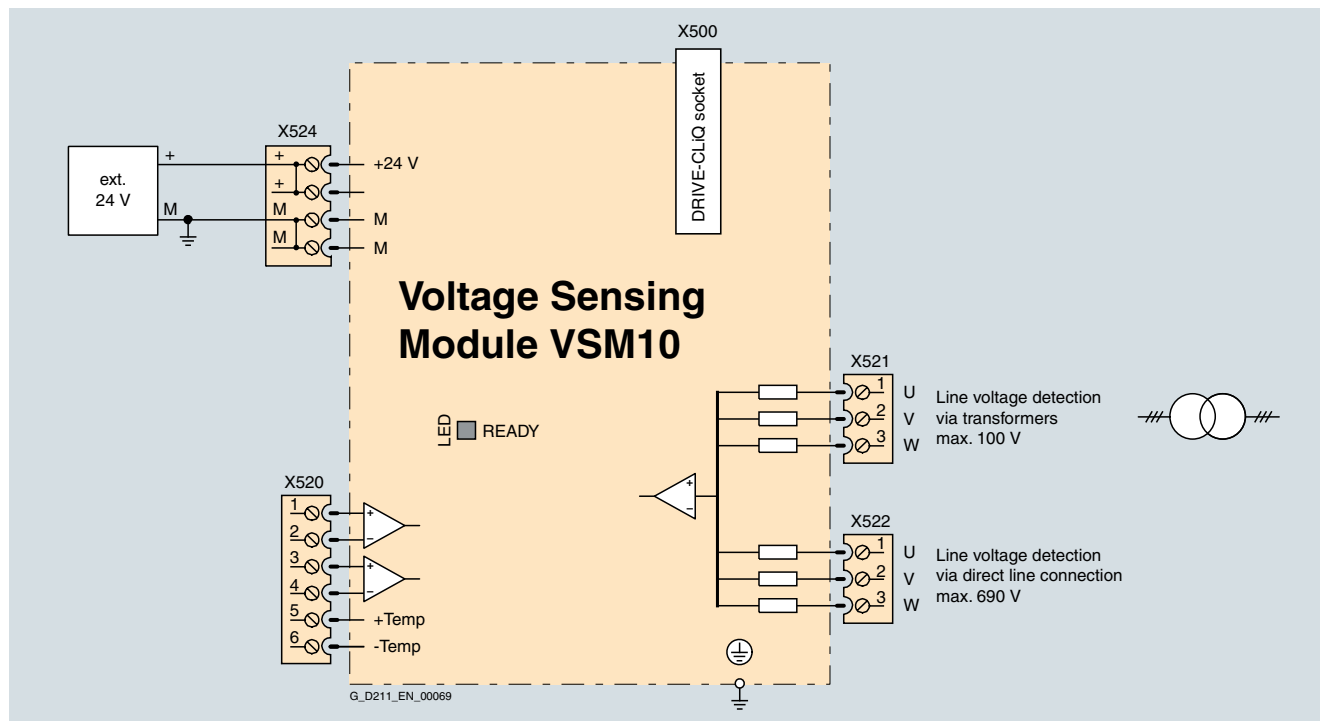
Selection and ordering data

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

For the series SINAMICS S150 and SINAMICS S120 Cabinet Modules, the VSM10 is ordered as an option by specifying order code **K51** (to implement the "flying restart" function).

Integration

The VSM10 Voltage Sensing Module communicates with the CU320 or SIMOTION D4x5 Control Unit.



Connection example of a VSM10 Voltage Sensing Module

Technical data

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
Line voltage sensing	
• Input resistance	
- Terminal X521	> 362 kΩ/phase
- Terminal X522	> 2.5 MΩ/phase
Analog inputs (reserved for monitoring an Active Interface Module in chassis format)	
• Internal resistance (between differential inputs)	approx. 100 kΩ
• Resolution	12 bit
PE connection	M4 screw
Dimensions	
• Width	50 mm
• Height	150 mm
• Depth	111 mm
Weight, approx.	0.9 kg
Conformity	CE
Approvals	cULus (File No.: E164110)

SINAMICS S120 chassis units

System components

Encoder system connection SMC10 Sensor Module Cabinet-Mounted

Overview



The SMC10 Sensor Module Cabinet-Mounted can be used to evaluate the encoders of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC10.

The following encoder signals can be evaluated:

- 2-pole resolver
- Multipole resolver

Design

The SMC10 Sensor Module Cabinet-Mounted features the following interfaces as standard:

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

The status of the SMC10 Sensor Module Cabinet-Mounted is indicated via a multi-color LED.

The SMC10 Sensor Module Cabinet-Mounted can be snapped onto a TH 35 top-hat rail according to EN 60715 (IEC 60715).

The signal cable shield is connected via the encoder system connector and can also be connected to the SMC10 Sensor Module Cabinet-Mounted via a shield connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1.

Selection and ordering data

Description	Order No.
SMC10 Sensor Module Cabinet-Mounted (without DRIVE-CLiQ cable)	6SL3055-0AA00-5AA0

For the series SINAMICS S150 and SINAMICS S120 Cabinet Modules, the SMC10 is ordered as an option by specifying order code **K46**.

Integration

SMC10 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

Technical data

SMC10 Sensor Module Cabinet-Mounted	
Current requirement, max. at 24 V DC, not taking encoder into account	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	• 2-pole resolver • Multipole resolver
• Excitation voltage, rms	4.1 V
• Excitation frequency	5 ... 10 kHz depending on the current controller clock cycle of the Motor Module or Power Module
• Transformation ratio	0.5
• Encoder frequency, max.	2 kHz depending on the pole pair number of the resolver and the current controller clock cycle of the Motor Module or Power Module
• Signal subdivision (interpolation), max.	16384 times (14 bit)
• Cable length to encoder, max.	130 m
PE connection	M4 screw
Dimensions	
• Width	50 mm
• Height	150 mm
• Depth	111 mm
Weight, approx.	0.8 kg
Conformity	CE
Approvals	cULus (File No.: E164110)

Overview



The SMC20 Sensor Module Cabinet-Mounted can be used to evaluate the encoders of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC20.

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1 V_{pp}
- EnDat absolute encoder
- SSI encoder with incremental signals sin/cos 1 V_{pp} (firmware version 2.4 and later)

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

Design

The SMC20 Sensor Module Cabinet-Mounted features the following interfaces as standard:

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

The status of the SMC20 Sensor Module Cabinet-Mounted is indicated via a multi-color LED.

The SMC20 Sensor Module Cabinet-Mounted can be snapped onto a TH 35 top-hat rail acc. to EN 60715 (IEC 60715).

The signal cable shield is connected via the encoder system connector and can also be connected to the SMC20 Sensor Module Cabinet-Mounted via a shield connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1.

Selection and ordering data

Description	Order No.
SMC20 Sensor Module Cabinet-Mounted (without DRIVE-CLiQ cable)	6SL3055-0AA00-5BA2

For the series SINAMICS S150 and SINAMICS S120 Cabinet Modules, the SMC20 is ordered as an option by specifying order code **K48**.

Integration

SMC20 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

Technical data

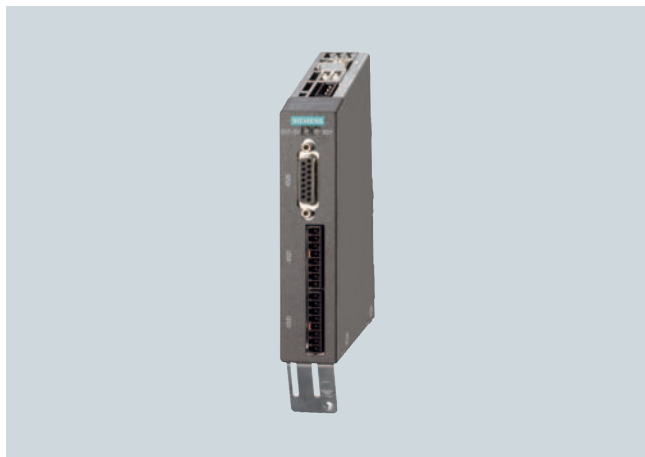
SMC20 Sensor Module Cabinet-Mounted	
Current requirement, max. at 24 V DC, not taking encoder into account	0.2 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
Power loss	< 10 W
Encoders which can be evaluated	<ul style="list-style-type: none"> • Incremental encoder sin/cos 1 V_{pp} • EnDat absolute encoder • SSI encoder with incremental signals sin/cos 1 V_{pp} (firmware version 2.4 and later)
• Encoder supply	5 V DC, 0.35 A
• Encoder frequency incremental signals, max.	500 kHz
• Signal subdivision (interpolation), max.	16384 times (14 bit)
• SSI baud rate	100 kBaud
• Cable length to encoder, max.	100 m
PE connection	M4 screw
Dimensions	
• Width	30 mm
• Height	150 mm
• Depth	111 mm
Weight, approx.	0.45 kg
Conformity	CE
Approvals	cULus (File No.: E164110)

SINAMICS S120 chassis units

System components

Encoder system connection SMC30 Sensor Module Cabinet-Mounted

Overview



The SMC30 Sensor Module Cabinet-Mounted can be used 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 either KTY84-130 or PTC temperature sensors.

Design

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

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

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

The SMC30 Sensor Module Cabinet-Mounted can be snapped onto a TH 35 top-hat rail according to 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 mm².

The signal cable shield can be connected to the SMC30 Sensor Module Cabinet-Mounted via a shield connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1.

Selection and ordering data

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

For the series SINAMICS S150 and SINAMICS S120 Cabinet Modules, the SMC30 Sensor Module Cabinet-Mounted is ordered as an option by specifying order code **K50**.

Integration

SMC30 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

Technical data

SMC30 Sensor Module Cabinet-Mounted	
Current requirement, max. at 24 V DC, not taking encoder into account	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	<ul style="list-style-type: none">• 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
Conformity	CE
Approvals	cULus (File No.: E164110)

¹⁾ Signal cables twisted in pairs and shielded.

Overview



MOTION-CONNECT DRIVE-CLiQ cable

Signal cables are pre-assembled and are sold by the meter for the connection of a variety of components.

The following different types of cable are available:

- DRIVE-CLiQ cables
- MOTION-CONNECT DRIVE-CLiQ cables
- MOTION-CONNECT pre-assembled cables

Applications

DRIVE-CLiQ cables

are used to connect components with DRIVE-CLiQ connections which have a separate or external 24 V DC power supply.

DRIVE-CLiQ cables for connecting Line/Motor Modules with a Control Unit are part of the scope of supply of the relevant modules.

MOTION-CONNECT DRIVE-CLiQ cables

are used whenever components with DRIVE-CLiQ connections must meet high requirements such as mechanical stress and oil resistance, e.g. when connections are made outside the cabinet between

- Motor Modules and Sensor Modules
- Motor Modules and motors with DRIVE-CLiQ interface

MOTION-CONNECT DRIVE-CLiQ cables have 24 V DC cores.

MOTION-CONNECT pre-assembled cables

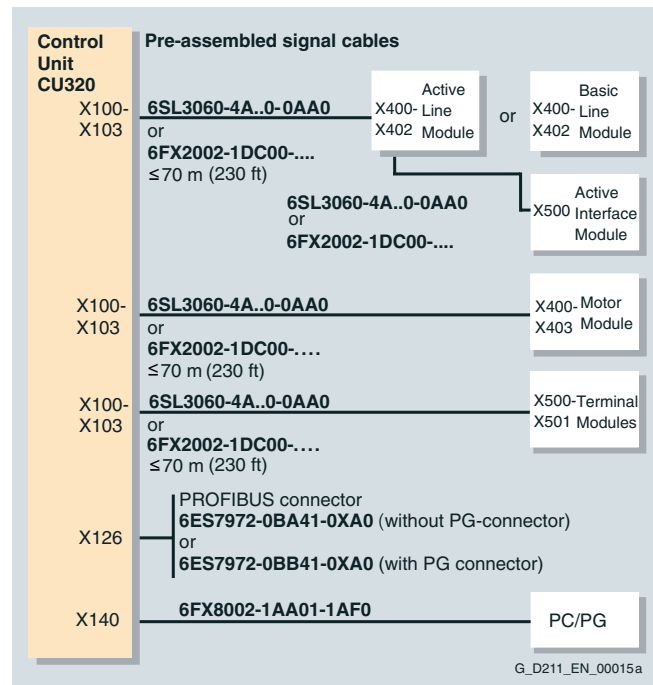
are used whenever motor encoders on motors without DRIVE-CLiQ interface are connected to Sensor Modules.

Note: All 6FX.002-2C... signal cables are also available with crimped contacts and connector housing supplied as a separate accessory.

- Signal cables with connector housing for motor end supplied as a separate accessory: 6FX.042-2C...-1... (4 in the 6th position)
- Signal cables with connector housing for module end supplied as a separate accessory: 6FX.012-2C...-1... (1 in the 6th position)

Integration

Connection overview for the CU320 Control Unit



SINAMICS S120 chassis units

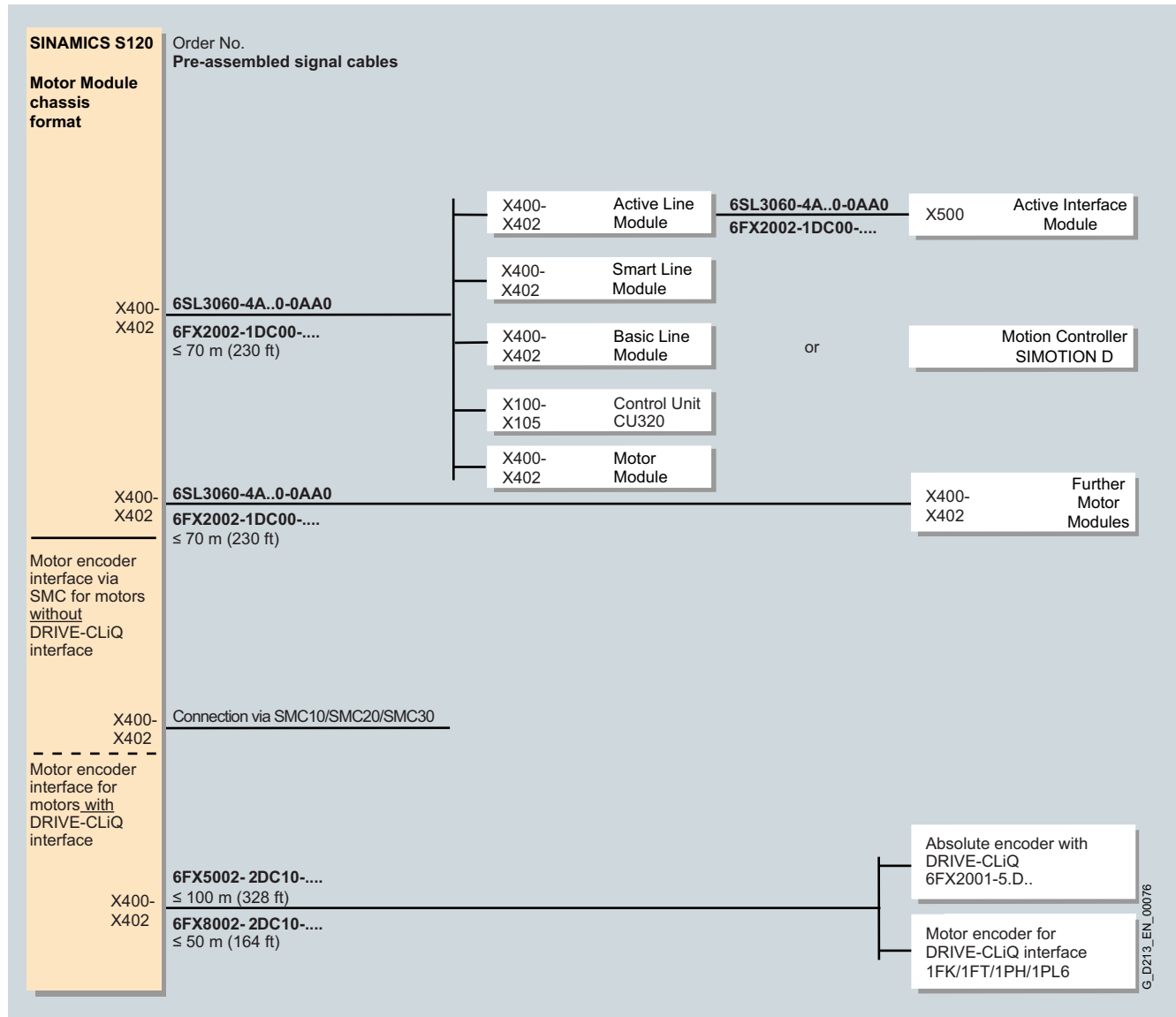
System components

Signal cables

Integration (continued)

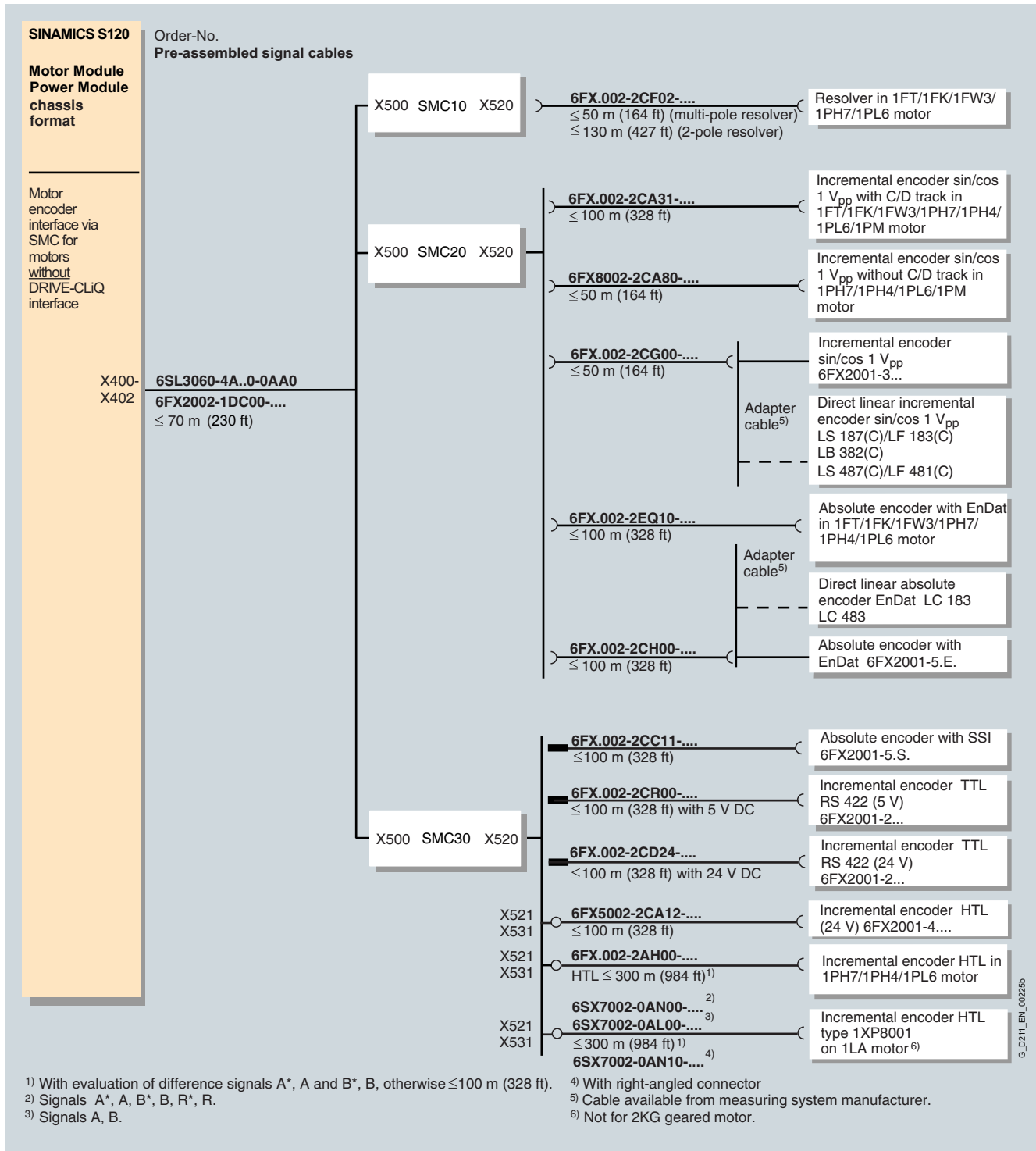
Connection overview for Line Modules and Motor Modules

The DRIVE-CLiQ type 6SL3060-4A..0-0AA0 cables for the standard configuration are part of the scope of supply of the Line Modules and Motor Modules. In this case, the modules must be mounted directly adjacent in a line.



Integration (continued)

Connection overview for Line Modules and Motor Modules



SINAMICS S120 chassis units

System components

Signal cables

Integration (continued)

Connection overview for Power Modules

A DRIVE-CLiQ cable of type 6SL3060-4A..0-0AA0 for connection to the chassis-mounted CU310 Control Unit is already included in the scope of supply.

SINAMICS S120

Power Module chassis format

U1/L1
Line connection V1/L2
W1/L3

Order-No.
Pre-assembled signal cables

Power supply cables see power cables for motors (by the meter)

X400

6SL3060-4A..0-0AA0

6FX2002-1DC00-....
≤ 70 m

Control Unit
X100- CU310, CU320
X105
or
SIMOTION D

X401

6SL3060-4A..0-0AA0

6FX2002-1DC00-....
≤ 70 m

Further Power Modules
or Terminal Module

Motor encoder interface via SMC (Sensor Module Cabinet-Mounted) for motors without DRIVE-CLiQ interface

X402

Connection via SMC10/SMC20/SMC30

Motor encoder interface for motors with DRIVE-CLiQ interface

X402

6FX5002-2DC10-....
≤ 100 m

6FX8002-2DC10-....
≤ 50 m

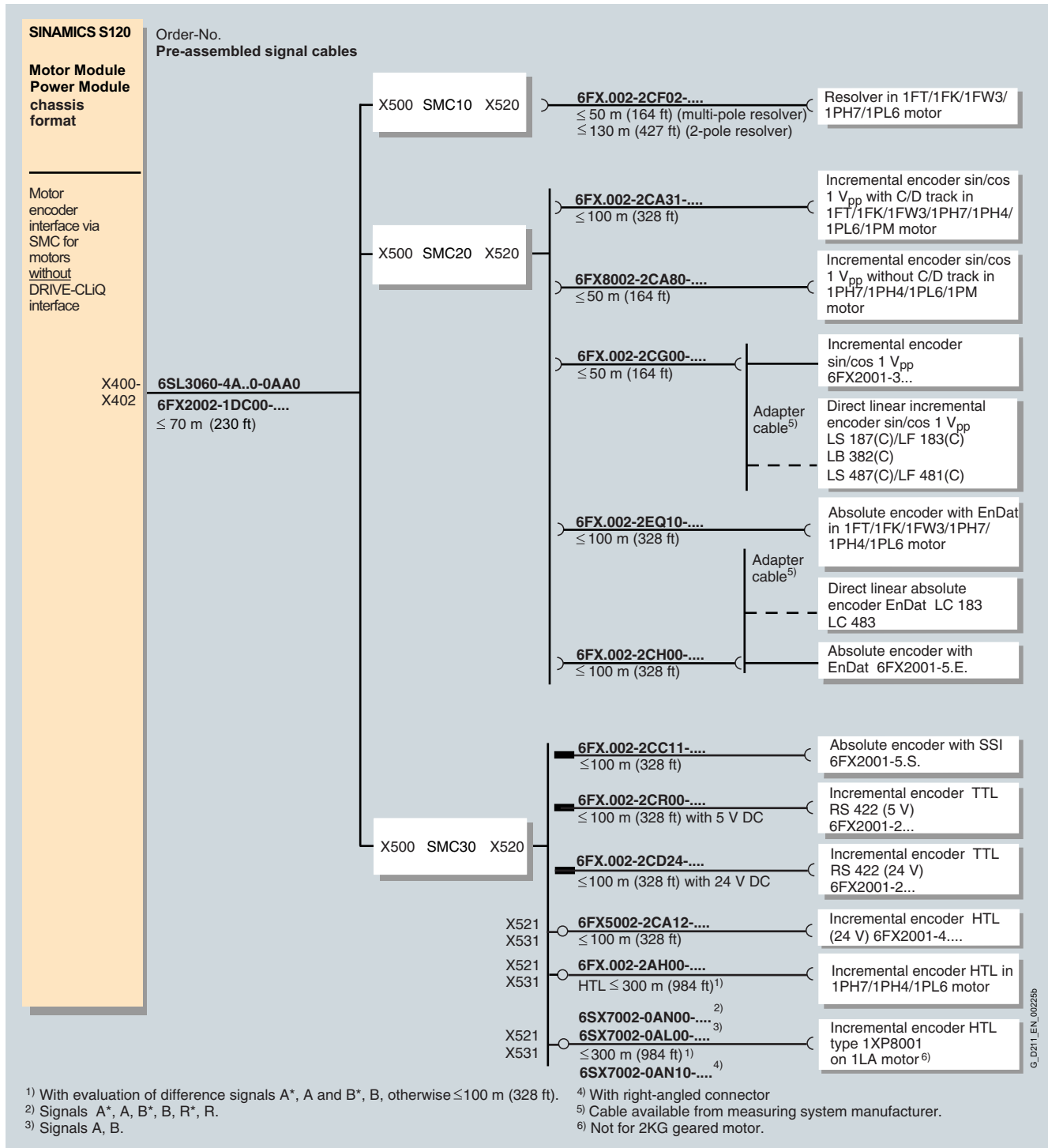
Motor encoder for motors with DRIVE-CLiQ interface
1FK1/1FT1/1FW3/1PH/1PM/1PL6

G_D213_EN_00077

2

Integration (continued)

Connection overview for Power Modules



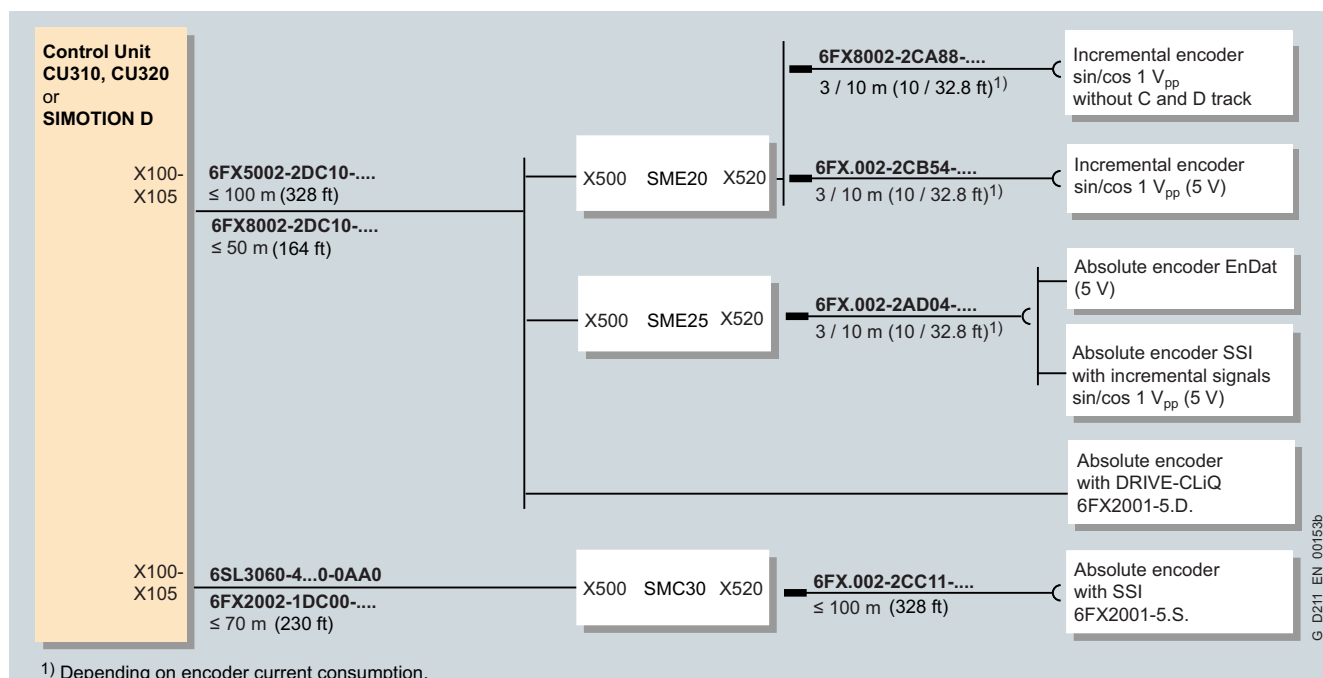
SINAMICS S120 chassis units

System components

Signal cables

Integration (continued)

Connection of a machine encoder (direct measuring system)



Technical data

Signal cable	Length	Degree of protection (connector)	Basic cable Order No.
DRIVE-CLiQ pre-assembled cables (without 24 V DC cores)			
In specific lengths	0.11 m 0.16 m 0.21 m 0.26 m 0.31 m 0.36 m 0.41 m 0.60 m 0.95 m 1.20 m 1.45 m 2.80 m 5.00 m	IP20/IP20	6SL3060-4AB00-0AA0 6SL3060-4AD00-0AA0 6SL3060-4AF00-0AA0 6SL3060-4AH00-0AA0 6SL3060-4AK00-0AA0 6SL3060-4AM00-0AA0 6SL3060-4AP00-0AA0 6SL3060-4AU00-0AA0 6SL3060-4AA10-0AA0 6SL3060-4AW00-0AA0 6SL3060-4AF10-0AA0 6SL3060-4AJ20-0AA0 6SL3060-4AA50-0AA0
To the meter	max. 70 m max. 70 m	IP20/IP20 IP67/IP67	6FX2002-1DC00-.... 6FX2002-1DC20-....
MOTION-CONNECT 500 DRIVE-CLiQ cables (with 24 V DC cores)			
To the meter	max. 100 m max. 100 m max. 100 m	IP20/IP20 IP20/IP67 IP67/IP67	6FX5002-2DC00-.... 6FX5002-2DC10-.... 6FX5002-2DC20-....
MOTION-CONNECT 800 DRIVE-CLiQ cables (with 24 V DC cores)			
To the meter	max. 50 m max. 50 m max. 50 m	IP20/IP20 IP20/IP67 IP67/IP67	6FX8002-2DC00-.... 6FX8002-2DC10-.... 6FX8002-2DC20-....

Length code (refer to the next page)

.....

Technical data (continued)

Length codes

Length codes for pre-assembled cables					
		Type			
		6FX.....-			
		6SX.....-			0
0 m		1			
100 m		2			
200 m		3			
300 m		4			
0 m			A		
10 m			B		
20 m			C		
30 m			D		
40 m			E		
50 m			F		
60 m			G		
70 m			H		
80 m			J		
90 m			K		
0 m				A	
1 m				B	
2 m				C	
3 m				D	
4 m				E	
5 m				F	
6 m				G	
7 m				H	
8 m				J	
9 m				K	
0 m					0
0.1 m					1
0.2 m					2
0.3 m					3
0.4 m					4
0.5 m					5
0.6 m					6
0.7 m					7
0.8 m					8
Examples:	1.0 m:	1	A	B	0
	2.2 m:	1	A	C	2
	8.0 m:	1	A	J	0
	299.0 m:	3	K	K	0

SINAMICS S120 chassis units

System components

Notes

2

SINAMICS S120 Cabinet Modules



3/2	System overview
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System overview

Overview



SINAMICS S120 Cabinet Modules are components forming part of a modular cabinet system for multi-motor drives with a central line infeed and a common DC busbar of the type typically used in, for example, paper-making machines, roller mills, test stands, or hoisting gear. As standard, they are installed side by side in a row. Other installation types (e.g. back to back) are possible on request.

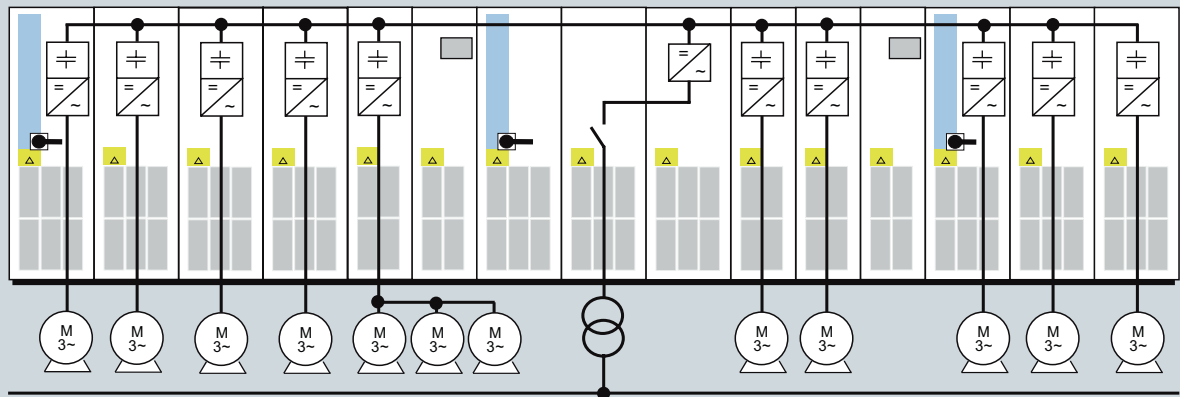
They include the chassis units from the SINAMICS S120 series in booksize format (Motor Modules) and chassis format, thus making the range an ideal supplement to the SINAMICS G150 and SINAMICS S150 cabinet unit series for single-motor drives.

All drive components, from the line infeed to the motor-side inverters, are configured in a clear, compact layout in the individual Cabinet Modules. They can be combined with great flexibility and can be optimally adapted to customer-specific requirements thanks to a comprehensive array of options.

The main components of the system are as follows:

- Line Connection Modules with line-side components such as contactors, fuses and circuit breakers, as well as line reactors for Basic Line Modules.
- Line Modules for the infeed in the following variations
 - Basic Line Modules for two-quadrant operation
 - Smart Line Modules for four-quadrant operation
 - Active Line Modules for four-quadrant operation with negligible system disturbances
- Central Braking Modules for braking operation
- The following types of Motor Modules
 - Booksize Kit
 - Chassis
- Control Units
- Auxiliary Power Supply Modules

Standardized interfaces for both the power and the control connections facilitate configuration and installation. Communication between the power modules and the central Control Unit takes place via DRIVE-CLiQ, the internal drive serial interface.



Example of a drive line-up with SINAMICS S120 Cabinet Modules for a multi-motor drive

Overview (continued)

The following table provides an overview of the voltage ranges and power ratings of the SINAMICS S120 Cabinet Modules

	Line voltage	Input current	DC link voltage	DC link current	Output current	Power range
Line Connection Modules	380 ... 480 V 3 AC 500 ... 690 V 3 AC	250 ... 3200 A 280 ... 3200 A				
Basic Line Modules	380 ... 480 V 3 AC 500 ... 690 V 3 AC	365 ... 1630 A 260 ... 1580 A	510 ... 650 V 675 ... 930 V	420 ... 1880 A 300 ... 1880 A		200 ... 900 kW 250 ... 1500 kW
Smart Line Modules	380 ... 480 V 3 AC 500 ... 690 V 3 AC	463 ... 1430 A 463 ... 1430 A	510 ... 650 V 675 ... 930 V	550 ... 1700 A 550 ... 1700 A		250 ... 800 kW 450 ... 1400 kW
Active Line Modules	380 ... 480 V 3 AC 500 ... 690 V 3 AC	210 ... 1405 A 575 ... 1270 A	540 ... 720 V 710 ... 1035 V	235 ... 1574 A 644 ... 1422 A		132 ... 900 kW 560 ... 1400 kW
Central Braking Modules	380 ... 480 V 3 AC 500 ... 600 V 3 AC 660 ... 690 V 3 AC		510 ... 720 V 675 ... 900 V 890 ... 1035 V			500 ... 1000 kW 550 ... 1100 kW 630 ... 1200 kW
Motor Modules booksize	380 ... 480 V 3 AC		510 ... 720 V	3.6 ... 200 A	3 ... 200 A	1.6 ... 107 kW
Motor Modules chassis	380 ... 480 V 3 AC 500 ... 690 V 3 AC		510 ... 720 V 675 ... 1035 V	252 ... 1686 A 102 ... 1524 A	210 ... 1405 A 85 ... 1270 A	110 ... 800 kW 75 ... 1200 kW

Benefits

The outstanding system features of the SINAMICS S120 Cabinet Modules provide plant operators with the following advantages:

- Process optimization with minimal effort:
 - A standard PROFIBUS interface and various analog and digital interfaces enables easy integration into automation solutions.
 - Vector control ensures that they fulfill the most exacting requirements regarding the accuracy and dynamic response of drives.
- High level of reliability and availability:
 - Individual modules and power components can be replaced quickly and easily, which ensures a higher level of plant availability.
- Energy savings during operation:

If the drive system includes motors that are operated in both the motoring and regenerating mode, then they can be coupled by means of a common DC link in such a way that allows energy to be transferred between them. Additional energy can be saved and system disturbances can be reduced in this fashion.

In certain cases, the line supply of the drive line-up can even be designed to supply less voltage than the total power of the individual Motor Modules operated on the common DC link would require.
- Cost minimization during operation, maintenance and service:
 - Simple commissioning thanks to the menu-driven STARTER commissioning tool.
 - Optional menu-driven AOP30 Advanced Operator Panel with a plain-text display.
 - All device modules are easily accessible, which makes them extremely service friendly.
- Space-saving design
- Environmentally-friendly operation:
 - The converters are exceptionally quiet and compact thanks to state-of-the-art IGBT power semiconductors and an innovative cooling concept.

Applications

SINAMICS S120 Cabinet Modules have been specially developed to allow simple construction of multi-motor systems. They are used for applications where several motors must be coordinated to realize a drive task as multi-motor drives in a drive line-up. Examples of such applications include:

- Paper machines
- Rolling mills
- Hoisting gear
- Test bays

Design

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 over their entire life cycle.

Attention has been paid to providing a wide range of cable routing options and special design concepts are applied consistently to broaden the scope of application and simplify servicing. The units feature all the necessary connections and connecting elements. Thanks to their carefully considered configuration concept, cabinets are shipped in a ready-to-connect state or, in the case of multiple transport units, have been prepared for quick assembly. The selection you make is supported by an extensive range of options, harmonized and coordinated to various applications.

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.

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.¹⁾

¹⁾ The properties of S120 Cabinet Modules described in this catalog are not transferable to cabinet units constructed to meet the requirements of specific applications.

System overview

Design (continued)

Line Modules

Power is fed to the drive line-up via Line Modules, which generate a DC voltage from the line voltage and, therefore, supply energy to the Motor Modules connected to the DC link. They are suitable for connection to grounded (TN, TT) and non-grounded (IT) systems.

The Line Modules are connected to the incoming supply system via Line Connection Modules and are equipped with an RI suppression filter in accordance with Category C3 as a standard feature. Category C3 is part of the "second environment" (in accordance with EN 61800-3). The "second" environment refers to locations outside residential areas or industrial sites which are supplied from the medium-voltage network via a separate transformer.

The range of Line Modules has power ratings from 132 kW to 900 kW (380 to 480 V) and from 250 kW to 1500 kW (500 to 690 V). Furthermore, up to four identical Line Modules can be connected in parallel in order to increase the power rating.

For a compact configuration, Line Connection Modules up to input currents of 3200 A are available. Two Line Modules can be operated in parallel on these Line Connection Modules.

The following types of Line Modules are available:

Basic Line Modules

Basic Line Modules are designed only for infeed operation, i.e. they are not capable of recovering energy to the mains supply.

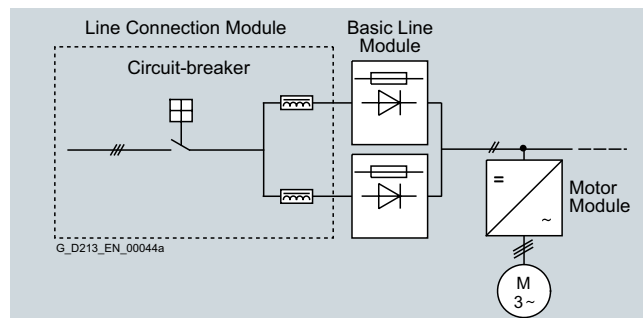
If regenerative energy is produced, e.g. when the drives brake, then it must be converted to heat by means of a Braking Module and a braking resistor.

When a Basic Line Module is used as the infeed, a line reactor appropriate to the supply conditions must be installed. Line reactors are generally required if two or more Basic Line Modules are operated in parallel on a common supply system in order to increase power.

For this reason, line reactors are installed in the appropriate Line Connection Module as standard.

If, for example, the infeed takes place by means of a converter transformer (12-pulse operation), line reactors might not be required and they can be optionally omitted (order code **L22**).

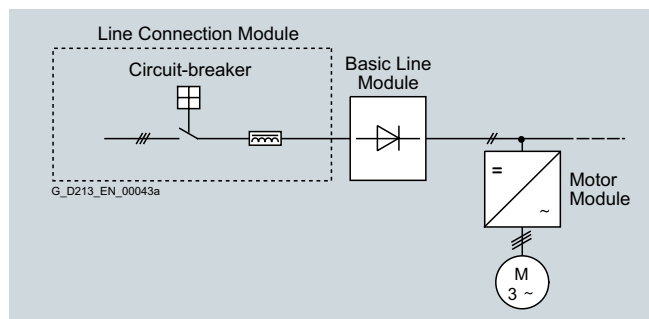
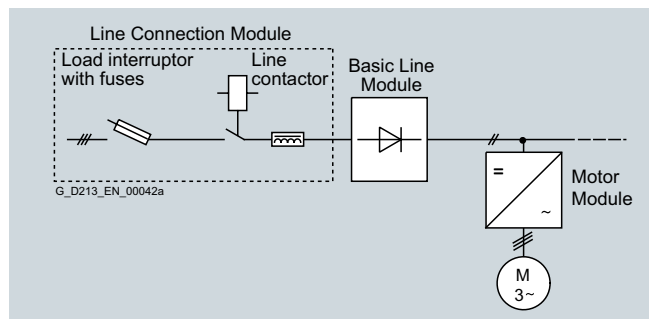
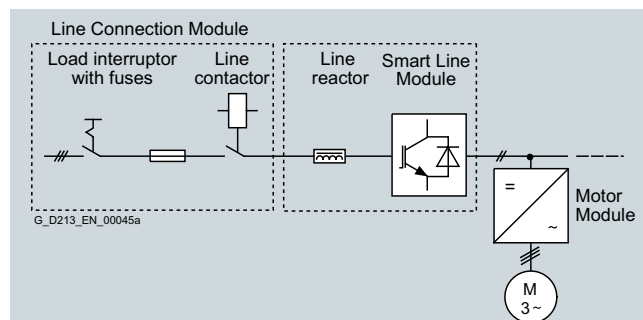
In the case of parallel connection, versions with line-side fuses are available for selective protection of the individual Basic Line Modules.



Smart Line Modules

Smart Line Modules can supply energy to the DC link and return regenerative energy to the supply system.

Braking Modules and braking resistors are required only if the drives need to be decelerated in a controlled manner after a power failure – i.e. when energy cannot be regenerated into the line supply. When a Smart Line Module is used as the infeed, the necessary line reactor is included in the device as standard.



Design (continued)

Active Line Modules

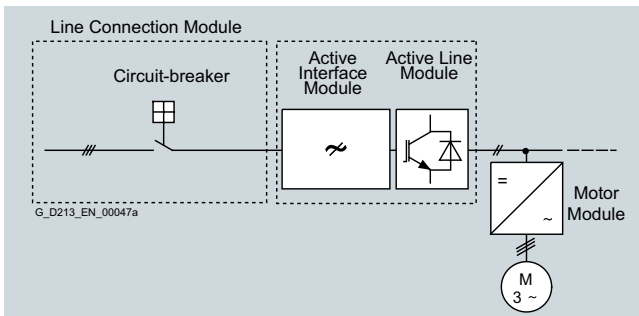
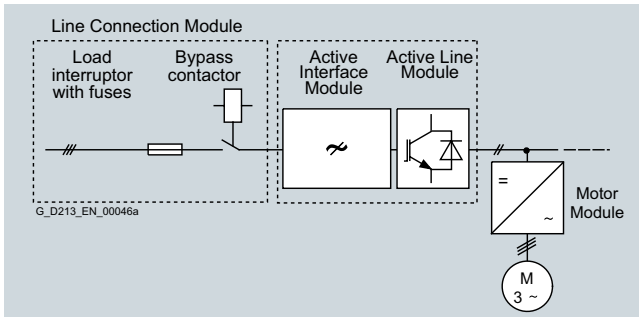
Active Line Modules can supply energy and return regenerative energy to the supply system. Braking Modules and braking resistors are required only if the drives need to be decelerated in a controlled manner after a power failure – i.e. when energy cannot be regenerated into the line supply.

In contrast to Basic Line Modules and Smart Line Modules, however, Active Line Modules generate a regulated DC voltage which remains constant despite fluctuations in the line voltage. However, in this case, the line voltage must remain within the permissible tolerance range.

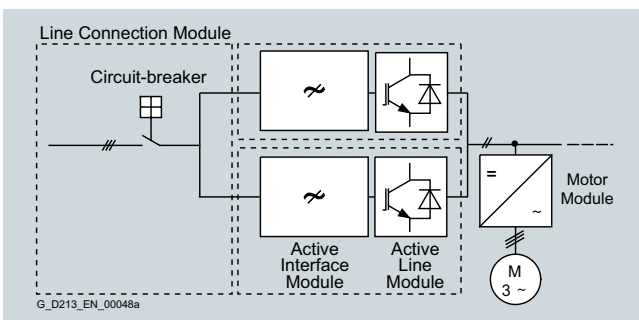
Active Line Modules draw a virtually sinusoidal current from the supply which limits any harmful current harmonics.

Active Line Modules must always be used in conjunction with an Active Interface Module. Active Interface Modules include the required pre-charging circuit for the Active Line Module in addition to a Clean Power Filter.

Within the context of SINAMICS S120 Cabinet Modules, these two components are always regarded as a single unit.



In the example, two units comprising an Active Interface Module and Active Line Module are connected in parallel to jointly supply the DC link.



DC link components

Braking Modules enable braking resistors to absorb the regenerative energy produced during drive deceleration, which is then converted into heat.

Braking Modules as a Motor Module option

For lower drive power ratings, Braking Modules are available with continuous braking powers up to 50 kW. These Braking Modules are ordered as an option (order codes **L61/L64** (25 kW) or **L62/L65** (50 kW) (→ Description of the options) for Line and Motor Modules.

Central Braking Modules

For larger continuous braking powers, separate Central Braking Modules are available. These modules are implemented centrally in the drive line-up.

Motor Modules

There are two different types of Motor Module available with the SINAMICS S120 Cabinet Modules drive system.

Booksize Base Cabinets with Booksize Cabinet Kits

Motor Modules at the low end of the power range from 1.6 kW to 107 kW (380 to 480 V) can be implemented as Booksize Cabinet Kits installed in Booksize Base Cabinets. In the 1.6 kW to 9.7 kW power range, Booksize Cabinet Kits are available as Double Motor Modules, which combine two inverters in a single module.

Chassis Cabinets

Each Chassis Cabinet is fitted with one SINAMICS S120 Motor Module in chassis format and covers the power range from 75 kW to 1200 kW (380 to 480 V or 500 to 690 V). The power rating can be extended up to approx. 4500 kW by connecting up to four Motor Modules in the chassis format in parallel.

System structure

Line Modules are coupled with the various Motor Modules by means of prefabricated busbar sets with different current carrying capacities.

All standard busbars, as well as electronics components, are protected against environmental influences. This is achieved through the use of nickel-plated copper bars and painted modules throughout.

An auxiliary voltage busbar system spanning the individual Cabinet Modules supplies the required auxiliary voltages for the power components, fans and 24 V loads.

Communication between the Control Unit, power units and other active SINAMICS components is realized via DRIVE-CLiQ connections.

DRIVE-CLiQ is an internal serial interface of the drive that enables fast and easy configuration of the complete drive line-up with prefabricated cables in varying lengths.

The Cabinet Modules can be optionally supplied in pre-configured transport units up to a total length of 2400 mm. This option is recommended in particular for Line Modules together with Line Connection Modules since, in this case, the Line Connection Module must be equipped with a pre-charging DC link or line reactors (depending on the type of Line Module), in addition to the electrical interface (busbar). Transport units enable the various devices to be quickly and easily assembled on-site.

System overview

Function

Communication with higher-level control and customer terminal block

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

This customer terminal block can be used to connect the system to the higher-level controller using analog and digital signals, or to connect additional units.

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

Open-loop and closed-loop control functions

The converter control includes a high-quality vector control with speed and current control (with and without encoder).

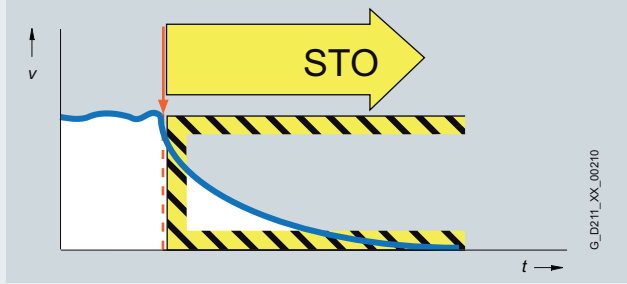
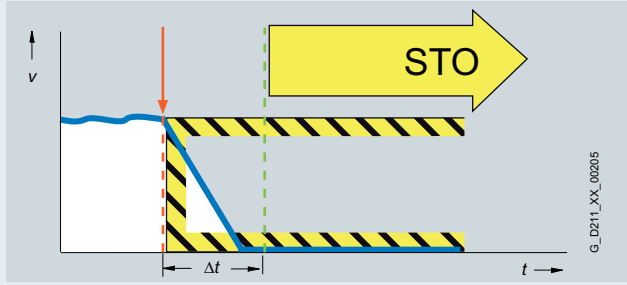
Software and protective functions

The software functions available as standard are described below:

Software and protective functions	Description
Setpoint input	The setpoint can be input both internally and externally. It is applied internally as a fixed setpoint, motorized potentiometer setpoint or jog setpoint and externally via the communications interface or an analog input on the customer terminal block. The internal fixed setpoint and the motorized potentiometer setpoint can be switched over or adjusted using control commands from any interface.
Motor identification	The automatic motor identification function makes commissioning faster and easier and optimizes closed-loop control of the drive.
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 operating behavior and as a result of the smooth starting, significantly reduces the wear on mechanical components. The ramp-down ramps can be parameterized separately for emergency stop.
Kinetic buffering (KIP)	For brief line supply failures, the kinetic energy of the rotating drive is used to buffer the DC link and therefore prevents fault trips. The drive converter remains operational as long as the drive can provide regenerative energy as a result of its motion and the DC link voltage does not drop below the trip threshold. When the line supply recovers within this time, the drive is again accelerated up to its setpoint speed.
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" function allows the converter to switch on to a motor that is still turning.
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 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 S120 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 S120. 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 configuring).
\hat{P} t sensing for motor protection	The motor temperature is calculated in a motor model stored in the drive converter software. More exact sensing of the temperature, which also takes into account the influence of the ambient temperature, is possible by means of direct temperature sensing using KTY84 sensors in the motor winding.
Motor temperature evaluation	Motor protection by evaluating a KTY84 or PTC temperature sensor. When a temperature sensor is connected, the limit values can be set for alarm or trip. When a PTC thermistor is connected, the system reaction to triggering of the thermistor (alarm or trip) can be defined.
Motor blocking protection	A blocked motor is detected and protected against thermal overloading by a fault trip.

¹⁾ Factory setting: not activated (can be parameterized).

Function (continued)

Safety Integrated	Description
Safe Torque Off (STO)	<p><u>Function description</u></p> <p>This function is a mechanism that 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.</p> <p><u>Application, customer benefits</u></p> <p>STO has the immediate effect that the drive cannot supply any torque-generating energy. STO can be used wherever the drive will naturally reach a standstill due to load torque or friction in a sufficiently short time or when "coasting down" of the drive will not have any relevance for safety.</p> 
Safe Stop 1 (SS1)	<p><u>Function description</u></p> <p>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 independently brakes along a quick stop ramp (OFF3) and automatically activates Safe Torque Off when the parameterized safety delay timer has expired.</p> <p><u>Application, customer benefits</u></p> <p>This integrated self-braking function eliminates the need for complex external monitoring equipment. Furthermore, it is often possible to eliminate mechanical brakes which wear, or to lessen the load on them, so that maintenance costs and the stresses on the machine can be reduced.</p> <p>Safe Stop 1 is employed for applications which require monitored braking, e.g. on centrifuges or conveyor vehicles.</p>  <p>The safety functions integrated in SINAMICS S120 satisfy the requirements of</p> <ul style="list-style-type: none"> • DIN EN ISO 13849-1 Category 3 (previously EN954-1) • Safety Integrity Level (SIL) 2 according to EN 61508 • Performance Level (PL) d according to EN ISO 13849-1 <p>In addition, the Safety Integrated functions of the SINAMICS S120 are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office.</p>
Terminal module for controlling STO and SS1 functions (order code K82)	<p>The terminal module is used to control the "Basic Safety Functions" over a wide voltage range from 24 V up to 240 V DC/AC. This means that the "STO" and "SS1" safety functions can be flexibly controlled from the signal voltages of the plant.</p> <p>See → Description of the options (K82)</p>
Power unit protection	Description
Ground fault monitoring at output end	A ground fault at the output end is detected by an aggregate current monitor and results in shutdown in grounded-neutral systems.
Electronic short-circuit protection at output end	A short-circuit (e.g. on the converter output terminals, in the motor cable or in the motor terminal box) is detected at the output end and the converter shuts down with a fault message.
Thermal overload protection	An alarm is issued first when the overtemperature threshold responds. If the temperature rises further, the unit either shuts down or independently adjusts the pulse frequency or output current so that a reduction in the thermal load is achieved. After the cause of the fault has been eliminated (e.g. improving the cooling), the drive system automatically returns to the original operating values.

System overview

Technical data

Electrical data			
Line voltages	<ul style="list-style-type: none">• 380 ... 480 V 3 AC, ±10% (-15% < 1 min)• 500 ... 690 V 3 AC, ±10% (-15% < 1 min)		
Types of supplies	TN/TT supplies or insulated supplies (IT supplies)		
Line frequency	47 ... 63 Hz		
Output frequency	0 ... 300 Hz (>100 / 160 Hz, observe the derating)		
Line power factor	Basic Line Module:	Smart Line Module:	Active Line Module:
Fundamental mode	> 0,96	> 0,96	Adjustable (factory set to cos φ = 1)
Efficiency	> 99.0 %	> 98.5 %	> 97.0 %
Control method	Servo control, vector control with and without encoder or V/f control		
Fixed speeds	15 fixed speeds plus 1 minimum speed, can be parameterized		
Skipped speed ranges	4, programmable		
Braking operation	By means of regenerative feedback into the line supply or additional Braking Modules and braking resistors		
Mechanical data			
Degree of protection	IP20, IP21, IP23, IP43 and IP54 (with options M26 and M27, side panels on the right and left respectively)		
Protection class	According to EN 61800-5-1		
Type of cooling	Forced air cooling AF according to EN 60146		
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 60146-1, EN 61800-2, EN 61800-3, EN 61800-5-1, EN 60204-1, EN 60529		
CE marking	According to EMC Directive No. 2004/108/EC and Low-Voltage Directive No. 2006/95/EC		
RI suppression	In accordance with EMC product standard for variable-speed drives EN 61800-3, second environment (1st environment on request).		
Ambient conditions	During operation	During storage	During transport
Ambient temperature	0 °C ... +40 °C up to +50 °C see derating data	-25 °C ... +55 °C	-25 °C ... +70 °C from -40 °C for 24 hours
Relative air humidity (condensation not permissible)	5% ... 95% corr. to 3K3 acc. to IEC 60721-3-3	5% ... 95% corr. to 1K4 acc. to IEC 60721-3-1	5% ... 95% at 40 °C corr. to 2K3 acc. to IEC 60721-3-2
Installation altitude	Cabinet Modules, chassis format: up to 2000 m above sea level without derating, >2000 m, see characteristic curves/derating data For Motor Modules Booksize Cabinet Kit format as well as Central Braking Modules: up to 1000 m above sea level without derating, >1000 m, see characteristic curves/derating data		
Mechanical stability	During operation	During storage	During transport
Vibratory load			
• Deflection	0.075 mm at 10 Hz ... 58 Hz	1.5 mm at 5 Hz ... 9 Hz	3.1 mm at 5 Hz ... 9 Hz
• Acceleration	9.8 m/s² at > 58 Hz ... 200 Hz	5 m/s² at > 9 Hz ... 200 Hz	10 m/s² at > 9 Hz ... 200 Hz
Shock load			
• Acceleration	100 m/s² at 11 ms	40 m/s² at 22 ms	100 m/s² at 11 ms

Deviations from the specified classes are underlined.

Characteristic curves

Chassis current derating

If the Cabinet Modules in the chassis format 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. The cooling air requirement (cooling air flow)

specified for the relevant Cabinet Modules in the technical data must be guaranteed at all times. The specified values already include a permitted compensation between installation altitude and ambient temperature (incoming air temperature at the inlet to the Cabinet Module).

Installation altitude above sea level m	Current derating at an ambient temperature (incoming air temperature) of						
	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0-2000						95.0 %	87.0 %
2001-2500	100 %				96.3 %	91.4 %	83.7 %
2501-3000				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 the ambient temperature (incoming air temperature) and installation altitude for Cabinet Modules with IP20, IP21, IP23 and IP43 degrees of protection.

Installation altitude above sea level m	Current derating at an ambient temperature (incoming air temperature) of						
	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0-2000						95.0 %	87.5 %
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		97.7 %	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 the ambient temperature (incoming air temperature) and installation altitude for cabinet units with degree of protection IP54.

Chassis voltage derating

In addition to current derating, voltage derating must be taken into consideration according to the following table for **installation altitudes > 2000 m** above sea level:

Installation altitude above sea level m	Voltage derating for a rated input voltage of											
	380 V	400 V	420 V	440 V	460 V	480 V	500 V	525 V	575 V	600 V	660 V	690 V
0-2000							100 %					
2001-2250						96 %						96 %
2251-2500	100 %				98 %	94 %	100 %				98 %	94 %
2501-2750				98 %	94 %	90 %					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 %
3501-3750		95 %	91 %	87 %	83 %	79 %				95 %	91 %	83 %
3751-4000	96 %	92 %	87 %	83 %	80 %	76 %				91 %	87 %	80 %

Voltage derating depending on the installation altitude for drive units with rated voltages between 380 V to 480 V or from 500 V to 690 V.

System overview

Characteristic curves (continued)

Booksize current derating

The Cabinet Modules with Booksize Cabinet Kits have different derating factors than the chassis format. Starting from an **installation altitude of > 1000 m** above sea level, the derating factors specified in the following tables regarding the maximum permissible output current must be taken into consideration (derating).

As with the chassis format, to obtain these values you must ensure an air flow rate in accordance with those specified in the technical data tables for the relevant Cabinet Modules. The specified values already include a permitted compensation between installation altitude and ambient temperature (incoming air temperature at the inlet to the Cabinet Module).

Installation altitude above sea level m	Current derating at an ambient temperature (incoming air temperature) of						
	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0-1000	100 %					86 %	73 %
1001-1500	92 %	92 %	92 %	92 %	92 %	79 %	67 %
1501-2000	84 %	84 %	84 %	84 %	84 %	72 %	61 %
2001-2500	79 %	79 %	79 %	79 %	79 %	68 %	57 %
2501-3000	75 %	75 %	75 %	75 %	75 %	65 %	54 %
3001-3500	66 %	66 %	66 %	66 %	66 %	56 %	48 %
3501-4000	63 %	63 %	63 %	63 %	63 %	54 %	46 %

Current derating depending on the ambient temperature (incoming air temperature) and installation altitude for Cabinet Modules in the booksize format with **IP20, IP21, IP23, IP43 and IP54** degrees of protection.

Booksize voltage derating

In addition to current derating, voltage derating must be taken into consideration according to the following table for **installation altitudes > 2000 m** above sea level:

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

Voltage derating depending on the installation altitude.

Overload capability

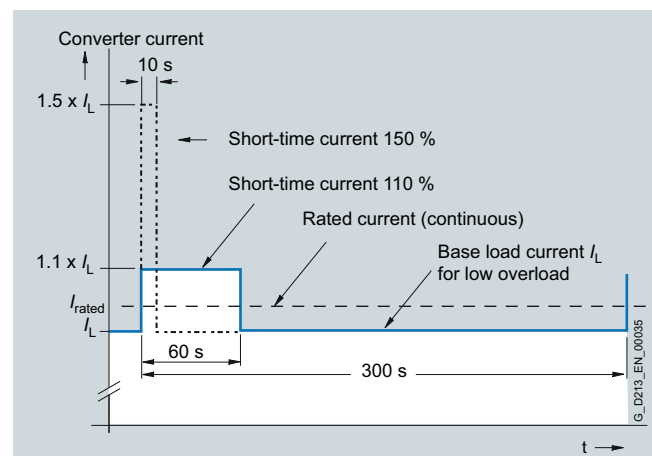
Motor Modules have an overload reserve e.g. to handle break-away torques. If larger surge loads occur, this must be taken into account when configuring. In the case of drives with overload requirements, the appropriate base load current must therefore be used as a basis for the required load.

Permissible overload assumes that the drive converter is operated at its base load current before and after the overload occurs, based on a duty cycle duration of 300 s.

Chassis format units

Cabinet Modules with power units in the chassis format can be configured on the basis of different base load currents.

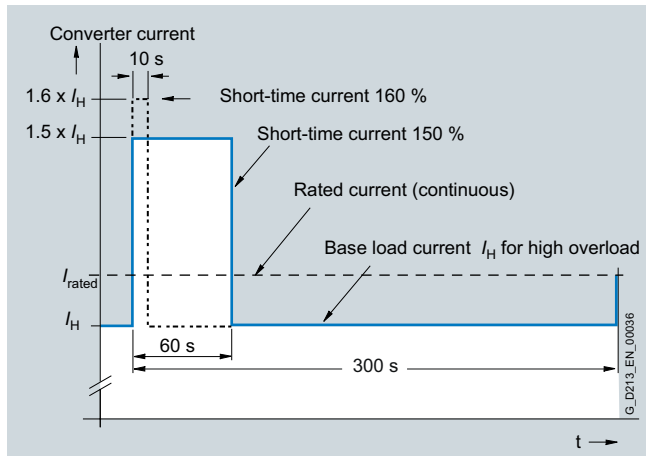
The base load current I_L for a low overload is based on a duty cycle of 110 % for 60 s or 150 % for 10 s.



Low overload

Characteristic curves (continued)

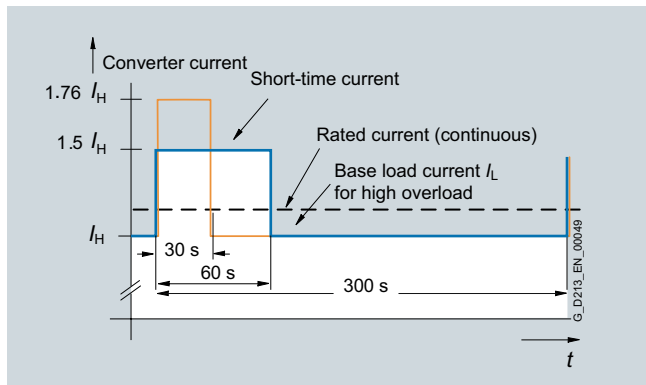
The base load current I_H for a high overload is based on a duty cycle of 150 % for 60 s or 160 % for 10 s.



High overload

Booksize format units

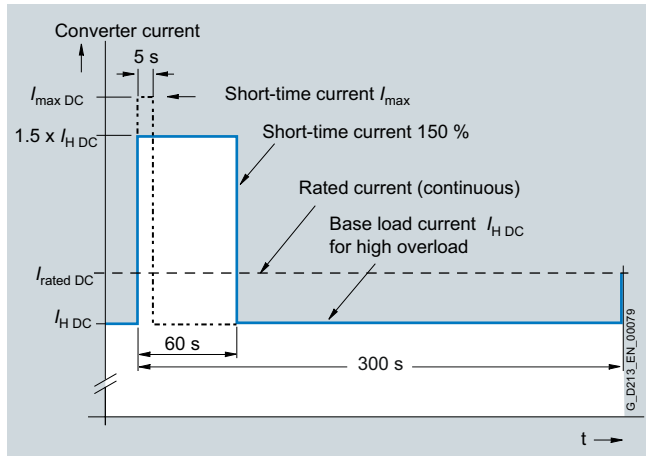
Cabinet Modules with power units in the booksize format have the following overload capabilities:



High overload

Line Modules

The base load current I_{HDC} for a high overload is based on a duty cycle of 150 % for 60 s or I_{maxDC} for 5 s.



High overload

Degrees of protection of Cabinet Modules

The EN 60529 standard covers 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 matter (touch protection and protection against ingress of solid 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.

Degree of protection	First digit Touch protection and protection against ingress of foreign solid matter	Second digit: Protection of the equipment against the ingress of water
IP20	Protected against solid foreign bodies, diameter 12.5 mm and larger	No water protection
IP21	Protected against solid foreign bodies, diameter 12.5 mm and larger	Drip-proof. Vertically falling drip water must not have a harmful effect.
IP23	Protected against solid foreign bodies, diameter 12.5 mm and larger	Protected against spray water. Water sprayed on both sides of the vertical at an angle of up to 60° must not have a harmful effect.
IP43	Protected against solid foreign bodies, diameter 1 mm and larger	Protected against spray water. Water sprayed on both sides of the vertical at an angle of up to 60° must not have a harmful effect.
IP54	Dust protected. Ingress of dust is not totally prevented, but dust must not enter in such quantities that the functioning or safety of the equipment is impaired.	Protected against splash water. Water sprayed from any direction onto the enclosure must not have a harmful effect.

Cabinet Modules fulfill the criteria for degree of protection IP20 as standard. The other degrees of protection outlined here are available as an option.

Line Modules Line Connection Modules

Overview



Line Connection Modules (LCM) contain the line-side infeed with main circuit breaker and fuse switch disconnector or circuit breaker and provide the connection between the plant power system and the Line Modules.

Line Connection Modules are available for the following voltages and currents:

Line voltage	Rated input current
380 ... 480 V 3 AC	250 ... 3200 A
500 ... 690 V 3 AC	280 ... 3200 A

Design

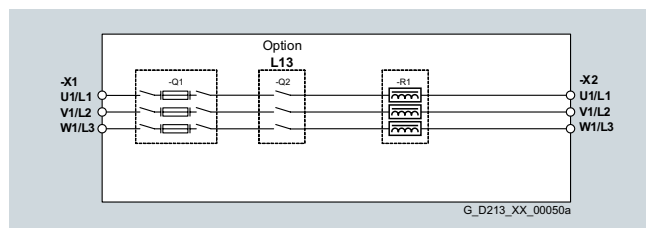
Different versions exist depending on the input current:

- Units ≤ 800 A include a main breaker with fuse switch disconnector
- Units > 800 A include a fixed-mounted circuit breaker (a withdrawable circuit breaker is optionally possible)

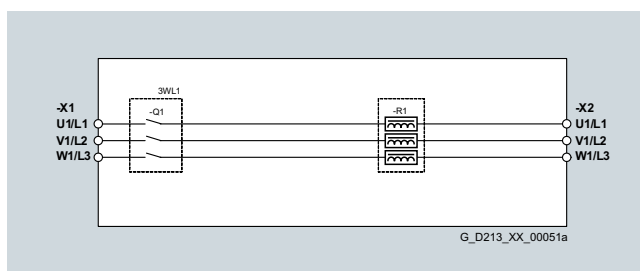
When Line Connection Modules are ordered, the type of Line Module used must be specified:

- for Active Line Modules: Order code **L42**
- for Basic Line Modules: Order code **L43**
- for Smart Line Modules: Order code **L44**

When Basic Line Modules are installed, a line reactor must also be selected to suit the relevant supply conditions (see SINAMICS – Low Voltage Engineering Manual). This is already included in the scope of delivery, but can be removed if required (order code **L22**).



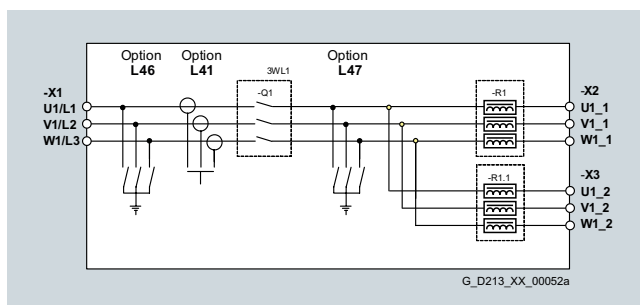
Example of connection of a Line Connection Module for units ≤ 800 A to connect to Basic Line Modules, order code **L43**, option line contactor, order code **L13**



Connection example of a Line Connection Module for units > 800 A, < 2000 A to connect to the Basic Line Modules, order code **L43**

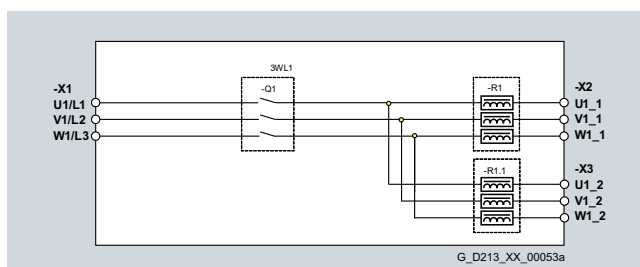
For input currents ≥ 2000 A, additional options are available:

- Grounding switch upstream of main circuit breaker: Order code **L46**
- Current transformer upstream of main circuit breaker: Order code **L41**
- Grounding switch downstream of main circuit breaker: Order code **L47**

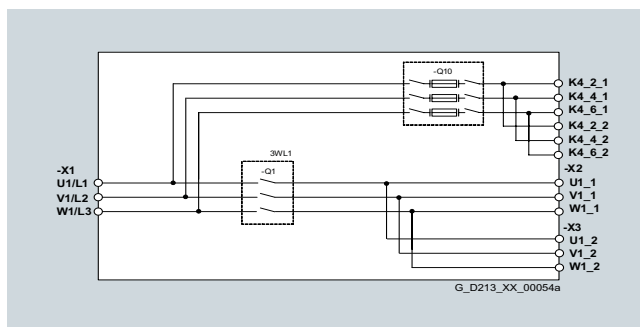


Connection example of a Line Connection Module ≥ 2000 A

When Basic Line Modules that are fed via a common Line Connection Module are connected in parallel, line reactors are generally required. These are installed in the Line Connection Module.



Connection example of a Line Connection Module ≥ 2000 A to connect to the Basic Line Modules, order code **L43**



Connection example of a Line Connection Module ≥ 2000 A to connect to the Active Line Modules in a parallel circuit configuration, order code **L42**

Selection and ordering data

The table below shows which Line Connection Modules can be assigned to the different types of Line Modules.

Line Connection Modules		Basic Line Modules		Smart Line Modules		Active Line Modules		
Current ¹⁾		Current		Current		Current		
A	Order No.	A		A		A		Note
Line voltage 380 ... 480 V 3 AC								
250	6SL3700-0LE32-5AA0	-	-	-	-	210	6SL3730-7TE32-1BA0	Parallel connection of two Line Modules on a Line Connection Module
380	6SL3700-0LE34-0AA0	-	-	-	-	260	6SL3730-7TE32-6BA0	
600	6SL3700-0LE36-3AA0	365	6SL3730-1TE34-2AA0	463	6SL3730-6TE35-5AA0	380	6SL3730-7TE33-8BA0	
		460	6SL3730-1TE35-3AA0			490	6SL3730-7TE35-0BA0	
770	6SL3700-0LE38-0AA0	710	6SL3730-1TE38-2AA0	614	6SL3730-6TE37-3AA0	605	6SL3730-7TE36-1BA0	
1000	6SL3700-0LE41-0AA0	-	-	883	6SL3730-6TE41-1AA0	840	6SL3730-7TE38-4BA0	
1250	6SL3700-0LE41-3AA0	1010	6SL3730-1TE41-2AA0	1093	6SL3730-6TE41-3AA0	985	6SL3730-7TE41-0BA0	
1600	6SL3700-0LE41-6AA0	1265	6SL3730-1TE41-5AA0	1430	6SL3730-6TE41-7AA0	1405	6SL3730-7TE41-4BA0	
2000	6SL3700-0LE42-0AA0	1630	6SL3730-1TE41-8AA0	-	-	-	-	
2000	6SL3700-0LE42-0BA0	2 x 935	6SL3730-1TE41-2BA0 6SL3730-1TE41-2BC0	2 x 817	6SL3730-6TE41-1BA0 6SL3730-6TE41-1BC0	2 x 936	6SL3730-7TE41-0BA0 6SL3730-7TE41-0BC0	
2500	6SL3700-0LE42-5BA0	2 x 1170	6SL3730-1TE41-5BA0 6SL3730-1TE41-5BC0	2 x 1011	6SL3730-6TE41-3BA0 6SL3730-6TE41-3BC0	-	-	
3200	6SL3700-0LE43-2BA0	2 x 1508	6SL3730-1TE41-8BA0 6SL3730-1TE41-8BC0	2 x 1323	6SL3730-6TE41-7BA0 6SL3730-6TE41-7BC0	2 x 1335	6SL3730-7TE41-4BA0 6SL3730-7TE41-4BC0	
Line voltage 500 ... 690 V 3 AC								
280	6SL3700-0LG32-8AA0	260	6SL3730-1TH33-0AA0	-	-	-	-	Parallel connection of two Line Modules on a Line Connection Module
380	6SL3700-0LG34-0AA0	375	6SL3730-1TH34-3AA0	-	-	-	-	
600	6SL3700-0LG36-3AA0	575	6SL3730-1TH36-8AA0	463	6SL3730-6TG35-5AA0	575	6SL3730-7TG35-8BA0	
770	6SL3700-0LG38-0AA0	-	-	757	6SL3730-6TG38-8AA0	735	6SL3730-7TG37-4BA0	
1000	6SL3700-0LG41-0AA0	925	6SL3730-1TH41-1AA0	-	-	-	-	
1250	6SL3700-0LG41-3AA0	1180	6SL3730-1TH41-4AA0	1009	6SL3730-6TG41-2AA0	1025	6SL3730-7TG41-0BA0	
1600	6SL3700-0LG41-6AA0	1580	6SL3730-1TH41-8AA0	1430	6SL3730-6TG41-7AA0	1270	6SL3730-7TG41-3BA0	
2000	6SL3700-0LG42-0BA0	2 x 855	6SL3730-1TH41-1BA0 6SL3730-1TH41-1BC0	2 x 700	6SL3730-6TG38-8BA0 6SL3730-6TG38-8BC0	2 x 698	6SL3730-7TG37-4BA0 6SL3730-7TG37-4BC0	
		-	-	2 x 934	6SL3730-6TG41-2BA0 6SL3730-6TG41-2BC0	2 x 974	6SL3730-7TG41-0BA0 6SL3730-7TG41-0BC0	
2500	6SL3700-0LG42-5BA0	2 x 1092	6SL3730-1TH41-4BA0 6SL3730-1TH41-4BC0	-	-	2 x 1206	6SL3730-7TG41-3BA0 6SL3730-7TG41-3BC0	
3200	6SL3700-0LG43-2BA0	2 x 1462	6SL3730-1TH41-8BA0 6SL3730-1TH41-8BC0	2 x 1323	6SL3730-6TG41-7BA0 6SL3730-6TG41-7BC0	-	-	
Note:	Parallel circuit of two Line Modules connected to a Line Connection Module. The required derating factors listed below are already included in the current values given above: • 7.5 % for Basic Line Modules • 5 % for Active Line Modules • 7.5 % for Smart Line Modules							

Note:

When ordering Line Connection Modules, the option order code must be attached to the Order No. to indicate whether the Line Connection Module is to be connected to an Active Line Module (order code **L42**), to a Basic Line Module (order code **L43**) or to a Smart Line Module (order code **L44**).

This information is required to ensure that the Line Connection Module is correctly equipped at the factory. This particularly applies to the busbar connection at the 3-phase end (3 AC), to any pre-charging circuits required and to the specified line reactors for Basic Line Modules.

¹⁾ The current values listed are based on an ambient temperature (incoming air temperature) of 40°C.

When Cabinet Modules are selected and combined in accordance with the above assignment table, the Line Connection Modules are equipped and prepared as specified at the factory. This is not the case for any other combinations. In such cases, the busbar connections will have to be engineered and installed on site.

SINAMICS S120 Cabinet Modules

Line Modules Line Connection Modules

Technical data

Line voltage 380 ... 480 V 3 AC		Line Connection Modules					
		6SL3700-0LE32-5AA0	6SL3700-0LE34-0AA0	6SL3700-0LE36-3AA0	6SL3700-0LE38-0AA0	6SL3700-0LE41-0AA0	6SL3700-0LE41-3AA0
Feed/feedback current							
• Rated current I_{NE}	A	250	380	600	770	1000	1250
Current requirement							
• 24 V DC auxiliary power supply	A	-	-	-	-	-	-
• 230 V 2 AC	A	-	-	-	-	1.07	1.07
• 230 V 2 AC ¹⁾							
- Making current	A	3.6	3.6	3.6	10.8	0.5	0.5
- Holding current	A	0.04	0.04	0.04	0.12	0.06	0.06
Power loss, max. ²⁾							
• at 50 Hz 400 V							
- Option L42/L44	kW	0.115	0.19	0.31	0.39	0.18	0.29
- Option L43	kW	-	-	0.675	0.74	-	0.787
• at 60 Hz 460 V							
- Option L42/L44	kW	0.115	0.19	0.31	0.39	0.18	0.29
- Option L43	kW	-	-	0.675	0.74	-	0.787
Cooling air requirement ³⁾	m ³ /s	-	-	-	-	0.36	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	-	-	-	-	68/70	68/70
Line connection L1, L2, L3							
• Conductor cross-section, max. (DIN VDE)	mm ²	2/M12 2 x 150	2/M12 2 x 150	2/M12 4 x 240	2/M12 8 x 240	5/M12 + 4/M16 8 x 240	5/M12 + 4/M16 8 x 240
PE/GND connection							
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	400	400	600	600	600	600
• Height ⁴⁾	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight							
• Option L42/L44	kg	210	230	310	340	450	470
• Option L43	kg	-	-	360	420	-	570
Frame size		FL	FL	GL	HL	JL	JL

¹⁾ Current requirement of contactors/circuit breakers and fans with IP23, IP43, IP54 degree of protection (in combination with Basic Line Modules).

²⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

³⁾ For IP23, IP43 or IP54 degree of protection only (in combination with Basic Line Modules).

⁴⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		Line Connection Modules				
		6SL3700-0LE41-6AA0	6SL3700-0LE42-0AA0	6SL3700-0LE42-0BA0	6SL3700-0LE42-5BA0	6SL3700-0LE43-2BA0
		Prepared for connection to Line Modules connected in parallel				
Feed/feedback current						
• Rated current I_{NE}	A	1600	2000	2000	2500	3200
Current requirement						
• 24 V DC auxiliary power supply	A	-	-	-	-	-
• 230 V 2 AC	A	1.07	2.14	2.14	2.14	2.14
• 230 V 2 AC ¹⁾						
- Making current	A	0.5	0.5	0.5	0.5	0.5
- Holding current	A	0.06	0.06	0.06	0.06	0.04
Power loss, max. ²⁾						
• at 50 Hz 400 V						
- Option L42/L44	kW	0.41	0.6	0.6	0.95	0.95
- Option L43	kW	1.186	1.366	1.594	2.502	2.482
• at 60 Hz 460 V						
- Option L42/L44	kW	0.41	0.6	0.6	0.95	0.95
- Option L43	kW	1.186	1.366	1.594	2.502	2.482
Cooling air requirement ³⁾	m ³ /s	0.36	0.72	0.72	0.72	0.72
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	68/70	70/72	70/72	70/72	70/72
Line connection L1, L2, L3		5/M12 + 4/M16	5/M12 + 4/M16	5/M12 + 4/M16	5/M12 + 4/M16	5/M12 + 4/M16
• Conductor cross-section, max. (DIN VDE)	mm ²	8 x 240	10 x 240	10 x 240	10 x 240	10 x 300
PE/GND connection		PE bar	PE bar	PE bar	PE bar	PE bar
• Busbar cross-section	mm ²	600	600	600	600	600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	600	1000	1000	1000	1000
• Height ⁴⁾	mm	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600
Weight						
• Option L42/L44	kg	490	600	620	620	720
• Option L43	kg	650	760	820	900	1000
Frame size		JL	KL	KL	KL	LL

¹⁾ Current requirement of contactors/circuit breakers and fans with IP23, IP43, IP54 degree of protection (in combination with Basic Line Modules).

²⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

³⁾ For IP23, IP43 or IP54 degree of protection only (in combination with Basic Line Modules).

⁴⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

SINAMICS S120 Cabinet Modules

Line Modules Line Connection Modules

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Line Connection Modules				
		6SL3700-0LG32-8AA0	6SL3700-0LG34-0AA0	6SL3700-0LG36-3AA0	6SL3700-0LG38-0AA0	6SL3700-0LG41-0AA0
Feed/feedback current						
• Rated current I_{NE}	A	280	380	600	770	1000
Current requirement						
• 24 V DC auxiliary power supply	A	-	-	-	-	-
• 230 V 2 AC	A	-	-	-	-	1.07
• 230 V 2 AC ¹⁾						
- Making current	A	3.6	3.6	3.6	10.8	0.5
- Holding current	A	0.04	0.04	0.04	0.12	0.06
Power loss, max. ²⁾						
• at 50 Hz 500/690 V						
- Option L42/L44	kW	0.125	0.19	0.31	0.39	0.18
- Option L43	kW	0.402	0.668	0.794	-	0.963
• at 60 Hz 575 V						
- Option L42/L44	kW	0.125	0.19	0.31	0.39	0.18
- Option L43	kW	0.402	0.668	0.794	-	0.963
Cooling air requirement ³⁾	m ³ /s	-	-	-	-	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	-	-	-	-	68/70
Line connection L1, L2, L3						
• Conductor cross-section, max. (DIN VDE)	mm ²	2/M12 2 x 150	2/M12 2 x 150	2/M12 4 x 240	2/M12 8 x 240	5/M12 + 4/M16 8 x 240
PE/GND connection						
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240
Degree of protection	IP20	IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	400	600	600	600	600
• Height ⁴⁾	mm	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600
Weight						
• Option L42/L44	kg	220	230	310	340	450
• Option L43	kg	260	310	400	-	650
Frame size		FL	FL	GL	HL	JL

¹⁾ Current requirement of contactors/circuit breakers and fans with IP23, IP43, IP54 degree of protection (in combination with Basic Line Modules).

²⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

³⁾ For IP23, IP43 or IP54 degree of protection only (in combination with Basic Line Modules).

⁴⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Technical data (continued)

Line supply voltage 500 to 690 V 3 AC		Line Connection Modules				
		6SL3700-0LG41-3AA0	6SL3700-0LG41-6AA0	6SL3700-0LG42-0BA0	6SL3700-0LG42-5BA0	6SL3700-0LG43-2BA0
		Prepared for connection to Line Modules connected in parallel				
Feed/feedback current						
• Rated current I_{NE}	A	1250	1600	2000	2500	3200
Current requirement						
• 24 V DC auxiliary power supply	A	-	-	-	-	-
• 230 V 2 AC	A	1.07	1.07	2.14	2.14	2.14
• 230 V 2 AC ¹⁾						
- Making current	A	0.5	0.5	0.5	0.5	0.5
- Holding current	A	0.06	0.06	0.06	0.06	0.06
Power loss, max. ²⁾						
• at 50 Hz 500/690 V						
- Option L42/L44	kW	0.29	0.41	0.6	0.6	0.95
- Option L43	kW	1.073	1.387	2.166	2.166	2.894
• at 60 Hz 575 V						
- Option L42/L44	kW	0.29	0.41	0.6	0.6	0.95
- Option L43	kW	1.073	1.387	2.166	2.166	2.894
Cooling air requirement ³⁾	m ³ /s	0.36	0.36	0.72	0.72	0.72
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	68/70	68/70	70/72	70/72	70/72
Line connection L1, L2, L3						
• Conductor cross-section, max. (DIN VDE)	mm ²	5/M12 + 4/M16 8 x 240	5/M12 + 4/M16 8 x 240	5/M12 + 4/M16 10 x 240	5/M12 + 4/M16 10 x 240	5/M12 + 4/M16 10 x 300
PE/GND connection						
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240
Degree of protection	IP20	IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	600	600	1000	1000	1000
• Height ⁴⁾	mm	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600
Weight						
• Option L42/L44	kg	470	490	600	620	720
• Option L43	kg	670	680	980	1000	1080
Frame size		JL	JL	KL	KL	LL

¹⁾ Current requirement of contactors/circuit breakers and fans with IP23, IP43, IP54 degree of protection (in combination with Basic Line Modules).

²⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

³⁾ For IP23, IP43 or IP54 degree of protection only (in combination with Basic Line Modules).

⁴⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Line Modules Line Connection Modules

Options

The table below lists the options available for Line Connection Modules (Details → Description of the options):

Brief description of the options	Order code	Rated current			
		≤ 400 A	≤ 800 A	> 800, < 2000 A	≥ 2000 A
Auxiliary voltage generation in the LCM	K76	–	✓	✓	✓
Line contactor for supply current ≤ 800 A	L13	✓	✓	–	–
Supplied without line reactor	L22	✓	✓	✓	–
Withdrawable circuit breaker in place of a fixed-mounted circuit breaker	L25	–	–	✓	✓
Current transformer upstream of main circuit breaker	L41	✓	✓	✓	✓
Line Connection Module for Active Line Modules	L42	✓	✓	✓	✓
Line Connection Module for Basic Line Modules	L43	✓	✓	✓	✓
Line Connection Module for Smart Line Modules	L44	✓	✓	✓	✓
EMERGENCY OFF pushbutton installed in the cabinet door	L45	✓	✓	✓	✓
Grounding switch upstream of main circuit breaker	L46	–	–	–	✓
Grounding switch downstream of main circuit breaker	L47	–	–	–	✓
Cabinet anti-condensation heating	L55	✓	✓	✓	✓
Insulation monitoring	L87	✓	✓	✓	✓
Base 100 mm high, RAL 7022	M06	✓	✓	✓	✓
Cable-marshaling compartment 200 mm high, RAL 7035	M07	✓	✓	✓	✓
IP21 degree of protection	M21	✓	✓	✓	✓
IP23 degree of protection (includes M60)	M23	✓	✓	✓	✓
Side panel (mounted on the left)	M27	✓	✓	✓	✓
IP43 degree of protection (includes M60)	M43	✓	✓	✓	✓
IP54 degree of protection (includes M60)	M54	✓	✓	✓	✓
Closed cabinet door, air inlet from below through floor opening	M59	✓	✓	✓	✓
Additional touch protection (included in M23 , M43 and M54)	M60	✓	✓	✓	✓
EMC shield bus	M70	✓	✓	✓	✓
DC busbar system ($I_d = 1170$ A, 1x 60 x 10 mm)	M80	✓	✓	✓	✓
DC busbar system ($I_d = 1500$ A, 1x 80 x 10 mm)	M81	✓	✓	✓	✓
DC busbar system ($I_d = 1840$ A, 1x 100 x 10 mm)	M82	✓	✓	✓	✓
DC busbar system ($I_d = 2150$ A, 2x 60 x 10 mm)	M83	✓	✓	✓	✓
DC busbar system ($I_d = 2730$ A, 2x 80 x 10 mm)	M84	✓	✓	✓	✓
DC busbar system ($I_d = 3320$ A, 2x 100 x 10 mm)	M85	✓	✓	✓	✓
DC busbar system ($I_d = 3720$ A, 3x 80 x 10 mm)	M86	✓	✓	✓	✓
DC busbar system ($I_d = 4480$ A, 3x 100 x 10 mm)	M87	✓	✓	✓	✓
Crane transport assembly (top-mounted)	M90	✓	✓	✓	✓
Measuring instrument for line supply values; mounted in cabinet door (incl. L41)	P10	✓	✓	✓	✓
Measuring instrument for line supply values such as option P10 , with PROFIBUS connection	P11	✓	✓	✓	✓
Special paint finish for cabinet	Y09	✓	✓	✓	✓
Factory assembly as transport units	Y11	✓	✓	✓	✓
One-line label for plant identification, 40 x 80 mm	Y31	✓	✓	✓	✓
Two-line label for plant identification, 40 x 180 mm	Y32	✓	✓	✓	✓
Four-line label for plant identification, 40 x 180 mm	Y33	✓	✓	✓	✓
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02	✓	✓	✓	✓
Preliminary version of customer documentation in PDF format	D14	✓	✓	✓	✓
Documentation in English / French	D58	✓	✓	✓	✓
Documentation in English / Spanish	D60	✓	✓	✓	✓
Documentation in English / Italian	D80	✓	✓	✓	✓
Without Operating Instructions	D99	✓	✓	✓	✓
Rating plate data in English / French	T58	✓	✓	✓	✓
Rating plate data in English / Spanish	T60	✓	✓	✓	✓
Rating plate data in English / Italian	T80	✓	✓	✓	✓

Options (continued)

Option selection matrix for Line Connection Modules

Certain options are mutually exclusive.

✓	Possible combination
–	Combination not possible

Electrical options

	K76 ¹⁾	L13 ²⁾	L25 ³⁾	L41	L45	L46 ⁴⁾	L47 ⁴⁾	L55	L87	P10	P11
K76 ¹⁾		✓	✓	✓	✓	✓	–	✓	✓	✓	✓
L13 ²⁾	✓		–	✓	✓	–	–	✓	✓	✓	✓
L25 ³⁾	✓	–		✓	✓	✓	✓	✓	✓	✓	✓
L41	✓	✓	✓		✓	✓	✓	✓	✓	–	–
L45	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
L46 ⁴⁾	✓	–	✓	✓	✓		✓	✓	✓	✓	✓
L47 ⁴⁾	–	–	✓	✓	✓	✓		✓	✓	✓	✓
L55	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
L87	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
P10	✓	✓	✓	–	✓	✓	✓	✓	✓		–
P11	✓	✓	✓	–	✓	✓	✓	✓	✓	–	

Mechanical/electrical options

	L22	L42	L43	L44	M06	M07	M21	M23	M43	M27	M54	M59	M60	M70	M90	Y09	Y11	Y31	Y32	Y33
L22		–	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L42	–		–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L43	✓	–		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L44	–	–	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M06	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M21	✓	✓	✓	✓	✓	✓		–	–	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
M23	✓	✓	✓	✓	✓	✓	–		–	✓	–	✓	– ⁵⁾	✓	✓	✓	✓	✓	✓	✓
M43	✓	✓	✓	✓	✓	✓	–	–		✓	–	✓	– ⁵⁾	✓	✓	✓	✓	✓	✓	✓
M27	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M54	✓	✓	✓	✓	✓	✓	–	–	–	✓		✓	– ⁵⁾	✓	✓	✓	✓	✓	✓	✓
M59	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
M60	✓	✓	✓	✓	✓	✓	– ⁵⁾	– ⁵⁾	✓	– ⁵⁾	✓		✓	✓	✓	✓	✓	✓	✓	✓
M70	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	–	✓	✓	✓
Y09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Y11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓		✓	✓	✓
Y31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	–
Y32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–
Y33	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	

¹⁾ Option not for units with rated currents ≤ 400 A.

²⁾ Option only for rated current ≤ 800 A.

³⁾ Option only for rated current > 800 A.

⁴⁾ Option only for rated current ≥ 2000 A.

⁵⁾ Option **M60** is already included in **M23**, **M43** and **M54**.

Line Modules Line Connection Modules

Options (continued)

Option selection matrix for Line Connection Modules

Mechanical options, DC busbar system
(busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

Documentation

	D02	D14	D58	D60	D80	D99
D02		✓	✓	✓	✓	–
D14	✓		✓	✓	✓	–
D58	✓	✓		–	–	–
D60	✓	✓	–		–	–
D80	✓	✓	–	–		–
D99	–	–	–	–	–	

Rating plate data

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

Overview



Basic Line Modules (BLM) are compact line infeeds for two-quadrant operation, i.e. no regenerative feedback.

They are used when no energy has to be fed back into the network.

If regenerative conditions occur in the drive line-up, Braking Modules must be used because they convert the excess energy into heat in braking resistors.

Basic Line Modules are available for the following voltages and power ratings:

Line voltage	Rated power
380 ... 480 V 3 AC	200 ... 900 kW
500 ... 690 V 3 AC	250 ... 1500 kW

The power ratings can be increased by connecting up to four identical Basic Line Modules in parallel.

When Basic Line Modules are used as the infeed, a line reactor must be installed in accordance with the supply short circuit power at the connection point (see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided). This reactor is available as a standard feature in the Line Connection Module. However, it can be removed if it is not required (order code **L22**).

Design

The Basic Line Modules are available in different frame sizes.

With frame sizes FB and GB, a fully controlled thyristor bridge is used to pre-charge the Basic Line Modules and connected Motor Modules. The thyristors normally operate with a trigger delay angle of 0°.

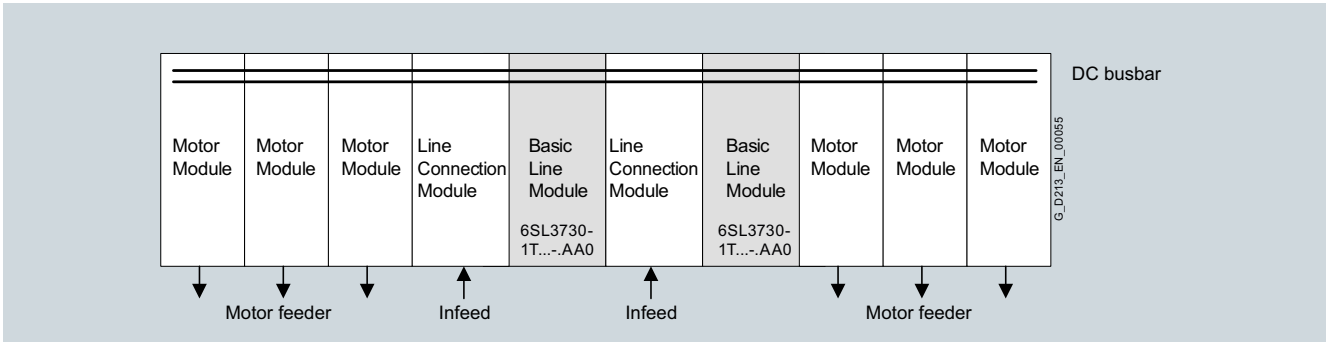
Basic Line Modules, frame size GD for 900 kW (400 V) or 1500 kW (690 V) include a diode bridge, and the DC link is precharged via a separate line-side pre-charging device that is located in the Line Connection Module (order code **L43**, Line Connection Module for Basic Line Module).

Parallel connection of Basic Line Modules to power increase

Line Modules can be connected in parallel (relative to the line supply) in two ways for the purpose of creating drive line-ups with a higher power rating.

Infeed of two Basic Line Modules via two separate Line Connection Modules

With this arrangement, each Basic Line Module is supplied by a separate Line Connection Module and the Basic Line Modules are protected by fuses or circuit breakers (at $I > 800\text{ A}$) in the Line Connection Module. A Basic Line Module is assigned to a Line Connection Module and is mechanically coupled. A direct coupling of both "groups" comprising Line Connection Module and Basic Line Module does not need to be carried out mechanically. Other modules can also be inserted in between.



Line Modules Basic Line Modules

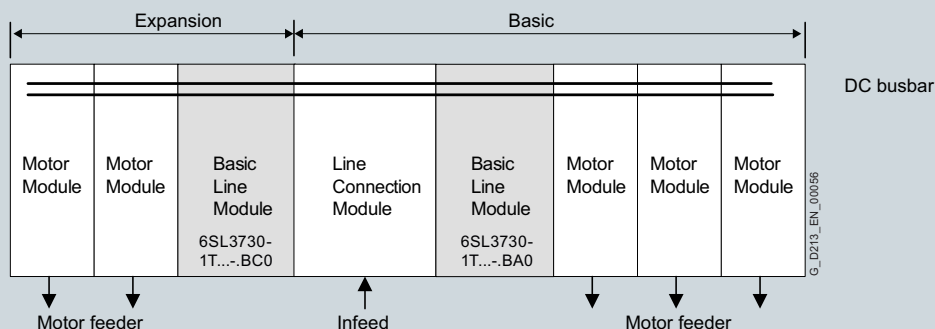
Design (continued)

Infeed of two Basic Line Modules via a single Line Connection Module

Basic Line Modules are available which can be operated on a single Line Connection Module. These can be connected to the left and right of the Line Connection Module. The power connections on the Basic Line Module on the left of the Line Connection Module are a mirror image (Order No. with "C" in the next to penultimate position, example: 6SL3730-1T...-BC0), which results

in an extremely compact line infeed design (see also SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided).

These module versions feature integrated line-side fuses which are required because the circuit breaker in the Line Connection Module is not capable of providing selective protection for the Basic Line Modules. They are therefore 200 mm wider in each case than version 6SL3730-1T...-AA0.



Note:

If the Basic Line Modules are supplied with power via the same circuit breaker, line-side fuses are provided to ensure selective individual protection of the modules. This arrangement increases the cabinet width by 200 mm (dimension data in selection tables includes extra width).

Please note that only Basic Line Modules with exactly the same output rating may be connected in parallel. The potential for

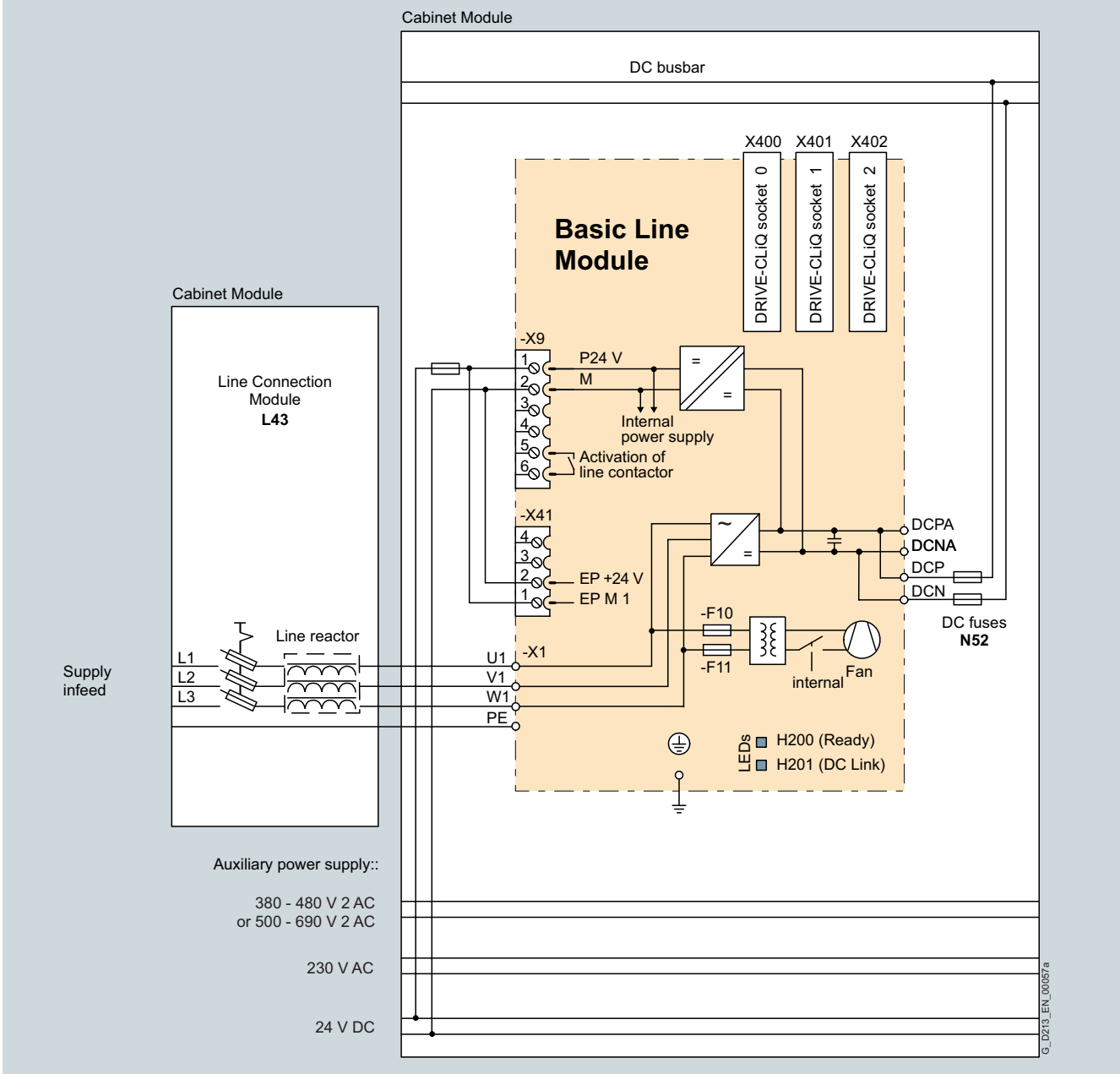
imbalances in current distribution means that a current derating of 7.5 % applies; this must be taken into account when the modules are dimensioned. A connection of the Basic Line Modules connected in parallel using DRIVE-CLiQ must be taken into consideration when engineering the system (see SINAMICS – Low Voltage Engineering Manual).

Selection and ordering data

Rated power kW	Basic Line Modules Order No.	
Line voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 650 V DC)		
200	6SL3730-1TE34-2AA0	
250	6SL3730-1TE35-3AA0	
400	6SL3730-1TE38-2AA0	
560	6SL3730-1TE41-2AA0	
560	6SL3730-1TE41-2BA0	For a parallel circuit config., mounted to the right of the Line Connection Module
560	6SL3730-1TE41-2BC0	For a parallel circuit config., mounted to the left of the Line Connection Module
710	6SL3730-1TE41-5AA0	
710	6SL3730-1TE41-5BA0	For a parallel circuit config., mounted to the right of the Line Connection Module
710	6SL3730-1TE41-5BC0	For a parallel circuit config., mounted to the left of the Line Connection Module
900	6SL3730-1TE41-8AA0	
900	6SL3730-1TE41-8BA0	For a parallel circuit config., mounted to the right of the Line Connection Module
900	6SL3730-1TE41-8BC0	For a parallel circuit config., mounted to the left of the Line Connection Module

Rated power kW	Basic Line Modules Order No.	
Line voltage 500 ... 690 V 3 AC (DC link voltage 675 ... 930 V DC)		
250	6SL3730-1TH33-0AA0	
355	6SL3730-1TH34-3AA0	
560	6SL3730-1TH36-8AA0	
900	6SL3730-1TH41-1AA0	
900	6SL3730-1TH41-1BA0	For a parallel circuit config., mounted to the right of the Line Connection Module
900	6SL3730-1TH41-1BC0	For a parallel circuit config., mounted to the left of the Line Connection Module
1100	6SL3730-1TH41-4AA0	
1100	6SL3730-1TH41-4BA0	For a parallel circuit config., mounted to the right of the Line Connection Module
1100	6SL3730-1TH41-4BC0	For a parallel circuit config., mounted to the left of the Line Connection Module
1500	6SL3730-1TH41-8AA0	
1500	6SL3730-1TH41-8BA0	For a parallel circuit config., mounted to the right of the Line Connection Module
1500	6SL3730-1TH41-8BC0	For a parallel circuit config., mounted to the left of the Line Connection Module

Integration



Connection example of a Basic Line Module

SINAMICS S120 Cabinet Modules

Line Modules Basic Line Modules

Technical data

Line voltage 380 ... 480 V 3 AC		Basic Line Modules					
		6SL3730-1TE34-2AA0	6SL3730-1TE35-3AA0	6SL3730-1TE38-2AA0	6SL3730-1TE41-2AA0	6SL3730-1TE41-5AA0	6SL3730-1TE41-8AA0
		For a parallel circuit configuration, mounted to the right of the Line Connection Module: 6SL3730-1TE41-2BA0 6SL3730-1TE41-5BA0 6SL3730-1TE41-8BA0 For a parallel circuit configuration, mounted to the left of the Line Connection Module: 6SL3730-1TE41-2BC0 6SL3730-1TE41-5BC0 6SL3730-1TE41-8BC0					
Rated power							
• at $I_{N\ DC}$ (50 Hz 400 V)	kW	200	250	400	560	710	900
• at $I_{H\ DC}$ (50 Hz 400 V)	kW	160	200	315	450	560	705
• at $I_{N\ DC}$ (60 Hz 460 V)	hp	305	385	615	860	1090	1390
• at $I_{H\ DC}$ (60 Hz 460 V)	hp	245	305	485	690	860	1090
DC link current							
• Rated current $I_{N\ DC}$	A	420	530	820	1200	1500	1880
• Base load current $I_{H\ DC}$ ¹⁾	A	328	413	640	936	1170	1467
• Maximum current $I_{max\ DC}$	A	630	795	1230	1800	2250	2820
Input current							
• Rated current $I_{N\ E}$	A	365	460	710	1010	1265	1630
• Maximum current $I_{max\ E}$	A	547	690	1065	1515	1897	2380
Current requirement							
• 24 V DC auxiliary power supply	A	1.1	1.1	1.1	1.1	1.1	1.1
• 400 V AC ²⁾	A	Internal	Internal	Internal	Internal	Internal	Internal
DC link capacitance							
• Basic Line Module	μF	7200	9600	14600	23200	29000	34800
• Drive line-up, max.	μF	57600	76800	116800	185600	232000	139200
Power loss, max. ³⁾							
• at 50 Hz 400 V	kW	1.9	2.1	3.2	4.6	5.5	6.9
• at 60 Hz 460 V	kW	1.9	2.1	3.2	4.6	5.5	6.9
Cooling-air requirement	m ³ /s	0.17	0.17	0.17	0.36	0.36	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	66/68	66/68	66/68	71/73	71/73	71/73
PE/GND connection							
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240
Cable length, max. ⁴⁾							
• Shielded	m	2600	2600	2600	4000	4000	4800
• Unshielded	m	3900	3900	3900	6000	6000	7200
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	400	400	400	400/600/600	400/600/600	400/600/600
• Height ⁵⁾	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight, approx.	kg	166	166	166	320/440/480	320/440/480	320/440/480
Frame size		FB	FB	FB	GB	GB	GD

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The current requirement for the 400 V AC auxiliary power supply is drawn from the line input voltage.

³⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁴⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.

⁵⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with degrees of protection IP23, IP43, IP54.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Basic Line Modules					
		6SL3730-1TH33-0AA0	6SL3730-1TH34-3AA0	6SL3730-1TH36-8AA0	6SL3730-1TH41-1AA0	6SL3730-1TH41-4AA0	6SL3730-1TH41-8AA0
		For a parallel circuit configuration, mounted to the right of the Line Connection Module: 6SL3730-1TH41-1BA0 6SL3730-1TH41-4BA0 6SL3730-1TH41-8BA0 For a parallel circuit configuration, mounted to the left of the Line Connection Module: 6SL3730-1TH41-1BC0 6SL3730-1TH41-4BC0 6SL3730-1TH41-8BC0					
Rated power							
• at $I_{N\ DC}$ (50 Hz 690 V)	kW	250	355	560	900	1100	1500
• at $I_{H\ DC}$ (50 Hz 690 V)	kW	195	280	440	710	910	1220
• at $I_{N\ DC}$ (50 Hz 500 V)	kW	175	250	390	635	810	1085
• at $I_{H\ DC}$ (50 Hz 500 V)	kW	165	235	365	595	755	1015
• at $I_{N\ DC}$ (60 Hz 575 V)	hp	250	350	600	900	1250	1500
• at $I_{H\ DC}$ (60 Hz 575 V)	hp	200	300	450	800	1000	1250
DC link current							
• Rated current $I_{N\ DC}$	A	300	430	680	1100	1400	1880
• Base load current $I_{H\ DC}$ ¹⁾	A	234	335	530	858	1092	1467
• Maximum current $I_{max\ DC}$	A	450	645	1020	1650	2100	2820
Input current							
• Rated current $I_{N\ E}$	A	260	375	575	925	1180	1580
• Maximum current $I_{max\ E}$	A	390	563	863	1388	1770	2370
Current requirement							
• 24 V DC aux. power supply	A	1.1	1.1	1.1	1.1	1.1	1.1
• 500/690 V AC ²⁾	A	Internal	Internal	Internal	Internal	Internal	Internal
DC link capacitance							
• Basic Line Module	μF	3200	4800	7300	11600	15470	19500
• Drive line-up. max.	μF	25600	38400	58400	92800	123760	78000
Power loss, max. ³⁾							
• at 690 V (50 Hz)	kW	1.5	2.1	3.0	5.4	5.8	7.3
• at 575 V (60 Hz)	kW	1.5	2.1	3.0	5.4	5.8	7.3
Cooling-air requirement		m ³ /s	0.17	0.17	0.17	0.36	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	66/68	66/68	66/68	71/73	71/73
PE/GND connection							
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240
Cable length, max. ⁴⁾							
• Shielded	m	1500	1500	1500	2250	2250	2750
• Unshielded	m	2250	2250	2250	3375	3375	4125
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	400	400	400	400/600/600	400/600/600	400/600/600
• Height ⁵⁾	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight, approx.		kg	166	166	166	320/440/480	320/440/480
Frame size		FB	FB	FB	GB	GB	GD

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The current requirement for the 500/690 V AC auxiliary power supply is drawn from the line input voltage.

³⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁴⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request

⁵⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with degrees of protection IP23, IP43, IP54.

Line Modules Basic Line Modules

Options

The table below lists the options available for Basic Line Modules (Details → Description of the options):

Brief description of the options	Order code	Brief description of the options	Order code
CBC10 Communication Board	G20	Crane transport assembly (top-mounted)	M90
CBE20 Communication Board	G33	DC link fuses for BLM	N52
AOP30 Advanced Operator Panel installed in the cabinet door	K08	Special paint finish for cabinet	Y09
CU320 Control Unit + CompactFlash card without performance expansion	K90	Factory assembly as transport units	Y11
CU320 Control Unit + CompactFlash card with performance expansion 1	K91	One-line label for plant identification, 40 x 80 mm	Y31
Cabinet anti-condensation heating	L55	Two-line label for plant identification, 40 x 180 mm	Y32
25/125 kW braking unit (can be used for frame size FB) for line voltages of 380 ... 480 V and 660 ... 690 V	L61	Four-line label for plant identification, 40 x 180 mm	Y33
50/250 kW braking unit (can be used for frame size GB / GD) for line voltages of 380 ... 480 V and 660 ... 690 V	L62	Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02
25/125 kW braking unit (can be used for frame size FB) for line voltages of 500 ... 600 V	L64	Preliminary version of customer documentation in PDF format	D14
50/250 kW braking unit (can be used for frame size GB / GD) for line voltages of 500 ... 600 V	L65	Documentation in English / French	D58
Base 100 mm high, RAL 7022	M06	Documentation in English / Spanish	D60
Cable-marshaling compartment 200 mm high, RAL 7035	M07	Documentation in English / Italian	D80
IP21 degree of protection	M21	Without Operating Instructions	D99
IP23 degree of protection (includes M60)	M23	Rating plate data in English / French	T58
Side panel mounted on the right	M26	Rating plate data in English / Spanish	T60
Side panel mounted on the left	M27	Rating plate data in English / Italian	T80
IP43 degree of protection (includes M60)	M43	Visual acceptance	F03
IP54 degree of protection (includes M60)	M54	Function test with no motor connected	F71
Closed cabinet door, air inlet from below through floor opening	M59	Insulation test	F77
Additional touch protection (included in M23 , M43 and M54)	M60	Customer-specific acceptance inspections (on request)	F97
DC busbar system ($I_d = 1170$ A, 1x 60 x 10 mm)	M80		
DC busbar system ($I_d = 1500$ A, 1x 80 x 10 mm)	M81		
DC busbar system ($I_d = 1840$ A, 1x 100 x 10 mm)	M82		
DC busbar system ($I_d = 2150$ A, 2x 60 x 10 mm)	M83		
DC busbar system ($I_d = 2730$ A, 2x 80 x 10 mm)	M84		
DC busbar system ($I_d = 3320$ A, 2x 100 x 10 mm)	M85		
DC busbar system ($I_d = 3720$ A, 3x 80 x 10 mm)	M86		
DC busbar system ($I_d = 4480$ A, 3x 100 x 10 mm)	M87		

Options (continued)

Option selection matrix for Basic Line Modules

Certain options are mutually exclusive.

✓	Possible combination
–	Combination not possible

Electrical options

	G20 ¹⁾	G33 ¹⁾	K08 ¹⁾	K90	K91	L55	L61/64	L62/65
G20 ¹⁾		–	✓	✓	✓	✓	✓	✓
G33 ¹⁾	–		✓	✓	✓	✓	✓	✓
K08 ¹⁾	✓	✓		✓	✓	✓	✓	✓
K90	✓	✓	✓		–	✓	✓	✓
K91	✓	✓	✓	–		✓	✓	✓
L55	✓	✓	✓	✓	✓		✓	✓
L61/64	✓	✓	✓	✓	✓	✓		–
L62/65	✓	✓	✓	✓	✓	✓	–	

Mechanical/electrical options

	M06	M07	M21	M23	M26	M27	M43	M54	M59	M60	M90	N52	Y09	Y11	Y31	Y32	Y33
M06		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M21	✓	✓		–	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
M23	✓	✓	–		✓	✓	–	–	✓	– ²⁾	✓	✓	✓	✓	✓	✓	✓
M26	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M27	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M43	✓	✓	–	–	✓	✓		–	✓	– ²⁾	✓	✓	✓	✓	✓	✓	✓
M54	✓	✓	–	–	✓	✓	–		✓	– ²⁾	✓	✓	✓	✓	✓	✓	✓
M59	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
M60	✓	✓	✓	– ²⁾	✓	✓	– ²⁾	– ²⁾	✓		✓	✓	✓	✓	✓	✓	✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	–	✓	✓	✓
N52	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Y09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Y11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓		✓	✓	✓
Y31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	–
Y32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–
Y33	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

Documentation

	D02	D14	D58	D60	D80	D99
D02		✓	✓	✓	✓	–
D14	✓		✓	✓	✓	–
D58	✓	✓		–	–	–
D60	✓	✓	–		–	–
D80	✓	✓	–	–		–
D99	–	–	–	–	–	

Rating plate data

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

¹⁾ Options **G20**, **G33** and **K08** require option **K90** or **K91**.

²⁾ Option **M60** is already included in **M23**, **M43** and **M54**.

Line Modules Smart Line Modules

Overview



Smart Line Modules are non-regulated feed/feedback units. The infeed takes place via a diode bridge, while the stall-protected, line-commutated feedback takes place via IGBTs with 100 % continuous regenerative feedback power. An autotransformer is not required for regenerative feedback.

The regenerative capability can be deactivated with a digital input.

Smart Line Modules are suitable for connection to grounded (TN, TT) and non-grounded (IT) supply systems. The following voltages and power ratings are available:

Line voltage	Rated power
380 ... 480 V 3 AC	250 ... 800 kW
500 ... 690 V 3 AC	450 ... 1400 kW

The power rating can be increased by connecting up to four identical Smart Line Modules in parallel (for configuration instructions, see the SINAMICS – Low Voltage Engineering Manual).

Design

IGBTs serve as Smart Line Module power semiconductors. Because this reduces switching losses, a high percentage of the power unit current can be utilized.

The current flows in incoming direction via the freewheeling diodes of the IGBTs. This means that the Smart Line Module behaves in a similar way to the Basic Line Module. If the DC link voltage increases due to regenerative operation of the drives, the IGBTs conduct the current, thus feeding the energy back into the supply system.

In contrast to Active Line Modules, Smart Line Modules do not require a line-side filter; all they require is a line reactor (4 % u_k). The unit has a built-in pre-charging circuit for the DC link capacitors. For this reason, a line contactor or a motor-driven circuit breaker is absolutely essential. By specifying the option with order code **L44** for the Line Connection Modules, these components are appropriately accommodated in the Line Connection Module.

Parallel connection of Smart Line Modules to power increase

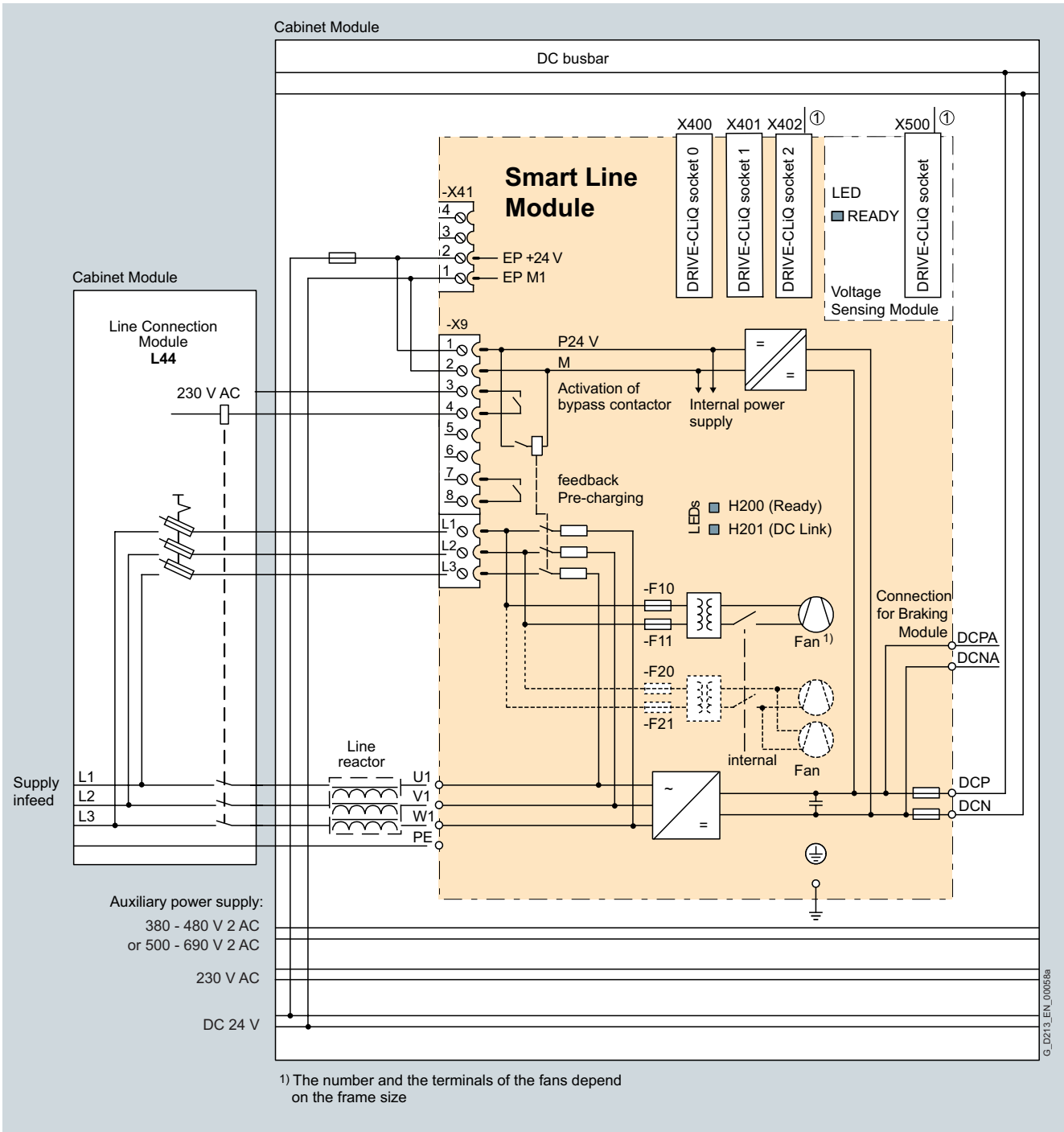
Up to four Smart Line Modules with the same power rating can be connected in parallel in order to increase power. Current derating of 7.5 % with respect to the rated current of each Smart Line Module must be taken into account when the system is dimensioned. A connection of the Basic Line Modules connected in parallel using DRIVE-CLiQ must be taken into consideration when engineering the system (see SINAMICS – Low Voltage Engineering Manual).

A 4 % reactor is always required upstream of each Smart Line Module for the purpose of current symmetrization. This is integrated as standard. Just as with the Basic Line Modules, "mirror-image" power connections are available for Smart Line Modules, which enable parallel circuits to be realized in a compact design. Units that are arranged to the left of the Line Connection Module have the letter "C" at the penultimate position of the order number. Example: 6SL3730-6TE41-1BC0 (see also the corresponding diagram for the Basic Line Modules).

Selection and ordering data

Rated power kW	Smart Line Module Order No.	
Line voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 650 V DC)		
250	6SL3730-6TE35-5AA0	
355	6SL3730-6TE37-3AA0	
500	6SL3730-6TE41-1AA0	
500	6SL3730-6TE41-1BA0	For parallel conn., mounted to the <u>right</u> of the LCM
500	6SL3730-6TE41-1BC0	For parallel conn., mounted to the <u>left</u> of the LCM
630	6SL3730-6TE41-3AA0	
630	6SL3730-6TE41-3BA0	For parallel conn., mounted to the <u>right</u> of the LCM
630	6SL3730-6TE41-3BC0	For parallel conn., mounted to the <u>left</u> of the LCM
800	6SL3730-6TE41-7AA0	
800	6SL3730-6TE41-7BA0	For parallel conn., mounted to the <u>right</u> of the LCM
800	6SL3730-6TE41-7BC0	For parallel conn., mounted to the <u>left</u> of the LCM
Line voltage 500 ... 690 V 3 AC (DC link voltage 675 ... 930 V DC)		
450	6SL3730-6TG35-5AA0	
710	6SL3730-6TG38-8AA0	
710	6SL3730-6TG38-8BA0	For parallel conn., mounted to the <u>right</u> of the LCM
710	6SL3730-6TG38-8BC0	For parallel conn., mounted to the <u>left</u> of the LCM
1000	6SL3730-6TG41-2AA0	
1000	6SL3730-6TG41-2BA0	For parallel conn., mounted to the <u>right</u> of the LCM
1000	6SL3730-6TG41-2BC0	For parallel conn., mounted to the <u>left</u> of the LCM
1400	6SL3730-6TG41-7AA0	
1400	6SL3730-6TG41-7BA0	For parallel conn., mounted to the <u>right</u> of the LCM
1400	6SL3730-6TG41-7BC0	For parallel conn., mounted to the <u>left</u> of the LCM

Integration



Connection example of a Smart Line Module

Line Modules Smart Line Modules

Technical data

Line voltage 380 ... 480 V 3 AC		Smart Line Modules				
		6SL3730-6TE35-5AA0	6SL3730-6TE37-3AA0	6SL3730-6TE41-1AA0	6SL3730-6TE41-3AA0	6SL3730-6TE41-7AA0
		For a parallel circuit configuration, mounted to the <u>right</u> of the Line Connection Module: 6SL3730-6TE41-1BA0 6SL3730-6TE41-3BA0 6SL3730-6TE41-7BA0 For a parallel circuit configuration, mounted to the <u>left</u> of the Line Connection Module: 6SL3730-6TE41-1BC0 6SL3730-6TE41-3BC0 6SL3730-6TE41-7BC0				
Rated power						
• at $I_{N\ DC}$ (50 Hz 400 V)	kW	250	355	500	630	800
• at $I_{H\ DC}$ (50 Hz 400 V)	kW	235	315	450	555	730
• at $I_{N\ DC}$ (60 Hz 460 V)	hp	395	545	770	970	1230
• at $I_{H\ DC}$ (60 Hz 460 V)	hp	360	485	695	855	1125
DC link current						
• Rated current $I_{N\ DC}$	A	550	730	1050	1300	1700
• Base load current $I_{H\ DC}^{1)}$	A	490	650	934	1157	1513
• Maximum current $I_{max\ DC}$	A	825	1095	1575	1950	2550
Feed/feedback current						
• Rated current $I_{N\ E}$	A	463	614	883	1093	1430
• Maximum current $I_{max\ E}$	A	694	921	1324	1639	2145
Current requirement						
• 24 V DC auxiliary power supply	A	1.35	1.35	1.4	1.5	1.7
• 400 V AC ²⁾	A	1.8	1.8	3.6	5.4	5.4
DC link capacitance						
• Smart Line Module	μF	8400	12000	16800	18900	28800
• Drive line-up, max.	μF	42000	60000	67200	75600	115200
Power loss, max. ³⁾						
• at 50 Hz 400 V	kW	3.7	4.7	7.1	11.0	11.5
• at 60 Hz 460 V	kW	3.7	4.7	7.1	11.0	11.5
Cooling-air requirement	m ³ /s	0.36	0.36	0.78	1.08	1.08
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	69/73	69/73	70/73	70/73	70/73
PE/GND connection						
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240
Cable length, max. ⁴⁾						
• Shielded	m	4000	4000	4800	4800	4800
• Unshielded	m	6000	6000	7200	7200	7200
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	400	400	600	800	800
• Height ⁵⁾	mm	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600
Weight, approx.	kg	270	270	490	775	775
Frame size		GX	GX	HX	JX	JX

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The current requirement for the 400 V AC auxiliary power supply is drawn from the line input voltage.

³⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁴⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request

⁵⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with degrees of protection IP23, IP43, IP54.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Smart Line Modules			
		6SL3730-6TG35-5AA0	6SL3730-6TG38-8AA0	6SL3730-6TG41-2AA0	6SL3730-6TG41-7AA0
		For a parallel circuit configuration, mounted to the <u>right</u> of the Line Connection Module: 6SL3730-6TG38-8BA0 6SL3730-6TG41-2BA0 6SL3730-6TG41-7BA0 For a parallel circuit configuration, mounted to the <u>left</u> of the Line Connection Module: 6SL3730-6TG38-8BC0 6SL3730-6TG41-2BC0 6SL3730-6TG41-7BC0			
Rated power					
• at $I_{N\ DC}$ (50 Hz 690 V)	kW	450	710	1000	1400
• at $I_{H\ DC}$ (50 Hz 690 V)	kW	405	665	885	1255
• at $I_{N\ DC}$ (50 Hz 500 V)	kW	320	525	705	995
• at $I_{H\ DC}$ (50 Hz 500 V)	kW	295	480	640	910
• at $I_{N\ DC}$ (60 Hz 575 V)	hp	500	790	1115	1465
• at $I_{H\ DC}$ (60 Hz 575 V)	hp	450	740	990	1400
DC link current					
• Rated current $I_{N\ DC}$	A	550	900	1200	1700
• Base load current $I_{H\ DC}$ ¹⁾	A	490	800	1068	1513
• Maximum current $I_{max\ DC}$	A	825	1350	1800	2550
Feed/feedback current					
• Rated current $I_{N\ E}$	A	463	757	1009	1430
• Maximum current $I_{max\ E}$	A	694	1135	1513	2145
Current requirement					
• 24 V DC auxiliary power supply	A	1.35	1.4	1.5	1.7
• 500 V AC or ²⁾	A	1.4	2.9	4.3	4.3
• 690 V AC	A	1.0	2.1	3.1	3.1
DC link capacitance					
• Smart Line Module	μF	5600	7400	11100	14400
• Drive line-up, max.	μF	28000	29600	44400	57600
Power loss, max. ³⁾					
• at 50 Hz 690 V	kW	4.3	6.5	12	13.8
• at 60 Hz 575 V	kW	4.3	6.5	12	13.8
Cooling-air requirement	m ³ /s	0.36	0.78	1.08	1.08
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	69/73	70/73	70/73	70/73
PE/GND connection					
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240
Cable length, max. ⁴⁾					
• Shielded	m	2250	2750	2750	2750
• Unshielded	m	3375	4125	4125	4125
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	400	600	800	800
• Height ⁵⁾	mm	2200	2200	2200	2200
• Depth	mm	600	600	600	600
Weight, approx.	kg	270	550	795	795
Frame size		GX	HX	JX	JX

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The current requirement for the 500 V / 690 V AC auxiliary power supply is drawn from the line input voltage.

³⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁴⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request.

⁵⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with degrees of protection IP23, IP43, IP54.

Line Modules Smart Line Modules

Options

The table below lists the options available for Smart Line Modules (Details → Description of the options):

Brief description of the options	Order code	Brief description of the options	Order code
CBC10 Communication Board	G20	Crane transport assembly (top-mounted)	M90
CBE20 Communication Board	G33	Special paint finish for cabinet	Y09
AOP30 Advanced Operator Panel installed in the cabinet door	K08	Factory assembly as transport units	Y11
Second auxiliary voltage busbar system	K75	One-line label for plant identification, 40 x 80 mm	Y31
CU320 Control Unit + CompactFlash card without performance expansion	K90	Two-line label for plant identification, 40 x 180 mm	Y32
CU320 Control Unit + CompactFlash card with performance expansion 1	K91	Four-line label for plant identification, 40 x 180 mm	Y33
Cabinet anti-condensation heating	L55	Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02
50/250 kW braking unit for line voltages of 380 ... 480 V and 660 ... 690 V	L62	Preliminary version of customer documentation in PDF format	D14
50/250 kW braking unit for line voltages of 500 ... 600 V	L65	Documentation in English / French	D58
Base 100 mm high, RAL 7022	M06	Documentation in English / Spanish	D60
Cable-marshaling compartment 200 mm high, RAL 7035	M07	Documentation in English / Italian	D80
IP21 degree of protection	M21	Without Operating Instructions	D99
IP23 degree of protection (includes M60)	M23	Rating plate data in English / French	T58
Side panel mounted on the right	M26	Rating plate data in English / Spanish	T60
Side panel mounted on the left	M27	Rating plate data in English / Italian	T80
IP43 degree of protection (includes M60)	M43	Visual acceptance	F03
IP54 degree of protection (includes M60)	M54	Function test without a motor connected	F71
Closed cabinet door, air inlet from below through floor opening	M59	Insulation test	F77
Additional touch protection (included in M23 , M43 and M54)	M60	Customer-specific acceptance inspections (on request)	F97
DC busbar system ($I_d = 1170$ A, 1x 60 x 10 mm)	M80		
DC busbar system ($I_d = 1500$ A, 1x 80 x 10 mm)	M81		
DC busbar system ($I_d = 1840$ A, 1x 100 x 10 mm)	M82		
DC busbar system ($I_d = 2150$ A, 2x 60 x 10 mm)	M83		
DC busbar system ($I_d = 2730$ A, 2x 80 x 10 mm)	M84		
DC busbar system ($I_d = 3320$ A, 2x 100 x 10 mm)	M85		
DC busbar system ($I_d = 3720$ A, 3x 80 x 10 mm)	M86		
DC busbar system ($I_d = 4480$ A, 3x 100 x 10 mm)	M87		

Options (continued)

Option selection matrix for Smart Line Modules

Certain options are mutually exclusive.

✓	Possible combination
–	Combination not possible

Electrical options

	G20 ¹⁾	G33 ¹⁾	K08 ¹⁾	K75	K90	K91	L55	L62/65
G20 ¹⁾		–	✓	✓	✓	✓	✓	✓
G33 ¹⁾	–		✓	✓	✓	✓	✓	✓
K08 ¹⁾	✓	✓		✓	✓	✓	✓	✓
K75	✓	✓	✓		✓	✓	✓	✓
K90	✓	✓	✓	✓		–	✓	✓
K91	✓	✓	✓	✓	–		✓	✓
L55	✓	✓	✓	✓	✓	✓		✓
L62/65	✓	✓	✓	✓	✓	✓	✓	

Mechanical/electrical options

	M06	M07	M21	M23	M26	M27	M43	M54	M59	M60	M90	Y09	Y11	Y31	Y32	Y33
M06		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M21	✓	✓		–	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓
M23	✓	✓	–		✓	✓	–	–	✓	– ²⁾	✓	✓	✓	✓	✓	✓
M26	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M27	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M43	✓	✓	–	–	✓	✓		–	✓	– ²⁾	✓	✓	✓	✓	✓	✓
M54	✓	✓	–	–	✓	✓	–		✓	– ²⁾	✓	✓	✓	✓	✓	✓
M59	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
M60	✓	✓	✓	– ²⁾	✓	✓	– ²⁾	– ²⁾	✓		✓	✓	✓	✓	✓	✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	–	✓	✓	✓
Y09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Y11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓		✓	✓	✓
Y31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	–
Y32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–
Y33	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	

Mechanical options, DC busbar system (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

Documentation

	D02	D14	D58	D60	D80	D99
D02		✓	✓	✓	✓	–
D14	✓		✓	✓	✓	–
D58	✓	✓		–	–	–
D60	✓	✓	–		–	–
D80	✓	✓	–	–		–
D99	–	–	–	–	–	

Rating plate data

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

¹⁾ The options **G20**, **G33** and **K08** require option **K90** or **K91**.

²⁾ Option **M60** is already included in **M23**, **M43** and **M54**.

Line Modules – Active Line Modules with Active Interface Modules

Overview



Active Line Modules can supply energy and return regenerative energy to the supply system.

In contrast to Basic Line Modules and Smart Line Modules, Active Line Modules generate a controlled DC voltage that is kept constant despite fluctuations in the line voltage (the line voltage must remain within the permissible tolerance range).

Active Line Modules draw a virtually sinusoidal current from the supply system and therefore do not cause any harmful current harmonics.

A Braking Module and braking resistor are required only if the drives need to be decelerated in a controlled manner after a power failure (i.e., when energy cannot be recovered to the supply).

Active Line Modules are available for the following voltages and power ratings:

Line voltage	Rated power
380 ... 480 V 3 AC	132 ... 900 kW
500 ... 690 V 3 AC	560 ... 1400 kW

Design

Active Line Modules are always operated together with an Active Interface Module, which contains the associated Clean Power Filter and pre-charging circuit. The integrated line filter ensures compliance with the EMC requirements for the "second environment".

The Active Line Module and Active Interface Module are supplied as a complete, fully wired unit, i.e., the customer does not need to supply any further cables or carry out any other wiring tasks.

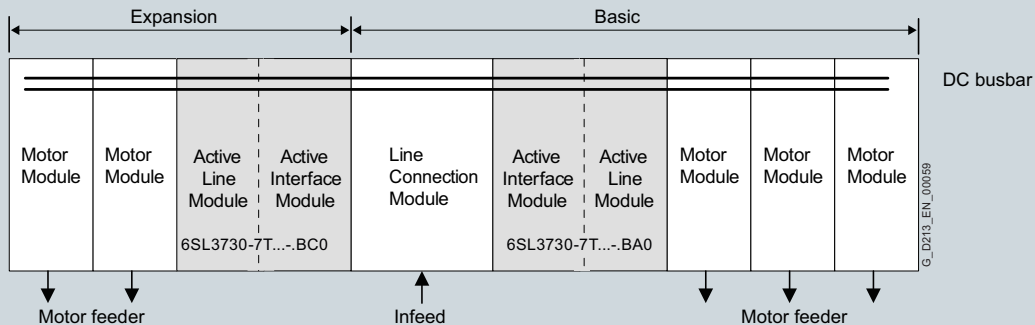
Parallel connection of Active Line Modules to power increase

Active Line Modules are available for creating drive line-ups with more power. These modules can be operated in parallel on a common Line Connection Module and are arranged to the right and left of the Line Connection Module.

The power connections on the Active Line Module on the left of the Line Connection Module are a "mirror image" (Order No. with "C" in the penultimate position, example: 6SL3730-7T.41.-.BC0), which results in a very compact design for the line infeed.

Please note that only Active Line Modules with exactly the same output rating may be connected in parallel. The potential for imbalances in current distribution means that a current derating of 5 % applies; this must be taken into account when the modules are dimensioned.

A connection of the Basic Line Modules connected in parallel using DRIVE-CLiQ must be taken into consideration when engineering the system (see SINAMICS – Low Voltage Engineering Manual).



Selection and ordering data

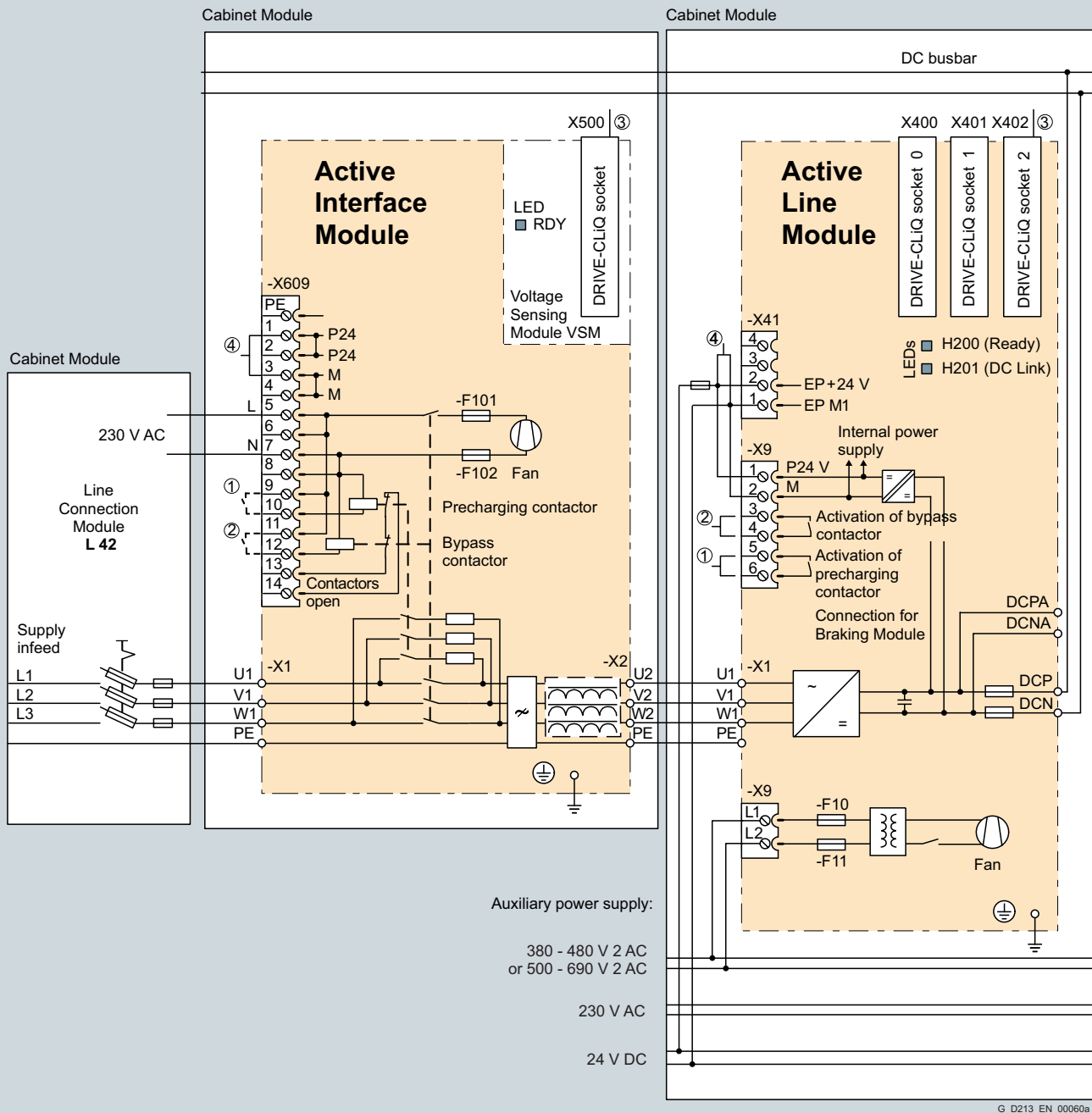
Rated power kW	Active Line Module (incl. Active Interface Module) Order No.	
Line voltage 380 ... 480 V 3 AC (DC link voltage 540 ... 720 V DC)		
132	6SL3730-7TE32-1BA0	
160	6SL3730-7TE32-6BA0	
235	6SL3730-7TE33-8BA0	
300	6SL3730-7TE35-0BA0	
380	6SL3730-7TE36-1BA0	
500	6SL3730-7TE38-4BA0	
630	6SL3730-7TE41-0BA0	
630	6SL3730-7TE41-0BC0	For a parallel circuit configuration, mounted to the left of the Line Connection Module (mirror-image configuration)
900	6SL3730-7TE41-4BA0	
900	6SL3730-7TE41-4BC0	For a parallel circuit configuration, mounted to the left of the Line Connection Module (mirror-image configuration)

Rated power kW	Active Line Module (incl. Active Interface Module) Order No.	
Line voltage 500 ... 690 V 3 AC (DC link voltage 710 ... 1035 V DC)		
560	6SL3730-7TG35-8BA0	
800	6SL3730-7TG37-4BA0	
800	6SL3730-7TG37-4BC0	For a parallel circuit configuration, mounted to the left of the Line Connection Module (mirror-image configuration)
1100	6SL3730-7TG41-0BA0	
1100	6SL3730-7TG41-0BC0	For a parallel circuit configuration, mounted to the left of the Line Connection Module (mirror-image configuration)
1400	6SL3730-7TG41-3BA0	
1400	6SL3730-7TG41-3BC0	For a parallel circuit configuration, mounted to the left of the Line Connection Module (mirror-image configuration)

Line Modules – Active Line Modules with Active Interface Modules

Integration

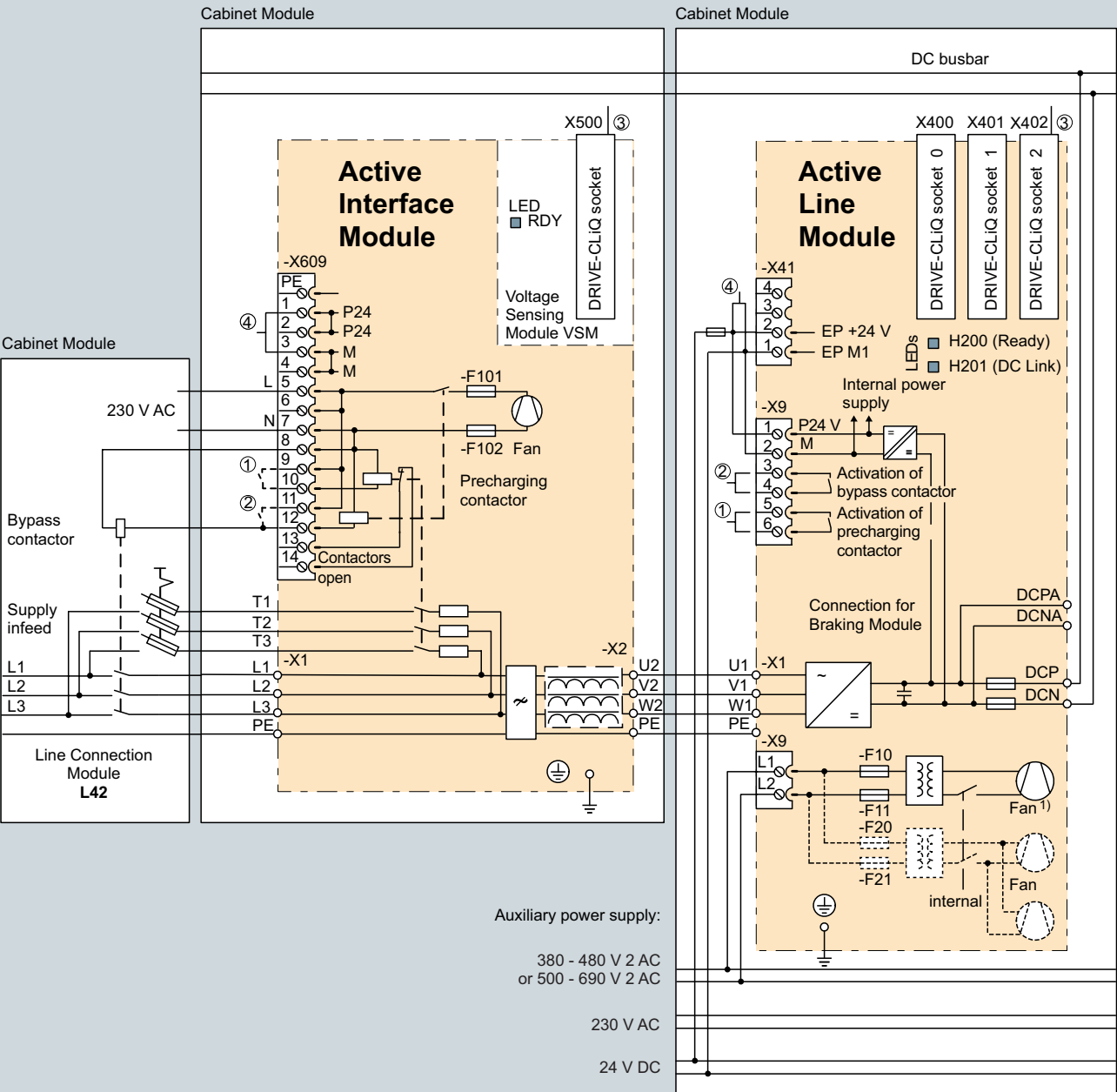
The Active Line Module is controlled by the CU320 Control Unit. Data is exchanged between the Control Unit and module via the DRIVE-CLiQ connections. The Active Interface Module is included in the scope of delivery for the Active Line Module.



Connection example of an Active Line Module (frame size FI/FX and GI/GX)

G_D213_EN_00060a

Integration (continued)



1) The number and the terminals of the fans depend on the frame size.

Connection example of an Active Line Module (frame size HI/HX and JI/JX)

Line Modules – Active Line Modules with Active Interface Modules

Technical data

Line voltage 380 ... 480 V 3 AC		Active Line Modules							
		6SL3730-7TE32-1BA0	6SL3730-7TE32-6BA0	6SL3730-7TE33-8BA0	6SL3730-7TE35-0BA0	6SL3730-7TE36-1BA0	6SL3730-7TE38-4BA0	6SL3730-7TE41-0BA0	6SL3730-7TE41-4BA0
									For a parallel circuit configuration, mounted to the left of the Line Connection Module: 6SL3730-7TE41-0BC0 6SL3730-7TE41-4BC0
Rated power									
• at $I_{N\ DC}$ (50 Hz 400 V)	kW	132	160	235	300	380	500	630	900
• at $I_{H\ DC}$ (50 Hz 400 V)	kW	115	145	210	270	335	465	545	780
• at $I_{N\ DC}$ (60 Hz 460 V)	hp	200	250	400	500	600	700	900	1250
• at $I_{H\ DC}$ (60 Hz 460 V)	hp	150	200	300	400	500	700	800	1000
DC link current									
• Rated current $I_{N\ DC}$	A	235	291	425	549	678	940	1103	1574
• Base load current $I_{H\ DC}$ ¹⁾	A	209	259	378	489	603	837	982	1401
• Maximum current $I_{max\ DC}$	A	352	436	637	823	1017	1410	1654	2361
Feed/feedback current									
• Rated current $I_{N\ E}$	A	210	260	380	490	605	840	985	1405
• Maximum current $I_{max\ E}$	A	315	390	570	735	907	1260	1477	2107
Current requirement									
• 24 V DC auxiliary power supply	A	1.27	1.27	1.52	1.52	1.57	1.57	1.67	1.67
• 230 V AC auxiliary power supply	A	0.6	0.6	1.2	1.2	4.6	4.6	4.9	4.9
• 400 V AC ²⁾	A	0.63	1.13	1.8	1.8	3.6	3.6	5.4	5.4
DC link capacitance									
• Active Line Module	μF	4200	5200	7800	9600	12600	16800	18900	28800
• Drive line-up, max.	μF	41600	41600	76800	76800	134400	134400	230400	230400
Power loss, max. ³⁾									
• at 50 Hz 400 V	kW	4.3	4.9	6.9	8.7	11.7	13.8	17.6	21.8
• at 60 Hz 460 V	kW	4.4	5.1	7.2	9.0	12.1	14.3	18.3	22.7
Cooling-air requirement	m ³ /s	0.65	0.65	1.3	1.3	1.58	1.58	1.88	1.88
Sound pressure level L_{pA} ⁴⁾ (1 m) at 50/60 Hz	dB(A)	71/73	71/73	72/74	72/74	77/79	77/79	78/80	78/80
PE/GND connection									
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240	240	240
Cable length, max. ⁵⁾									
• Shielded	m	2700	2700	2700	2700	3900	3900	3900	3900
• Unshielded	m	4050	4050	4050	4050	5850	5850	5850	5850
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20
Dimensions									
• Width	mm	800	800	800	800	1000	1000	1400	1400
• Height ⁶⁾	mm	2200	2200	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600	600	600
Weight, approx.	kg	380	380	530	530	930	930	1360	1360
Frame size		FX + FI	FX + FI	GX + GI	GX + GI	HX + HI	HX + HI	JX + JI	JX + JI

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The current requirement for the 400 V AC auxiliary power supply is drawn from the line input voltage.

³⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁴⁾ Total sound pressure level of Active Interface Module and Active Line Module.

⁵⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request

⁶⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with degrees of protection IP23, IP43, IP54.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		Active Line Modules			
		6SL3730-7TG35-8BA0	6SL3730-7TG37-4BA0	6SL3730-7TG41-0BA0	6SL3730-7TG41-3BA0
		For a parallel circuit configuration, mounted to the <u>left</u> of the Line Connection Module:			
			6SL3730-7TG37-4BC0	6SL3730-7TG41-0BC0	6SL3730-7TG41-3BC0
Rated power					
• at $I_{N\ DC}$ (50 Hz 690 V)	kW	560	800	1100	1400
• at $I_{H\ DC}$ (50 Hz 690 V)	kW	550	705	980	1215
• at $I_{N\ DC}$ (50 Hz 500 V)	kW	435	560	780	965
• at $I_{H\ DC}$ (50 Hz 500 V)	kW	400	510	710	880
• at $I_{N\ DC}$ (60 Hz 575 V)	hp	600	900	1250	1500
• at $I_{H\ DC}$ (60 Hz 575 V)	hp	450	600	1000	1250
DC link current					
• Rated current $I_{N\ DC}$	A	644	823	1148	1422
• Base load current $I_{H\ DC}$ ¹⁾	A	573	732	1022	1266
• Maximum current $I_{max\ DC}$	A	966	1234	1722	2133
Feed/feedback current					
• Rated current $I_{N\ E}$	A	575	735	1025	1270
• Maximum current $I_{max\ E}$	A	862	1102	1537	1905
Current requirement ²⁾					
• 24 V DC auxiliary power supply	A	1.57	1.67	1.87	1.87
• 230 V AC auxiliary power supply	A	4.6	4.9	4.9	4.9
• 500 V AC or	A	3.0	4.4	4.4	4.4
• 690 V AC	A	2.1	3.1	3.1	3.1
DC link capacitance					
• Active Line Module	μF	7400	11100	14400	19200
• Drive line-up, max.	μF	59200	153600	153600	153600
Power loss, max. ³⁾					
• at 50 Hz 500/690 V	kW	13.6	19.2	22.8	26.1
• at 60 Hz 575 V	kW	13.0	18.6	22.1	24.9
Cooling-air requirement	m ³ /s	1.58	1.88	1.88	1.88
Sound pressure level L_{pA} ⁴⁾ (1 m) at 50/60 Hz	dB(A)	77/79	77/79	77/79	77/79
PE/GND connection					
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240
Cable length, max. ⁵⁾					
• Shielded	m	2250	2250	2250	2250
• Unshielded	m	3375	3375	3375	3375
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	1000	1400	1400	1400
• Height ⁶⁾	mm	2200	2200	2200	2200
• Depth	mm	600	600	600	600
Weight, approx.	kg	930	1360	1360	1360
Frame size		HX + HI	JX + JI	JX + JI	JX + JI

¹⁾ The base load current $I_{H\ DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\ DC}$ for 5 s with a duty cycle duration of 300 s.

²⁾ The current requirement for the 500/690 V AC auxiliary power supply is drawn from the line input voltage.

³⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁴⁾ Total sound pressure level of Active Interface Module and Active Line Module.

⁵⁾ Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request

⁶⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with degrees of protection IP23, IP43, IP54.

Line Modules – Active Line Modules with Active Interface Modules

Options

The table below lists the options available for Active Line Modules (Details → Description of the options):

Brief description of the options	Order code	Brief description of the options	Order code
CBC10 Communication Board	G20	Crane transport assembly (top-mounted)	M90
CBE20 Communication Board	G33	Special paint finish for cabinet	Y09
AOP30 Advanced Operator Panel, installed in the cabinet door	K08	Factory assembly as transport units	Y11
CU320 Control Unit + CompactFlash card without performance expansion	K90	One-line label for plant identification, 40 x 80 mm	Y31
CU320 Control Unit + CompactFlash card with performance expansion 1	K91	Two-line label for plant identification, 40 x 180 mm	Y32
Cabinet anti-condensation heating	L55	Four-line label for plant identification, 40 x 180 mm	Y33
25/125 kW braking unit (can be used for frame size FX) for line voltages of 380 ... 480 V and 660 ... 690 V	L61	Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02
50/250 kW braking unit (can be used for frame size GX, HX, JX) for line voltages of 380 ... 480 V and 660 ... 690 V	L62	Preliminary version of customer documentation in PDF format	D14
25/125 kW braking unit (can be used for frame size FX) for line voltages of 500 ... 600 V	L64	Documentation in English / French	D58
50/250 kW braking unit (can be used for frame size GX, HX, JX) for line voltages of 500 ... 600 V	L65	Documentation in English / Spanish	D60
Base 100 mm high, RAL 7022	M06	Documentation in English / Italian	D80
Cable-marshaling compartment 200 mm high, RAL 7035	M07	Without operating instructions	D99
IP21 degree of protection	M21	Rating plate data in English / French	T58
IP23 degree of protection (includes M60)	M23	Rating plate data in English / Spanish	T60
Side panel mounted on the right	M26	Rating plate data in English / Italian	T80
Side panel mounted on the left	M27	Visual acceptance	F03
IP43 degree of protection (includes M60)	M43	Function test with no motor connected	F71
IP54 degree of protection (includes M60)	M54	Insulation test	F77
Closed cabinet door, air inlet from below through floor opening	M59	Customer-specific acceptance inspections (on request)	F97
Additional touch protection (included in M23 , M43 and M54)	M60		
DC busbar system ($I_d = 1170$ A, 1x 60 x 10 mm)	M80		
DC busbar system ($I_d = 1500$ A, 1x 80 x 10 mm)	M81		
DC busbar system ($I_d = 1840$ A, 1x 100 x 10 mm)	M82		
DC busbar system ($I_d = 2150$ A, 2x 60 x 10 mm)	M83		
DC busbar system ($I_d = 2730$ A, 2x 80 x 10 mm)	M84		
DC busbar system ($I_d = 3320$ A, 2x 100 x 10 mm)	M85		
DC busbar system ($I_d = 3720$ A, 3x 80 x 10 mm)	M86		
DC busbar system ($I_d = 4480$ A, 3x 100 x 10 mm)	M87		

Options (continued)

Option selection matrix for Active Line Modules

Certain options are mutually exclusive.

✓	Possible combination
–	Combination not possible

Electrical options

	G20 ¹⁾	G33 ¹⁾	K08 ¹⁾	K90	K91	L55	L61/64	L62/65
G20 ¹⁾		–	✓	✓	✓	✓	✓	✓
G33 ¹⁾	–		✓	✓	✓	✓	✓	✓
K08 ¹⁾	✓	✓		✓	✓	✓	✓	✓
K90	✓	✓	✓		–	✓	✓	✓
K91	✓	✓	✓	–		✓	✓	✓
L55	✓	✓	✓	✓	✓		✓	✓
L61/64	✓	✓	✓	✓	✓	✓		–
L62/65	✓	✓	✓	✓	✓	✓	–	

Mechanical/electrical options

	M06	M07	M21	M23	M26	M27	M43	M54	M59	M60	M90	Y09	Y11	Y31	Y32	Y33
M06		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M21	✓	✓		–	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓
M23	✓	✓	–		✓	✓	–	–	✓	– ²⁾	✓	✓	✓	✓	✓	✓
M26	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M27	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M43	✓	✓	–	–	✓	✓		–	✓	– ²⁾	✓	✓	✓	✓	✓	✓
M54	✓	✓	–	–	✓	✓	–		✓	– ²⁾	✓	✓	✓	✓	✓	✓
M59	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
M60	✓	✓	✓	– ²⁾	✓	✓	– ²⁾	– ²⁾	✓		✓	✓	✓	✓	✓	✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	–	✓	✓	✓
Y09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Y11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓		✓	✓	✓
Y31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	–
Y32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–
Y33	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

Documentation

	D02	D14	D58	D60	D80	D99
D02		✓	✓	✓	✓	–
D14	✓		✓	✓	✓	–
D58	✓	✓		–	–	–
D60	✓	✓	–		–	–
D80	✓	✓	–	–		–
D99	–	–	–	–	–	

Rating plate data

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

¹⁾ The options **G20**, **G33** and **K08** require option **K90** or **K91**. They are installed in the Active Line Module.

²⁾ Option **M60** is already included in **M23**, **M43** and **M54**.

Motor Modules Booksize Cabinet Kits

Overview



Motor Modules are also available as Booksize Cabinet Kits for power ratings from 1.6 kW to 107 kW in voltage class 380 V to 480 V (DC link voltage 510 V to 720 V).

Single Motor Modules are available for connecting one motor, and Double Motor Modules (in the power rating range from 1.6 to 9.7 kW) are available for connecting two motors.

Design

Motor Modules in the booksize format are factory-installed as Booksize Cabinet Kits in Booksize Base Cabinets and delivered as a complete unit including cabinet-side connection components. A Cabinet Kit contains all the necessary components for operating a SINAMICS S120 Booksize.

Multiple Booksize Cabinet Kits can be installed in one Base Cabinet, depending on the installation width requirements, which in turn depend on the power. The number of Cabinet Kits that can be installed within a Base Cabinet is determined solely on the basis of the available cabinet width. By changing the way in which the cabinet width is used, it can be adapted to suit system requirements.

Each booksize Motor Module is connected separately to the DC busbar of the Cabinet Module via a separate fuse switch disconnecter with integrated fuses. The DC connecting busbar integrated in the units is not used.

The basic version of the Booksize Cabinet Kit comprises the following components:

- Motor Module in the booksize format
- Fuse switch disconnecter for each Motor Module installed
- Customer interface -X55.1 located in the connection area of the Base Cabinet
- Shield connection plate
- Complete electrical connection to the Base Cabinet interfaces

Whereas Single Motor Modules have one inverter connection, Double Motor Modules combine two inverters in a single module. Each Double Motor Module that is installed in a Cabinet Kit features dual customer interfaces and motor connections; the same applies to certain options relating to separate control. For details, please refer to the option selection table.

The Booksize Base Cabinets can be operated up to and including IP54 degree of protection without additional temperature derating. However, some of the values that need to be taken into account here are different from those associated with the chassis format. Derating data, see the system overview → Characteristic curves.

Selection and ordering data

Type rating	Rated output current I_{rated}	Installation width	Motor Modules Booksize Cabinet Kits
kW	A	mm	Order No.
Line voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)			Double Motor Modules
2 x 1.6	2 x 3	200	6SL3720-2TE13-0AB0
2 x 2.7	2 x 5	200	6SL3720-2TE15-0AB0
2 x 4.8	2 x 9	200	6SL3720-2TE21-0AB0
2 x 9.7	2 x 18	200	6SL3720-2TE21-8AB0
Line voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)			Single Motor Modules
1.6	3	100	6SL3720-1TE13-0AB0
2.7	5	100	6SL3720-1TE15-0AB0
4.8	9	100	6SL3720-1TE21-0AB0
9.7	18	100	6SL3720-1TE21-8AB0
16	30	100	6SL3720-1TE23-0AB0
24	45	200	6SL3720-1TE24-5AB0
32	60	200	6SL3720-1TE26-0AB0
46	85	200	6SL3720-1TE28-5AB0
71	132	300	6SL3720-1TE31-3AB0
107	200	300	6SL3720-1TE32-0AB0

Booksize Cabinet Kits must always be ordered in combination with at least one Booksize Base Cabinet (cannot be supplied as a single unit).

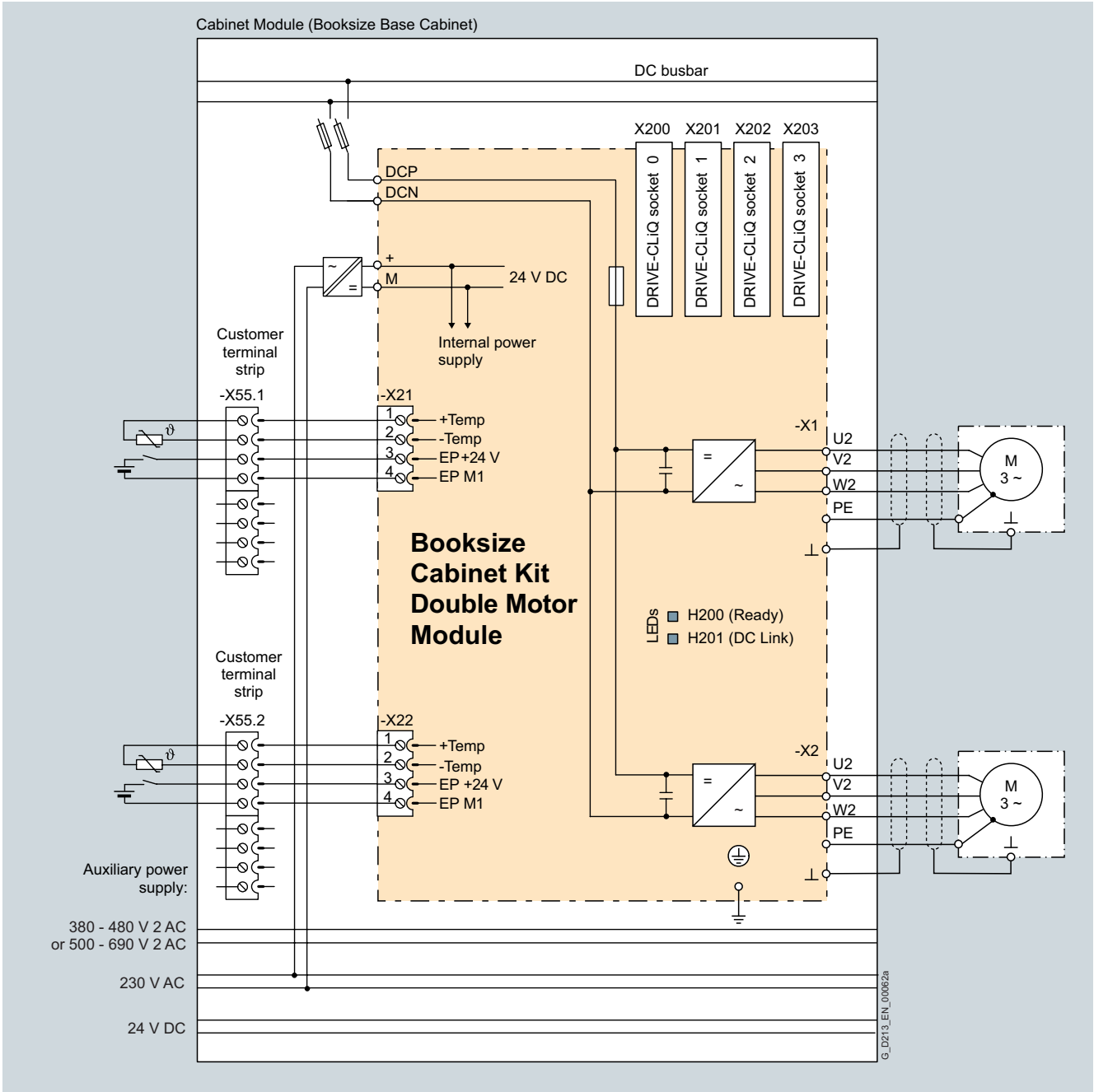
The required number of Booksize Cabinet Kits installed in a Booksize Base Cabinet must be stated in plain text in the order. The number of possible kits is limited only by the usable installation width of the Booksize Base Cabinet.

Booksize Base Cabinets ready to be installed in the Booksize Cabinet Kits:

Usable installation width	Weight	Dimensions IP20 ¹⁾ (W x D x H)	Booksize Base Cabinets
mm	kg	mm	Order No.
600	170	800 x 600 x 2200	6SL3720-1TX38-0AA0
1000	240	1200 x 600 x 2200	6SL3720-1TX41-2AA0

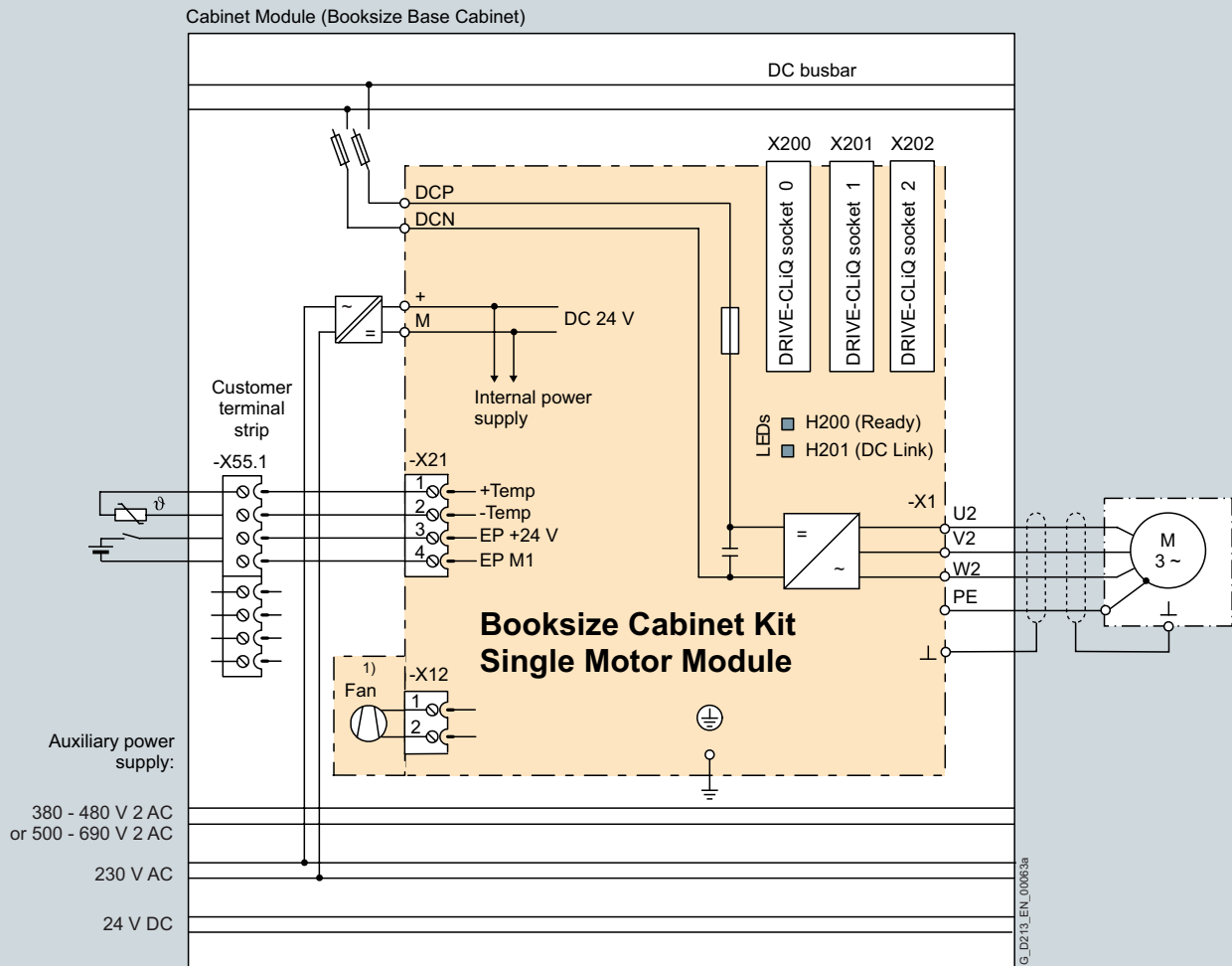
¹⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Integration



Connection example: Double Motor Module in Booksize Cabinet Kit format

Integration (continued)



Connection example: Single Motor Module in Booksize Cabinet Kit format

¹⁾ Withdrawable fan unit with a rated output current of 132 A and 200 A.

Technical data

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules Booksize Cabinet Kit			
		Double Motor Modules			
		6SL3720-2TE13-0AB0	6SL3720-2TE15-0AB0	6SL3720-2TE21-0AB0	6SL3720-2TE21-8AB0
Type rating					
• at I_N (50 Hz 400 V) ¹⁾	kW	2 x 1.6	2 x 2.7	2 x 4.8	2 x 9.7
• at I_H (50 Hz 400 V) ¹⁾	kW	2 x 1.4	2 x 2.3	2 x 4.1	2 x 8.2
• at I_N (60 Hz 460 V) ²⁾	hp	2 x 1.5	2 x 3	2 x 5	2 x 10
• at I_H (60 Hz 460 V) ²⁾	hp	2 x 1	2 x 2	2 x 5	2 x 10
Output current					
• Rated current I_{NA}	A	2 x 3	2 x 5	2 x 9	2 x 18
• Base load current I_H ³⁾	A	2 x 2.6	2 x 4.3	2 x 7.7	2 x 15.3
• Maximum current $I_{max A}$	A	2 x 6	2 x 10	2 x 18	2 x 36
DC link current I_d ⁴⁾	A	7.2	12	22	43
Current requirement					
• 24 V DC, max.	A	0.85	0.85	0.85	0.85
DC link capacitance	μF	110	220	220	710
Pulse frequency ⁵⁾					
• Rated frequency	kHz	4	4	4	4
• Pulse frequency, max. - with current derating	kHz	16	16	16	16
Power loss, max. ⁶⁾					
• at 50 Hz 400 V	kW	0.07	0.11	0.16	0.32
• at 60 Hz 460 V	kW	0.07	0.11	0.16	0.32
Cooling-air requirement	m ³ /s	0.008	0.008	0.008	0.016
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	< 60	< 60	< 60	< 60
Motor connection U2, V2, W2		Terminal	Terminal	Terminal	Terminal
• Conductor cross-section, max. (DIN VDE)	mm ²	6	6	6	6
Cable length, max. ⁷⁾					
• Shielded	m	50	50	50	70
• Unshielded	m	75	75	75	100
PE/GND connection					
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20
Weight, approx.	kg	23.3	23.3	23.3	24.8
Installation width	mm	200	200	200	200

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

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

³⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ For a DC link voltage of 600 V DC.

⁵⁾ For the correlation between the pulse frequency and max. output current/output frequency, see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request.

Motor Modules Booksize Cabinet Kits

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules Booksize Cabinet Kit			
		Single Motor Modules			
		6SL3720-1TE13-0AB0	6SL3720-1TE15-0AB0	6SL3720-1TE21-0AB0	6SL3720-1TE21-8AB0
Type rating					
• at I_N (50 Hz 400 V) ¹⁾	kW	1.6	2.7	4.8	9.7
• at I_H (50 Hz 400 V) ¹⁾	kW	1.4	2.3	4.1	8.2
• at I_N (60 Hz 460 V) ²⁾	hp	1.5	3	5	10
• at I_H (60 Hz 460 V) ²⁾	hp	1	2	5	10
Output current					
• Rated current I_{NA}	A	3	5	9	18
• Base load current I_H ³⁾	A	2.3	4.3	7.7	15.3
• Maximum current $I_{max A}$	A	6	10	18	36
DC link current I_d ⁴⁾	A	3.6	6	11	22
Current requirement					
• 24 V DC, max.	A	0.85	0.85	0.85	0.85
DC link capacitance	μF	110	110	110	220
Pulse frequency ⁵⁾					
• Rated frequency	kHz	4	4	4	4
• Pulse frequency, max. - with current derating	kHz	16	16	16	16
Power loss, max. ⁶⁾					
• at 50 Hz 400 V	kW	0.035	0.055	0.08	0.165
• at 60 Hz 460 V	kW	0.035	0.055	0.08	0.165
Cooling-air requirement	m ³ /s	0.008	0.008	0.008	0.008
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	< 60	< 60	< 60	< 60
Motor connection U2, V2, W2		Terminal	Terminal	Terminal	Terminal
• Conductor cross-section, max. (DIN VDE)	mm ²	6	6	6	6
Cable length, max. ⁷⁾					
• Shielded	m	50	50	50	70
• Unshielded	m	75	75	75	100
PE/GND connection					
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20
Weight, approx.	kg	20.1	20.1	20	20
Installation width	mm	100	100	100	100

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

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

³⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ For a DC link voltage of 600 V DC.

⁵⁾ For the correlation between the pulse frequency and max. output current/output frequency, see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Motor Modules Booksize Cabinet Kit					
		Single Motor Modules					
		6SL3720-1TE23-0AB0	6SL3720-1TE24-5AB0	6SL3720-1TE26-0AB0	6SL3720-1TE28-5AB0	6SL3720-1TE31-3AB0	6SL3720-1TE32-0AB0
Type rating							
• at I_N (50 Hz 400 V) ¹⁾	kW	16	24	32	46	71	107
• at I_H (50 Hz 400 V) ¹⁾	kW	13.7	21	28	37	57	76
• at I_N (60 Hz 460 V) ²⁾	hp	20	30	40	60	100	150
• at I_H (60 Hz 460 V) ²⁾	hp	15	25	40	50	75	100
Output current							
• Rated current I_{NA}	A	30	45	60	85	132	200
• Base load current I_H ³⁾	A	25.5	38	52	68	105	141
• Maximum current $I_{max A}$	A	56	85	113	141	210	282
DC link current I_d ⁴⁾	A	36	54	72	102	158	200
Current requirement							
• 24 V DC, max.	A	0.9	1.2	1.2	1.5	1.5	1.5
DC link capacitance	μF	710	1175	1410	1880	2820	3995
Pulse frequency ⁵⁾							
• Rated frequency	kHz	4	4	4	4	4	4
• Pulse frequency, max. - with current derating	kHz	16	16	16	16	16	16
Power loss, max. ⁶⁾							
• at 50 Hz 400 V	kW	0.29	0.43	0.59	0.75	1.25	2.05
• at 60 Hz 460 V	kW	0.29	0.43	0.59	0.75	1.25	2.05
Cooling-air requirement	m³/s	0.016	0.031	0.031	0.044	0.144	0.144
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	< 60	< 65	< 65	< 60	< 73	< 73
Motor connection U2, V2, W2		Terminal	Terminal	Terminal	Terminal	Terminal	Terminal
• Conductor cross-section, max. (DIN VDE)	mm²	6	6	6	6	6	6
Cable length, max. ⁷⁾							
• Shielded	m	100	100	100	100	100	100
• Unshielded	m	150	150	150	150	150	150
PE/GND connection							
• Busbar cross-section	mm²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm²	240	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Weight, approx.	kg	21.9	27	27	33	41	41
Installation width	mm	100	200	200	200	300	300

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

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

³⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ For a DC link voltage of 600 V DC.

⁵⁾ For the correlation between the pulse frequency and max. output current/output frequency, see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request.

Motor Modules Booksize Cabinet Kits

Options

The table below lists the options available for Motor Modules (Details → Description of the options):

Brief description of the options	Order code	Booksize Cabinet Kits	Booksize Base Cabinets
CBC10 Communication Board	G20	✓	–
CBE20 Communication Board	G33	✓	–
AOP30 Advanced Operator Panel, installed in the cabinet door	K08	✓	–
SMC10 Sensor Module Cabinet-Mounted	K46	✓ ¹⁾	–
SMC20 Sensor Module Cabinet-Mounted	K48	✓ ¹⁾	–
SMC30 Sensor Module Cabinet-Mounted	K50	✓ ¹⁾	–
VSM10 Voltage Sensing Module Cabinet-Mounted for voltage sensing	K51	✓ ¹⁾	–
Second auxiliary voltage busbar system	K75	–	✓
Terminal module for controlling the "Safe Torque Off" and "Safe Stop 1" safety functions	K82	✓ ¹⁾	–
CU320 Control Unit + CompactFlash card without performance expansion	K90	✓	–
CU320 Control Unit + CompactFlash card with performance expansion 1	K91	✓	–
Motor reactor	L08	✓ ¹⁾	–
2 motor reactors in series (not available for Double Motor Modules)	L09	✓	–
DC interface incl. pre-charging circuit of the relevant DC link capacitance	L37	✓	–
Cabinet anti-condensation heating	L55	–	✓
Base 100 mm high, RAL 7022	M06	–	✓
Cable-marshaling compartment 200 mm high, RAL 7035	M07	–	✓
IP21 degree of protection	M21	–	✓
IP23 degree of protection (includes M60)	M23	–	✓
Side panel mounted on the right	M26	–	✓
Side panel mounted on the left	M27	–	✓
IP43 degree of protection (includes M60)	M43	–	✓
IP54 degree of protection (includes M60)	M54	–	✓
Closed cabinet door, air inlet from below through floor opening	M59	–	✓
EMC shield bus	M70	–	✓
DC busbar system ($I_d = 1170$ A, 1x 60 x 10 mm)	M80	–	✓
DC busbar system ($I_d = 1500$ A, 1x 80 x 10 mm)	M81	–	✓
DC busbar system ($I_d = 1840$ A, 1x 100 x 10 mm)	M82	–	✓
DC busbar system ($I_d = 2150$ A, 2x 60 x 10 mm)	M83	–	✓
DC busbar system ($I_d = 2730$ A, 2x 80 x 10 mm)	M84	–	✓
DC busbar system ($I_d = 3320$ A, 2x 100 x 10 mm)	M85	–	✓
DC busbar system ($I_d = 3720$ A, 3x 80 x 10 mm)	M86	–	✓
DC busbar system ($I_d = 4480$ A, 3x 100 x 10 mm)	M87	–	✓
Crane transport assembly (top-mounted)	M90	–	✓
Special paint finish for cabinet	Y09	–	✓
Factory assembly as transport units	Y11	–	✓
One-line label for plant identification, 40 x 80 mm	Y31	–	✓
Two-line label for plant identification, 40 x 180 mm	Y32	–	✓
Four-line label for plant identification, 40 x 180 mm	Y33	–	✓
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02	–	✓ ¹⁾
Preliminary version of customer documentation in PDF format	D14	–	✓ ¹⁾
Documentation in English / French	D58	–	✓
Documentation in English / Spanish	D60	–	✓
Documentation in English / Italian	D80	–	✓
Without operating instructions	D99	–	✓

¹⁾ In the case of the Double Motor Modules, these options are available for each inverter

Options (continued)

Brief description of the options	Order code	Booksize Cabinet Kits	Booksize Base Cabinets
Rating plate data in English / French	T58	–	✓
Rating plate data in English / Spanish	T60	–	✓
Rating plate data in English / Italian	T80	–	✓
Visual acceptance	F03	–	✓
Function test with no motor connected	F71	–	✓
Insulation test	F77	–	✓
Customer-specific acceptance inspections (on request)	F97	–	✓

Option selection matrix for Booksize Cabinet Kits and Booksize Base Cabinets

Certain options are mutually exclusive.

✓	Possible combination
–	Combination not possible

Electrical options Booksize Cabinet Kits

	G20 ¹⁾	G33 ¹⁾	K08 ¹⁾	K46	K48	K50	K51	K82	K90	K91	L08	L09	L37
G20 ¹⁾		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
G33 ¹⁾	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K08 ¹⁾	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K46	✓	✓	✓		–	–	–	✓	✓	✓	✓	✓	✓
K48	✓	✓	✓	–		–	–	✓	✓	✓	✓	✓	✓
K50	✓	✓	✓	–	–		–	✓	✓	✓	✓	✓	✓
K51	✓	✓	✓	–	–	–		✓	✓	✓	✓	✓	✓
K82	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
K90	✓	✓	✓	✓	✓	✓	✓	✓		–	✓	✓	✓
K91	✓	✓	✓	✓	✓	✓	✓	✓	–		✓	✓	✓
L08	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	✓
L09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		✓
L37	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

L55 can be combined with K75 for the Booksize Base Cabinets.

Mechanical options for Booksize Base Cabinets

	M06	M07	M21	M23	M26	M27	M43	M54	M59	M70	M90	Y09	Y11	Y31	Y32	Y33
M06		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M21	✓	✓		–	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓
M23	✓	✓	–		✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓
M26	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M27	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M43	✓	✓	–	–	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓
M54	✓	✓	–	–	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓
M59	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
M70	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	–	✓	✓	✓
Y09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Y11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓		✓	✓	✓
Y31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	–
Y32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–
Y33	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	

¹⁾ Options G20, G33 and K08 require option K90 or K91.

Motor Modules Booksize Cabinet Kits

Options (continued)

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

Documentation

	D02	D14	D58	D60	D80	D99
D02		✓	✓	✓	✓	–
D14	✓		✓	✓	✓	–
D58	✓	✓		–	–	–
D60	✓	✓	–		–	–
D80	✓	✓	–	–		–
D99	–	–	–	–	–	

Rating plate data

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

Overview



Motor Modules in the chassis format are available in the power range from 75 kW to 1200 kW.

Line voltage	DC link voltage	Type rating
380 ... 480 V 3 AC	510 ... 720 V DC	110 ... 800 kW
500 ... 690 V 3 AC	675 ... 1035 V DC	75 ... 1200 kW

By connecting in parallel up to 4 Motor Modules, which are operated on one Control Unit and supply one motor, it is possible to increase the available shaft power to max. approx. 4500 kW (taking into account the derating factors according to the SINAMICS – Low Voltage Engineering Manual).

Design

Motor Modules contain the following components as standard:

- Retaining device for the DC busbar, including the connection to the DC connections of the Motor Module
- Nickel-plated connection busbars for motor cables for Motor Modules, frame sizes FX and GX; for Motor Modules frame sizes HX and JX, the connection is made directly on the unit
- Clamping bar for the power cables
- DRIVE-CLiQ interface (3 DRIVE-CLiQ sockets), without Control Unit
- Customer interface -X55
- Auxiliary busbar system (6-pole) for the auxiliary power supply, including jumpers for looping through to the next Cabinet Module
- Nickel-plated PE busbar (60 x 10 mm), including jumper for looping through to the next Cabinet Module
- EMC-compliant design thanks to additional shielding measures and appropriate laying of cables

Selection and ordering data

Type rating kW	Rated output current I_{rated} A	Motor Modules chassis format Order No.
Line voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)		
110	210	6SL3720-1TE32-1AA0
132	260	6SL3720-1TE32-6AA0
160	310	6SL3720-1TE33-1AA0
200	380	6SL3720-1TE33-8AA0
250	490	6SL3720-1TE35-0AA0
315	605	6SL3720-1TE36-1AA0
400	745	6SL3720-1TE37-5AA0
450	840	6SL3720-1TE38-4AA0
560	985	6SL3720-1TE41-0AA0
710	1260	6SL3720-1TE41-2AA0
800	1405	6SL3720-1TE41-4AA0
Line voltage 500 ... 690 V 3 AC (DC link voltage 675 ... 1035 V DC)		
75	85	6SL3720-1TG28-5AA0
90	100	6SL3720-1TG31-0AA0
110	120	6SL3720-1TG31-2AA0
132	150	6SL3720-1TG31-5AA0
160	175	6SL3720-1TG31-8AA0
200	215	6SL3720-1TG32-2AA0
250	260	6SL3720-1TG32-6AA0
315	330	6SL3720-1TG33-3AA0
400	410	6SL3720-1TG34-1AA0
450	465	6SL3720-1TG34-7AA0
560	575	6SL3720-1TG35-8AA0
710	735	6SL3720-1TG37-4AA0
800	810	6SL3720-1TG38-1AA0
900	910	6SL3720-1TG38-8AA0
1000	1025	6SL3720-1TG41-0AA0
1200	1270	6SL3720-1TG41-3AA0

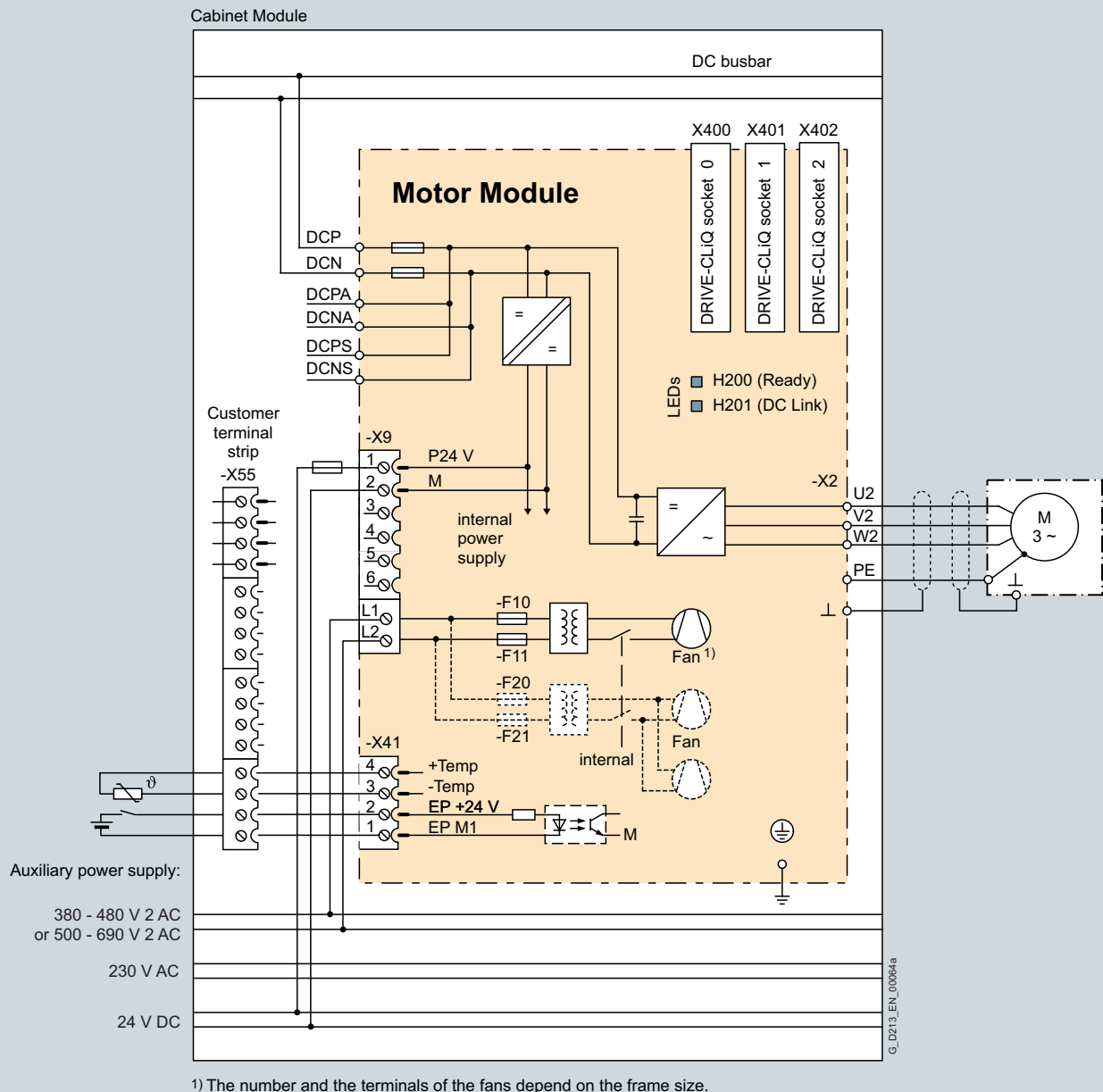
Motor Modules Chassis format

Integration

Motor Modules are controlled by the CU320 Control Unit and communication takes place via the DRIVE-CLiQ connection.

If the Control Unit is integrated as an option with order codes **K90/K91** in the same cabinet, then these communication cables

will already be installed. If the Control Unit is to be located externally, the DRIVE-CLiQ cable will not be included in the scope of delivery and must be configured on site (see SINAMICS – Low Voltage Engineering Manual).



1) The number and the terminals of the fans depend on the frame size.

Connection example: Motor Module in chassis format

Technical data

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Chassis format Motor Modules					
		6SL3720-1TE32-1AA0	6SL3720-1TE32-6AA0	6SL3720-1TE33-1AA0	6SL3720-1TE33-8AA0	6SL3720-1TE35-0AA0	6SL3720-1TE36-1AA0
Type rating							
• at I_L (50 Hz 400 V) ¹⁾	kW	110	132	160	200	250	315
• at I_H (50 Hz 400 V) ¹⁾	kW	90	110	132	160	200	250
• at I_L (60 Hz 460 V) ²⁾	hp	150	200	250	300	400	500
• at I_H (60 Hz 460 V) ²⁾	hp	150	200	200	250	350	350
Output current							
• Rated current I_{NA}	A	210	260	310	380	490	605
• Base load current I_L ³⁾	A	205	250	302	370	477	590
• Base load current I_H ⁴⁾	A	178	233	277	340	438	460
• Maximum current $I_{max A}$	A	307	375	453	555	715	885
DC link current							
• Rated current $I_{N DC}$ when supplied from							
- Basic/Smart Line Module	A	252	312	372	456	588	726
- Active Line Module	A	227	281	335	411	529	653
• Base load current $I_L DC$ ³⁾ when supplied from							
- Basic/Smart Line Module	A	245	304	362	444	573	707
- Active Line Module	A	221	273	326	400	515	636
• Base load current $I_H DC$ ⁴⁾ when supplied from							
- Basic/Smart Line Module	A	224	277	331	405	523	646
- Active Line Module	A	202	250	298	365	470	581
Current requirement							
• 24 V DC aux. power supply	A	0.8	0.8	0.9	0.9	0.9	1.0
• 400 V AC	A	0.63	1.13	1.8	1.8	1.8	3.6
DC link capacitance	µF	4200	5200	6300	7800	9600	12600
Pulse frequency ⁵⁾							
• Rated frequency	kHz	2	2	2	2	2	1.25
• Pulse frequency, max.							
- without current derating	kHz	2	2	2	2	2	1.25
- with current derating	kHz	8	8	8	8	8	7.5
Power loss, max. ⁶⁾							
• at 50 Hz 400 V	kW	1.86	2.5	2.96	3.67	4.28	5.84
• at 60 Hz 460 V	kW	1.94	2.6	3.1	3.8	4.5	6.3
Cooling-air requirement	m ³ /s	0.17	0.23	0.36	0.36	0.36	0.78
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	67	69	69	69	69	72
Motor connection U2, V2, W2		M12 screws	M12 screws	M12 screws	M12 screws	M12 screws	M12 screws
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x 185	2 x 185	2 x 240	2 x 240	2 x 240	4 x 240
Cable length, max. ⁷⁾							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
PE/GND connection							
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and max. output current/output frequency, see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS – Low Voltage Engineering Manual.

SINAMICS S120 Cabinet Modules

Motor Modules Chassis format

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Chassis format Motor Modules					
		6SL3720-1TE32-1AA0	6SL3720-1TE32-6AA0	6SL3720-1TE33-1AA0	6SL3720-1TE33-8AA0	6SL3720-1TE35-0AA0	6SL3720-1TE36-1AA0
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width ¹⁾	mm	400	400	400	400	400	600
• Height ²⁾	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight, approx.	kg	145	145	286	286	286	490
Frame size		FX	FX	GX	GX	GX	HX

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¹⁾ With option **L10** (dv/dt filter plus VPL):
 - Frame sizes FX/GX/HX/JX → Supplementary cabinet, 600 mm wide
 With option **L34** (output-side circuit breaker):
 - Frame sizes FX/GX → Supplementary cabinet, 400 mm wide
 - Frame sizes HX/JX → Supplementary cabinet, 600 mm wide

²⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Chassis format Motor Modules				
		6SL3720-1TE37-5AA0	6SL3720-1TE38-4AA0	6SL3720-1TE41-0AA0	6SL3720-1TE41-2AA0	6SL3720-1TE41-4AA0
Type rating						
• at I_L (50 Hz 400 V) ¹⁾	kW	400	450	560	710	800
• at I_H (50 Hz 400 V) ¹⁾	kW	315	400	450	560	710
• at I_L (60 Hz 460 V) ²⁾	hp	600	700	800	1000	1000
• at I_H (60 Hz 460 V) ²⁾	hp	450	600	700	900	1000
Output current						
• Rated current I_{NA}	A	745	840	985	1260	1405
• Base load current I_L ³⁾	A	725	820	960	1230	1370
• Base load current I_H ⁴⁾	A	570	700	860	1127	1257
• Maximum current $I_{max A}$	A	1087	1230	1440	1845	2055
DC link current						
• Rated current $I_{N DC}$ when supplied from						
- Basic/Smart Line Module	A	894	1008	1182	1512	1686
- Active Line Module	A	805	907	1064	1361	1517
• Base load current I_L ³⁾ when supplied from						
- Basic/Smart Line Module	A	871	982	1152	1474	1643
- Active Line Module	A	784	884	1037	1326	1479
• Base load current I_H ⁴⁾ when supplied from						
- Basic/Smart Line Module	A	795	897	1051	1345	1500
- Active Line Module	A	716	807	946	1211	1350
Current requirement						
• 24 V DC auxiliary power supply	A	1.0	1.0	1.25	1.4	1.4
• 400 V AC	A	3.6	3.6	5.4	5.4	5.4
DC link capacitance	μF	15600	16800	18900	26100	28800
Pulse frequency ⁵⁾						
• Rated frequency	kHz	1.25	1.25	1.25	1.25	1.25
• Pulse frequency, max.						
- without current derating	kHz	1.25	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾						
• at 50 Hz 400 V	kW	6.68	7.15	9.5	11.1	12
• at 60 Hz 460 V	kW	7.3	7.8	10.2	12.0	13
Cooling-air requirement	m ³ /s	0.78	0.78	1.1	1.1	1.1
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	72	72	72	72	72
Motor connection U2, V2, W2		M12 screws	M12 screws	M12 screws	M12 screws	M12 screws
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 240	4 x 240	6 x 240	6 x 240	6 x 240
Cable length, max. ⁷⁾						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
PE/GND connection						
• Busbar cross-section	mm ²	PE bar	PE bar	PE bar	PE bar	PE bar
• Conductor cross-section, max. (DIN VDE)	mm ²	600	600	600	600	600
	mm ²	240	240	240	240	240

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and max. output current/output frequency, see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS – Low Voltage Engineering Manual.

SINAMICS S120 Cabinet Modules

Motor Modules Chassis format

Technical data (continued)

Line voltage 380 ... 480 V 3 AC DC link voltage 510 ... 720 V DC		Chassis format Motor Modules				
		6SL3720-1TE37-5AA0	6SL3720-1TE38-4AA0	6SL3720-1TE41-0AA0	6SL3720-1TE41-2AA0	6SL3720-1TE41-4AA0
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width ¹⁾	mm	600	600	800	800	800
• Height ²⁾	mm	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600
Weight, approx.	kg	490	490	700	700	700
Frame size		HX	HX	JX	JX	JX

- ¹⁾ With option **L10** (dv/dt filter plus VPL):
 - Frame sizes FX/GX/HX/JX → Supplementary cabinet, 600 mm wide
 With option **L34** (output-side circuit breaker):
 - Frame sizes FX/GX → Supplementary cabinet, 400 mm wide
 - Frame sizes HX/JX → Supplementary cabinet, 600 mm wide
- ²⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Chassis format Motor Modules					
		6SL3720-1TG28-5AA0	6SL3720-1TG31-0AA0	6SL3720-1TG31-2AA0	6SL3720-1TG31-5AA0	6SL3720-1TG31-8AA0	6SL3720-1TG32-2AA0
Type rating							
• at I_L (50 Hz 690 V) ¹⁾	kW	75	90	110	132	160	200
• at I_H (50 Hz 690 V) ¹⁾	kW	55	75	90	110	132	160
• at I_L (50 Hz 500 V) ¹⁾	kW	55	55	75	90	110	132
• at I_H (50 Hz 500 V) ¹⁾	kW	45	55	75	90	90	110
• at I_L (60 Hz 575 V) ²⁾	hp	75	75	100	150	150	200
• at I_H (60 Hz 575 V) ²⁾	hp	75	75	100	125	150	200
Output current							
• Rated current I_{NA}	A	85	100	120	150	175	215
• Base load current I_L ³⁾	A	80	95	115	142	170	208
• Base load current I_H ⁴⁾	A	76	89	107	134	157	192
• Maximum current $I_{max A}$	A	120	142	172	213	255	312
DC link current							
• Rated current $I_{N DC}$ when supplied from							
- Basic/Smart Line Module	A	102	120	144	180	210	258
- Active Line Module	A	92	108	130	162	189	232
• Base load current $I_L DC$ ³⁾ when supplied from							
Basic/Smart Line Module	A	99	117	140	175	204	251
Active Line Module	A	89	105	126	157	184	226
• Base load current $I_H DC$ ⁴⁾ when supplied from							
- Basic/Smart Line Module	A	90	106	128	160	186	229
- Active Line Module	A	81	96	115	144	168	206
Current requirement							
• 24 V DC auxiliary power supply	A	0.8	0.8	0.8	0.8	0.9	0.9
• 690 V AC	A	0.4	0.4	0.4	0.4	1.0	1.0
DC link capacitance		μF	1200	1200	1600	2800	2800
Pulse frequency ⁵⁾							
• Rated frequency	kHz	1.25	1.25	1.25	1.25	1.25	1.25
• Pulse frequency, max.							
- without current derating	kHz	1.25	1.25	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾							
• at 50 Hz 690 V	kW	1.17	1.43	1.89	1.8	2.67	3.09
• at 60 Hz 575 V	kW	1.1	1.3	1.77	1.62	2.5	2.91
Cooling-air requirement		m ³ /s	0.17	0.17	0.17	0.36	0.36
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	67	67	67	69	69
Motor connection U2, V2, W2							
• Conductor cross-section, max. (DIN VDE)	mm ²	M12 screws 2 x 185	M12 screws 2 x 185	M12 screws 2 x 185	M12 screws 2 x 185	M12 screws 2 x 240	M12 screws 2 x 240
Cable length, max. ⁷⁾							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
PE/GND connection							
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and max. output current/output frequency, see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS – Low Voltage Engineering Manual.

SINAMICS S120 Cabinet Modules

Motor Modules Chassis format

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Chassis format Motor Modules					
		6SL3720-1TG28-5AA0	6SL3720-1TG31-0AA0	6SL3720-1TG31-2AA0	6SL3720-1TG31-5AA0	6SL3720-1TG31-8AA0	6SL3720-1TG32-2AA0
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width ¹⁾	mm	400	400	400	400	400	400
• Height ²⁾	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight, approx.	kg	145	145	145	145	286	286
Frame size		FX	FX	FX	FX	GX	GX

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¹⁾ With option **L10** (dv/dt filter plus VPL):
 - Frame sizes FX/GX/HX/JX → Supplementary cabinet, 600 mm wide
 With option **L34** (output-side circuit breaker):
 - Frame sizes FX/GX → Supplementary cabinet, 400 mm wide
 - Frame sizes HX/JX → Supplementary cabinet, 600 mm wide

²⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Chassis format Motor Modules					
		6SL3720-1TG32-6AA0	6SL3720-1TG33-3AA0	6SL3720-1TG34-1AA0	6SL3720-1TG34-7AA0	6SL3720-1TG35-8AA0	6SL3720-1TG37-4AA0
Type rating							
• at I_L (50 Hz 690 V) ¹⁾	kW	250	315	400	450	560	710
• at I_H (50 Hz 690 V) ¹⁾	kW	200	250	315	400	450	630
• at I_L (50 Hz 500 V) ¹⁾	kW	160	200	250	315	400	500
• at I_H (50 Hz 500 V) ¹⁾	kW	132	160	200	250	315	450
• at I_L (60 Hz 575 V) ²⁾	hp	250	300	400	450	600	700
• at I_H (60 Hz 575 V) ²⁾	hp	200	250	350	450	500	700
Output current							
• Rated current I_{NA}	A	260	330	410	465	575	735
• Base load current I_L ³⁾	A	250	320	400	452	560	710
• Base load current I_H ⁴⁾	A	233	280	367	416	514	657
• Maximum current $I_{max A}$	A	375	480	600	678	840	1065
DC link current							
• Rated current $I_{N DC}$ when supplied from							
- Basic/Smart Line Module	A	312	396	492	558	690	882
- Active Line Module	A	281	356	443	502	621	794
• Base load current I_L ³⁾ when supplied from							
- Basic/Smart Line Module	A	304	386	479	544	672	859
- Active Line Module	A	273	347	431	489	605	774
• Base load current I_H ⁴⁾ when supplied from							
- Basic/Smart Line Module	A	277	352	437	496	614	784
- Active Line Module	A	250	316	394	446	552	706
Current requirement							
• 24 V DC auxiliary power supply	A	0.9	0.9	1.0	1.0	1.0	1.25
• 690 V AC	A	1.0	1.0	2.1	2.1	2.1	3.1
DC link capacitance		μF	3900	4200	7400	7400	11100
Pulse frequency ⁵⁾							
• Rated frequency	kHz	1.25	1.25	1.25	1.25	1.25	1.25
• Pulse frequency, max.							
- without current derating	kHz	1.25	1.25	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾							
• at 50 Hz 690 V	kW	3.62	4.34	6.13	6.8	10.3	10.9
• at 60 Hz 575 V	kW	3.38	3.98	5.71	6.32	9.7	10
Cooling-air requirement		m ³ /s	0.36	0.36	0.78	0.78	1.474
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	69	69	72	72	72
Motor connection U2, V2, W2							
• Conductor cross-section, max. (DIN VDE)	mm ²	M12 screws 2 x 240	M12 screws 2 x 240	M12 screws 4 x 240	M12 screws 4 x 240	M12 screws 4 x 240	M12 screws 6 x 240
Cable length, max. ⁷⁾							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
PE/GND connection							
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and max. output current/output frequency, see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request.
See also SINAMICS – Low Voltage Engineering Manual.

SINAMICS S120 Cabinet Modules

Motor Modules Chassis format

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Chassis format Motor Modules					
		6SL3720-1TG32-6AA0	6SL3720-1TG33-3AA0	6SL3720-1TG34-1AA0	6SL3720-1TG34-7AA0	6SL3720-1TG35-8AA0	6SL3720-1TG37-4AA0
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width ¹⁾	mm	400	400	600	600	600	800
• Height ²⁾	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight, approx.	kg	286	286	490	490	490	700
Frame size		GX	GX	HX	HX	HX	JX

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¹⁾ With option **L10** (dv/dt filter plus VPL):
 - Frame sizes FX/GX/HX/JX → Supplementary cabinet, 600 mm wide
 With option **L34** (output-side circuit breaker):
 - Frame sizes FX/GX → Supplementary cabinet, 400 mm wide
 - Frame sizes HX/JX → Supplementary cabinet, 600 mm wide

²⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Chassis format Motor Modules			
		6SL3720-1TG38-1AA0	6SL3720-1TG38-8AA0	6SL3720-1TG41-0AA0	6SL3720-1TG41-3AA0
Type rating					
• at I_L (50 Hz 690 V) ¹⁾	kW	800	900	1000	1200
• at I_H (50 Hz 690 V) ¹⁾	kW	710	800	900	1000
• at I_L (50 Hz 500 V) ¹⁾	kW	560	630	710	900
• at I_H (50 Hz 500 V) ¹⁾	kW	500	560	630	800
• at I_L (60 Hz 575 V) ²⁾	hp	800	900	1000	1250
• at I_H (60 Hz 575 V) ²⁾	hp	700	800	900	1000
Output current					
• Rated current I_{NA}	A	810	910	1025	1270
• Base load current I_L ³⁾	A	790	880	1000	1230
• Base load current I_H ⁴⁾	A	724	814	917	1136
• Maximum current $I_{max A}$	A	1185	1320	1500	1845
DC link current					
• Rated current $I_{N DC}$ when supplied from					
- Basic/Smart Line Module	A	972	1092	1230	1524
- Active Line Module	A	875	983	1107	1372
• Base load current $I_L DC$ ³⁾ when supplied from					
- Basic/Smart Line Module	A	947	1064	1199	1485
- Active Line Module	A	853	958	1079	1337
• Base load current $I_H DC$ ⁴⁾ when supplied from					
- Basic/Smart Line Module	A	865	971	1094	1356
- Active Line Module	A	778	874	985	1221
Current requirement					
• 24 V DC auxiliary power supply	A	1.25	1.4	1.4	1.4
• 690 V AC	A	3.1	3.1	3.1	3.1
DC link capacitance		μF	11100	14400	19200
Pulse frequency ⁵⁾					
• Rated frequency	kHz	1.25	1.25	1.25	1.25
• Pulse frequency, max.					
- without current derating	kHz	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5
Power loss, max. ⁶⁾					
• at 50 Hz 690 V	kW	11.5	11.7	13.2	16.0
• at 60 Hz 575 V	kW	10.5	10.6	12.0	14.2
Cooling-air requirement		m ³ /s	1.474	1.474	1.474
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	72	72	72
Motor connection U2, V2, W2					
• Conductor cross-section, max. (DIN VDE)	mm ²	M12 screws 6 x 240	M12 screws 6 x 240	M12 screws 6 x 240	M12 screws 6 x 240
Cable length, max. ⁷⁾					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
PE/GND connection					
• Busbar cross-section	mm ²	PE bar 600	PE bar 600	PE bar 600	PE bar 600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ For the correlation between the pulse frequency and max. output current/output frequency, see SINAMICS – Low Voltage Engineering Manual on the CD-ROM provided.

⁶⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

⁷⁾ Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS – Low Voltage Engineering Manual.

SINAMICS S120 Cabinet Modules

Motor Modules Chassis format

Technical data (continued)

Line voltage 500 ... 690 V 3 AC DC link voltage 675 ... 1035 V DC		Chassis format Motor Modules			
		6SL3720-1TG38-1AA0	6SL3720-1TG38-8AA0	6SL3720-1TG41-0AA0	6SL3720-1TG41-3AA0
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width ¹⁾	mm	800	800	800	800
• Height ²⁾	mm	2200	2200	2200	2200
• Depth	mm	600	600	600	600
Weight	kg	700	700	700	700
Frame size		JX	JX	JX	JX

3

¹⁾ With option **L10** (dv/dt filter plus VPL):
 - Frame sizes FX/GX/HX/JX → Supplementary cabinet, 600 mm wide
 With option **L34** (output-side circuit breaker):
 - Frame sizes FX/GX → Supplementary cabinet, 400 mm wide
 - Frame sizes HX/JX → Supplementary cabinet, 600 mm wide

²⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Options

The table below lists the options available for Motor Modules (Details → Description of the options):

Brief description of the options	Order code	Brief description of the options	Order code
CBC10 Communication Board	G20	Crane transport assembly (top-mounted)	M90
CBE20 Communication Board	G33	Special paint finish for cabinet	Y09
AOP30 Advanced Operator Panel installed in the cabinet door	K08	Factory assembly as transport units	Y11
SMC10 Sensor Module Cabinet-Mounted	K46	One-line label for plant identification, 40 x 80 mm	Y31
SMC20 Sensor Module Cabinet-Mounted	K48	Two-line label for plant identification, 40 x 180 mm	Y32
SMC30 Sensor Module Cabinet-Mounted	K50	Four-line label for plant identification, 40 x 180 mm	Y33
VSM10 Voltage Sensing Module Cabinet-Mounted for voltage sensing	K51	Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02
Second auxiliary voltage busbar system	K75	Preliminary version of customer documentation in PDF format	D14
Terminal module for controlling the "Safe Torque Off" and "Safe Stop 1" safety functions	K82	Documentation in English / French	D58
CU320 Control Unit + CompactFlash card without performance expansion	K90	Documentation in English / Spanish	D60
CU320 Control Unit + CompactFlash card with performance expansion 1	K91	Documentation in English / Italian	D80
Motor reactor	L08	Without operating instructions	D99
dv/dt filter plus Voltage Peak Limiter	L10	Rating plate data in English / French	T58
Output-side circuit breaker (motor-driven)	L34	Rating plate data in English / Spanish	T60
		Rating plate data in English / Italian	T80
DC interface incl. pre-charging circuit of the relevant DC link capacitance	L37	Visual acceptance	F03
Cabinet anti-condensation heating	L55	Function test with no motor connected	F71
25/125 kW braking unit (can be used for frame size FX) for line voltages of 380 ... 480 V and 660 ... 690 V	L61	Insulation test	F77
50/250 kW braking unit (can be used for frame size GX, HX, JX) for line voltages of 380 ... 480 V and 660 ... 690 V	L62	Customer-specific acceptance inspections (on request)	F97
25/125 kW braking unit (can be used for frame size FX) for line voltages of 500 ... 600 V	L64		
50/250 kW braking unit (can be used for frame size GX, HX, JX) for line voltages of 500 ... 600 V	L65		
Base 100 mm high, RAL 7022	M06		
Cable-marshaling compartment 200 mm high, RAL 7035	M07		
IP21 degree of protection	M21		
IP23 degree of protection (includes M60)	M23		
Side panel mounted on the right	M26		
Side panel mounted on the left	M27		
IP43 degree of protection	M43		
IP54 degree of protection	M54		
Closed cabinet door, air inlet from below through floor opening	M59		
Additional touch protection (included in M23 , M43 and M54)	M60		
EMC shield bus	M70		
DC busbar system ($I_d = 1170$ A, 1x 60 x 10 mm)	M80		
DC busbar system ($I_d = 1500$ A, 1x 80 x 10 mm)	M81		
DC busbar system ($I_d = 1840$ A, 1x 100 x 10 mm)	M82		
DC busbar system ($I_d = 2150$ A, 2x 60 x 10 mm)	M83		
DC busbar system ($I_d = 2730$ A, 2x 80 x 10 mm)	M84		
DC busbar system ($I_d = 3320$ A, 2x 100 x 10 mm)	M85		
DC busbar system ($I_d = 3720$ A, 3x 80 x 10 mm)	M86		
DC busbar system ($I_d = 4480$ A, 3x 100 x 10 mm)	M87		

SINAMICS S120 Cabinet Modules

Motor Modules Chassis format

Options (continued)

Option selection matrix for Motor Modules in the chassis format

Certain options are mutually exclusive.

✓	Possible combination
–	Combination not possible

Electrical options

	G20 ¹⁾	G33 ¹⁾	K08 ¹⁾	K46	K48	K50	K51	K75	K82	K90	K91	L08	L10	L34	L37 ²⁾	L55	L61/64	L62/65
G20 ¹⁾		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
G33 ¹⁾	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K08 ¹⁾	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K46	✓	✓	✓		–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K48	✓	✓	✓	–		–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K50	✓	✓	✓	–	–		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K51	✓	✓	✓	–	–	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K75	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
K82	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
K90	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓
K91	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓
L08	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	✓	✓	✓	✓	✓
L10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–	✓	✓	✓	✓
L34	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		✓	✓	✓	✓
L37 ²⁾	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	–	–
L55	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
L61/64	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓		–
L62/65	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	

Mechanical/electrical options

	M06	M07	M21	M23	M26	M27	M43	M54	M59	M60	M70	M90	Y09	Y11	Y31	Y32	Y33
M06		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M21	✓	✓		–	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
M23	✓	✓	–		✓	✓	–	–	✓	– ²⁾	✓	✓	✓	✓	✓	✓	✓
M26	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M27	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M43	✓	✓	–	–	✓	✓		–	✓	– ²⁾	✓	✓	✓	✓	✓	✓	✓
M54	✓	✓	–	–	✓	✓	–		✓	– ²⁾	✓	✓	✓	✓	✓	✓	✓
M59	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
M60	✓	✓	✓	– ²⁾	✓	✓	– ²⁾	– ²⁾	✓		✓	✓	✓	✓	✓	✓	✓
M70	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	–	✓	✓	✓
Y09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Y11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓		✓	✓	✓
Y31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	–
Y32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–
Y33	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	

¹⁾ Options **G20**, **G33** and **K08** require option **K90** or **K91**.

²⁾ The option **M60** is included in **L37**, **M23**, **M43** and **M54**.

Options (continued)

Mechanical options, DC busbar system
(busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

Documentation

	D02	D14	D58	D60	D80	D99
D02		✓	✓	✓	✓	–
D14	✓		✓	✓	✓	–
D58	✓	✓		–	–	–
D60	✓	✓	–		–	–
D80	✓	✓	–	–		–
D99	–	–	–	–	–	

Rating plate data

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

Central Braking Modules

Overview



Central Braking Modules limit the DC link voltage at a central location in the drive line-up when the motors are operating in generator mode and energy recovery to the supply system is not possible. If the voltage of the DC busbar exceeds a limit value in generator operation, an externally installed braking resistor is switched in, thus restricting the voltage from increasing further. The regenerative energy is converted into heat. The braking resistor is switched in by the Braking Unit integrated in the Cabinet Module which is equipped with state-of-the-art MOSFET/IGBT semiconductors.

Central Braking Modules are an alternative to the optional Braking Modules (order code **L61/ L62** or **L64/ L65**) and are particularly suitable when high braking powers are required in a drive system. The required braking power can also be increased by connecting units in parallel.

Line voltage	DC link voltage	Braking power P_{150}
380 ... 480 V 3 AC	510 ... 720 V DC	500 kW/1000 kW
500 ... 600 V 3 AC	675 ... 900 V DC	550 kW/1100 kW
660 ... 690 V 3 AC	890 ... 1035 V DC	630 kW/1200 kW

Central Braking Modules operate as fully stand-alone modules. They only require a connection to the DC link. An external control voltage is not required.

The built-in fan means that Central Braking Modules are also suitable for high continuous power systems.

Design

The Central Braking Module is a cabinet unit with integrated braking chopper. Using state-of-the-art MOSFET/ IGBT semiconductors, the power unit controls the braking resistor.

Central Braking Modules are designed as a 400 mm wide cabinet module. The connection between the modules and the DC link busbar is fused.

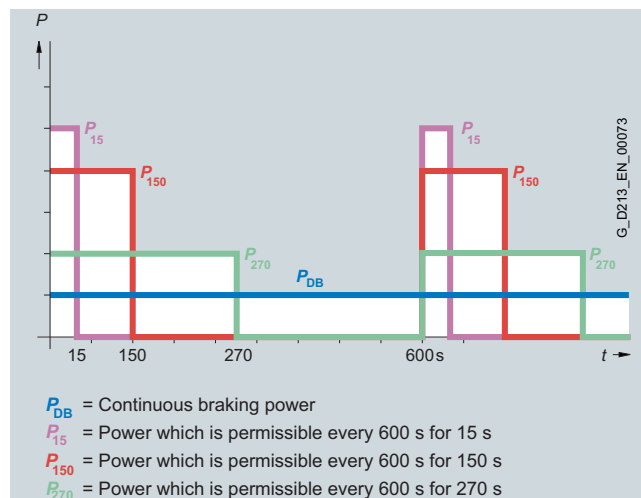
Central Braking Modules require externally mounted braking resistors which must be ordered separately. The cables to the resistors can be connected to lugs which are specially prepared for plant application and which are located in the connection area of the cabinet.

The power units have a diagnostics LED for the display of faults and also a control output for the communication of faults. The Central Braking Module can be disabled externally via a control input.

The arrangement in the DC link line-up is subject to configuring rules; these can be found in the SINAMICS – Low Voltage Engineering Manual.

Selection and ordering data

Central Braking Modules are dimensioned for braking powers with the following duty cycles:



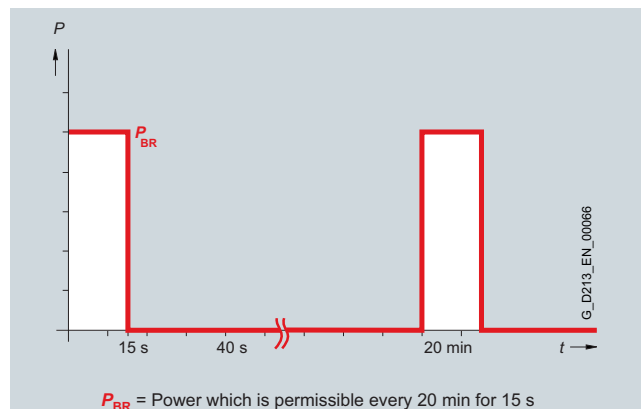
Braking powers of the Central Braking Modules

The braking powers are subject to a cycle time of 600 s. P_{150} is assumed to be the rated braking power. The braking resistors available as standard can be assigned according to these power ratings.

Braking powers				Central Braking Module
P_{15} kW	P_{150} kW	P_{270} kW	P_{DB} kW	Order No.
DC link voltage 510 ... 720 V DC				
730	500	300	200	6SL3700-1AE35-0AA1
1380	1000	580	370	6SL3700-1AE41-0AA1
DC link voltage 675 ... 900 V DC				
830	550	340	220	6SL3700-1AF35-5AA1
1580	1100	650	420	6SL3700-1AF41-1AA1
DC link voltage 890 ... 1035 V DC				
920	630	380	240	6SL3700-1AH36-3AA1
1700	1200	720	460	6SL3700-1AH41-2AA1

In most applications, Central Braking Modules are only used for occasional braking operations, e.g. stopping a drive in an emergency.

Low-cost braking resistors in IP21 degree of protection are specifically offered for these types of applications; these braking resistors are dimensioned for braking powers P_{BR} with the following duty cycle:



Duty cycle for braking resistors

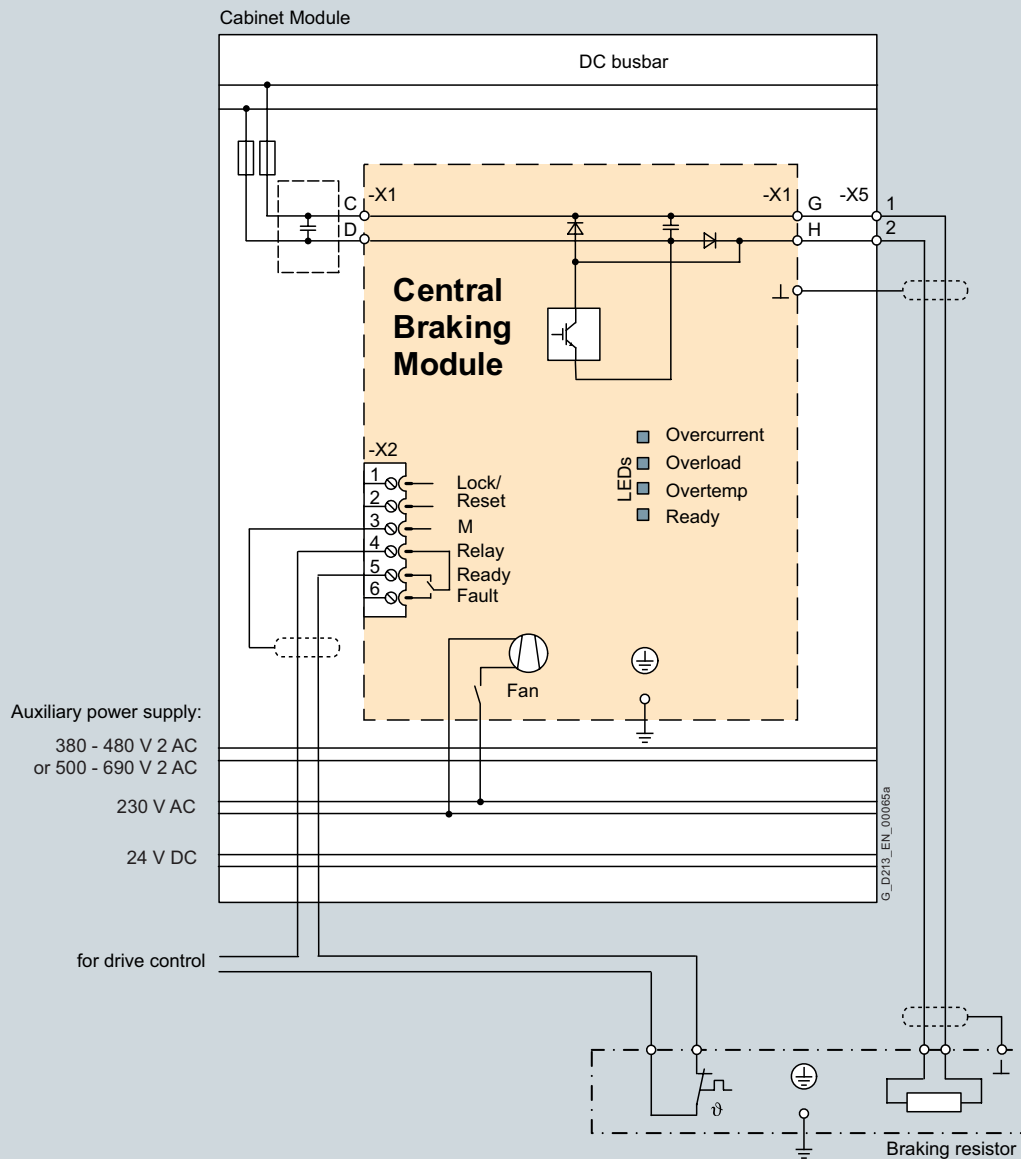
Braking resistors with a higher braking power and shorter cycle times are available on request.

Braking power P_{150}	Dimensions W x D x H	Braking resistor (IP21 degree of protection)
kW	mm	Order No.
DC link voltage 510 ... 720 V DC		
500	960 x 620 x 790	6SL3000-1BE35-0AA0
1000	960 x 620 x 1430	6SL3000-1BE41-0AA0
DC link voltage 675 ... 900 V DC		
550	960 x 620 x 1110	6SL3000-1BF35-5AA0
1100	960 x 620 x 1430	6SL3000-1BF41-1AA0

Braking power P_{150}	Dimensions W x D x H	Braking resistor (IP21 degree of protection)
kW	mm	Order No.
DC link voltage 890 ... 1035 V DC		
630	960 x 620 x 1110	6SL3000-1BH36-3AA0
1200	960 x 620 x 1430	6SL3000-1BH41-2AA0

Note: In contrast to the optional Braking Modules (order code **L61, L62** or **L64, L65**), the braking resistors for the Central Braking Modules must be separately ordered.

Integration



Connection example of a Central Braking Module

Central Braking Modules

Technical data

		Central Braking Modules					
		6SL3700-1AE35-0AA1	6SL3700-1AE41-0AA1	6SL3700-1AF35-5AA1	6SL3700-1AF41-1AA1	6SL3700-1AH36-3AA1	6SL3700-1AH41-2AA1
Line voltage	V	380 ... 480		500 ... 600		660 ... 690	
Braking power P_{150}	kW	500	1000	550	1100	630	1200
Continuous braking power P_{DB}	kW	200	370	220	420	240	460
Braking current for P_{150}	A	650	1200	580	1100	520	1000
Current requirement ¹⁾							
• 230 V 2 AC	A	0.4	0.4	0.4	0.4	0.4	0.4
Power loss, max. ²⁾ at 50 Hz 400/500/690 V	kW	0.8	1.5	0.8	1.5	0.8	1.5
DC link capacitance	μF	8160	9720	7640	8680	7640	8680
Cooling-air requirement	m ³ /s	0.14	0.14	0.14	0.14	0.14	0.14
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	55	55	55	55	55	55
Braking resistor connection terminal		M12 screws	M12 screws	M12 screws	M12 screws	M12 screws	M12 screws
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x 240	2 x 240	2 x 240	2 x 240	2 x 240	2 x 240
PE/GND connection		PE bar	PE bar	PE bar	PE bar	PE bar	PE bar
• Busbar cross-section	mm ²	600	600	600	600	600	600
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	400	400	400	400	400	400
• Height ³⁾	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight, approx.	kg	230	230	230	230	230	230
Frame size	mm	400	400	400	400	400	400

		Braking resistors					
		6SL3000-1BE35-0AA0	6SL3000-1BE41-0AA0	6SL3000-1BF35-5AA0	6SL3000-1BF41-1AA0	6SL3000-1BH36-3AA0	6SL3000-1BH41-2AA0
Line voltage	V	380 ... 480		500 ... 600		660 ... 690	
Braking power P_{BR}	kW	500	1000	550	1100	630	1200
Continuous braking power P_{DB}	kW	23	58	34	62	42	75
Resistance value	Ω	1.1	0.55	1.6	0.8	1.95	1.0
Degree of protection		IP21	IP21	IP21	IP21	IP21	IP21
Dimensions							
• Width	mm	960	960	960	960	960	960
• Height	mm	620	620	620	620	620	620
• Depth	mm	790	1430	1110	1430	1110	1430
Weight, approx.	kg	82	170	110	180	124	196

¹⁾ Current requirement of the fans.

²⁾ The specified power loss represents the maximum value at 100 % utilization. The value is lower under normal operating conditions.

³⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP43 and IP54 degrees of protection.

Options

The following options are available for the Central Braking Modules:

Brief description of the options	Order code
Second auxiliary voltage busbar system	K75
Cabinet anti-condensation heating	L55
Base 100 mm high, RAL 7022	M06
Cable-marshaling compartment 200 mm high, RAL 7035	M07
IP21 degree of protection	M21
IP23 degree of protection (includes M60)	M23
Side panel mounted on the right	M26
Side panel mounted on the left	M27
IP43 degree of protection	M43
IP54 degree of protection	M54
Closed cabinet door, air inlet from below through floor opening	M59
DC busbar system ($I_d = 1170$ A, 1x 60 x 10 mm)	M80
DC busbar system ($I_d = 1500$ A, 1x 80 x 10 mm)	M81
DC busbar system ($I_d = 1840$ A, 1x 100 x 10 mm)	M82
DC busbar system ($I_d = 2150$ A, 2x 60 x 10 mm)	M83
DC busbar system ($I_d = 2730$ A, 2x 80 x 10 mm)	M84
DC busbar system ($I_d = 3320$ A, 2x 100 x 10 mm)	M85
DC busbar system ($I_d = 3720$ A, 3x 80 x 10 mm)	M86
DC busbar system ($I_d = 4480$ A, 3x 100 x 10 mm)	M87
Crane transport assembly (top-mounted)	M90
Special paint finish for cabinet	Y09
Factory assembly as transport units	Y11
One-line label for plant identification, 40 x 80 mm	Y31
Two-line label for plant identification, 40 x 180 mm	Y32
Four-line label for plant identification, 40 x 180 mm	Y33
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02
Preliminary version of customer documentation in PDF format	D14
Documentation in English / French	D58
Documentation in English / Spanish	D60
Documentation in English / Italian	D80
Without operating instructions	D99
Rating plate data in English / French	T58
Rating plate data in English / Spanish	T60
Rating plate data in English / Italian	T80
Visual acceptance	F03
Function test with no motor connected	F71
Insulation test	F77
Customer-specific acceptance inspections (on request)	F97

Central Braking Modules

Options (continued)

Option selection matrix for Central Braking Modules

Certain options are mutually exclusive.

✓	Possible combination
–	Combination not possible

Mechanical/electrical options

	M06	M07	M21	M23	M26	M27	M43	M54	M59	M90	Y09	Y11	Y31	Y32	Y33
M06		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M21	✓	✓		–	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓
M23	✓	✓	–		✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓
M26	✓	✓	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓	✓
M27	✓	✓	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓	✓
M43	✓	✓	–	–	✓	✓		–	✓	✓	✓	✓	✓	✓	✓
M54	✓	✓	–	–	✓	✓	–		✓	✓	✓	✓	✓	✓	✓
M59	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	–	✓	✓	✓
Y09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Y11	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓		✓	✓	✓
Y31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	–
Y32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–
Y33	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	

Mechanical options, DC busbar (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

Documentation

	D02	D14	D58	D60	D80	D99
D02		✓	✓	✓	✓	–
D14	✓		✓	✓	✓	–
D58	✓	✓		–	–	–
D60	✓	✓	–		–	–
D80	✓	✓	–	–		–
D99	–	–	–	–	–	

Rating plate data

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

Overview



Auxiliary Power Supply Modules supply power to the auxiliary voltage busbar system of the SINAMICS S120 Cabinet Modules. One of the units connected to this auxiliary voltage busbar system are the fans of the SINAMICS S120 devices installed in the Cabinet Modules. In addition, the auxiliary voltage busbar system supplies the electronic modules with an external 24 V DC voltage. This is required when the DC link is not charged, for instance, in order to maintain PROFIBUS communication.

Design

The Auxiliary Power Supply Module is connected in the customer's plant to a voltage corresponding to the respective rated unit voltage.

The standard version contains the following components:

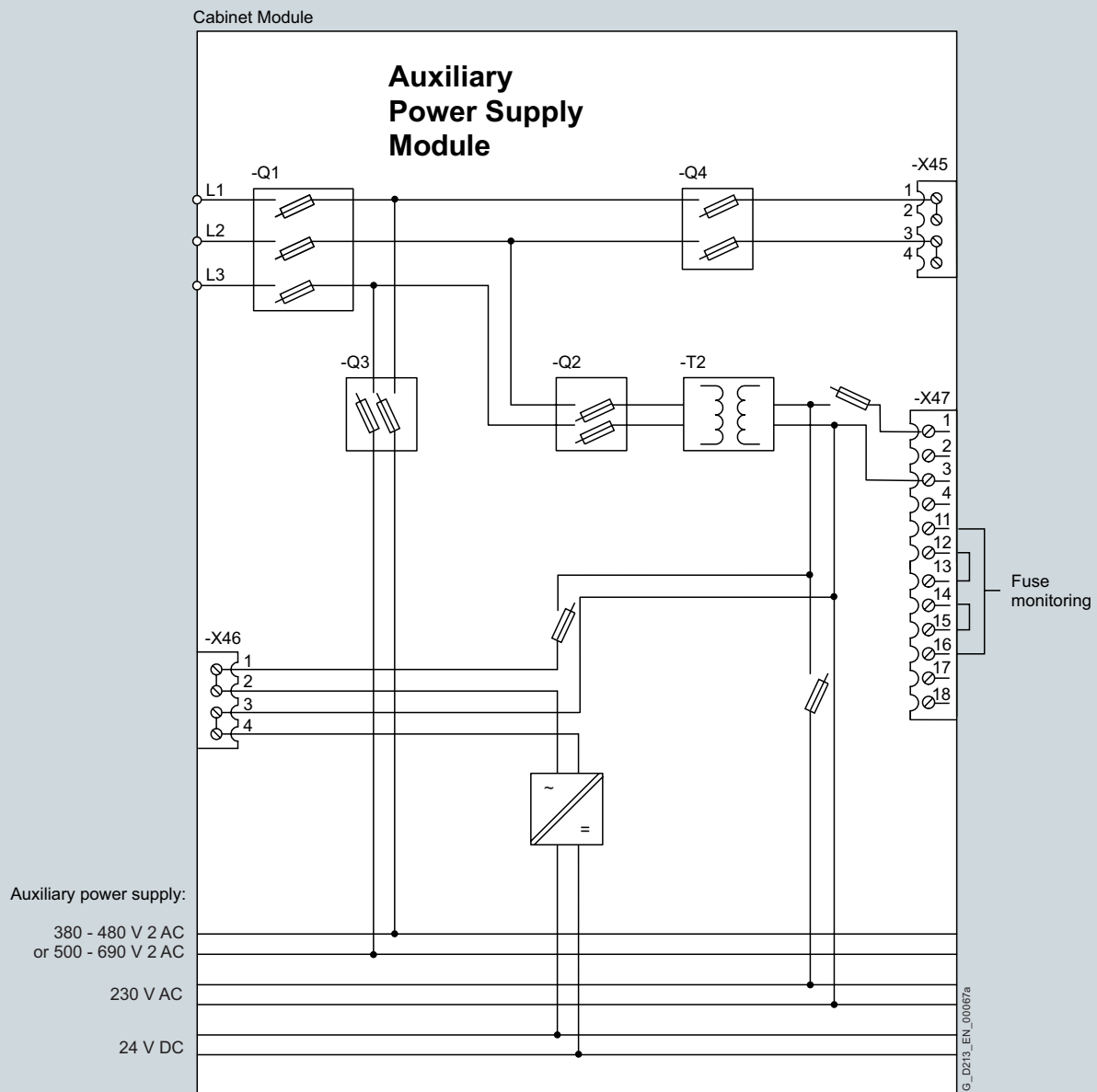
- Fuse switch disconnecter with fuse monitoring for external evaluation
- Supply of the auxiliary voltage busbar system with 3 fused auxiliary voltages:
 - 24 V DC for the electronics power supply
 - 230 V 2 AC to supply 230 V loads
 - 380 V to 690 V 2 AC to supply the equipment fans
- Customer terminal blocks 230 V 2 AC and 380 V 3 AC, e.g. to supply a second auxiliary voltage busbar system (order code **K75**)
- Transformer with 230 V output voltage
- SITOP 24 V DC power supply
- 6-pole auxiliary voltage busbar system (ready-wired), including jumpers for looping through to the next Cabinet Module
- Nickel-plated PE busbar (60 mm × 10 mm), including jumper for looping through to the next Cabinet Module

Selection and ordering data

Site power supply (380 ... 690 V 3 AC)	Auxiliary Power Supply Module
A	Order No.
125	6SL3700-0MX14-0AA0
160	6SL3700-0MX16-3AA0
200	6SL3700-0MX21-0AA0
250	6SL3700-0MX21-4AA0

Note:

In smaller systems, there is often no need for an additional Cabinet Module for the auxiliary power supply. In such cases, the infeed for the auxiliary voltage busbar system can also be supplied by the Line Connection Module. This must then be ordered separately (order code **K76**).



Block diagram, Auxiliary Power Supply Module

Technical data

Auxiliary Power Supply Modules					
		6SL3700-0MX14-0AA0	6SL3700-0MX16-3AA0	6SL3700-0MX21-0AA0	6SL3700-0MX21-4AA0
Site power supply 380 ... 690 V 3 AC	A	125	160	200	250
Line connection • Conductor cross-section, max. (DIN VDE)	mm ²	150	150	150	150
Max. current carrying capacity • Load connection 380 V ... 690 V AC - to auxiliary voltage busbar - to customer terminal –X45 • Load connection 230 V AC - to auxiliary voltage busbar - to customer terminal –X47 • Load connection 24 V DC - to auxiliary voltage busbar	A A A A A	63 50 6 8 20	80 63 10 10 40	100 80 10 10 80	100 80 20 20 80
Cable cross-section, max. • Connection –X45 • Connection –X47	mm ² mm ²	16 2.5	16 2.5	16 2.5	16 2.5
Cooling-air requirement		Natural convection	Natural convection	Natural convection	Natural convection
PE/GND connection • Busbar cross-section • Conductor cross-section, max. (DIN VDE)	mm ² mm ²	PE bar 600 240	PE bar 600 240	PE bar 600 240	PE bar 600 240
Degree of protection		IP20	IP20	IP20	IP20
Dimensions • Width • Height ¹⁾ • Depth	mm mm mm	600 2200 600	600 2200 600	600 2200 600	600 2200 600
Weight, approx.	kg	170	180	210	240

Options

The table below lists the options available for Auxiliary Power Supply Modules (Details → Description of the options):

Brief description of the options	Order code	Brief description of the options	Order code
Second auxiliary voltage busbar system	K75	Special paint finish for cabinet	Y09
Cabinet anti-condensation heating	L55	Factory assembly as transport units	Y11
Base 100 mm high, RAL 7022	M06	One-line label for plant identification, 40 x 80 mm	Y31
Cable-marshaling compartment 200 mm high, RAL 7035	M07	Two-line label for plant identification, 40 x 180 mm	Y32
IP21 degree of protection	M21	Four-line label for plant identification, 40 x 180 mm	Y33
IP23 degree of protection	M23	Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02
Side panel mounted on the right	M26	Preliminary version of customer documentation in PDF format	D14
Side panel mounted on the left	M27	Documentation in English / French	D58
IP43 degree of protection	M43	Documentation in English / Spanish	D60
IP54 degree of protection	M54	Documentation in English / Italian	D80
Closed cabinet door, air inlet from below through floor opening	M59	Without operating instructions	D99
EMC shield bus	M70	Rating plate data in English / French	T58
DC busbar system ($I_d = 1170$ A, 1x 60 x 10 mm)	M80	Rating plate data in English / Spanish	T60
DC busbar system ($I_d = 1500$ A, 1x 80 x 10 mm)	M81	Rating plate data in English / Italian	T80
DC busbar system ($I_d = 1840$ A, 1x 100 x 10 mm)	M82	Visual acceptance	F03
DC busbar system ($I_d = 2150$ A, 2x 60 x 10 mm)	M83	Function test with no motor connected	F71
DC busbar system ($I_d = 2730$ A, 2x 80 x 10 mm)	M84	Insulation test	F77
DC busbar system ($I_d = 3320$ A, 2x 100 x 10 mm)	M85	Customer-specific acceptance inspections (on request)	F97
DC busbar system ($I_d = 3720$ A, 3x 80 x 10 mm)	M86		
DC busbar system ($I_d = 4480$ A, 3x 100 x 10 mm)	M87		
Crane transport assembly (top-mounted)	M90		

¹⁾ The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23, IP24 and IP54 degrees of protection.

Auxiliary Power Supply Modules

Options (continued)

Option selection matrix for Auxiliary Power Supply Modules

Certain options are mutually exclusive.

✓	Possible combination
–	Combination not possible

Mechanical/electrical options

	M06	M07	M21	M23	M26	M27	M43	M54	M59	M70	M90	Y09	Y11	Y31	Y32	Y33
M06		–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	–		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M21	✓	✓		–	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓
M23	✓	✓	–		✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓
M26	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M27	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M43	✓	✓	–	–	✓	✓		–	✓	✓	✓	✓	✓	✓	✓	✓
M54	✓	✓	–	–	✓	✓	–		✓	✓	✓	✓	✓	✓	✓	✓
M59	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
M70	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
M90	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	–	✓	✓	✓
Y09	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Y11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓		✓	✓	✓
Y31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		–	–
Y32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–		–
Y33	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

Documentation

	D02	D14	D58	D60	D80	D99
D02		✓	✓	✓	✓	–
D14	✓		✓	✓	✓	–
D58	✓	✓		–	–	–
D60	✓	✓	–		–	–
D80	✓	✓	–	–		–
D99	–	–	–	–	–	

Rating plate data

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

Description of the options

D02

Customer documentation in DXF format

Option **D02** can be used to order documents such as circuit diagrams, terminal diagrams, as well as the layout diagrams and the dimension drawing in DXF format, e.g. for further processing in other AutoCAD systems.

D14

Preliminary version of customer documentation in PDF format

If documents such as circuit diagrams, terminal diagrams, the layout diagram and the dimension drawing are required in advance for the purpose of system engineering (integration of drive into higher-level systems, interface definition, installation, building planning, etc.), it is possible to order a draft copy of the documentation when ordering the Cabinet Modules. These documents are then supplied electronically a few working days following receipt of the order. If the order includes options that fall outside the scope of standard delivery, these will not be covered by the documentation due to the obvious time constraints.

Documentation relating to the order is sent to the buyer by e-mail. The recipient's e-mail address must be specified with the order for this purpose. In the e-mail, the recipient will also receive a link (Internet address) for downloading general, non-order-specific documentation such as the operating instructions, equipment manual and commissioning guides.

D58/D60/D80

Documentation language

Order code	Language
D58	English/French
D60	English/Spanish
D80	English/Italian

D99

Without operating instructions

The Cabinet Modules/Booksize Cabinet Kit are shipped without a documentation CD.

F03, F71, F77, F97

Equipment acceptance in the presence of the customer

Order code	Description
F03	<p>Visual acceptance</p> <p>The inspection includes the following:</p> <ul style="list-style-type: none"> • Check of degree of protection • Check of equipment (components) • Check of equipment identifiers • Check of clearance and creepage distances • Check of cables • Check of customer documentation • Submission of the acceptance report <p>All the above checks are performed with the equipment in a no-voltage condition.</p>
F71	<p>Function test of the equipment without connected motor</p> <p>The inspection includes the following:</p> <ul style="list-style-type: none"> • Visual inspection as described for option F03 • Check of power supply • Check of protective and monitoring devices (simulation) • Check of fans • Pre-charging test • Function test without connected motor • Submission of the acceptance report <p>After the visual inspection with the equipment in a no-voltage condition, the rated voltage is connected to the equipment. No current at the equipment output.</p>
F77	<p>Insulation test of the equipment</p> <p>The inspection includes the following:</p> <ul style="list-style-type: none"> • High-voltage test • Insulation resistance measurement
F97	<p>Customer-specific acceptance inspections (on request)</p> <p>If acceptance inspections are desired which are not covered by the options F03, F71, F75 or F77, customized acceptance inspections/supplementary tests can be ordered using order code F97 on request and following technical clarification.</p>

Description of the options

Description of the options (continued)

G20

CBC10 Communication Board

The CBC10 Communication Board is used to interface the CU320 Control Unit and thus the SINAMICS S120 Cabinet Modules 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.

The CBC10 Communication Board can only be ordered in conjunction with a CU320 Control Unit (order code **K90/K91**) and is supplied in an accessories pack for possible configuration. It cannot be combined with option **G33**.

(Description of the CBC10 Communication Board → Part 2, Supplementary system components).

G33

CBE20 Communication Board

The CBE20 Communication Board can be used to connect the SINAMICS S120 Cabinet Modules to a PROFINET IO network via a CU320 Control Unit. The CBE20 Communication Board plugs into the option slot on the CU320 Control Unit.

The CBE20 Communication Board can only be ordered as option **G33** in conjunction with a CU320 Control Unit (order code **K90/K91**) and is supplied in an accessories pack for possible configuration. It cannot be combined with option **G20**.

(Description of the CBE20 Communication Board → Part 2, Supplementary system components).

K08

AOP30 Advanced Operator Panel

The AOP30 Advanced Operator Panel is an optional input/output device for the Cabinet Modules. If a CU320 Control Unit (order code **K90/K91**) is selected for use with a Cabinet Module in chassis format or a Booksize Cabinet Kit, a dedicated operator panel can be assigned to this module with the option **K08**. The AOP30 Advanced Operator Panel is mounted in the cabinet door of the relevant Cabinet Module.

(Description of the AOP30 → Part 2, Supplementary system components).

K46

SMC10 Sensor Module Cabinet-Mounted for resolvers

The SMC10 encoder module can be used to simultaneously record the speed and the rotor position angle. The signals received from the resolver are converted here and made available to the closed-loop controller via the DRIVE-CLiQ interface for evaluation purposes.

The following encoders are supported by the SMC10:

- 2-pole resolver
- Multipole resolver

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

(Description of the SMC Sensor Module → Part 2, Supplementary system components)

K48

SMC20 Sensor Module Cabinet-Mounted for sin/cos incremental encoder or EnDat absolute encoder

The SMC20 encoder module can be used to simultaneously record the speed and position. The signals received from the incremental encoder are converted here and made available to the closed-loop controller via the DRIVE-CLiQ interface for evaluation purposes.

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1 Vpp
- EnDat absolute encoder
- SSI encoder

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

(Description of the SMC20 Sensor Module → Part 2, Supplementary system components)

K50

SMC30 Sensor Module Cabinet-Mounted to sense the actual motor speed

The SMC30 encoder module can be used to sense speed. The signals emitted by the rotary pulse encoder are converted here and made available to the closed-loop controller via the DRIVE-CLiQ interface for evaluation purposes.

The following encoder signals can be evaluated:

- TTL encoder
- HTL encoder
- SSI encoder

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

(Description of the SMC30 Sensor Module → Part 2, Supplementary system components)

K51

VSM10 Voltage Sensing Module for voltage sensing

The VSM10 Voltage Sensing Module is used to sense the voltage so that the following function can be implemented:

- Operation of a permanent-magnet synchronous machine without encoder with the requirement to be able to connect to a motor that is already running ("Flying restart" function)

(Description of the VSM10 Voltage Sensor Module → Part 2, Supplementary system components).

Description of the options (continued)

K75

Second auxiliary voltage busbar system

If further supply voltages are required in addition to the three system auxiliary voltages supplied by the auxiliary busbar system that is integrated as standard, the optional second auxiliary voltage busbar system can be installed to provide and manage additional auxiliary voltages in the Cabinet Modules. Each Cabinet Module is supplied with three 2-pin connectors, thus making it easy to interconnect individual Cabinet Modules.

Connectors for the voltage tap and the infeed can be ordered as required using order number 5ST2545.

The current-carrying capacity of the 6-pole auxiliary voltage busbar system is 100 A according to IEC and 80 A according to UL.

K76

Auxiliary voltage generation in the Line Connection Module

Cabinet Modules require an auxiliary energy supply to function properly. This current requirement must be included in the configuration and supplied from an external source. If an external supply is not possible, the required auxiliary voltages can be supplied by means of an Auxiliary Power Supply Module.

Alternatively, option **K76** can be selected to generate the auxiliary voltages in the Line Connection Module. This is particularly advisable for smaller device configurations.

The following auxiliary voltages are available:

- 380 V to 480 V or 500 V 2 AC
(possible tap approx. 80 A)
- 230 V 2 AC
(possible tap, LCM < 800 A: approx. 4 A, > 800 A: approx. 6 A)
- 24 V DC
(possible tap, LCM < 800 A: approx. 20 A, > 800 A: approx. 40 A)

The auxiliary voltages can be connected to the auxiliary voltage busbar system from the Line Connection Module, and are therefore able to supply the entire cabinet group from here.

K82

Terminal module for controlling the "Safe Torque Off" and "Safe Stop 1" safety functions

The terminal module is used to control the "Basic Safety Functions" over a wide voltage range from 24 V to 240 V DC/AC. This means that the "STO" and "SS1" safety functions can be flexibly controlled from the signal voltages in the plant.

The integrated safety functions, starting from the Safety Integrated (SI) input terminals of the components (Control Unit and Motor Module), satisfy the requirements of Machinery Directive 98/37/EC, EN 60204-1, and DIN EN ISO 13849-1 Category 3 (formerly EN 954-1), as well as Performance Level (PL) d and IEC 61508 SIL 2.

These Safety Integrated functions of the SINAMICS S120 are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office.

With option **K82**, the requirements specified in Machinery Directive 98/37/EC, EN 60204-1, DIN EN ISO 13849-1 Category 3 (formerly EN 954-1) as well as Performance Level (PL) d and IEC 61508 SIL 2 are fulfilled. The Safety Integrated functions using option **K82** are only available in conjunction with certified components and software versions.

The following Safety Integrated functions are controlled using option **K82**:

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

K90

CU320 Control Unit + CompactFlash card without performance expansion

Option **K90** assigns a CU320 Control Unit to the Line Modules and Motor Modules. This unit handles the communication, open-loop and closed-loop control functions.

The latest firmware version is installed on the CompactFlash card, including licensing but without performance expansion. The unit can communicate with other devices via PROFIBUS or the DRIVE-CLiQ interface. (Description of the CU320 → Part 2 → Components → Control Units).

K91

CU320 Control Unit + CompactFlash card with performance expansion 1

Option **K91** assigns a CU320 Control Unit to the Line Modules and Motor Modules. This unit handles the communication, open-loop and closed-loop control functions.

The CompactFlash card has the actual firmware release including licensing with performance expansion 1. Communication to other devices is possible via a PROFIBUS or DRIVE-CLiQ interface.

(Description of the CU320 → Part 2 → Components → Control Units).

Description of the options

Description of the options (continued)

L08

Motor reactor

Motor reactors reduce the voltage load on the motor windings by reducing the voltage gradients on the motor terminals that occur during converter operation. At the same time, the capacitive charge/discharge currents are reduced, which place an additional load on the converter output when long motor cables are used.

This means that suitably dimensioned motor reactors or a series connection of several reactors allows higher capacitances and thus longer motor cables to be connected.

In the case of multi-motor drives, the use of motor reactors is recommended as a general principle.

Option **L08** enables you to select a fully wired motor reactor.

The motor reactor is accommodated in the Cabinet Module. A supplementary cabinet, which is 600 mm wide and located to the right of the Motor Module, is only required for the chassis format in frame sizes Hx and Jx.

With option **L08**, the max. permissible motor cable lengths increase by the amounts shown below:

Booksize Cabinet Kit	Rated output current of the Motor Module	Shielded cable		Unshielded cable	
		Max. permissible motor cable length without reactor	Max. permissible cable length between motor reactor and motor with option L08	Max. permissible motor cable length without reactor	Max. permissible cable length between motor reactor and motor with option L08
Order No.	A	m	m	m	m
6SL3720-1TE13-0AB0	3	50	100	75	150
6SL3720-2TE13-0AB0	2x3	50	100	75	150
6SL3720-1TE15-0AB0	5	50	100	75	150
6SL3720-2TE15-0AB0	2x5	50	100	75	150
6SL3720-1TE21-0AB0	9	50	135	75	200
6SL3720-2TE21-0AB0	2x9	50	135	75	200
6SL3720-1TE21-8AB0	18	70	160	100	240
6SL3720-2TE21-8AB0	2x18	50	160	75	240
6SL3720-1TE23-0AB0	30	100	190	150	280
6SL3720-1TE24-5AB0	45	100	200	150	300
6SL3720-1TE26-0AB0	60	100	200	150	300
6SL3720-1TE28-5AB0	85	100	200	150	300
6SL3720-1TE31-3AB0	132	100	200	150	300
6SL3720-1TE32-0AB0	200	100	200	150	300

For the Motor Modules in chassis format, the permissible motor cable length cannot be increased.

Note: The terminal lugs of the reactors are not nickel-plated.

Description of the options (continued)

L09 2 motor reactors in series

With option **L09**, two motor reactors connected in series are used with the Booksize Cabinet Kits. These reactors are accommodated within the standard width of the Cabinet Kit.

With option **L09**, the max. permissible motor cable lengths increase by the amounts shown below:

Booksize Cabinet Kit	Rated output current of Motor Module	Max. permissible cable length between motor reactor and motor with option L09	
		Shielded cable	Unshielded cable
Order No.	A	m	m
6SL3720-1TE21-8AB0	18	320	480
6SL3720-1TE23-0AB0	30	375	560
6SL3720-1TE24-5AB0	45	400	600
6SL3720-1TE26-0AB0	60	400	600
6SL3720-1TE28-5AB0	85	400	600
6SL3720-1TE31-3AB0	132	400	600
6SL3720-1TE32-0AB0	200	400	600

Option **L09** is not compatible with Cabinet Kits with Double Motor Modules.

Note: The terminal lugs of the reactors are not nickel-plated.

L10 dv/dt filter plus Voltage Peak Limiter

The dv/dt filter plus VPL limits the voltage peaks and supplies the energy back into the DC link. It comprises two components: The dv/dt reactor and the voltage limiting network (Voltage Peak Limiter).

Dv/dt filters plus VPL must be used for motors in cases where the withstand voltage of the insulation system is unknown or insufficient. Standard motors of the 1LA5, 1LA6 and 1LA8 series only require them for supply voltages > 500 V.

The dv/dt filters plus VPL limit the rate of voltage rise to values < 500 V/μs and the typical voltage peaks to the following values (with motor cable lengths of < 300 m (frame sizes FX, GX, HX) or < 150 m (JX):

< 1000 V at $V_{line} < 575$ V

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

Option **L10** is installed in an additional cabinet with a width of 600 mm that is located on the right-hand side of the Motor Module.

Note: Parts of option **L10** do not have nickel-plated copper busbars.

L13 Line contactor for the supply current ≤ 800 A

Line Connection Modules for current ratings up to 800 A feature only a manually operated fuse switch disconnecter as standard. Option **L13** is needed if a switching element is also required for disconnecting the cabinet from the infeed (needed for EMERGENCY OFF). The contactor is controlled by the closed-loop control in this case.

Option **L13** can be ordered for Line Connection Modules together with Basic Line Modules (option **L43**). With Smart Line Modules and Active Line Modules, the contactor is already included for the purpose of pre-charging.

L22 Supplied without line reactor

If a Line Connection Module is used to supply the infeed for a Basic Line Module, a line reactor may be required depending on the ratio between the supply short circuit power and the fundamental apparent power of the connected drive line-up (see SINAMICS Low Voltage Engineering Manual).

Since the supply short circuit power at the connection point of the drive line-up is often not known in practice, it is generally advisable to install a line reactor upstream. Therefore a line reactor for the Basic Line Module is included as standard in the Line Connection Module.

The line reactor can also be deselected with option **L22** when ordering the Line Connection Module.

A line reactor must always be provided for Basic Line Modules connected in parallel.

L25 Circuit breaker in a withdrawable unit design

Line Connection Modules with an input current of > 800 A are equipped with fixed-mounted circuit breakers as standard. Where the customer requires a visible isolating distance, a withdrawable circuit breaker can be ordered as an option.

L34 Output-side circuit breaker

Option **L34** can be used to separate the motor terminals from the Motor Module in chassis format.

A rotating permanent-magnet synchronous machine generates a voltage proportional to speed at its motor terminals. The motor terminal voltage is present at the inverter output terminals as well as at the DC link and therefore the connected components.

Option **L34** is available to provide separation in the case of a fault or when service & maintenance work is required.

Option **L34** is completely pre-wired and is accommodated in a supplementary cabinet ¹⁾, which is located to the right-hand side of the Motor Module. It is controlled using a TM31 Terminal Module, which is included with this option. The output switch is therefore automatically controlled from the Motor Module.

Option **L34** cannot be combined with option **L10** (dv/dt filter plus Voltage Peak Limiter).

¹⁾ 400 mm wide for frame size FX/GX, 600 mm wide for frame size HX/JX.

Description of the options

Description of the options (continued)

L37

DC interface incl. pre-charging circuit of the relevant DC link capacitance

If, for reasons relating to the process or availability, the Motor Module needs to be disconnected from or connected to the common DC link for an entire drive line-up during operation, a manually operated isolating distance can be ordered as an option. With chassis format power units, this takes the form of switch disconnectors, and with Booksize Cabinet Kits, a contactor combination.

Option **L37** is installed on the busbar between the Motor Module and the main DC busbar. To ensure that the module can be connected to a pre-charged DC link, the option also includes a pre-charging circuit for the DC link capacitors of the relevant Motor Module.

The switching operation is realized externally. The operating levers can be locked using a padlock (padlock not included in scope of delivery). The degree of protection of the electrical cabinets is not affected.

Option **L37** also includes option **M60** for air guidance (additional touch protection).

Options **L61/L62** and **L64/L65** (braking units) cannot be ordered together with option **L37** for space reasons.

L41

Current transformer upstream of main circuit breaker

If additional current transformers are required for measuring or monitoring purposes, these can be ordered as option **L41** for the Line Connection Modules. The current transformers are installed upstream of the main circuit breaker in all three infeed phases.

The transformers have an accuracy class of 1.0. The secondary current is max. 1 A.

The transformer measuring connections are routed to the terminal block in the Line Connection Module.

Note:

These current transformers are already included in options **P10** and **P11** (measuring instrument for the display of line values).

L42

Line Connection Module for Active Line Modules

Order code **L42** is specified in the order to indicate that the Line Connection Module will be connected to an Active Line Module. The Line Connection Module is then adapted accordingly (pre-charging circuit, connection busbars, etc.). Also refer to the assignment table in the "Line Connection Modules".

L43

Line Connection Module for Basic Line Modules

Order code **L43** is specified in the order to indicate that the Line Connection Module will be connected to a Basic Line Module. The Line Connection Module is then adapted accordingly (line reactors, pre-charging circuit, connection busbars, etc.). Also refer to the assignment table in the "Line Connection Modules".

L44

Line Connection Module for Smart Line Modules

Order code **L44** is specified in the order to indicate that the Line Connection Module will be connected to a Smart Line Module. The Line Connection Module is then adapted accordingly (pre-charging circuit, connection busbars, etc.). Also refer to the assignment table in the "Line Connection Modules".

L45

EMERGENCY OFF pushbutton, fitted in the cabinet door

The EMERGENCY OFF pushbutton with protective collar is installed in the cabinet door of the Line Connection Module and its contacts are connected to a terminal block. From here, the EMERGENCY OFF pushbutton can be integrated into the plant-side EMERGENCY OFF chain.

L46

Grounding switch upstream of main circuit breaker

The grounding switch is upstream of the circuit breaker in the Line Connection Module and short-circuits the incoming supply system to ground.

The grounding switch is manually engaged using a rotary operating mechanism to ensure isolation from the supply when maintenance is being carried out. Measures must be taken at the plant to ensure that the grounding switch cannot be engaged when voltage is applied.

It is also essential to ensure that the supply system cannot be connected when the grounding switch is engaged.

The signals required for mutual interlocking are available on the terminal block.

L47

Grounding switch downstream of main circuit breaker

The grounding switch is installed downstream of the circuit breaker in the Line Connection Module and short-circuits the incoming supply system to ground downstream of the main circuit breaker.

The grounding switch is manually engaged using a rotary operating mechanism to ensure isolation from the supply when maintenance work is being carried out on the converter.

In this case, the grounding switch and the main circuit breaker for the Line Connection Module are interlocked with each other, which ensures that the grounding switch cannot be engaged when the main circuit breaker is closed.

If the grounding switch is engaged, it is interconnected to ensure that the main circuit breaker cannot be closed.

L55

Anti-condensation heating for cabinet

The anti-condensation heating is recommended at low ambient temperatures and high levels of humidity to prevent condensation. Depending on the cabinet width, a 100 W cabinet heater is installed for each Cabinet Module.

1 heating element for cabinet width up to 600 mm, 2 heating elements for cabinet width over 800 mm.

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

Option **L55** cannot be ordered together with option **K82** (terminal module for the control of safety functions).

Description of the options (continued)

L61, L62, L64, L65 Braking units

Braking units may be required for drives in which motors might operate in generator mode but have no other facility for feeding energy back into the supply system.

The braking unit comprises two components:

- a Braking Module which can be installed in the air outlet of the chassis format power units and
- a braking resistor to be mounted 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 mounted braking resistor.

A max. cable length of 100 m is permissible between the Braking Module and the braking resistor. This allows the braking resistor to be mounted externally so that heat losses can be dissipated outside the converter enclosure. The braking resistor is connected directly to the terminal -X5.

Terminal -X5	Meaning
1	Braking resistor connection
2	Braking resistor connection

The braking resistors are available in different versions:

Option	Braking Module			
	Rated power- P_{DB} kW	Braking power P_{20} kW	Peak power P_{15} kW	Can be used with frame sizes
380 ... 480 V 3 AC, 660 ... 690 V 3 AC				
L61	25	100	125	Fx
L62	50	200	250	Gx, Hx, Jx
500 ... 600 V 3 AC				
L64	25	100	125	Fx
L65	50	200	250	Gx, Hx, Jx

P_{DB} : Rated power (continuous braking power)
 P_{20} : 20 s power referred to a braking interval of 90 s
 P_{15} : 15 s power referred to a braking interval of 90 s

If the braking units listed here do not provide adequate braking power, up to 4 braking units on a DC link busbar may be connected in parallel. Braking power can be shared among several Modules. In this case, a Braking Module is assigned to each braking resistor.

Note:

It is only possible to use the Braking Modules if a DC interface (order code **L37**) is not simultaneously selected for the Module Module.

When engineering the system, it must be ensured that the module in which the Braking Module is installed is powered-up during braking to ensure that the Braking Module is cooled. Failure to follow this instruction means that the Braking Module could overheat and shut down, so that the drive will no longer be able to operate in braking mode. In this case, the Braking Modules should preferably be arranged in the Line Modules.

L87 Insulation monitoring

An insulation monitor must be used if the converter is operated on an isolated-neutral system. The device monitors the entire galvanically coupled circuit for insulation faults. An alarm is output by the insulation monitor in the event of a fault.

Notice: Only **one** insulation monitor can be used in each galvanically coupled network.

As there are different response strategies when a ground fault occurs in an isolated-neutral system, output relays of the insulation monitor are provided for integration in a plant-side control. It is also possible to integrate the outputs into the Cabinet Modules monitoring system 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 ... 400 μA)
M-	External kΩ display (0 ... 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

M06 Base 100 mm high, RAL 7022

The additional cabinet base allows larger bending radii for cables (cable inlet from below) and enables them to be routed within the cabinet base.

The cabinet base is generally supplied in RAL 7022. A special paint finish is not available for the base. It is delivered completely assembled with the cabinet.

M07 Cable-marshaling compartment 200 mm high, RAL 7035

The cable-marshaling compartment is made of strong sheet steel and allows cables to be connected more flexibly (entry from below). It also allows routing of cables within the marshaling compartment. It is delivered completely assembled with the cabinet.

Notice: The cable-marshaling compartment is painted as standard with RAL 7035. If a special paint color is requested for the cabinet (order code **Y09**), the cable-marshaling compartment is also painted in this color.

Description of the options

Description of the options (continued)

M21

Degree of protection IP21

Cabinet version in IP20, but with additional top or drip protection cover. This increases the cabinet height by 250 mm.

For transport reasons, the top or drip protection covers are delivered separately and must be mounted on site.

Notice: The top or drip protection covers are painted in RAL 7035 as standard. If a special paint color is requested for the cabinet (order code **Y09**), the top or drip protection covers will also be painted in this color.

M23

IP23 degree of protection

Cabinet Modules with IP23 degree of protection are supplied with additional roof sections, plastic ventilation grilles, and a filter medium in the air inlet and outlet. This increases the cabinet height by 400 mm. The filter medium must be maintained according to the local environmental conditions.

For transport reasons, the roof sections are supplied separately and must be mounted on site.

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

M26

Side panel mounted at the right

For side-by-side installation of Cabinet Modules from left to right, cabinets can be ordered ready-prepared at the factory for assembly on-site. If option **M26** is ordered, the Cabinet Module is shipped with a side panel fitted on the right.

This side panel is essential for ensuring compliance with IP20 and higher degrees of protection.

M27

Side panel mounted at the left

For side-by-side installation of Cabinet Modules from right to left, cabinets can be ordered ready-prepared at the factory for assembly on-site. If option **M27** is ordered, the Cabinet Module is shipped with a side panel fitted on the left.

This side panel is essential for ensuring compliance with IP20 and higher degrees of protection.

M43

IP43 degree of protection

Cabinet Modules with IP43 degree of protection are supplied with additional roof sections, plastic ventilation grilles, and a filter medium in the air inlet and outlet. This increases the cabinet height by 400 mm. The filter medium must be maintained according to the local environmental conditions.

For transport reasons, the roof sections are delivered separately and must be mounted on site.

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

M54

IP54 degree of protection

Cabinet Modules with IP54 degree of protection are supplied with additional roof sections, plastic ventilation grilles, and a filter medium in the air inlet and outlet, which ensures compliance with IP54 degree of protection. This increases the cabinet height by 400 mm.

The filters must be maintained according to the local environmental conditions.

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

Notice:

- The roof sections are colored RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the roof sections are also painted in this color. The molded plastic parts (e.g. ventilation grilles) are colored RAL 7035 and cannot be painted.
- For units with IP54 degree of protection, it is important to observe the output currents in relation to ambient temperature and installation altitude. The output currents are outlined in the technical data.

M59

Closed cabinet doors, air inlet from below through floor opening

If the cabinet modules are erected on a false floor or duct which forms part of a forced ventilation system, the modules can be ordered with closed cabinet doors. To ensure an adequate air inlet cross-section, the units are shipped without the standard base plates. In this case, the customer must ensure that no dirt/dust or moisture can enter the Cabinet Module. Cables must not be routed in such a way that they impede the flow of air through the cabinet floor opening. If the area beneath the Cabinet Modules can be accessed, the customer must provide touch protection.

M60

Additional shock protection

The Cabinet Modules are designed in accordance with BGV A3 as standard. With option **M60**, additional covers (out of reach) are provided in the area of the AC and DC busbars and over the power unit.

M70

EMC shield bus

The EMC shield bus is used for the connection of line and motor shielded power cables. The supplied EMC shield clamps provide a large surface area for the connection.

Description of the options (continued)

M80 to M87 DC busbar system

The correct DC busbar for the Cabinet Module must be ordered. This is fitted in the upper section of the Cabinet Modules and connects the Line Modules to the Motor Modules.

The busbar is dimensioned according to the load requirements and demand factor associated with operation of the individual drives, and according to the specific Cabinet Module layout. For these reasons, the DC busbar is not supplied as standard, but must be ordered as an option.

When selecting busbars, it is important to ensure that the systems of adjacent Cabinet Modules are compatible with one another (refer to the table below and option selection matrix for the Cabinet Modules in question).

Where Cabinet Modules are ordered as a factory-assembled transport unit with option **Y11**, all busbars in the transport unit must be identical.

Order code	DC busbar system, rated current I_N	Number	Dimensions	Compatible with
	A		mm	
M80	1170	1	60 x 10	M83
M81	1500	1	80 x 10	M84 and M86
M82	1840	1	100 x 10	M85 and M87
M83	2150	2	60 x 10	M80
M84	2730	2	80 x 10	M81 and M86
M85	3320	2	100 x 10	M82 and M87
M86	3720	3	80 x 10	M81 and M84
M87	4480	3	100 x 10	M82 and M85

The DC busbars are nickel-plated as standard and are available in different designs for a variety of current-carrying capacities. The scope of delivery also includes the jumpers required to link the busbar systems of individual Cabinet Modules.

M90 Crane transport assembly (top-mounted)

A top-mounted crane transport assembly can be ordered as an option for Cabinet Modules.

Depending on the width of the module, it consists of either transport eyebolts (width ≤ 800 mm) or transport rails (width > 800 mm).

When Cabinet Modules are ordered as factory-assembled transport units (order code **Y11**), they are shipped with transport rails, i.e. option **M90** is automatically included in the scope of delivery of option **Y11** and does not need to be ordered separately.

N52 DC link fuses for the Basic Line Module

The Basic Line Modules do not have DC link fuses as standard.

If fuses are required, they can be ordered with option **N52**. The fuses are mounted on the connecting rail to the DC busbar in the cabinet rather than in the power unit.

DC link fuses are recommended when connecting Basic Line Modules in parallel.

P10 Measuring instrument for line values (mounted in the cabinet door)

A measuring instrument with display, installed in the cabinet door of the Line Connection Module, for acquiring measured values of the power supply. In addition to these measured values, additional plant values (such as power, power factor, etc.) are calculated from the measured values using powerful, state-of-the-art microprocessors.

The current transformers of option **L41** are included in the scope of delivery.

P11 Measuring instrument for line values with PROFIBUS connection (mounted in the cabinet door)

A measuring instrument with display, installed in the cabinet door of the Line Connection Module, for acquiring measured values of the power supply. In addition to these measured values, additional plant values (such as power, power factor, etc.) are calculated from the measured values using powerful, state-of-the-art microprocessors. The measuring instrument has a PROFIBUS interface that enables a communication rate of up to 16 Mbaud.

The current transformers of option **L41** are included in the scope of delivery.

T58, T60, T80 Rating plate data

The standard version of the rating plate is English/German for the individual Cabinet Modules. A rating plate in another language can be selected by specifying the following option order codes.

Order code	Rating plate language
T58	English / French
T60	English / Spanish
T80	English / Italian

Y09 Special cabinet paint coating

The Cabinet Modules are delivered in RAL 7035 as standard. The special paint finish must be stated in plain text in the order. Any RAL colors that are available as powdered coatings can be selected.

Notice:

If options such as cable-marshaling compartment (order code **M07**), top or drip protection covers (order code **M21**) or roof sections (order codes **M23/M43/M54**) are ordered for the Cabinet Modules, they will also be supplied in the paint finish specified in the order. The molded plastic parts (e.g. ventilation grilles) are colored RAL 7035 and cannot be painted.

Description of the options

Description of the options (continued)

Y11

Factory assembly into transport units

With this option, Cabinet Modules can be ordered as factory-assembled transport units with a maximum total width of up to 2400 mm. In this case, the relevant modules are shipped as interconnected units (both electrically and mechanically).

When DC busbars (options **M80** to **M87**) are selected for these "units", it must be ensured that identical busbars are installed within the transport unit and are compatible with all adjacent Cabinet Modules.

In the case of a transport unit order, all the Cabinet Modules to be included in the unit and their installation sequence from left to right must be specified in plain text according to the syntax below:

Plain text required to order:

- Transportation unit
- Serial number of transport unit
- Position of Cabinet Module within transport unit from left to right

TE 1 - 1 ... 6

Option **Y11** is particularly recommended for units comprising Line Connection Modules and Line Modules because the required pre-charging circuits and connection busbars, for example, can be incorporated in the transport unit for certain variants. Please refer to the assignment tables in "Line Connection Modules".

The transport unit is shipped with a crane transport rail, which means that option **M90** is not required.

Y31

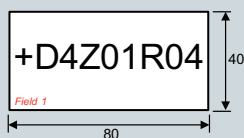
One-line label for plant identification, 40 x 80 mm

For identifying the Cabinet Modules resopal labeling plates (white with black lettering) are offered. The labels are attached to the cabinet door.

Dimensions H x W: 40 x 80 mm

The text must be specified in plain text when ordering.

Field 1: max. 9 characters, font size 10 mm.



Y32

Two-line label for plant identification, 40 x 180 mm

For identifying the Cabinet Modules resopal labeling plates (white with black lettering) are offered. The labels are attached to the cabinet door.

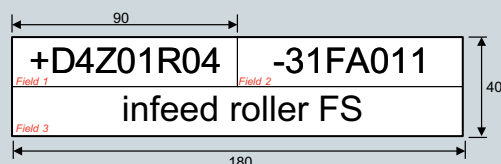
Dimensions H x W: 40 x 180 mm

The text must be specified in plain text when ordering.

Field 1: max. 9 characters, font size 10 mm

Field 2: max. 9 characters, font size 10 mm

Field 3: max. 20 characters, font size 10 mm.



Y33

Four-line label for plant identification, 40 x 180 mm

For identifying the Cabinet Modules resopal labeling plates (white with black lettering) are offered. The labels are attached to the cabinet door.

Dimensions H x W: 40 x 180 mm

The text must be specified in plain text when ordering.

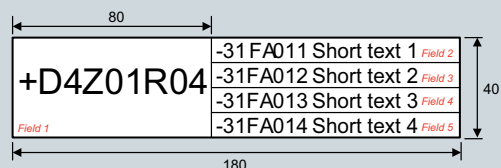
Field 1: max. 9 characters, font size 10 mm

Field 2: max. 20 characters, font size 6 mm

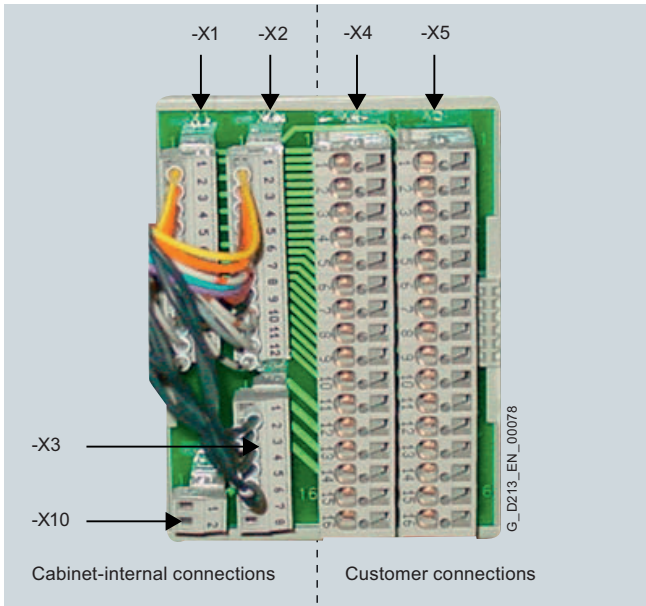
Field 3: max. 20 characters, font size 6 mm

Field 4: max. 20 characters, font size 6 mm

Field 5: max. 20 characters, font size 6 mm.



Overview



Customer terminal block -X55 represents the interface to the I/O devices and marshals a range of cabinet-internal signals to a central terminal block module mounted in the lower part of the cabinet.

This terminal block module is an interface that has been specially designed for plant construction. It is integrated as standard in the Motor Modules in chassis format and, in combination with a CU320 Control Unit in the Basic Line, Smart Line and Active Line Cabinet Modules as well as the Booksize Cabinet Kits.

Design

Terminals -X4 and -X5 are provided for the connection of customer signal lines. Cable cross-sections of 0.14 mm² up to 2.5 mm² can be connected for both solid and stranded cables.

Terminals -X1 to -X3 are assigned internally in the cabinet depending on the cabinet variant (with/without option **K90** or **K91**).

The customer terminal block -X55 includes:	Motor Modules		Line Modules/ Booksize Cabinet Kits	
	With CU320 (K90/K91)	Without CU320	With CU320 (K90/K91)	Without CU320
8 digital inputs	✓	-	✓	-
8 bidirectional inputs/outputs (DI/DO)	✓	-	✓	-
Temperature sensor connection (KTY84/ PTC)	✓	✓	_1)	_1)
Auxiliary voltage output (+24 V)	✓	✓	✓	✓ 2)
Safety function ("Safe Torque Off/ Safe Stop1")	✓	✓	_1)	_1)

Terminal -X10 provides a 24 V power supply for service purposes and has a connector. The maximum current rating is 250 mA. Cable cross-sections of 0.14 mm² up to 1.5 mm² can be connected.

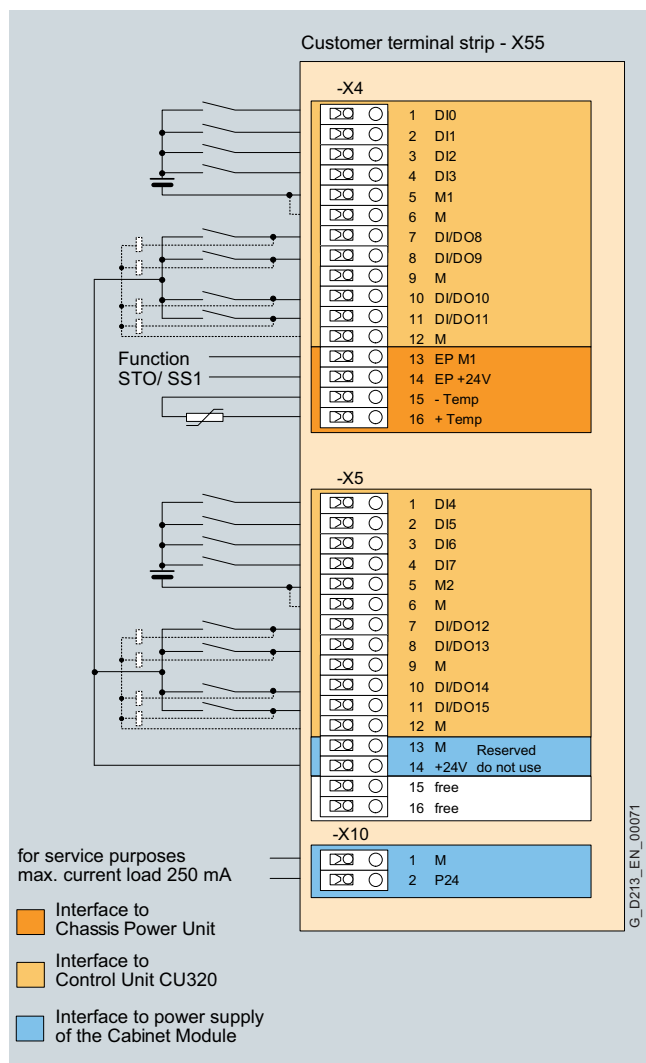
¹⁾ For Booksize Cabinet Kits, a connection is provided at the separate customer terminal block -X55.1.

²⁾ Not for Line Modules.

Customer terminal block

Design (continued)

Pin assignment



Terminal assignment of customer terminal block -X55

Terminal block at -X55	Factory pre-assignment	Comment
-X4		
1	DI0	free
2	DI1	free
3	DI2	free
4	DI3	free
5	M1	
6	M	
7	DI/DO8	free
8	DI/DO9	free
9	M	
10	DI/DO10	free
11	DI/DO11	free
12	M	
13	EP M1	free
14	EP +24V	free
15	- Temp	free
16	+ Temp	free
-X5		
1	DI4	free
2	DI5	free
3	DI6	free
4	DI7	free
5	M2	
6	M	
7	DI/DO12	free
8	DI/DO13	free
9	M	
10	DI/DO14	free
11	DI/DO15	free
12	M	
13	M	Reserved
14	+24V	do not use
15	free	
16	free	
-X10		
1	M	
2	P24	

DI: Digital input

DI/DO: Bidirectional digital input/output

M: Electronics ground

M1/M2: Reference ground

Temp: Motor temperature sensor

Overview

Auxiliary supply to the auxiliary voltage busbar system of the Cabinet Modules

To ensure a 24 V DC power supply for the open-loop and closed-loop control systems, and the power supply for the fans (380 V to 480 V or 500 V to 690 V), the auxiliary voltage busbar systems within the Cabinet Modules must be provided with 24 V DC or 380 V to 480 V 2 AC / 500 V to 690 V 2 AC from an external source. This is not required when option **K76** is selected or if there is an Auxiliary Power Supply Module. The current requirement can be found in the technical data of the individual Cabinet Modules.

The supply connectors specified in the table are required to connect the infeed to the auxiliary voltage busbar system. If the customer requires additional cabinets, which must also be supplied by the auxiliary voltage busbar system, the busbars and connectors used in the Cabinet Modules can be ordered separately.

Description		Order No.
125 A infeed connector		5ST2546
100 A connector (2-pole)		5ST2545
Busbar, 6-pole,	390 mm long	5ST2540
	590 mm long	5ST2541
	790 mm long	5ST2542
	990 mm long	5ST2543
	1190 mm long	5ST2544

Mounting aid



Power block handling device for installing and removing the power blocks for the Basic Line Modules, Smart Line Modules, Active Line Modules and Motor Modules in chassis format.

The power block handling device is a mounting aid. It is placed in front of the Cabinet Module and attached to the chassis. The telescopic rails allow the device to be adjusted to the installation height of the power blocks. Once the mechanical and electrical connections have been undone, the power block can be removed from the chassis. The power block is guided and supported by the guide rails on the handling device.

Selection and ordering data

Description	Order No.
Power block handling device for installing and removing power blocks	6SL3766-1FA00-0AA0

Order-specific integration engineering

Overview

Just like the SINAMICS S120 chassis units, SINAMICS S120 Cabinet Modules form a modular drive system that consists of various intelligent "Drive Objects" (DO) such as Line Modules, Motor Modules, Control Units, Sensor Modules, etc.

In contrast to the SINAMICS G150/S150, in which the DO topology is clearly defined and can, therefore, be generated automatically, with the SINAMICS S120 modular drive system it is necessary to configure the drive objects individually before the actual commissioning process can take place.

SINAMICS S120 Cabinet Modules are supplied with documentation that relates exclusively to the individual Cabinet Module (circuit diagram, layout diagram, terminal diagram). Higher-level documentation, which shows the signal connections between the individual Cabinet Modules of an order, is not included in the standard scope of delivery. Just the mechanical assembly of individual Cabinet Modules to create transport units can be ordered by selecting option **Y11**.

It is not possible for the DOs to be configured automatically at the factory or the appropriate documentation to be created, since the open system means that any number of combinations are supported. The topology which is most suitable in each case depends on a variety of order-specific supplementary conditions, such as the technological interaction between individual drives/axes, the required closed-loop control performance, and so on.

In general, the required system integration will be engineered by a system integrator or by the customer themselves. The SIZER and STARTER tools offer effective support in this respect.

In the case of orders where neither a system integrator nor the customer will be taking care of integration engineering, this work can be ordered as an additional service to supplement the Cabinet Modules order.

Scope of service

The scope of delivery comprises the following services:

- Checking the combinations and options ordered, in relation to the device configurations
- Determining how the individual drive objects (DO) are to be connected, in consultation with the customer, if required. Checking the performance of the ordered CompactFlash card.
- Installing the required DRIVE-CLiQ cables within the transport units. Connecting cables between transport units at one end.
- Providing documentation covering the scope of delivery (layout diagram, circuit diagram, terminal diagram, dimension drawing, spare parts list).

Selection and ordering data

The following engineering services can be ordered depending on the number of drives/axes included in an order:

Integration engineering for	Order No.
1 drive (incl. parallel connection), including corresponding Line Modules, Sensor Modules, Terminal Modules, etc.	6SL3780-0AA00-0AA0
Up to 3 drives (incl. parallel connection), including corresponding Line Modules, Sensor Modules, Terminal Modules, etc.	6SL3780-0AC00-0AA0
Up to 5 drives (incl. parallel connection), including corresponding Line Modules, Sensor Modules, Terminal Modules, etc.	6SL3780-0AE00-0AA0
Up to 10 drives (incl. parallel connection), including corresponding Line Modules, Sensor Modules, Terminal Modules, etc.	6SL3780-0AJ00-0AA0

Engineering services for larger drive systems is also available on request.

SINAMICS S150 Converter Cabinet Units



4/2	System overview
4/2	Overview
4/2	Benefits
4/2	Applications
4/3	Design
4/4	Function
4/8	Technical data
4/17	Selection and ordering data
4/18	Options
4/21	Description of the options
4/30	Line-side components

System overview

Overview



SINAMICS S150 Converter Cabinet Units

SINAMICS S150 converter cabinet units are particularly suitable for all variable-speed single-axis drives with high performance requirements, i.e., drives with:

- high dynamic requirements
- frequent braking cycles and high braking energy levels
- four-quadrant operation

SINAMICS S150 offers high-performance speed control with excellent accuracy and a high dynamic response.

The following voltages and powers are available:

Line voltage	Type rating
380 ... 480 V 3 AC	110 ... 800 kW
500 ... 690 V 3 AC	75 ... 1200 kW

Degrees of protection are IP20 (standard), and IP21, IP23, IP43 and IP54 (optional).

Line and motor-side components as well as additional monitoring devices can be installed in the converter cabinet units.

A wide range of electrical and mechanical components enable the drive system to be optimized individually to suit customer requirements.

Benefits

The self-commutating, pulsed feed/feedback unit uses IGBT technology and is equipped with a Clean Power Filter. This combination guarantees extremely line-friendly behavior which is characterized by the following:

- negligible line harmonics as a result of the innovative Clean Power Filter ($< 1\%$)
- the stringent limit values of IEEE519-1992 are fully complied with
- regenerative feedback (four-quadrant operation)
- tolerant to fluctuations in the line voltage
- operation on weak line supplies
- reactive power compensation is possible (inductive or capacitive)
- high drive dynamic performance

Simple drive handling from engineering to operation thanks to

- compact, modular and service-friendly design
- problem-free configuration
- simple installation, as it is ready to connect
- fast, menu-driven commissioning without complex parameterization
- clear and convenient operation via a user-friendly graphical operator panel with measured values displayed in plain text or in a quasi-analog bar display.

Applications

Typical applications for SINAMICS S150 include:

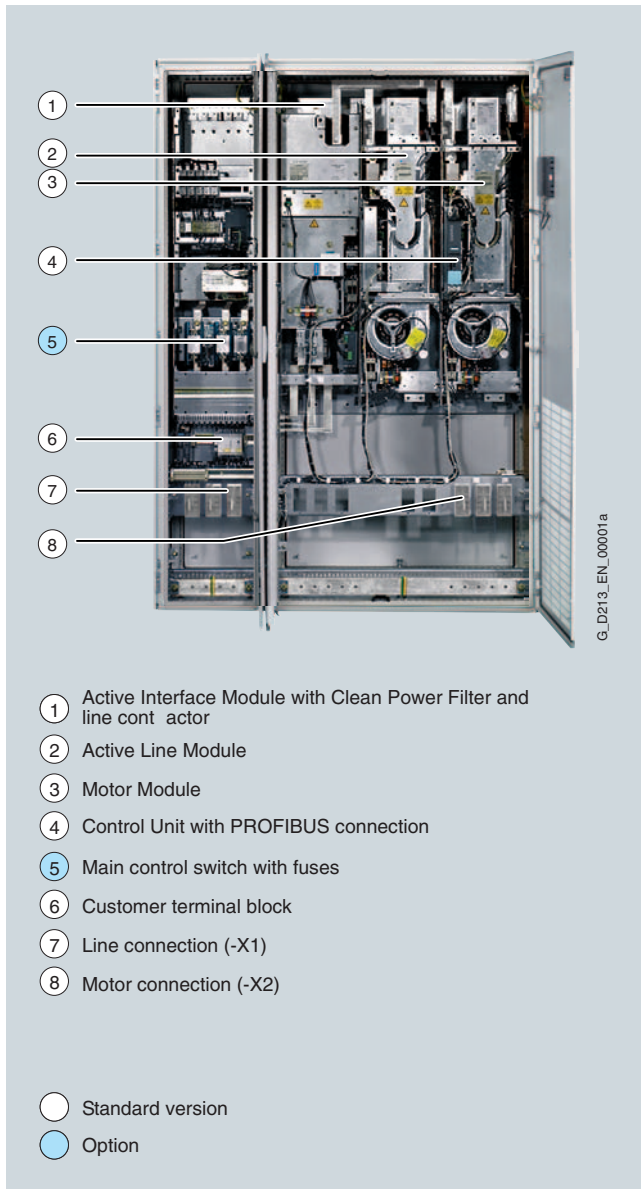
- test bay drives
- centrifuges
- elevators and cranes
- paper and rolling mill drives
- cross cutters and shears
- conveyor belts
- presses
- cable winches

Worldwide application

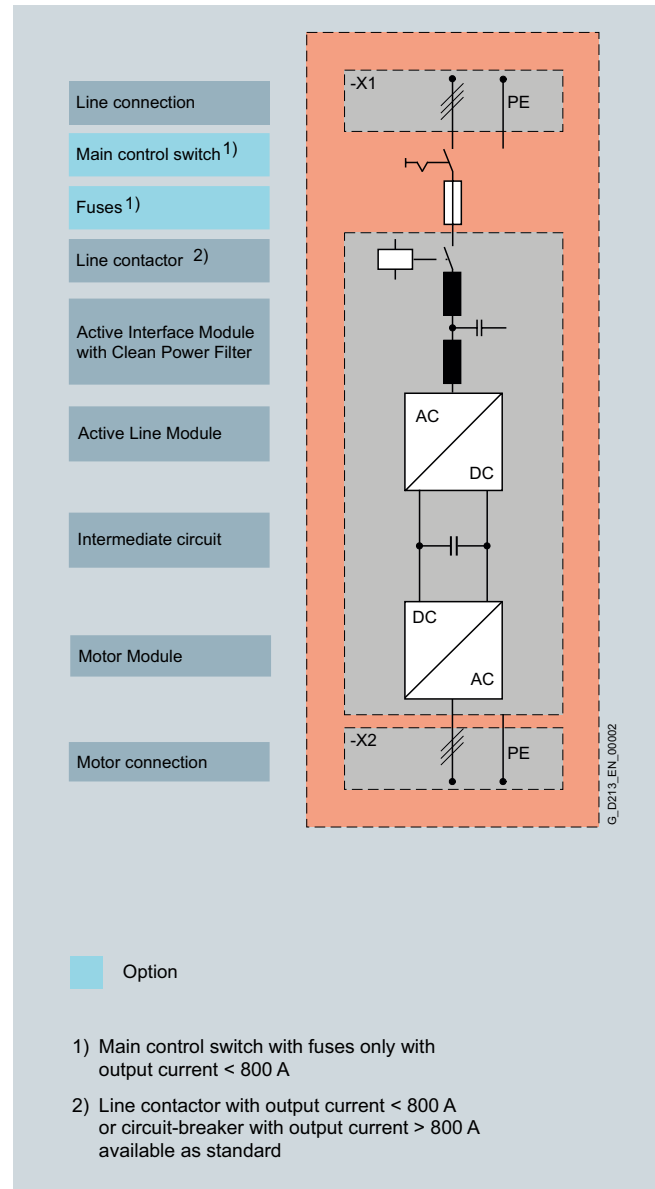
SINAMICS S150 converter cabinet units are manufactured in compliance with relevant international standards and regulations, and are therefore suitable for global use (see technical data).

Design

The SINAMICS S150 converter cabinet units are characterized by their compact, modular and service-friendly design.



Design example of a SINAMICS S150 converter cabinet unit

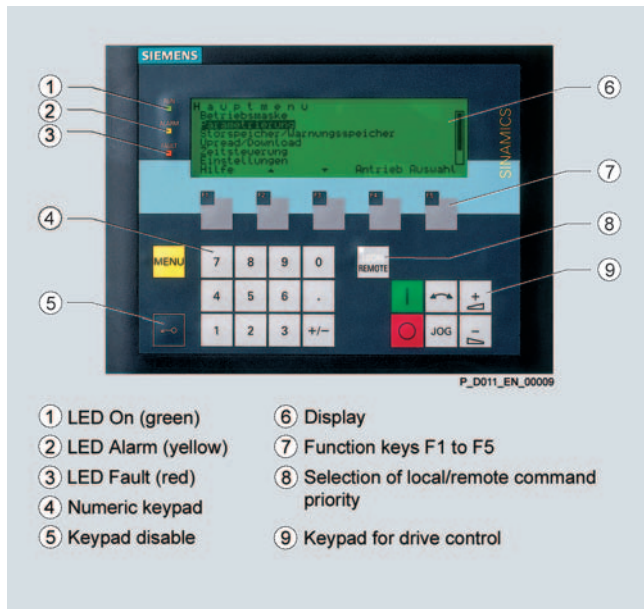


Basic design of a SINAMICS S150 converter cabinet unit with a number of version-specific options

System overview

Function

AOP30 Advanced Operator Panel



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

The user is guided by interactive menus through the drive-commissioning screens. When commissioning the drive for the first time, only 6 motor parameters (which can be found on a motor rating plate) have to be entered on the AOP30. The control is then optimized automatically to fine-tune the converter to the motor.

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 the keyboard lock so that only parameter values and process variables can be displayed on the operating 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.

English, French, German, Italian, Spanish and **Chinese** are stored on the CU320 Control Unit's CompactFlash card as operator panel languages. **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/>

Examples of plain-text displays at various phases of operation are shown below.

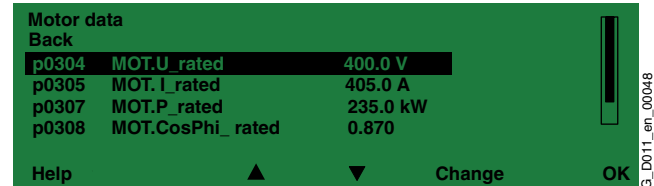
The **first commissioning** process is performed using the operator panel.



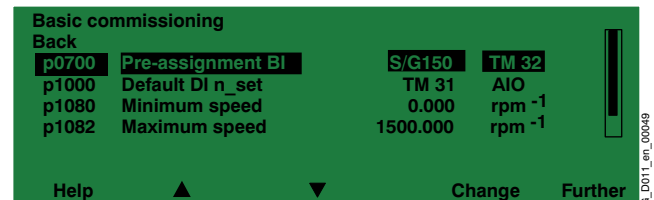
Only 6 motor parameters have to be entered:

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

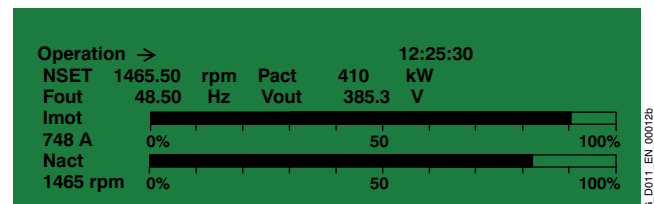
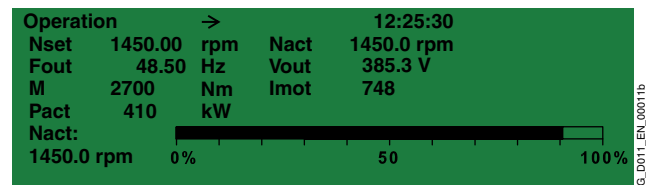
This information can be found on the motor rating plate, and must be entered into the screens on the display by following a short, menu-assisted procedure. The motor cooling method must also be specified.



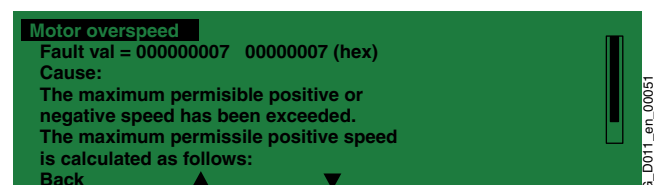
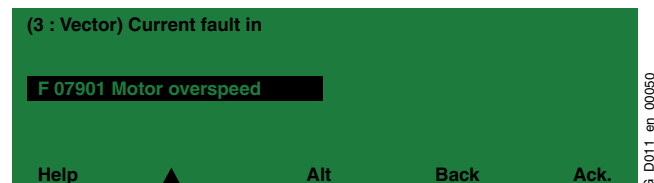
The next screen contains the parameter values that are used to automatically optimize the control.



During **operation**, actual data are output on the display as absolute values, such as setpoint and actual values, or it is possible to parameterize up to three 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 (with counter/remedial measures).



Function (continued)

Communication with higher-level control and customer terminal block TM31

A PROFIBUS interface on the Control Unit and the TM31 terminal block are provided as standard as the customer control interface.

This customer terminal block can be used to connect the system to the higher-level controller using analog and digital signals, or to connect additional units.

The customer terminal block includes:

- 8 digital inputs
- 4 bidirectional digital inputs/digital outputs
- 2 relay outputs with changeover contact
- 2 analog inputs
- 2 analog outputs
- 1 temperature sensor input (KTY84-130 or PTC)
- auxiliary voltage output ± 10 V for analog setpoint input
- auxiliary voltage output +24 V for digital inputs



Customer terminal block TM31

A detailed description of the SINAMICS S150 interfaces can be found in the Engineering Manual on the CD-ROM provided.

System overview

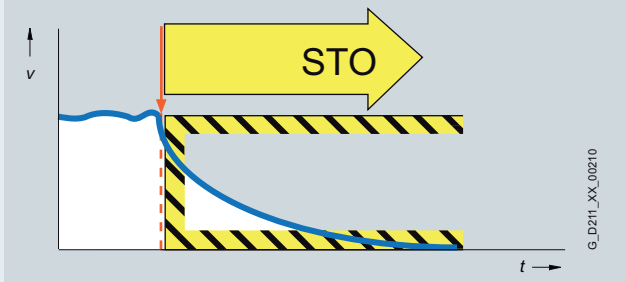
Function (continued)

Open-loop and closed-loop control functions

The converter control includes a high-quality vector control with speed and current control (with and without encoder).

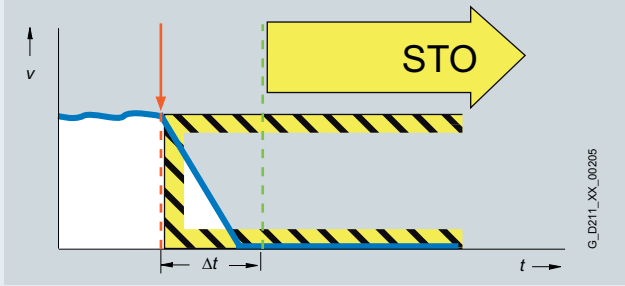
Software and protective functions

The software functions available as standard are described below:

Software and protective functions	Description
Setpoint input	The setpoint can be input both internally and externally. It is applied internally as a fixed setpoint, motorized potentiometer setpoint or jog setpoint and externally via the communications interface or an analog input on the customer terminal block. The internal fixed setpoint and the motorized potentiometer setpoint can be switched over or adjusted using control commands from any interface.
Motor identification	The automatic motor identification function makes commissioning faster and easier and optimizes closed-loop control of the drive.
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 operating behavior and as a result of the smooth starting, significantly reduces the wear on mechanical components. The ramp-down ramps can be parameterized separately for emergency stop.
Kinetic buffering (KIP)	For brief line supply failures, the kinetic energy of the rotating drive is used to buffer the DC link and therefore prevents fault trips. The drive converter remains operational as long as the drive can provide regenerative energy as a result of its motion and the DC link voltage does not drop below the trip threshold. When the line supply recovers within this time, the drive is again accelerated up to its setpoint speed.
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" function allows the converter to switch on to a motor that is still turning.
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 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 S150 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 S150. 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 configuring).
$\hat{P} t$ sensing for motor protection	The motor temperature is calculated in a motor model stored in the drive converter software. More exact sensing of the temperature, which also takes into account the influence of the ambient temperature, is possible by means of direct temperature sensing using KTY84 sensors in the motor winding.
Motor temperature evaluation	Motor protection by evaluating a KTY84 or PTC temperature sensor. When a temperature sensor is connected, the limit values can be set for alarm or trip. When a PTC thermistor is connected, the system reaction to triggering of the thermistor (alarm or trip) can be defined.
Motor blocking protection	A blocked motor is detected and protected against thermal overloading by a fault trip.
Safety Integrated	
Safe Torque Off (STO)	<p><u>Function description</u></p> <p>This function is a mechanism that 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.</p> <p><u>Application, customer benefits</u></p> <p>STO has the immediate effect that the drive cannot supply any torque-generating energy. STO can be used wherever the drive will naturally reach a standstill due to load torque or friction in a sufficiently short time or when "coasting down" of the drive will not have any relevance for safety.</p> 

¹⁾ Factory setting: not activated (can be parameterized).

Function (continued)

Software and protective functions	Description
Safety Integrated	
Safe Stop 1 (SS1)	<p><u>Function description</u></p> <p>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 independently brakes along a quick stop ramp (OFF3) and automatically activates Safe Torque Off when the parameterized safety delay timer has expired.</p> <p><u>Application, customer benefits</u></p> <p>This integrated self-braking function eliminates the need for complex external monitoring equipment. Furthermore, it is often possible to eliminate mechanical brakes which wear, or to lessen the load on them, so that maintenance costs and the stresses on the machine can be reduced.</p> <p>Safe Stop 1 is employed for applications which require monitored braking, e.g. on centrifuges or conveyor vehicles.</p>  <p>The safety functions integrated in SINAMICS S150 fulfill the specifications of</p> <ul style="list-style-type: none"> • DIN EN ISO 13849-1 Category 3 (previously EN954-1) • Safety Integrity Level (SIL) 2 according to EN 61508 • Performance Level (PL) d according to EN ISO 13849-1 <p>In addition, the Safety Integrated functions of the SINAMICS S150 are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office.</p>
Terminal module for controlling STO and SS1 functions (order code K82)	<p>The terminal module is used to control the "Basic Safety Functions" over a wide voltage range from 24 V up to 240 V DC/AC. This means that the "STO" and "SS1" safety functions can be flexibly controlled from the signal voltages of the plant.</p> <p>See → Description of the options (K82)</p>
Power unit protection	
Ground fault monitoring at output end	A ground fault at the output end is detected by an aggregate current monitor and results in shutdown in grounded-neutral systems.
Electronic short-circuit protection at the output	A short-circuit (e.g. on the converter output terminals, in the motor cable or in the motor terminal box) is detected at the output end and the converter shuts down with a fault message.
Thermal overload protection	An alarm is issued first when the overtemperature threshold responds. If the temperature rises further, the unit either shuts down or independently adjusts the pulse frequency or output current so that a reduction in the thermal load is achieved. After the cause of the fault has been eliminated (e.g. improving the cooling), the drive system automatically returns to the original operating values.

System overview

Technical data

General technical data

Electrical data			
Line voltages	<ul style="list-style-type: none">• 380 ... 480 V 3 AC, ±10 % (-15 % < 1 min)• 500 ... 690 V 3 AC, ±10 % (-15 % < 1 min)		
Types of supplies	TN/TT supplies or insulated supplies (IT supplies)		
Line frequency	47 Hz ... 63 Hz		
Output frequency	0 Hz ... 300 Hz		
Line power factor	Adjustable (factory-set to cos φ = 1)		
Control method	Vector control with and without encoder, servo control or V/f control		
Fixed speeds	15 fixed speeds plus 1 minimum speed, programmable (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 (14 bits + sign) 12 bit analog		
Braking operation	Four-quadrant operation is possible as standard (optional via a braking unit if braking is required when power fails)		
Mechanical data			
Degree of protection	IP20 (higher degrees of protection up to IP54 optional)		
Protection class	acc. to EN 61800-5-1		
Type of cooling	Forced air cooling		
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 60146-1, EN 61800-2, EN 61800-3, EN 61800-5-1, EN 60204-1, EN 60529, IEEE519-1992		
CE marking	acc. to EMC directive No. 2004/108/EC and low-voltage directive No. 2006/95/EC		
RI suppression	The SINAMICS S150 drive converter systems are not designed for connection to the public power network ("first environment"). RI suppression 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.		
Ambient conditions	During operation	During storage	During transport
Ambient temperature	0 °C ... +40 °C up to +50 °C see derating data	-25 °C ... +55 °C	-25 °C ... +70 °C from -40 °C for 24 hours
Relative air humidity (condensation not permissible)	5% ... 95 % corr. to 3K3 acc. to IEC 60721-3-3	5 % ... 95 % corr. to 1K4 acc. to IEC 60721-3-1	5 % ... 95 % at 40 °C corr. to 2K3 acc. to IEC 60721-3-2
Installation altitude	Up to 2000 m above sea level without derating, > 2000 m, see derating data		
Mechanical stability	During operation	During storage	During transport
Vibratory load			
• Deflection	0.075 mm at 10 Hz ... 58 Hz	1.5 mm at 5 Hz ... 9 Hz	3.5 mm at 5 Hz ... 9 Hz
• Acceleration	9.8 m/s² at > 58 Hz ... 200 Hz -	5 m/s² at > 9 Hz ... 200 Hz corr. to 1M2 acc. to IEC 60721-3-1	10 m/s² at > 9 Hz ... 200 Hz corr. to 2M2 acc. to IEC 60721-3-2
Shock load			
• Acceleration	100 m/s² at 11 ms corr. to 3M4 acc. to IEC 60721-3-3	40 m/s² at 22 ms corr. to 1M2 acc. to IEC 60721-3-1	100 m/s² at 11 ms corr. to 2M2 acc. to IEC 60721-3-2

Deviations from the specified classes are underlined.

Technical data (continued)

Derating data

Current derating as a function of installation altitude/
ambient temperature

If the drive converters are operated at an **installation altitude > 2000 m** above sea level, the permissible drive converter output currents must be reduced in accordance with the following tables.

The degree of protection of the converter cabinets must also be taken into account. The listed derating data already include compensation between the installation altitude and ambient temperature (incoming air temperature at the inlet to the converter cabinet).

Install. altitude above sea level m	Current derating at an ambient temperature of						
	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0-2000						95.0 %	87.0 %
2001-2500	100 %				96.3 %	91.4 %	83.7 %
2501-3000				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 ambient temperature (incoming air temperature) and installation altitude for cabinet units with degrees of protection IP20, IP21, IP23 and IP43

Install. altitude above sea level m	Current derating at an ambient temperature of						
	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		97.7 %	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 as a function of ambient temperature (incoming 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 taken into consideration according to the following tables for **installation altitudes > 2000 m** above sea level:

Install. altitude above sea level m	Voltage derating for a rated input voltage of											
	380 V	400 V	420 V	440 V	460 V	480 V	500 V	525 V	575 V	600 V	660 V	690 V
0-2000												100 %
2001-2250						96 %						96 %
2251-2500	100 %				98 %	94 %	100 %				98 %	94 %
2501-2750				98 %	94 %	90 %					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 %			95 %	91 %	83 %	79 %
3751-4000	96 %	92 %	87 %	83 %	80 %	76 %			91 %	87 %	80 %	76 %

Voltage derating as a function of installation altitude

System overview

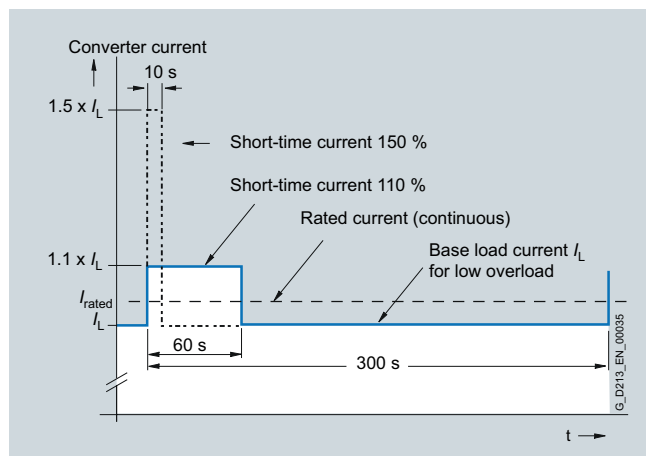
Technical data (continued)

Overload capability

The SINAMICS S150 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.

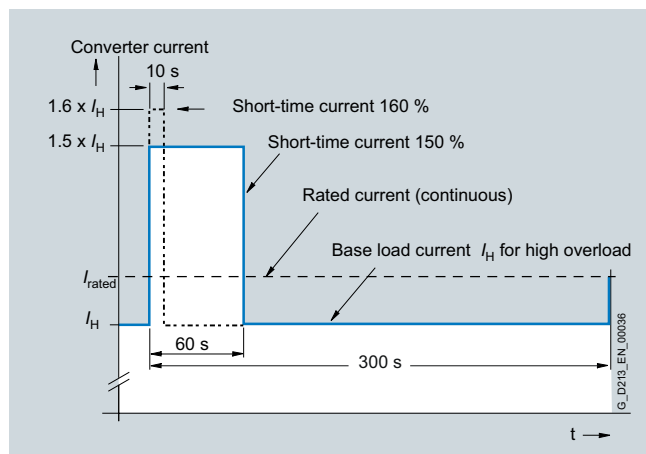
The criterion for overload is that the drive is operated with its base load current before and after the overload occurs on the basis of a duty cycle duration of 300 s.

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.



Low overload

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.



High overload

Degrees of protection of cabinet units

The EN 60529 standard covers 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 matter (touch protection and protection against ingress of solid 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 converter cabinet unit	First digit (touch protection and protection against ingress of foreign solid matter)	Second digit (protection of the equipment against the ingress of water)
IP20 (standard)	Protected against solid foreign bodies, diameter ≥ 12.5 mm.	No water protection
IP21 (option M21)	Protected against solid foreign bodies, diameter ≥ 12.5 mm.	Protected against drip water Vertically falling drip water shall not have a harmful effect.
IP23 (option M23)	Protected against solid foreign bodies, diameter ≥ 12.5 mm.	Protected against spray 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 foreign bodies, diameter ≥ 1 mm.	Protected against spray 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 splash water Water splashing onto the enclosure from any direction shall not have a harmful effect.

Technical data (continued)

EMC information

The term "electromagnetic compatibility" describes - according to the definition of the EMC Directive - the "capability of a device to work satisfactorily in the electromagnetic environment without itself causing electromagnetic interference which is 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.

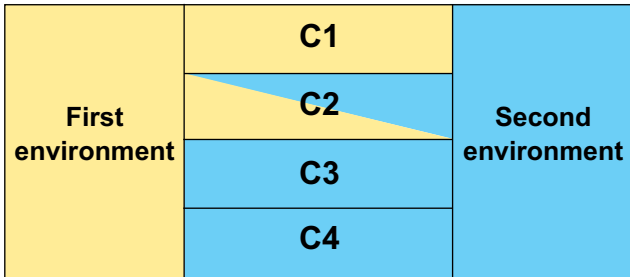
Residential buildings or locations at which the drive system is directly connected to a public low-voltage supply without intermediate transformer are defined as the **first environment**.

A **second environment** involves locations outside residential areas or industrial sites which are supplied from the medium-voltage network via a separate transformer.

Four different categories are defined in EN 61800-3 Ed.2 depending on the location and the power of the drive:

- **Category C1:** Drive systems for rated voltages less than 1000 V for unrestricted use in the first environment.
- **Category C2:** Stationary drive systems for rated voltages less than 1000 V for use in the second environment. Use in the first environment is possible if the drive system is distributed and installed by qualified personnel. The warning and installation information supplied by the manufacturer must be observed.
- **Category C3:** Drive systems for rated voltages less than 1000 V for exclusive use in the second environment.
- **Category C4:** Drive systems for rated voltages greater than or equal to 1000 V or for rated currents greater than or equal to 400 A for use in complex systems in the second environment.

The following diagram shows how the four categories are assigned to the first and second environments:



G D213 EN 00009

SINAMICS S150 is almost exclusively used in the second environment (Categories C3 and C4).

To limit the **emitted interference**, SINAMICS S150 is equipped with a line filter as standard, according to the limits defined in Category C3. Optional line filters are available on request for use in the first environment (Category C2).

SINAMICS S150 fulfills the **noise-immunity** requirements 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 equipment documentation) must be observed.

Grounding

The protective conductor cross-section 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 protective conductor, no impermissibly high contact voltages may occur (< 50 V AC or < 120 V DC, EN 50178 Section 5.3.2.2, IEC 60364, IEC 60543).
- The protective conductor must not be excessively loaded by any ground fault current it carries.
- If it is possible for continuous currents to flow through the protective conductor when a fault occurs in accordance with EN 50178 Section 8.3.3.4, the protective conductor cross-section must be dimensioned for this continuous current.

The protective conductor cross-section must be selected according to EN 60204-1, EN 60439-1, IEC 60364.

Cross-section external conductor	Minimum cross-section of external protective conductor
up to 16 mm ²	Minimum cross-section of external conductor
16 mm ² to 35 mm ²	16 mm ²
from 35 mm ²	At least half the cross-section of external conductor

- 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. In spite of the protective conductor cross-sections used in accordance with the table above, no inadmissible touch voltages occur with this grounding system. However, from experience gained with different grounding constellations, we recommend that the ground cable from the motor returns directly to the drive converter. For EMC reasons and to prevent bearing currents, symmetrical motor cables rather than four-wire cables should be used here. The ground connection (protective conductor, 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. Considering this situation, we recommend the protective conductor cross-section to be analog with the cross-section of the external conductor for grounding the control cabinet.

System overview

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		6SL3710- 7LE32-1AA0	6SL3710- 7LE32-6AA0	6SL3710- 7LE33-1AA0	6SL3710- 7LE33-8AA0	6SL3710- 7LE35-0AA0	6SL3710- 7LE36-1AA0
Type rating							
• at I_L (50 Hz 400 V) ¹⁾	kW	110	132	160	200	250	315
• at I_H (50 Hz 400 V) ¹⁾	kW	90	110	132	160	200	250
• at I_L (60 Hz 460 V) ²⁾	hp	150	200	250	300	400	500
• at I_H (60 Hz 460 V) ²⁾	hp	150	200	200	250	350	350
Output current							
• Rated current I_{NA}	A	210	260	310	380	490	605
• Base load current I_L ³⁾	A	205	250	302	370	477	590
• Base load current I_H ⁴⁾	A	178	233	277	340	438	460
• Maximum current $I_{max A}$	A	307	375	453	555	715	885
Feed/feedback current							
• Rated current I_{NE}	A	197	242	286	349	447	549
• Maximum current $I_{max E}$	A	315	390	570	570	735	907
Current requirement, max. ⁵⁾							
• 24 V DC auxiliary power supply	A	Internal	Internal	Internal	Internal	Internal	Internal
Pulse frequency ⁶⁾							
• Rated frequency	kHz	2	2	2	2	2	1.25
• Pulse frequency, max.							
- without current derating	kHz	2	2	2	2	2	1.25
- with current derating	kHz	8	8	8	8	8	7.5
Power loss, max. ⁷⁾							
• at 50 Hz 400 V	kW	6.31	7.55	10.01	10.72	13.13	17.69
• at 60 Hz 460 V	kW	6.49	7.85	10.45	11.15	13.65	18.55
Cooling-air requirement		m ³ /s	0.58	0.7	1.19	1.19	1.96
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	71/73	71/73	72/74	72/74	77/79
Line connection U1, V1, W1							
• Conductor cross-section, max. (DIN VDE)	mm ²	M12 screw 4 x 240	M12 screw 4 x 240	M12 screw 4 x 240	M12 screw 4 x 240	M12 screw 4 x 240	M12 screw 4 x 240
Motor connection U2/T1, V2/T2, W2/T2							
• Conductor cross-section, max. (DIN VDE)	mm ²	M12 screw 2 x 150	M12 screw 2 x 150	M12 screw 2 x 150	M12 screw 2 x 150	M12 screw 2 x 240	M12 screw 4 x 240
Cable length, max.							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
PE/GND connection							
• Conductor cross-section, max. (DIN VDE)	mm ²	M12 screw 240	M12 screw 240	M12 screw 240	M12 screw 240	M12 screw 240	M12 screw 240
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	1400	1400	1600	1800	1800	2200
• Height	mm	2000	2000	2000	2000	2000	2000
• Depth	mm	600	600	600	600	600	600
Weight, approx.		kg	708	708	892	980	1716
Frame size		F	F	G	G	G	H

¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ If the drive closed-loop control is still to remain active after a main infeed failure, then the equipment must be provided with an external 24 V DC supply.

⁶⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the Engineering Manual on the CD-ROM provided.

⁷⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 380 ... 480 V 3 AC		6SL3710- 7LE37-5AA0	6SL3710- 7LE38-4AA0	6SL3710- 7LE41-0AA0	6SL3710- 7LE41-2AA0	6SL3710- 7LE41-4AA0
Type rating						
• at I_L (50 Hz 400 V) ¹⁾	kW	400	450	560	710	800
• at I_H (50 Hz 400 V) ¹⁾	kW	315	400	450	560	710
• at I_L (60 Hz 460 V) ²⁾	hp	600	700	800	1000	1000
• at I_H (60 Hz 460 V) ²⁾	hp	450	600	700	900	1000
Output current						
• Rated current I_{NA}	A	745	840	985	1260	1405
• Base load current I_L ³⁾	A	725	820	960	1230	1370
• Base load current I_H ⁴⁾	A	570	700	860	1127	1257
• Maximum current $I_{max A}$	A	1087	1230	1440	1845	2055
Feed/feedback current						
• Rated current I_{NE}	A	674	759	888	1133	1262
• Maximum current $I_{max E}$	A	1118	1260	1477	1891	2107
Current requirement, max. ⁵⁾						
• 24 V DC aux. power supply	A	Internal	Internal	Internal	Internal	Internal
Pulse frequency ⁶⁾						
• Rated frequency	kHz	1.25	1.25	1.25	1.25	1.25
• Pulse frequency, max.						
- without current derating	kHz	1.25	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5	7.5
Power loss, max. ⁷⁾						
• at 50 Hz 400 V	kW	20.63	21.1	27.25	33.05	33.95
• at 60 Hz 460 V	kW	21.75	22.25	28.65	34.85	35.85
Cooling-air requirement	m ³ /s	1.96	1.96	2.6	2.6	2.6
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	77/79	77/79	77/79	78/80	78/80
Line connection U1, V1, W1		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 240	8 x 240	8 x 240	8 x 240	8 x 240
Motor connection U2/T1, V2/T2, W2/T2		M12 screw	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	6 x 240
Cable length, max.						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
PE/GND connection		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	2200	2200	2800	2800	2800
• Height	mm	2000	2000	2000	2000	2000
• Depth	mm	600	600	600	600	600
Weight, approx.	kg	1731	1778	2408	2408	2408
Frame size		H	H	J	J	J

- ¹⁾ Rated power of a typ. 6-pole standard asynchronous (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 asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.
- ⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.
- ⁵⁾ If the drive closed-loop control is still to remain active after a main infeed failure, then the equipment must be provided with an external 24 V DC supply.
- ⁶⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the Engineering Manual on the CD-ROM provided.
- ⁷⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

System overview

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		6SL3710- 7LG28-5AA0	6SL3710- 7LG31-0AA0	6SL3710- 7LG31-2AA0	6SL3710- 7LG31-5AA0	6SL3710- 7LG31-8AA0	6SL3710- 7LG32-2AA0
Type rating							
• at I_L (50 Hz 690 V) ¹⁾	kW	75	90	110	132	160	200
• at I_H (50 Hz 690 V) ¹⁾	kW	55	75	90	110	132	160
• at I_L (50 Hz 500 V) ¹⁾	kW	55	55	75	90	110	132
• at I_H (50 Hz 500 V) ¹⁾	kW	45	55	75	90	90	110
• at I_L (60 Hz 575 V) ²⁾	hp	75	75	100	150	150	200
• at I_H (60 Hz 575 V) ²⁾	hp	75	75	100	125	150	200
Output current							
• Rated current I_{NA}	A	85	100	120	150	175	215
• Base load current I_L ³⁾	A	80	95	115	142	170	208
• Base load current I_H ⁴⁾	A	76	89	117	134	157	192
• Maximum current $I_{max A}$	A	120	142	172	213	255	312
Feed/feedback current							
• Rated current I_{NE}	A	86	99	117	144	166	202
• Maximum current $I_{max E}$	A	125	144	170	210	253	308
Current requirement, max. ⁵⁾							
• 24 V DC auxiliary power supply	A	Internal	Internal	Internal	Internal	Internal	Internal
Pulse frequency ⁶⁾							
• Rated frequency	kHz	1.25	1.25	1.25	1.25	1.25	1.25
• Pulse frequency, max. - without current derating	kHz	1.25	1.25	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5	7.5	7.5
Power loss, max. ⁷⁾							
• at 50 Hz 690 V	kW	5.12	5.38	5.84	5.75	11.02	11.44
• at 60 Hz 575 V	kW	4.45	4.65	5.12	4.97	11.15	11.56
Cooling-air requirement	m ³ /s	0.58	0.58	0.58	0.58	1.19	1.19
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	71/73	71/73	71/73	71/73	75/77	75/77
Line connection U1, V1, W1		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 240	4 x 240	4 x 240	4 x 240	4 x 240	4 x 240
Motor connection U2/T1, V2/T2, W2/T2		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x 70	2 x 150	2 x 150	2 x 150	2 x 150	2 x 150
Cable length, max.							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
PE/GND connection		M12 screw	M12 screw	M12 screw	M12 screw	M12 screw	M12 screw
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	1400	1400	1400	1400	1600	1600
• Height	mm	2000	2000	2000	2000	200	2000
• Depth	mm	600	600	600	600	600	600
Weight, approx.	kg	708	708	708	708	892	892
Frame size		F	F	F	F	G	G

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ If the drive closed-loop control is still to remain active after a main infeed failure, then the equipment must be provided with an external 24 V DC supply.

⁶⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the Engineering Manual on the CD-ROM provided.

⁷⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		6SL3710- 7LG32-6AA0	6SL3710- 7LG33-3AA0	6SL3710- 7LG34-1AA0	6SL3710- 7LG34-7AA0	6SL3710- 7LG35-8AA0	6SL3710- 7LG37-4AA0
Type rating							
• at I_L (50 Hz 690 V) ¹⁾	kW	250	315	400	450	560	710
• at I_H (50 Hz 690 V) ¹⁾	kW	200	250	315	400	450	630
• at I_L (50 Hz 500 V) ¹⁾	kW	160	200	250	315	400	500
• at I_H (50 Hz 500 V) ¹⁾	kW	132	160	200	250	315	450
• at I_L (60 Hz 575 V) ²⁾	hp	250	300	400	450	600	700
• at I_H (60 Hz 575 V) ²⁾	hp	200	250	350	450	500	700
Output current							
• Rated current I_{NA}	A	260	330	410	465	575	735
• Base load current I_L ³⁾	A	250	320	400	452	560	710
• Base load current I_H ⁴⁾	A	233	280	367	416	514	657
• Maximum current $I_{max A}$	A	375	480	600	678	840	1065
Feed/feedback current							
• Rated current I_{NE}	A	242	304	375	424	522	665
• Maximum current $I_{max E}$	A	370	465	619	700	862	1102
Current requirement, max. ⁵⁾							
• 24 V DC auxiliary power supply	A	Internal	Internal	Internal	Internal	Internal	Internal
Pulse frequency ⁶⁾							
• Rated frequency	kHz	1.25	1.25	1.25	1.25	1.25	1.25
• Pulse frequency, max.							
- without current derating	kHz	1.25	1.25	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5	7.5	7.5
Power loss, max. ⁷⁾							
• at 50 Hz 690 V	kW	11.97	12.69	19.98	20.55	24.05	30.25
• at 60 Hz 575 V	kW	12.03	12.63	18.86	19.47	22.85	28.75
Cooling-air requirement	m ³ /s	1.19	1.19	1.96	1.96	1.96	2.6
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB(A)	75/77	75/77	77/79	77/79	77/79	77/79
Line connection U1, V1, W1							
• Conductor cross-section, max. (DIN VDE)	mm ²	4 x 240	4 x 240	4 x 240	4 x 240	4 x 240	8 x 240
Motor connection U2/T1, V2/T2, W2/T2							
• Conductor cross-section, max. (DIN VDE)	mm ²	2 x 185	2 x 240	4 x 240	4 x 240	4 x 240	6 x 240
Cable length, max.							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
PE/GND connection							
• Conductor cross-section, max. (DIN VDE)	mm ²	M12 screw 240	M12 screw 240	M12 screw 240	M12 screw 240	M12 screw 240	M12 screw 240
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	1600	1600	2200	2200	2200	2800
• Height	mm	2000	2000	2000	2000	2000	2000
• Depth	mm	600	600	600	600	600	600
Weight, approx.	kg	892	892	1716	1716	1716	2300
Frame size		G	G	H	H	H	J

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ If the drive closed-loop control is still to remain active after a main infeed failure, then the equipment must be provided with an external 24 V DC supply.

⁶⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the Engineering Manual on the CD-ROM provided.

⁷⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

System overview

Technical data (continued)

Line voltage 500 ... 690 V 3 AC		6SL3710- 7LG38-1AA0	6SL3710- 7LG38-8AA0	6SL3710- 7LG41-0AA0	6SL3710- 7LG41-3AA0
Type rating					
• at I_L (50 Hz 690 V) ¹⁾	kW	800	900	1000	1200
• at I_H (50 Hz 690 V) ¹⁾	kW	710	800	900	1000
• at I_L (50 Hz 500 V) ¹⁾	kW	560	630	710	900
• at I_H (50 Hz 500 V) ¹⁾	kW	500	560	630	800
• at I_L (60 Hz 575 V) ²⁾	hp	800	900	1000	1250
• at I_H (60 Hz 575 V) ²⁾	hp	700	800	900	1000
Output current					
• Rated current I_{NA}	A	810	910	1025	1270
• Base load current I_L ³⁾	A	790	880	1000	1230
• Base load current I_H ⁴⁾	A	724	814	917	1136
• Maximum current $I_{max A}$	A	1185	1320	1500	1845
Feed/feedback current					
• Rated current I_{NE}	A	732	821	923	1142
• Maximum current $I_{max E}$	A	1218	1367	1537	1905
Current requirement, max. ⁵⁾					
• 24 V DC auxiliary power supply	A	Internal	Internal	Internal	Internal
Pulse frequency ⁶⁾					
• Rated frequency	kHz	1.25	1.25	1.25	1.25
• Pulse frequency, max.					
- without current derating	kHz	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5
Power loss, max. ⁷⁾					
• at 50 Hz 690 V	kW	34.45	34.65	36.15	42.25
• at 60 Hz 575 V	kW	32.75	32.85	34.25	39.25
Cooling-air requirement		m ³ /s	2.6	2.6	2.6
Sound pressure level L_{pA} (1 m) at 50/60 Hz		dB(A)	77/79	77/79	77/79
Line connection U1, V1, W1					
• Conductor cross-section, max. (DIN VDE)	mm ²	8 x 240	8 x 240	8 x 240	8 x 240
Motor connection U2/T1, V2/T2, W2/T2					
• Conductor cross-section, max. (DIN VDE)	mm ²	6 x 240	6 x 240	6 x 240	6 x 240
Cable length, max.					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
PE/GND connection					
• Conductor cross-section, max. (DIN VDE)	mm ²	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	2800	2800	2800	2800
• Height	mm	2000	2000	2000	2000
• Depth	mm	600	600	600	600
Weight, approx.		kg	2408	2408	2408
Frame size		J	J	J	J

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

²⁾ Rated power of a typ. 6-pole standard asynchronous (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 duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

⁵⁾ If the drive closed-loop control is still to remain active after a main infeed failure, then the equipment must be provided with an external 24 V DC supply.

⁶⁾ For the correlation between the pulse frequency and maximum output current/output frequency, see the Engineering Manual on the CD-ROM provided.

⁷⁾ The specified power loss represents the maximum value at 100% utilization. The value is lower under normal operating conditions.

Selection and ordering data

Type rating kW	Rated output current I_{rated} A	SINAMICS S150 converter cabinet units Order No.
Line voltage 380 ... 480 V 3 AC		
110	210	6SL3710-7LE32-1AA0
132	260	6SL3710-7LE32-6AA0
160	310	6SL3710-7LE33-1AA0
200	380	6SL3710-7LE33-8AA0
250	490	6SL3710-7LE35-0AA0
315	605	6SL3710-7LE36-1AA0
400	745	6SL3710-7LE37-5AA0
450	840	6SL3710-7LE38-4AA0
560	985	6SL3710-7LE41-0AA0
710	1260	6SL3710-7LE41-2AA0
800	1405	6SL3710-7LE41-4AA0
Line voltage 500 ... 690 V 3 AC		
75	85	6SL3710-7LG28-5AA0
90	100	6SL3710-7LG31-0AA0
110	120	6SL3710-7LG31-2AA0
132	150	6SL3710-7LG31-5AA0
160	175	6SL3710-7LG31-8AA0
200	215	6SL3710-7LG32-2AA0
250	260	6SL3710-7LG32-6AA0
315	330	6SL3710-7LG33-3AA0
400	410	6SL3710-7LG34-1AA0
450	465	6SL3710-7LG34-7AA0
560	575	6SL3710-7LG35-8AA0
710	735	6SL3710-7LG37-4AA0
800	810	6SL3710-7LG38-1AA0
900	910	6SL3710-7LG38-8AA0
1000	1025	6SL3710-7LG41-0AA0
1200	1270	6SL3710-7LG41-3AA0

System overview

Options

When ordering a drive converter with options, add the suffix **"-Z"** after the order number and then state the order code(s) for the desired option(s) after the suffix.

Example:

6SL3710-7LE32-1AA0-Z
+M07+D60+...

See also ordering examples.

Available options	Order code
Input side	
Main breaker incl. fuses/circuit breakers	L26
EMC shield bus (cable connection from below) ¹⁾	M70
Output side	
Motor reactor	L08
dv/dt filter plus VPL	L10
Sine-wave filter (only for the voltage range 380 to 480 V, up to 200 kW)	L15
EMC shield bus (cable connection from below) ¹⁾	M70
Motor protection and safety functions	
EMERGENCY-OFF pushbutton in cabinet door	L45
EMERGENCY-OFF Category 0, 230 V AC or 24 V DC, uncontrolled stop	L57
EMERGENCY-STOP Category 1, 230 V AC, controlled stop	L59
EMERGENCY-STOP category 1, 24 V DC, controlled stop	L60
Thermistor motor protection unit with PTB approval (alarm)	L83
Thermistor motor protection unit with PTB approval (trip)	L84
PT100 evaluation unit (for 6 PT100s)	L86
Insulation monitoring	L87
Additional shock-hazard protection	M60
Enhanced 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-marshaling compartment 200 mm high, RAL 7035	M07
Line connection from above	M13
Motor connection from above	M78
Crane transport assembly (top-mounted)	M90
Other options	
CBC10 Communication Board	G20
CBE20 Communication Board	G33
TM31 customer terminal block extension	G61

Available options	Order code
Other options	
SMC10 Sensor Module Cabinet-Mounted for resolvers	K46
SMC20 Sensor Module Cabinet-Mounted for sin/cos incremental encoder or EnDat absolute encoder	K48
SMC30 Sensor Module Cabinet-Mounted to sense the actual motor speed	K50
VSM10 Voltage Sensing Module Cabinet-Mounted for voltage sensing	K51
Terminal module for controlling the "Safe Torque Off" and "Safe Stop 1" safety functions	K82
Connection for external auxiliary equipment	L19
Cabinet illumination with service socket	L50
Cabinet anti-condensation heating	L55
25 kW braking unit for line voltages of 380 ... 480 V (110 ... 132 kW) and 660 ... 690 V (75 ... 132 kW)	L61
50 kW braking unit for line voltages of 380 ... 480 V (160 ... 800 kW) and 660 ... 690 V (160 ... 1200 kW)	L62
25 kW braking unit for line voltages of 500 ... 600 V (110 ... 132 kW)	L64
50 kW braking unit for line voltages of 500 ... 600 V (160 ... 1200 kW)	L65
Special cabinet paint finish ²⁾	Y09
Documentation (standard: English / German)	
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	D02
Customer documentation as hard copy	D04
Preliminary version of customer documentation in PDF format	D14
Documentation in English / French	D58
Documentation in English / Spanish	D60
Documentation in English / Italian	D80
Languages (standard: English / German)	
Rating plate data in English / French	T58
Rating plate data in English / Spanish	T60
Rating plate data in English / Italian	T80
Options specific to the chemical industry	
NAMUR terminal block	B00
Protective separation for 24 V supply (PELV)	B02
Outgoing feeder for external auxiliaries (uncontrolled)	B03
Converter acceptance inspection in presence of customer	
Visual acceptance	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
Customer-specific converter acceptance inspections (on request)	F97

Note: Please refer to the selection matrix for information about possible option combinations.

¹⁾ This option is listed for the input- and output-side options, but is only required once.

²⁾ The order code Y.. requires data in plain text.

Options (continued)

Available options	Order code
Options specific to the shipbuilding industry	
Marine version	M66
Individual certificate from Germanische 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 Certification Society (CCS)	E71

Option selection matrix

Certain options are mutually exclusive.

✓	Possible combination
—	Combination not possible

Electrical options

	L08	L10	L15	L57	L59	L60	L61/64	L62/65	L87	K82
L08		—	—	✓	✓	✓	✓	✓	✓	✓
L10	—		—	✓	✓	✓	✓	✓	✓	✓
L15	—	—		✓	✓	✓	✓	✓	✓	✓
L57	✓	✓	✓		—	—	✓	✓	✓	✓
L59	✓	✓	✓	—		—	✓	✓	✓	✓
L60	✓	✓	✓	—	—		✓	✓	✓	✓
L61/64	✓	✓	✓	✓	✓	✓		—	✓	✓
L62/65	✓	✓	✓	✓	✓	✓	—		✓	✓
L87	✓	✓	✓	✓	✓	✓	✓	✓		— ¹⁾
K82	✓	✓	✓	✓	✓	✓	✓	✓	— ¹⁾	

Mechanical/electrical options

	M06	M07	M13	M21	M23	M43	M54	M60	M66	M70	M78
M06		—	✓	✓	✓	✓	✓	✓	✓	✓	✓
M07	—		✓	✓	✓	✓	✓	✓	✓	✓	✓
M13	✓	✓		—	✓	✓	✓	—	✓	— ²⁾	✓
M21	✓	✓	—		—	—	—	— ³⁾	—	✓	—
M23	✓	✓	✓	—		—	—	—	—	✓	✓
M43	✓	✓	✓	—	—		—	—	—	✓	✓
M54	✓	✓	✓	—	—	—		—	✓	✓	✓
M60	✓	✓	—	— ³⁾	—	—	—		✓	✓	—
M66	✓	✓	✓	—	—	—	✓	✓		✓	—
M70	✓	✓	— ²⁾	✓	✓	✓	✓	✓	✓		— ²⁾
M78	✓	✓	✓	—	✓	✓	✓	—	—	— ²⁾	

¹⁾ A combination of **L87** and **K82** is available on request.

²⁾ If the line connection (option **M13**) and the motor connection (option **M78**) are from above, the EMC shield bus is not required in the lower cabinet area.

³⁾ Can only be selected for converters in the voltage range 400 V to 250 kW and 690 V to 315 kW. The **M60** option is fitted as standard for higher outputs.

Other options

	G20	G33	K46	K48	K50	K51
G20		—	✓	✓	✓	✓
G33	—		✓	✓	✓	✓
K46	✓	✓		—	—	—
K48	✓	✓	—		—	—
K50	✓	✓	—	—		—
K51	✓	✓	—	—	—	

Rating plate data

	T58	T60	T80
T58		—	—
T60	—		—
T80	—	—	

System overview

Options (continued)

Ordering examples

Example 1

Task:

A drive system is required for a vehicle chassis dynamometer for exhaust gas analysis with which driving profiles and cycles as encountered in everyday traffic can be simulated. This means for the drive system that the dynamometer must be operated both in the motoring as well as regenerating modes.

A drive with regenerative feedback into the line supply is required as regenerative operation is the predominant operating mode and dynamic switching operations are required.

The max. regenerative power is 200 kW. The drive converter must have degree of protection IP54 as a result of the environmental conditions. The installation altitude is < 1000 meters and 45 °C is the maximum ambient temperature. The windings must be equipped with PT100 resistance thermometers and monitored by the drive converter for alarm and trip. A switch disconnect must be provided to disconnect the converter from the 400 V power supply. In addition, the cabinet is to have a special paint finish in RAL 3002.

Solution:

Taking into account the derating factors for degree of protection IP54 and the increased ambient temperature of 45 °C, a drive converter with a minimum power rating of 223 kW must be used. A drive converter with a power of 250 kW and the options **M54** (IP54 degree of protection), **L26** (main breaker incl. fuses), **L86** (PT100 evaluation unit) and **Y09** (special paint) is selected.

The ordering data are as follows:

6SL3710-7LE35-0AA0-Z
+M54 +L26+L86+Y09
Cabinet color RAL 3002

Example 2

Task:

A drive system is required for a conveyor belt in a brown-coal open-cast mine which is capable of both motor and regenerative operation. Since the conveyor belt must be capable of starting after a fault when loaded with bulk material, and it is possible for peak loads to occur where 1.5 times the power is required for up to 60 s, the drive system must be designed according to the overload requirements of such a case. The drive converter is installed in a climate-controlled container as a result of the environmental conditions typical of an open-cast mine. The installation altitude is 320 m above sea level and the maximum ambient temperature in the container is 35 °C. The drive is supplied through a converter transformer from the medium-voltage network. The drive is connected to an isolated-neutral system and must have insulation monitoring. A motor with separately-driven fan is selected here, as the motor is subject to a high load torque when starting and in the lower range. The fan supply voltage is 690 V and must be drawn from the drive converter.

The required motor power is 420 kW.

Solution:

Since the converter is installed in an air-conditioned container, it can be designed with IP20 degree of protection. The 35 °C ambient temperature does not necessitate any additional derating. However, due to the specified overload conditions, the base load current I_H (for high overload) must be applied. This results in a power of approx. 520 kW for the drive converter. The drive converter with order no. 6SL3710-7LG35-8AA0 must be selected.

Option **L87** (insulation monitoring) must also be selected.

Option **L19** (connection for external auxiliaries) must be selected for the controlled outgoing feeder to supply the separately-driven fan.

The ordering data are as follows:

6SL3710-7LG35-8AA0-Z
+L19+L87

Description of the options

B00, B02, B03

Options compliant with NAMUR requirements

List of impermissible combinations with other options:

The following restrictions and exclusions applicable to the NAMUR terminal block **B00** in relation to other available options must be taken into account.

Incompatible with option	Reason
L45, L57, L59, L60	A Category 0 EMERGENCY-OFF is already provided in the NAMUR version. The forced power supply disconnection is accessed at terminals -A1-X2: 17, 18.
L83, L84	The B00 option already provides a PTC thermistor evaluation unit as standard (trip).
L19	Alternatively, option B03 can be selected. This means that a reduced scope is available for external auxiliaries.
L87	The insulation monitor monitors the complete electrically coupled network. An insulation monitor must therefore be provided on site.

With options **L50, L55, L86**, the connection is made as standard. These options are not wired to the NAMUR terminal block.

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 inputs and outputs assigned to the terminals fulfill PELV requirements ("protective extra-low voltage and protective separation").

The terminal block and associated functions have been reduced to the necessary minimum. Unlike the NAMUR recommendation, optional terminals are not available.

Terminal -A1-X2:	Meaning	Default	Remarks
10	DI	ON(dynamic)/ ON/OFF (static)	The effective mode can be encoded using a wire jumper at 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		Supply disconnection	EMERGENCY-OFF circuit
30, 31		Ready for operation	Relay output (NO contact)
32, 33		Motor is turning	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 by the customer via terminals -A1-X2:1-3 (fused in the converter with 1 A). It must be ensured that the PELV safety requirements are fulfilled ("protective extra-low voltage with protective separation").

Terminal -A1-X2:	Meaning
1	M Reference ground
2	P24 24 V DC infeed
3	P24 24 V DC outgoing feeder

For temperature monitoring of explosion-proof motors, the option **B00** includes a PTC thermistor with PTB approval. Violation of the limit value leads to motor shutdown. The associated PTC sensor is connected to terminal -A1-X3:90, 91.

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

Description of the options

Description of the options (continued)

B02

Protective separation for 24 V supply (PELV)

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

Notice: The option **B02** is only possible in combination with **B00**.

B03

Outgoing feeder for external auxiliaries (uncontrolled)

If a motor fan is to be supplied with power from the plant, option **B03** provides an external outgoing feeder with a 10 A fuse. As soon as the supply voltage is present at the converter input, a voltage equaling the converter input voltage ($U = U_{line}$) is also applied at these terminals. This must be taken into consideration when separately driven fans are configured.

Terminal -A1-X1:	Meaning
1, 2, 3, PE	External outgoing feeder for a separately-driven motor fan

Notice: Option **B03** is only possible in combination with **B00**.

D02

Customer documentation in DXF format

Option **D02** can be used to order documents such as circuit diagrams, terminal diagrams, layout diagrams, and dimension drawings in DXF format, e.g. for further processing in AutoCad systems.

D04

Customer documentation as hard copy

Equipment 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 drive converter:

- Operating instructions
- Circuit diagram
- Terminal diagram
- Layout diagram
- Dimension 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 version of customer documentation in PDF format

If documents such as circuit diagrams, terminal diagrams, layout diagrams and dimension drawings are required in advance for the purpose of system engineering (integration of drive into higher-level systems, interface definition, installation, building planning, etc.), it is possible to order a draft copy of the documentation when ordering the converter cabinet units. These documents are then supplied electronically a few working days following receipt of the order. If the order includes options that fall outside the scope of standard delivery, these will not be covered by the documentation due to the obvious time constraints.

Documentation relating to the order is sent to the buyer by e-mail. The recipient's e-mail address must be specified with the order for this purpose. In the e-mail, the recipient will also receive a link (Internet address) for downloading general, non-order-specific documentation such as the operating instructions, equipment manual and commissioning guide.

D58/D60/D80

Documentation language

Order code	Language
D58	English / French
D60	English / Spanish
D80	English / Italian

E11 to E71

Individual certification of the converter

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

- **E11** Individual certificate from Germanische 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 available.

Description of the options (continued)

F03, F71, F75, F77, F97

Converter acceptance inspections in the presence of the customer

Order code	Description
F03	<p>Visual acceptance</p> <p>The inspection includes the following:</p> <ul style="list-style-type: none"> • Check of degree of protection • Check of equipment (components) • Check of equipment identifiers • Check of clearance and creepage distances • Check of cables • Check of customer documentation • Submission of the acceptance report <p>All the above checks are performed with the converter isolated from the power supply.</p>
F71	<p>Function test of the drive converter without connected motor</p> <p>The inspection includes the following:</p> <ul style="list-style-type: none"> • Visual inspection as described for option F03 • Check of power supply • Check of protective and monitoring devices (simulation) • Check of fans • Pre-charging test • Function test without connected motor • Submission of the acceptance report <p>After the visual inspection with the converter switched off, the converter is connected to rated voltage. No current at the converter output end.</p>
F75	<p>Function test of the drive converter with test bay motor (no load)</p> <p>The inspection includes the following:</p> <ul style="list-style-type: none"> • Visual inspection as described for option F03 • Check of power supply • Check of protective and monitoring devices (simulation) • Check of fans • Pre-charging test • Function test with test bay motor (no load) • Submission of the acceptance report <p>After the visual inspection with the converter switched off, the converter is connected to rated voltage. A small current flows at the converter's output in order to operate the test bay motor (no load).</p>
F77	<p>Insulation test of the drive converter</p> <p>The inspection includes the following:</p> <ul style="list-style-type: none"> • High-voltage test • Measurement of insulation resistance
F97	<p>Customer-specific acceptance inspections (on request)</p> <p>If acceptance inspections are desired which are not covered by the options F03, F71, F75 or F77, customized acceptance inspections/supplementary tests can be ordered using order code F97 on request and following technical clarification.</p>

G20

CBC10 Communication Board

The CBC10 Communication Board is used to interface the CU320 Control Unit and thus the SINAMICS S150 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.

G33

CBE20 Communication Board

The CBE20 Communication Board can be used to connect the SINAMICS S150 to a PROFINET IO network via a CU320 Control Unit. The CBE plugs into the option slot on the CU320 Control Unit.

G61

TM31 customer terminal block extension

In the standard version, the SINAMICS S150 cabinet units already include a TM31 interface module (customer terminal block). 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 by:

- 8 digital inputs
- 4 bidirectional digital inputs/outputs
- 2 relay outputs with changeover contact
- 2 analog inputs
- 2 analog outputs
- 1 temperature sensor input (KTY84-130 or PTC)

The second TM31 must be integrated by the customer.

K46

SMC10 Sensor Module Cabinet-Mounted for resolvers

The SMC10 encoder module can be used to simultaneously record the speed and the rotor position angle. The signals emitted by the resolver are converted here and made available to the closed-loop control for evaluation via the DRIVE-CLiQ interface.

The following encoders are supported by the SMC10:

- 2-pole resolver
- Multipole resolver

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

Description of the options

Description of the options (continued)

K48

SMC20 Sensor Module Cabinet-Mounted for sin/cos incremental encoder or EnDat absolute encoder

The SMC20 encoder module can be used to simultaneously record the speed and position. The signals emitted by the incremental encoder are converted here and made available to the closed-loop control for evaluation via the DRIVE-CLiQ interface.

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1 V_{pp}
- EnDat absolute encoder
- SSI encoder

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

K50

SMC30 Sensor Module Cabinet-Mounted to sense the actual motor speed

The SMC30 encoder module can be used to sense speed. The signals from the rotary pulse encoder are converted here and made available to the closed-loop control for evaluation via the DRIVE-CLiQ interface.

The following encoders are supported by the SMC30:

- TTL encoder
- HTL encoder
- SSI encoder

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

K51

VSM10 Voltage Sensing Module for voltage sensing

The VSM10 Voltage Sensing Module is used to sense the motor voltage so that the following function can be implemented:

- Operation of a permanent-magnet synchronous motor without encoder with the requirement to be able to connect to a motor that is already running ("flying restart" function).

K82

Terminal module for controlling the "Safe Torque Off" and "Safe Stop 1" safety functions

The terminal module is used to control the "Basic Safety Functions" over a wide voltage range from 24 V to 240 V DC/AC. This means that the "STO" and "SS1" safety functions can be flexibly controlled from the signal voltages in the plant.

The integrated safety functions, starting from the Safety Integrated (SI) input terminals of the components (Control Unit and Motor Module), satisfy the requirements of Machinery Directive 98/37/EC, EN 60204-1, and DIN EN ISO 13849-1 Category 3 (formerly EN 954-1), as well as Performance Level (PL) d and IEC 61508 SIL 2.

These Safety Integrated functions of the SINAMICS S150 are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office.

With option **K82**, the requirements specified in Machinery Directive 98/37/EC, EN 60204-1, DIN EN ISO 13849-1 Category 3 (formerly EN 954-1) as well as Performance Level (PL) d and IEC 61508 SIL 2 are fulfilled. The Safety Integrated functions using option **K82** are only available in conjunction with certified components and software versions. The following Safety Integrated functions are controlled using option **K82**:

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

L08

Motor reactor

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

Option **L08** cannot be combined with option **M78** (motor connection from above).

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.

Dv/dt filters plus VPL must be used for motors in cases where the withstand voltage of the insulation system is unknown or insufficient. Standard 1LA5, 1LA6 and 1LA8 motors only require them in cases where the motor insulation has not been specifically designed for operation with a drive converter (see Catalog D 81.1, Chapter "Motors operating with frequency converters").

The dv/dt filter plus VPL limit the rate of voltage rise to values $< 500 \text{ V}/\mu\text{s}$ and the typical voltage peaks for rated line voltages to the following values (for motor cable lengths of $< 150 \text{ m}$):

$< 1000 \text{ V}$ at $V_{line} < 575 \text{ V}$

$< 1250 \text{ V}$ at $575 \text{ V} < V_{line} < 690 \text{ V}$

L15

Sine-wave filter

Sine-wave filters are available in the voltage range from 380 V to 480 V for a converter power up to 200 kW.

The sine-wave filter at the drive converter output delivers practically sinusoidal voltages to the motor so that standard motors can be used without special cables and without power derating. For wiring standard cables can be used. The max. motor cable length is limited to 300 meters.

Notice: In conjunction with the option **L15**, the pulse frequency of the converter must be increased. This reduces the power available at the drive converter output (derating factor 0.88).

Description of the options (continued)

L19

Connection for external auxiliary equipment

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

The voltage is tapped at the drive converter input upstream of the line contactor/circuit breaker and, therefore, has the same level as the supply voltage.

The outgoing feeder can be switched inside the drive 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	Feedback signal, circuit breaker	230 V AC/0.5 A; 24 V DC/2 A
14	Feedback signal, circuit breaker	230 V AC/0.5 A; 24 V DC/2 A
15	Feedback signal, contactor	230 V AC/6 A
16	Feedback signal, contactor	230 V AC/6 A
PE	PE	

L26

Main breaker incl. fuses/circuit breakers

Up to 800 A, a switch disconnecter with mounted fuses is available as a main breaker. At currents greater than 800 A, a circuit breaker provided as standard is used to isolate the drive system from the line supply. The circuit breaker is controlled and supplied within the converter.

Terminal -X50:	Meaning
1	Checkback contact (NO contact) Main breaker/circuit breaker closed
2	Checkback contact (NC contact) Main breaker/circuit breaker closed
3	Common potential

L45

EMERGENCY-OFF pushbutton in the cabinet door

The option **L45** only includes the EMERGENCY-OFF pushbutton which is fitted with a protective collar in the cabinet door of the converter. The contacts of the pushbutton are brought out and connected to a terminal block.

The EMERGENCY-OFF functions of Category 0 or 1 can be activated in conjunction with options **L57**, **L59** and **L60**.

Terminal -X120:	Meaning
1	Checkback contact of the EMERGENCY-OFF pushbutton in the cabinet door
2	Checkback contact of the EMERGENCY-OFF pushbutton in the cabinet door
3	Checkback contact of the EMERGENCY-OFF pushbutton in the cabinet door *)
4	Checkback contact of the EMERGENCY-OFF pushbutton in the cabinet door *)

*) Used inside the converter with options **L57** to **L60**

Notice: By pressing the EMERGENCY-OFF pushbutton, 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 compliance with IEC 60204-1 (VDE 0113). Auxiliary voltages, e.g. for a separately driven fan supply or anti-condensation heating, may still be present. Certain areas within the converter also remain live (under voltage), e.g. the control or auxiliaries. If complete disconnection of all voltages is required, the EMERGENCY-OFF pushbutton must be incorporated into a protective system to be implemented by the customer. For this purpose, an NC contact is provided at terminal -X120.

L50

Cabinet illumination with service socket

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

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

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. A 100 W electrical cabinet heater is installed for each cabinet element (two heating units are installed for each element for cabinet element widths from 800 mm to 1200 mm).

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

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

Description of the options

Description of the options (continued)

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

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

The function includes disconnecting the voltage at the converter output using the line contactor and bypassing the microprocessor controller using a safety combination according to EN 60204-1. The motor then coasts down. When shipped, the pushbutton circuit is preset to 230 V AC. Jumpers must be appropriately set when using 24 V DC.

Terminal -X120:	Meaning
7	Loop in EMERGENCY-OFF pushbutton from the customer plant; remove jumper 7-8!
8	Loop in EMERGENCY-OFF pushbutton from the customer plant; remove jumper 7-8!
15	"On" for monitored start; remove jumper 15-16!
16	"On" for monitored start; remove jumper 15-16!
17	Checkback "trip safety combination"
18	Checkback "trip safety combination"

L59 EMERGENCY-STOP Category 1, 230 V AC

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

The function shuts down the drive in a fast stop process along a deceleration ramp to be parameterized by the user. The voltage is then disconnected as described for EMERGENCY-OFF Category 0 (option L57). The pushbutton circuit is operated at 230 V AC.

Terminal -X120:	Meaning
7	Loop in EMERGENCY-OFF pushbutton from the customer plant; remove jumper 7-8!
8	Loop in EMERGENCY-OFF pushbutton from the customer plant; remove jumper 7-8!
15	"On" for manual start; remove jumper 15-16!
16	"On" for manual start; remove jumper 15-16!
17	Checkback "trip safety combination"
18	Checkback "trip safety combination"

L60 EMERGENCY-STOP Category 1, 24 V DC

EMERGENCY-STOP Category 1 for controlled stopping according to EN 60204.

The function shuts down the drive in a fast stop process along a deceleration ramp to be parameterized by the user. The voltage is then disconnected as described for EMERGENCY-OFF Category 0 (option L57). The pushbutton circuit is operated at 24 V DC.

Terminal -X120:	Meaning
7	Loop in EMERGENCY-OFF pushbutton from the customer plant; remove jumper 7-8!
8	Loop in EMERGENCY-OFF pushbutton from the customer plant; remove jumper 7-8!
15	"On" for manual start; remove jumper 15-16!
16	"On" for manual start; remove jumper 15-16!
17	Checkback "trip safety combination"
18	Checkback "trip safety combination"

L61, L62, L64, L65 Braking units

Braking units may be required for drives in which motors might operate in generator mode but have no other facility for feeding energy back into the supply system.

The braking unit comprises two components:

- a Braking Module that can be installed in the air discharge duct of the power units
- a braking resistor to be installed 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 mounted braking resistor.

A max. cable length of 100 m is permissible between the Braking Module and the braking resistor. This allows the braking resistor to be mounted externally so that heat losses can be dissipated outside the converter enclosure. The braking resistor is connected directly to the terminal -X5.

Terminal -X5:	Meaning
1	Braking resistor connection
2	Braking resistor connection

The braking resistors are available in different versions:

Option	Braking Module			
	Drive converter S150 kW	Rated power P_{DB} kW	Braking power P_{20} kW	Peak power P_{15} kW
380 ... 480 V 3 AC				
L61	110 ... 132	25	100	125
L62	160 ... 800	50	200	250
500 ... 600 V 3 AC				
L64	75 ... 132	25	100	125
L65	160 ... 1200	50	200	250
660 ... 690 V 3 AC				
L61	75 ... 132	25	100	125
L62	160 ... 1200	50	200	250

P_{DB} : Rated power (continuous braking power)

$P_{20} = 4 \times P_{DB}$: 20 s power referred to a braking interval of 90 s

$P_{15} = 5 \times P_{DB}$: 15 s power referred to a braking interval of 90 s

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

L83 Thermistor motor protection unit (alarm)

Thermistor motor protection device (with PTB approval) for PTC temperature thermistors (PTC resistors, type A) for alarm. The thermistor motor protection unit is supplied with power and evaluated internally in the converter.

Terminal -F127:	Meaning
T1	Sensor loop connection
T2	Sensor loop connection

Description of the options (continued)

L84

Thermistor motor protection unit (trip)

Thermistor motor protection device (with PTB approval) for PTC thermistors temperature sensor (PTC resistors, type A) for trip. The thermistor motor protection unit is supplied with power and evaluated internally in the converter.

Terminal -F125:	Meaning
T1	Sensor loop connection
T2	Sensor loop connection

L86

PT100 evaluation unit

The PT100 evaluation unit can monitor up to 6 sensors. The sensors can be connected with two or three conductors to the evaluation unit. The limit values can be freely programmed for each channel.

In the factory setting, the measuring channels are divided into two groups each with 3 channels. With motors, for example, this means that three PT100s in the stator windings and two PT100s in the motor bearings can be monitored. Unused channels can be suppressed via parameters.

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 are also available (0/4 mA to 20 mA and 0/2 V to 10 V) for integration in a higher-level control system.

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 value for group 1 reached; (changeover contact)
61, 62, 64	Relay output Limit value for group 2 reached; (changeover contact)
Ground (OUT 1)	Analog output OUT 1; group 1 sensor
U1 (OUT 1)	Analog output OUT 1; group 1 sensor
I1 (OUT 1)	Analog output OUT 1; group 1 sensor
Ground (OUT 2)	Analog output OUT 2; group 2 sensor
U2 (OUT 2)	Analog output OUT 2; group 2 sensor
I2 (OUT 2)	Analog output OUT 2; group 2 sensor

L87

Insulation monitoring

An insulation monitor must be used if the converter is operated on an isolated-neutral system. The device monitors the entire galvanically coupled circuit for insulation faults.

An alarm is output by the insulation monitor in the event of a fault.

Notice: Only **one** insulation monitor can be used in each galvanically coupled network.

The response concept in the event of a ground fault in the isolated-neutral system can vary, so output relays are available for linking the monitor into a higher-level plant control. The customer can also choose to integrate the outputs into the converter monitoring system.

Terminal -A1-A101:	Meaning
11	Signaling relay ALARM 1 base
12	Signaling relay ALARM 1 NC contact
14	Signaling relay ALARM 1 NO contact
21	Signaling relay ALARM 2 base
22	Signaling relay ALARM 2 NC contacts
24	Signaling relay ALARM 2 NO contacts
M+	External kΩ display 0 μA to 400 μA
M-	External kΩ display 0 μA to 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

M06

Base 100 mm high, RAL 7022

The additional cabinet base allows larger bending radii for cables (cable inlet from below) and enables them to be routed within the cabinet base.

The cabinet base is supplied in RAL 7022 in all cases. A special paint finish is not available for the base. It is delivered completely assembled with the cabinet. The mounting height of the operator panel changes accordingly.

M07

Cable-marshaling compartment 200 mm high, RAL 7035

The cable-marshaling compartment is made of strong sheet steel and allows cables to be connected more flexibly (entry from below). It also allows routing of cables within the marshaling compartment. It is delivered completely assembled with the cabinet. The mounting height of the operator panel changes accordingly.

Notice: The cable-marshaling compartment is painted as standard with RAL 7035. If a special color is requested for the cabinet (Order code **Y09**), the cable-marshaling compartment is also painted in this color.

Description of the options

Description of the options (continued)

M13

Line connection from above

The control cabinet is provided with an additional roof section to allow a line connection from above. The connecting lugs for the power cables, the clamping bar for mechanically securing the cables, an EMC shield bus, and a PE busbar are located inside the roof section.

This increases the cabinet height by 405 mm. The busbars for connection from above are fully mounted when the cabinet is delivered. For transport reasons, the roof sections are delivered separately and must be fitted on site. Crane transport assemblies (option **M90**) can still be used. However, they must be removed on site before the roof sections can be installed. Use of rope spreaders should be considered in the case of small crane hook heights.

An undrilled aluminum mounting plate (5 mm thick) is provided in the roof section for feeding in the cables. Depending on the number of cables and the cross-sections used, holes for attaching cable glands for feeding in the cables must be drilled in this mounting plate on site.

Note: The control lines are still connected from below. Option **M13** eliminates the lugs, provided as standard, to connect the line supply from below.

The degree of protection of the roof sections is IP21. In combination with options **M23**, **M43** and **M54**, additional plastic ventilation grilles and filter elements are provided.

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

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

M21

IP21 degree of protection

Cabinet version in IP20, but with additional top or drip protection cover. This increases the cabinet height by 250 mm.

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

Notice: The top or drip protection covers are painted in RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the top or drip protection covers will also be painted this color.

M23

IP23 degree of protection

Converter cabinet units with IP23 degree of protection are supplied with additional roof sections and plastic ventilation grilles in the air inlet and outlet. This increases the cabinet height by 400 mm. The covers provided with option **M60** are also included in the scope of supply.

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

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

M43

IP43 degree of protection

Converter cabinet units with IP43 degree of protection are supplied with additional roof sections as well as plastic ventilation grilles and a wire mesh in the air inlet and outlet. This increases the cabinet height by 400 mm. The covers provided with option **M60** are also included in the scope of supply. They are an integral component of the internal cabinet air guidance system and are adapted accordingly.

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

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

M54

IP54 degree of protection

Converter cabinet units with IP54 degree of protection are supplied with additional roof sections as well as plastic ventilation grilles and a filter medium in the air inlet and outlet. This increases the cabinet height by 400 mm. The covers provided with option **M60** are also included in the scope of supply. They are an integral component of the internal cabinet air guidance system and are adapted accordingly. The filters must be maintained according to the local environmental conditions.

Notice: With IP54 degree of protection, the derating factors for the output current must be observed.

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

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

M60

Additional shock protection

The converter cabinet units are designed as standard according to BGV A3. Option **M60** provides additional covers (outside arm's reach) in the vicinity of the AC busbars and above the power unit (can only be selected as an option with converters up to 250 kW in the 400 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).

Description of the options (continued)

M66

Marine version

For compliance with the requirements of the classification institutes:

- 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 has degree of protection IP23 (**M23** option) and includes a cabinet anti-condensation heater (**L55** option). To attach the drive converter to the ship's deck, a welding frame (5 mm high) is supplied separately.

Note: M66 cannot be combined with options **M21**, **M23** and **L55**. Individual certification is additionally required if the converter is used for a safety-relevant drive on the ship (see options **E11** to **E71**).

M70

EMC shield bus (cable connection from below)

The EMC shield bus is used to connect shielded power cables for the line supply and motor feeder cables. With the options **M13** and **M78**, the EMC shield bus is already included as standard for the connection busbars underneath the roof section.

M78

Motor connection from above

The control cabinet is provided with an additional roof section for a motor connection from above. The connecting lugs for the power cables, the clamping bar for mechanically securing the cables, an EMC shield bus, and a PE busbar are located inside the roof section.

This increases the cabinet height by 405 mm. The busbars for connection from above are fully mounted when the cabinet is delivered. For transport reasons, the roof sections are delivered separately and must be fitted on site. Crane transport assemblies (option **M90**) can still be used. However, they must be removed on site before the roof sections can be installed. Use of rope spreaders should be considered in the case of small crane hook heights.

An undrilled aluminum mounting plate (5 mm thick) is provided in the roof section for feeding in the cables. Depending on the number of cables and the cross-sections used, holes for attaching cable glands for feeding in the cables must be drilled in this mounting plate on site.

Note: The control cables are still connected from below. Option **M78** eliminates the lugs, provided as standard, to connect the motor from below.

The degree of protection of the roof sections is IP21. In combination with options **M23**, **M43** and **M54**, additional plastic ventilation grilles and filter elements are provided.

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

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

M90

Crane transport assembly (top-mounted)

In the case of single cabinets up to a width of 600 mm, transport eyebolts are provided to transport the unit by crane. For cabinet widths of 800 mm and wider, transport rails are used.

T58, T60, T80

Rating plate data

The standard version of the rating plate is English/German. A rating plate in another language can be selected by specifying the following option order codes.

Order code	Rating plate language
T58	English / French
T60	English / Spanish
T80	English / Italian

Y09

Special cabinet paint coating

The converter cabinet units are painted with RAL 7035 as standard. The special paint finish must be stated in plain text in the order. All RAL colors which are available as powder coatings can be selected. If options such as cable-marshaling compartment (order code **M07**), top or drip protection covers (order code **M21**), roof sections (order codes **M23/M43/M54**) or cable connection from above (order codes **M13/M78**) are ordered for the converter cabinet units, they will also be supplied in the paint finish stated in the order. The molded plastic parts (e.g. ventilation grilles) are colored RAL 7035 and cannot be painted.

SINAMICS S150 Converter Cabinet Units

Line-side components

Overview

The fuses specified below are the recommended types for protecting the unit on the low-voltage distribution panel. If option **L26** was selected for SINAMICS S150 with rated input currents < 800 A, then the semiconductor protection is already integrated in the unit. For units > 800 A, this function is realized by the circuit breaker provided as standard. In this case, a **3NA** fuse can be used in the distribution system. If option **L26** has not

been selected for units < 800 A, then we strongly advise that **3NE** fuses are used. ¹⁾

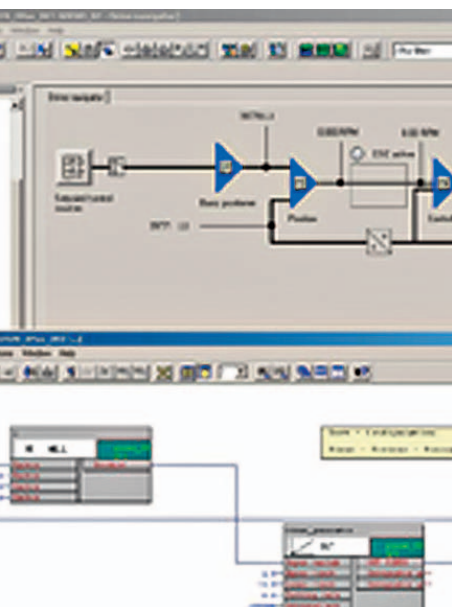
Further information on the listed fuses and circuit breakers can be found in Catalogs LV 1 and LV 1 T.

Type rating		Drive converter SINAMICS S150	Cable protection fuse in systems with fuse switch disconnector			Cable protection fuse (incl. semiconductor protection) in systems without fuse switch disconnector		
at 50 Hz 400 V, 500 V or 690 V	at 60 Hz 460 V or 575 V			Rated current			Rated current	
kW	hp	6SL3710-...	Order No.	A	Frame size acc. to DIN 43620-1	Order No.	A	Frame size acc. to DIN 43620-1
Line voltage 380 ... 480 V 3 AC								
110	150	7LE32-1AA0	3NA3 252	315	2	3NE1 230-2	315	1
132	200	7LE32-6AA0	3NA3 254	355	2	3NE1 331-2	350	2
160	250	7LE33-1AA0	3NA3 365	500	3	3NE1 334-2	500	2
200	300	7LE33-8AA0	3NA3 365	500	3	3NE1 334-2	500	2
250	400	7LE35-0AA0	3NA3 372	630	3	3NE1 436-2	630	3
315	500	7LE36-1AA0	3NA3 475	800	4	3NE1 438-2	800	3
400	600	7LE37-5AA0	3NA3 475	800	4	3NE1 448-2	850	3
450	700	7LE38-4AA0	-	-	-	Circuit breaker as standard		
560	800	7LE41-0AA0	-	-	-	Circuit breaker as standard		
710	1000	7LE41-2AA0	-	-	-	Circuit breaker as standard		
800	1000	7LE41-4AA0	-	-	-	Circuit breaker as standard		
Line voltage 500 ... 690 V 3 AC								
75	75	7LG28-5AA0	3NA3 132-6	125	1	3NE1 022-2	125	00
90	75	7LG31-0AA0	3NA3 132-6	125	1	3NE1 022-2	125	00
110	100	7LG31-2AA0	3NA3 136-6	160	1	3NE1 224-2	160	1
132	150	7LG31-5AA0	3NA3 240-6	200	2	3NE1 225-2	200	1
160	150	7LG31-8AA0	3NA3 244-6	250	2	3NE1 227-2	250	1
200	200	7LG32-2AA0	3NA3 252-6	315	2	3NE1 230-2	315	1
250	250	7LG32-6AA0	3NA3 354-6	355	3	3NE1 331-2	350	2
315	300	7LG33-3AA0	3NA3 365-6	500	3	3NE1 334-2	500	2
400	400	7LG34-1AA0	3NA3 365-6	500	3	3NE1 334-2	500	2
450	450	7LG34-7AA0	3NA3 352-6	2x315	2	3NE1 435-2	560	3
560	600	7LG35-8AA0	3NA3 354-6	2x355	3	3NE1 447-2	670	3
710	700	7LG37-4AA0	3NA3 365-6	2x500	3	3NE1 448-2	850	3
800	800	7LG38-1AA0	-	-	-	Circuit breaker as standard		
900	900	7LG38-8AA0	-	-	-	Circuit breaker as standard		
1000	1000	7LG41-0AA0	-	-	-	Circuit breaker as standard		
1200	1250	7LG41-3AA0	-	-	-	Circuit breaker as standard		

¹⁾ The double function fuses (3NE1.) with duty class gS 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.

- super fast
- adapted to the limit current integral of the semiconductor
- lower arc voltage
- improved current limiting (lower let-through values).

Tools and configuration



5/2

Engineering Software

5/2

SIZER configuration tool

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STARTER commissioning tool

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Drive Control Chart (DCC)

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Drive ES Engineering System

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Communication

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Overview

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PROFIBUS

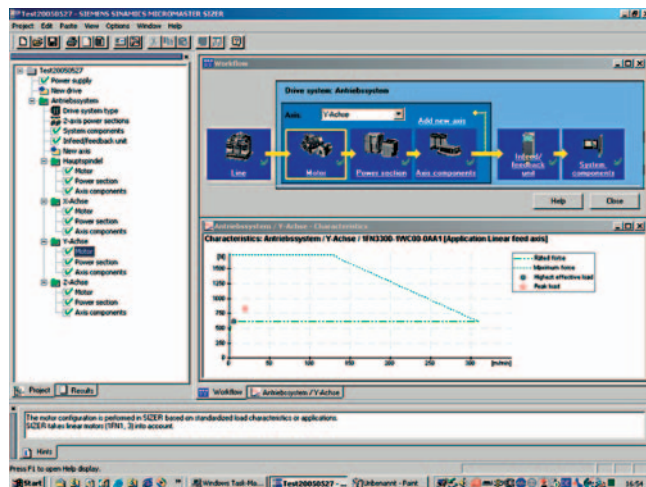
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PROFINET

5/11

PROFIdrive

Overview



The SIZER configuration tool provides an easy-to-use means of configuring the SINAMICS and MICROMASTER 4 drive families, as well as the SINUMERIK solution line CNC and SIMOTION Motion Control system. It provides support in the technical planning of the hardware and firmware components required to perform a specific drive task. It covers the full range of operations required to configure a complete drive system, from simple single drives to complex multi-axis applications.

SIZER supports all of the engineering steps in one workflow:

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

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

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

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

The configuration process produces the following results:

- A parts list of the required components (export to Excel, use of the Excel data sheet for import to VSR)
- Technical data of the system
- Characteristic curves
- Information about harmonic effects on the supply
- Location diagram of drive and control components and dimension drawings of the 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, which provides the following information:

- Detailed technical data
- 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

Programming device or PC with Pentium II 400 MHz (Windows 2000),

Pentium III 500 MHz (Windows XP Professional)

256 MB RAM (512 MB RAM 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

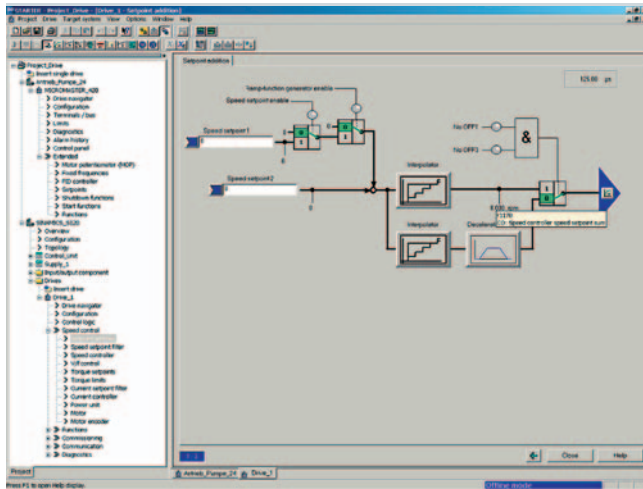
Windows 2000 SP2 / XP Professional SP1 / XP Home Edition SP1

Microsoft Internet Explorer 5.5 SP2

Selection and ordering data

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

Overview



The user-friendly STARTER commissioning tool can be used for:

- Commissioning,
- Optimizing and
- Diagnostics

This software can be operated either as a standalone PC application or can be integrated into the SCOUT engineering system (on SIMOTION) or STEP 7 (with Drive ES Basic). The basic functions and handling are the same in both cases.

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

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

Beginners are supported by 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 ensures that even though only a small number of parameter settings have been made, the drive configuration has already progressed far enough to permit axis movement.

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

Diagnostics functions provide information about:

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

Performance features

- Easy to use: Only a small number of settings need to be made for successful first commissioning: Axis turning
- Solution-oriented 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

Minimum hardware and software requirements

Programming device or PC with Pentium II 400 MHz (Windows 2000),
Pentium III 500 MHz (Windows XP Professional)

512 MB RAM (1 GB RAM recommended)

Monitor resolution 1024 × 768 pixels

Windows 2000 SP3, SP4; Windows 2003 Server SP1;
Windows XP Professional SP1, SP2

Microsoft Internet Explorer V5.0.1 or higher

Integration

The CU320 Control Unit in the SINAMICS S120/SINAMICS S150 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

Description	Order No.
STARTER commissioning tool for SINAMICS and MICROMASTER English/French/German/Italian/Spanish	6SL3072-0AA00-0AG0
Optional package Drive Control Chart (DCC) for SINAMICS English/French/German/Italian/Spanish single-user 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 communications board CP 5512 (PCMCIA type 2 card + adapter with 9-pin SUB-D socket for connection to PROFIBUS. For MS Windows 2000/XP Professional and PCMCIA 32)	6GK1551-2AA00
Connecting cable between CP 5512 and PROFIBUS	6ES7901-4BD00-0XA0

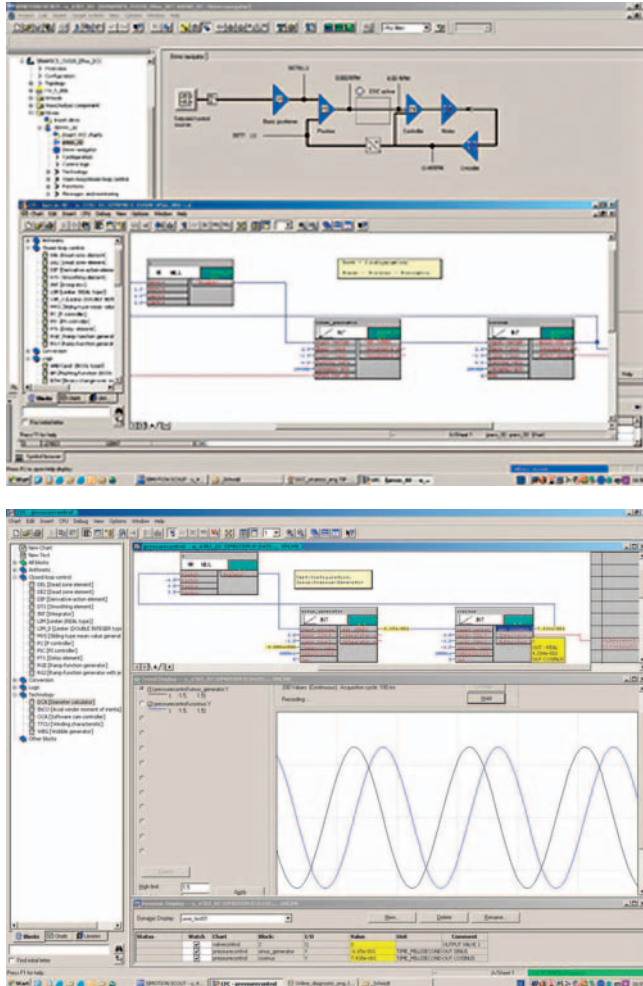
Further information

The STARTER commissioning tool is also available on the Internet at

<http://support.automation.siemens.com/WW/view/en/10804985/133100>

Overview

Graphical configuring and expansion of the device functionality by means of available closed-loop control, arithmetic, and logic function blocks



Drive Control Chart (DCC) allows for drive-related automation and process tasks to be accomplished directly in the SINAMICS drive system or Motion Control System SIMOTION. The ability to process directly in the drive supports the implementation of modular machine concepts and results in an increase of the complete machine performance. DCC has no restriction with regard to the number of usable functions; this is only limited by the performance capability of the target platform.

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.

The open-loop and closed-loop control functionality is defined by using multi-instance-enabled blocks (Drive Control Blocks (DCBs)) from a pre-defined library (DCB library) that are selected and graphically linked by dragging and dropping. Test and diagnostic functions allow verification of program behavior or the identification of causes in the event of faults.

The block library encompasses a large selection of technology, arithmetic and logic function blocks, as well as comprehensive open-loop and closed-loop control functions.

For combining, analyzing and acquiring binary signals, all commonly used logic functions are available for selection (AND, XOR, on/off delay, RS flipflop, counter, etc.). Diverse arithmetic functions such as absolute-value generation, dividers and minimum/maximum analysis are available for monitoring and evaluating numeric variables. In addition to the automatic speed control, axial winder functions, closed-loop PI controllers, ramp function generators or wobble generators can be configured simply and without problems.

Almost unlimited programming of control structures is possible in conjunction with the Motion Control System SIMOTION. These can be combined with other program sections to form an overall program.

Drive Control Chart for SINAMICS 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 for the application requirements. On-site processing in the drive supports modular machine concepts and results in increased overall machine performance.

Minimum hardware and software requirements

See the STARTER engineering software, since DCC is installed in association to these programs.

Selection and ordering data

DCC comprises the graphical configuring tool (DCC Editor) and the block library (DCB Library).

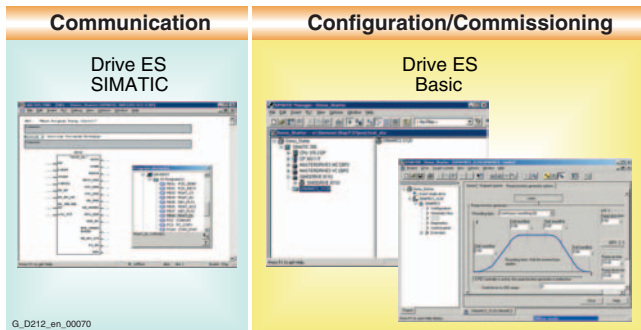
DCC is installed association to STARTER engineering software.

The necessary engineering license for each PC (floating) for DCC is acquired at the same time the order is placed; additional runtime licenses are not required.

DCC can be supplied in two versions: the version for SIMOTION and SINAMICS applications, or the version for SINAMICS applications only.

Description	Order No.
DCC SIMOTION/SINAMICS V2.0 SP1 for STARTER V4.1 SP1 (Single engineering license, with DCC data carrier) DCC editor + DCB libraries for use on SIMOTION V4.1 SP1 and SINAMICS V2.5 SP1 English/French/German/Italian (SIMOTION) English/French/German/Italian/Spanish (SINAMICS)	6AU1810-1JA20-1XA0
DCC SINAMICS V2.0 SP1 for STARTER V4.1 SP1 (Single engineering license, with DCC data carrier) DCC editor + DCB libraries for use on SINAMICS V2.5 SP1 English/French/German/Italian/Spanish	

Overview



Drive ES is the engineering system used to integrate 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 to 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 Basic enables both the automation system and the drives to be handled via the SIMATIC Manager user interface. Drive ES Basic is the starting point for common data 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 commissioning tool STARTER 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, 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 this:
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 a device being replaced
 - Load part parameter sets (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 the Siemens drives in a proxy concept in the PCS 7 Maintenance Station.
- **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 and 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 the Siemens drives in a proxy concept in the PCS 7 Maintenance Station.

For further information please visit us on the Internet at:

<http://www.siemens.com/drivesolutions>

Selection and ordering data

Description	Order No.
Drive ES Basic V5.4 SPx ¹⁾	
• Configuration software for the integration of drives into Totally Integrated Automation	
• Requirement: STEP 7 V 5.3 and higher, SP3	
• Supply format: on CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation	
Single license	6SW1700-5JA00-4AA0
Single license without data carrier, 60 units	6SW1700-5JA00-4AA1
Software Update service for single license	6SW1700-0JA00-0AB2
Update service for single license without data carrier	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 and higher, SP 3	
• Supply format: on 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: on CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation	
Single license, incl. 1 x Runtime license	6SW1700-5JD00-0AA0
Runtime license	6SW1700-5JD00-1AC0
Software Update Service for single license	6SW1700-0JD00-0AB2
Upgrade from V5.x to V6.1	6SW1700-5JD00-3AA4
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: on 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 up-to-date Service Pack (SP).

Communication

Overview

Most production machines use digital field bus systems today. These handle the communication between the control level, the machine control and the executing components, i.e. the sensors and actuators. There are two different types of communication in accordance with the data that is being exchanged: process communication and data communication.

Process communication

In the case of process communication, control data, setpoints and actual values are transferred cyclically between the higher-level controller and the devices at the field level. The quantity of transfer data is comparatively small. For example, a drive only uses between 4 and 32 bytes of process data. The number of connected sensors and actuators is usually specified by the configuration which makes the bus cycle of process communication very constant.

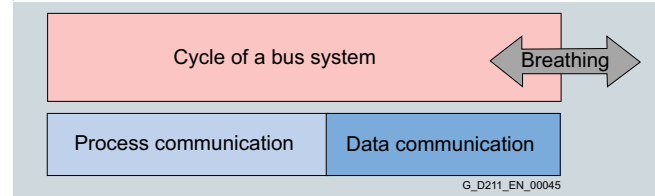
Data communication

Data communication is often required for engineering and is not directly linked to the execution of the production process. Data is sporadically (acyclically) exchanged with connected devices. The volume of this communication can be very large with over 100 bytes per device and communication task.

Cycle time of a bus system

The cycle time of a bus system comprises time segments for process communication and data communication. The overall cycle time is therefore not constant in the case of conventional bus systems, but it varies according to the amount of data communication, the cycle time is much shorter without data communication.

Some say: the bus cycle breathes. However, this breathing is unsuitable for highly accurate applications in drive technology.



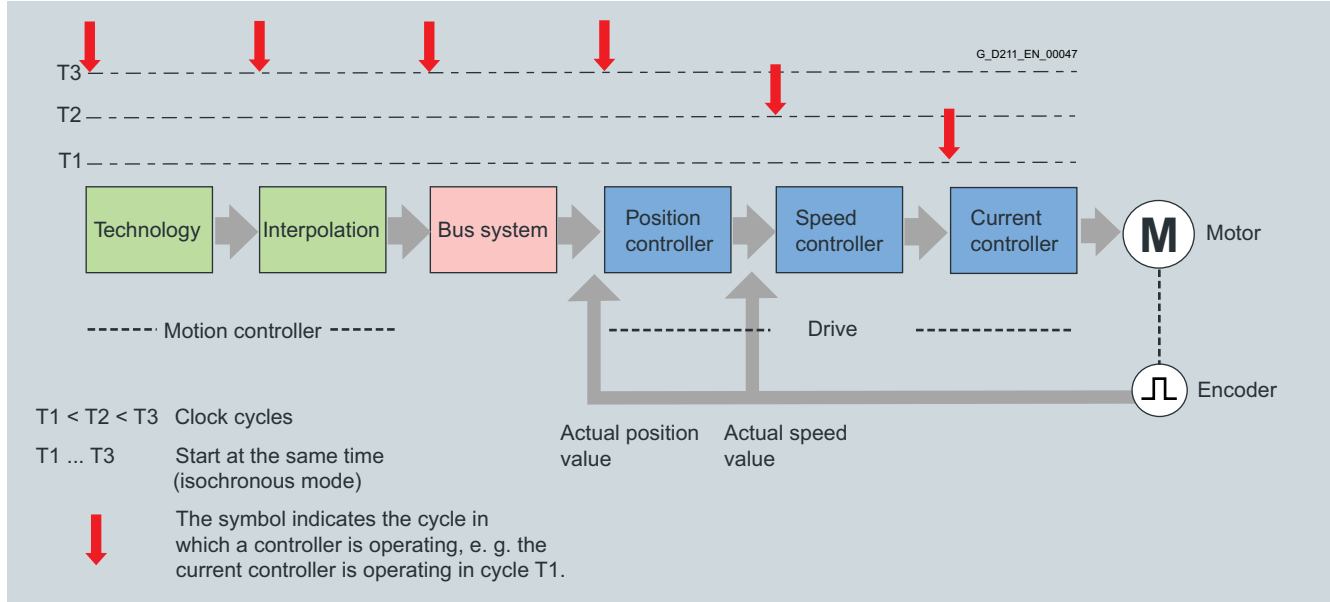
Breathing of the bus cycle

Demands placed on the fieldbus by digital drive controllers

Most modern drives have a digital closed-loop control. This closed-loop control ensures that the controlled variable of the drive, for example the speed or position, are achieved and maintained. This type of digital closed-loop control comprises several intertwined controls (position, speed, current, ...). These must be matched to one another, i.e. they must be synchronized. This synchronization is important to keep the controls stable, to achieve the setpoints quickly and to accurately maintain them.

If some of the components of the closed-loop control are located outside the drive, a bus system must be used to manage the communication between these components. The bus system must then operate synchronously just like closed-loop controls.

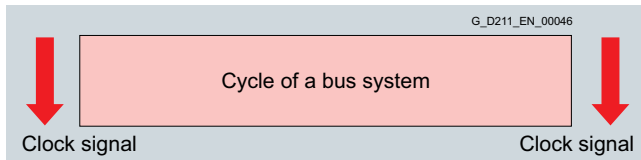
5



Digital drive control: Synchronous operation of all stations

Overview (continued)**The solution: Isochronous mode**

To ensure that all the connected devices can communicate synchronously over the bus system, an additional clock signal is used to synchronize the cycle time of the bus system. This is also known as isochronous mode.



Constant bus cycle due to isochronous mode

For drives in the area of motion control systems, isochronous operation must be extremely quick and very accurate. It ensures that the length of the bus cycle varies only slightly.

This is then no longer referred to as the breathing of the bus cycle (large deviations), but as jitter (small deviations). Permissible values are $< 1 \mu\text{s}$.

Bus systems for Motion Control applications

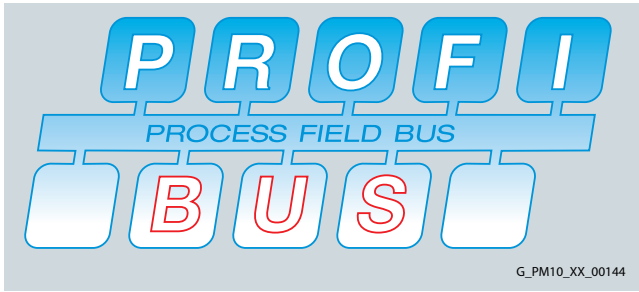
So that a bus system can be used for motion control applications, the bus cycle must be constant and deterministic. Only deviations of less than $1 \mu\text{s}$ (jitter) from bus cycle to bus cycle can be tolerated.

To fulfill these requirements with conventional bus systems, an additional bus system is frequently implemented for highvolume, non-time-critical data communication, such as Industrial Ethernet.

PROFIBUS DP and PROFINET satisfy the requirements for real-time and isochronous real-time communication. PROFINET also supports communication via standard TCP/IP on the network.

Industrial Ethernet – the predecessor of PROFINET – is not suitable for real-time communication, but for data communication using standard IT protocols such as TCP/IP and UDP/IP.

Overview



PROFIBUS – The most successful open fieldbus in automation

The demands of users for an open, vendor-independent communication system resulted in the specification and standardization of the PROFIBUS protocol.

PROFIBUS defines the technical and functional features of a serial fieldbus system with which distributed programmable field controllers of the low-end (sensor/actuator level) to mid performance range (cell level) can be networked.

Standardization according to IEC 61158 / EN 50170 provides future protection for your investment.

Through the conformity and interoperability test performed by the test laboratories authorized by PROFIBUS & PROFINET International (PI) and the certification of the devices by PI, the user can rest assured that quality and functionality are also ensured for multi-vendor installations.

PROFIBUS variants

Three different PROFIBUS variants have been defined to fulfill the wide range of different requirements at the field level:

- **PROFIBUS FMS** – (Fieldbus Message Specification) The universal solution for communication tasks on the field and cell level of the industrial communication hierarchy.
- **PROFIBUS PA** – (Process Automation) The variant for applications in process automation. PROFIBUS PA uses the intrinsically safe transmission technology specified in IEC 61158-2.
- **PROFIBUS DP** – (Distributed Peripherals) This variant, which is optimized for speed, is tailored especially for the communication of automation systems with distributed I/O stations and drives. PROFIBUS DP is characterized by its very short response times and high degree of fault tolerance and replaces cost-intensive parallel signal transmission with 24 V and the measured value transmission with 0/4 ... 20 mA technology.

Design

Bus nodes for PROFIBUS DP

PROFIBUS DP distinguishes between two different master classes and one slave class:

DP master Class 1

The DP master Class 1 is the central component in PROFIBUS DP. The central master station exchanges information with distributed stations (DP slaves) in a fixed, repeated message cycle.

DP master Class 2

Devices of this type are used (programming, configuration or control devices) during start-up, for configuring the DP system, for diagnostics or controlling the plant during normal operation. A DP master Class 2 can be used, for example, to read the input, output, diagnostic and configuration data of the slaves.

DP slave

A DP slave is an I/O device which receives output information or setpoints from the DP master and sends input information, measured values or actual values to the DP master in response.

A DP slave never sends data independently, it must always be prompted by the DP master.

The volume of input and output data depends on the device and can be up to 244 bytes per DP slave and transfer direction.

Function

Functional scope in DP masters and DP slaves

The functional scope can differ between DP masters and DP slaves. The functional scope is different for DP-V0, DP-V1 and DP-V2.

DP-V0 communication functions

The DP-V0 master functions comprise the functions "Configuration", "Parameter Assignment", "Read Diagnostics Data" as well as cyclic reading of input data/actual values and writing output data/setpoints.

DP-V1 communication functions

The DP-V1 function expansions make it possible to perform acyclic read and write functions as well as processing cyclic data communication. This type of slave must be supplied with extensive parameterization data during start-up and during normal operation. These acyclically transferred parameterization data are only rarely changed in comparison to the cyclic setpoints, actual values, and measured values, and are transferred at lower priority in parallel with the cyclic high-speed user data transfer. Detailed diagnostic information can be transferred in the same way.

DP-V2 communication functions

The extended DP-V2 master functions mainly comprise functions for isochronous operation and direct data exchange between DP slaves.

- **Isochronous mode:**
Isochronous mode is implemented by means of an equidistant signal in the bus system. This cyclic, equidistant cycle is sent by the DP master to all bus nodes in the form of a Global Control Telegram. Master and slaves can then synchronize their applications with this signal. The signal jitter between cycles is less than 1 μ s.
- **Slave-to-slave communication:**
The "publisher/subscriber" model is used to implement slave-to-slave communication. Slaves declared as publishers make their input data/actual values and measured values available to other slaves, the subscribers, for reading. This is performed by sending the response message to the master as a broadcast. Slave-to-slave communication is therefore a cyclic process.

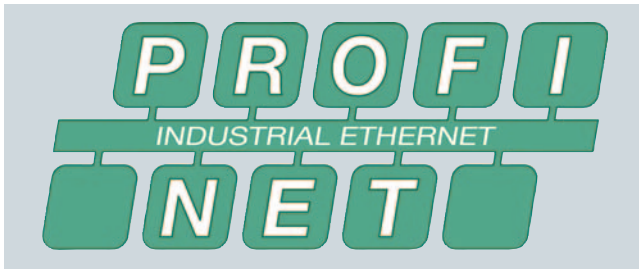
PROFIBUS for SINAMICS and SIMOTION

SINAMICS and SIMOTION use the PROFIBUS-Protokoll PROFIBUS DP.

SINAMICS S120 drives can operate only as DP slaves and support all communication functions. i.e. DP-V0, DP-V1 and DP-V2.

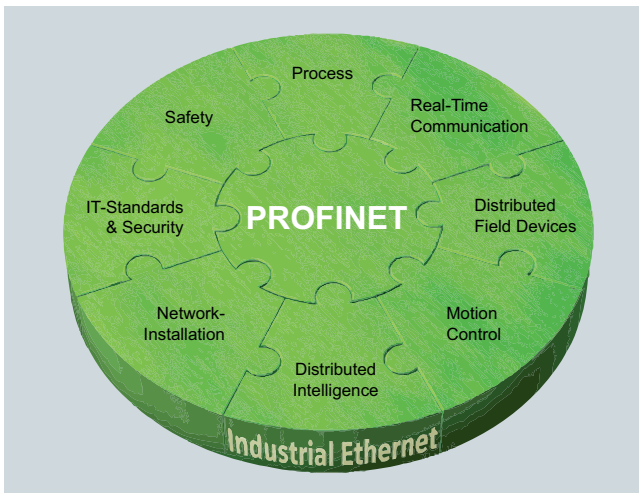
The SIMOTION systems can be used both as DP masters and DP slaves. The DP-V0, DP-V1 and DP-V2 communication functions are supported.

Overview



PROFINET is the innovative and open Industrial Ethernet standard (IEC 61158) for industrial automation. With PROFINET, IT communication, data communication and cyclic process communication are combined on one communication medium. PROFINET thus permits integrated communication from the control level down through to the field level, offers plant-wide engineering and uses well-proven standards from the IT world, such as TCP/IP and UDP.

Existing fieldbus systems such as PROFIBUS can be easily integrated without any modification of existing devices.



PROFINET satisfies all the requirements of industrial automation:

- Industry-standard installation technology
- Real-time capability
- Deterministic behavior
- Integration of distributed field devices
- Simple network administration and diagnostics
- Protection against unauthorized access
- Efficient, cross-vendor engineering as well as
- Isochronous motion control applications.

PROFINET relies on switch technology and has expanded this technology for isochronous real-time applications. Switch technology enables the network topology to be optimized to the requirements of the machine. Collisions are prevented allowing optimal data throughput.

Function

PROFINET communication

Data communication

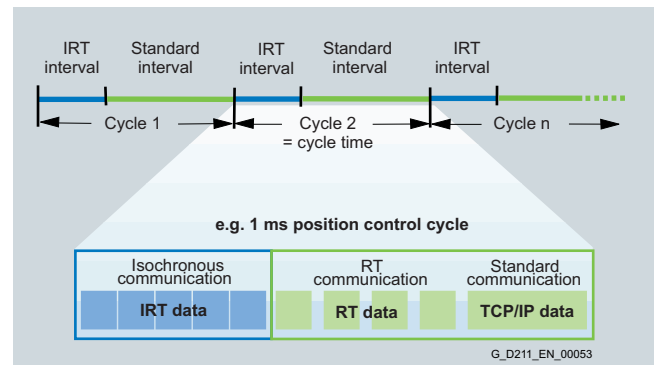
PROFINET uses standard TCP/IP for non-time-critical data communication, e.g. for parameter assignment, configuration and diagnostics.

Process communication/Real-time communication

Real-time communication for process data transfer and nontime-critical data communication is performed on the same cable in the case of PROFINET IO. PROFINET IO offers the following performance levels for real-time communication:

- **Real-Time (RT):**
RT uses the option of prioritizing the communication stack of the bus nodes. This permits high-performance data transmission with standard network components.
- **Isochronous Real-Time (IRT):**
IRT permits strict deterministic, cyclic data transmission with short response times and minimum jitter for high-performance motion control applications. This feature is implemented with a special ASIC, the ERTEC (Enhanced Real Time Ethernet Controller), in the corresponding interfaces (switch integrated into device) or network components (switch).

In PROFINET, the communication cycle is subdivided into different, time-specific intervals. The first interval is used for isochronous real-time communication (IRT), followed by real-time communication (RT) and standard TCP/IP communication. The temporal sequence of the individual messages for each network section can be calculated with a special algorithm which takes the topology into account. This permits a switch to forward the IRT messages without delay from the input port to the specified output port and then to the target device.



Communication PROFINET

Function (continued)

Device classes for PROFINET IO

PROFINET IO recognizes several different device classes within a PROFINET IO system:

IO Supervisor

An IO Supervisor is typically an engineering station that is granted time-limited access to the field devices for parameterization, commissioning or diagnostics. Engineering data is transferred over the standard TCP/IP channel of PROFINET IO.

IO Controller

An IO Controller is typically a programmable logic controller (PLC) or a motion control system, e.g. SIMATIC S7 or SIMOTION. The IO Controller transmits control signals and setpoints to the IO Devices that are assigned to it and reads actual values and any alarms from the subordinate IO Devices. Communication is performed between the IO Controller and the IO Devices – depending on the requirements of the application – in real-time (RT) or isochronous real-time (IRT).

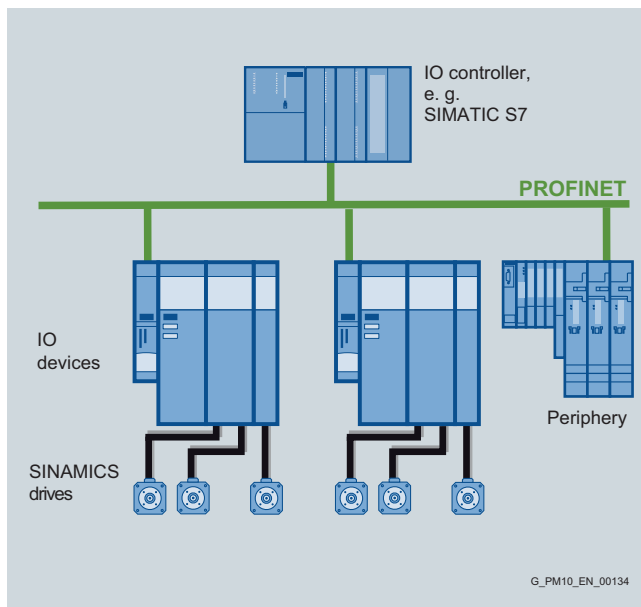
IO Device

IO Devices are typically distributed I/O systems and drives, such as SIMATIC ET 200S and SINAMICS S120. IO Devices receive control signals and setpoints from a higher-level IO Controller and represent the direct interface to process. They send actual values to the higher-level IO Controller so that it can update its internal process image.

Device concept for a PROFINET IO system

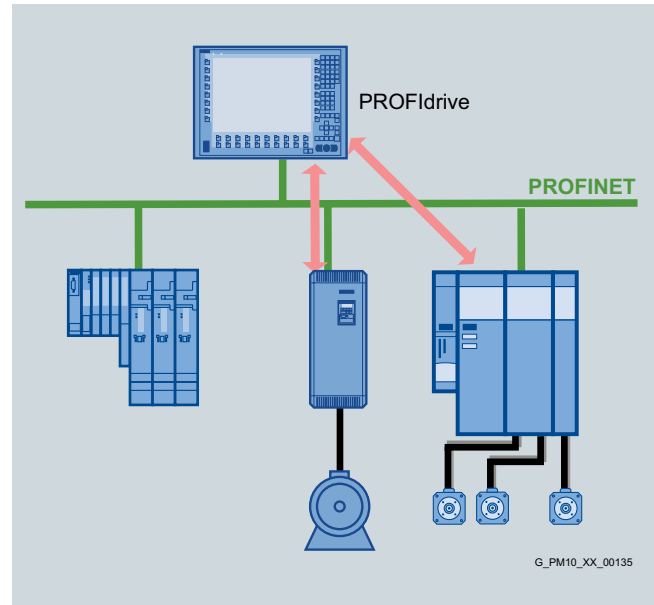
A PROFINET IO System comprises in the simplest case, one IO Controller and several IO Devices that are assigned to it. The IO Devices are initialized and parameterized by the IO Controller on startup. The controller and its devices together constitute a PROFINET I/O System (compare master-slave system for PROFIBUS).

The IO Controller updates its internal process image via cyclic process communications with the assigned IO Devices. The process image is updated cyclically in real-time (RT, devices are typically distributed I/O devices) or isochronous real-time (IRT, devices are typically servo drives) depending on requirements and device characteristics. In addition, PROFINET permits communications between controllers and devices of different I/O systems.



PROFIdrive – The standardized drive profile for PROFIBUS and PROFINET

The functional interface between the controller and the SINAMICS drives for PROFINET and PROFIBUS is defined by the PROFIdrive drive profile V4 of PROFIBUS International. It is not necessary to change a user program to transfer from PROFIBUS to PROFINET.



PROFINET IO with RT: The right choice for standard drive applications

With typical cycle times between 4 ms and 10 ms, PROFINET IO with RT offers the same performance characteristics as PROFIBUS as regards cyclic data transmission.

Thus all standard drive applications of PROFIdrive application categories 1 to 3 can be automated. These drive applications are characterized by specified speed, torque and current setpoints, or by target positions, which do not have to be linked isochronously.

Note: In the case of real-time communication (RT), the process data can also be transferred wirelessly using wireless LAN products.

PROFINET IO with IRT: The right choice for demanding motion control applications in isochronous mode

In this case, a motion control system (e.g. SIMOTION) controls or synchronizes axes via PROFINET. This requires cyclic, isochronous data exchange with the drives where the following criteria must be met:

- Synchronization of the control-loop pulses with the bus cycle
- Closing of the control loops over the bus
- Time-synchronized acquisition of the actual position values
- Time-synchronized activation of the setpoints

PROFINET IO with IRT fulfills these requirements. By configuring the application, e.g. synchronous operation of two axes, the IRT messages are determined implicitly and the corresponding configuration data is generated.

Overview***PROFIDRIVE – The standardized drive profile for PROFIBUS and PROFINET***

PROFIdrive defines the device behavior and the procedure internal drive data for electrical drives on PROFIBUS and PROFINET, from simple frequency converters up to high-performance servo controllers.

It contains a detailed description of how the communication functions "slave-to-slave communication", "constant bus cycle time" and "isochronous operation" are used for drive applications. In addition, it clearly specifies all device characteristics which influence interfaces connected to controller over PROFIBUS or PROFINET. This includes the sequence control, encoder interface, standardization of values, definition of standard messages, access to drive parameters, and more.

The PROFIdrive profile supports both central as well as distributed Motion Control concepts.

What are profiles?

Profiles specify specific properties and responses for devices and systems in automation. In this manner, manufacturers and users pursue the goal of defining common standards. Devices and systems that comply with a multi-vendor profile can interoperate on a fieldbus and can be operated interchangeably to a certain extent.

Do different profile types exist?

A distinction is made between application profiles (general or specific) and system profiles:

- Application profiles (also known as device profiles) mainly refer to devices (drives) and contain an agreed selection of bus communication modes, as well as specific device applications.
- System profiles describe system classes and include the master functionality, program interfaces and integration methods.

Is IPROFIdrive future-proof?

PROFIdrive has been specified by PROFIBUS and PROFINET International and has been laid down in IEC 61800-7 as a future-proof standard.

The basic philosophy: Keep it simple

The PROFIdrive profile tries to keep the drive interface as simple as possible and free from technology functions. This philosophy ensures that reference models, as well as the functionality and performance of the PROFIBUS/PROFINET master, have no or very little influence on the drive interface.

One drive profile – Different application categories

The integration of drives into automation solutions depends heavily on the drive task. To cover the extensive range of drive applications from the most simple frequency converter up to highly dynamic, synchronized multi-axis systems with a single profile, PROFIdrive defines six application categories which cover most drive applications:

- Category 1 – Standard Drives (such as pumps, fans, stirring units, etc.)
- Category 2 – Standard Drives with technology functions
- Category 3 – Positioning Drives
- **Category 4 – Motion control drives with central, higher-level motion control intelligence and the patented "Dynamic Servo Control" position control concept**
- Category 5 – Motion control drives with central, higher-level motion control intelligence and position setpoint interface
- Category 6 – Motion control drives with distributed motion control intelligence integrated in the drives

Design

The PROFdrive device model

PROFdrive defines a device model based on function modules which cooperate in the device and generate the intelligence of the drive system. These modules have objects assigned to them which are described in the profile and are defined with respect to their functions. The overall functionality of a drive is therefore described through the sum of its parameters.

In contrast to other drive profiles, PROFdrive defines only the access mechanisms to the parameters as well as a subset of profile parameters (about 30) such as the fault buffer, drive control and device identification.

All other parameters are vendor-specific which gives drive manufacturers great flexibility with respect to implementing control functions. The elements of a parameter are accessed acyclically over data records.

As a communication protocol, PROFdrive uses DP-V0, DP-V1, and the DP-V2 expansions for PROFIBUS including the functions "Slave-to-Slave Communication" and "Isochronous Operation", or PROFINET IO with real-time classes RT and IRT. In SIMOTION the drive interface has been implemented according to the PROFdrive V4 profile and application categories 1 to 4 (category 4 with and without DSC) and is simply referred to as the PROFdrive interface below.

PROFdrive for Motion Control

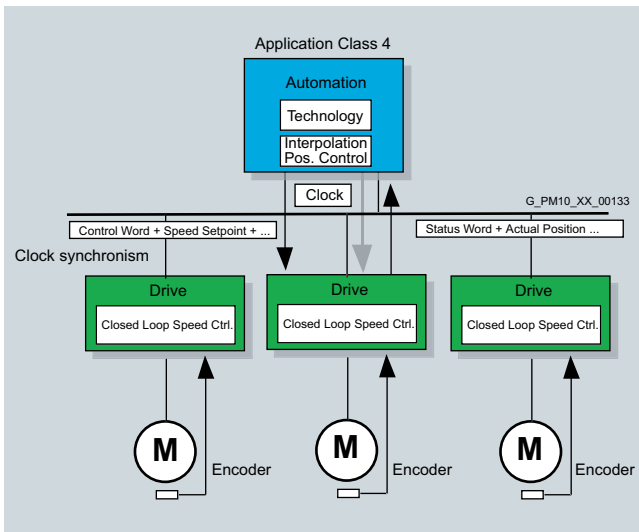
Utilization category 4 is the most important category for highly dynamic and highly complex Motion Control tasks. This application category describes in detail the master/slave relationship between the controller and the drives which are connected to each other over PROFIBUS and PROFINET.

The DSC (Dynamic Servo Control) function significantly improves the dynamic response and stiffness of the position control circuit by minimizing the dead times which usually occur for speed setpoint interfaces with an additional, relatively simple feedback network in the drive. The position control circuit is closed in the drive which permits very fast position control cycles (e.g. 125 μ s for SINAMICS S120) and thus limits dead times exclusively to the control behavior.

PROFdrive bei SIMOTION und SINAMICS

In SIMOTION and SINAMICS, the drive interface has been implemented according to the PROFdrive profile V4 and application categories 1 to 4 (category 4 with and without DSC) and is referred to below as the PROFdrive interface.

When SINAMICS S120 is used in SIMOTION, application category 4 with DSC is used by default.





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Training

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The practical experience of our trainers enables them to pass on theoretical matter in a plausible manner. But since theory has its grey areas, 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.

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We are only a short distance away. You can find us at more than 50 locations in Germany, and worldwide in 62 countries. 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.

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Blended learning is understood to be the combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a self-teach program as preparation or follow-up. Additional effect: Reduced traveling costs and periods of absence.



Training package for SINAMICS S120/S150 drive system

This provides an overview of the training courses available for the SINAMICS S120/S150 drive system.

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

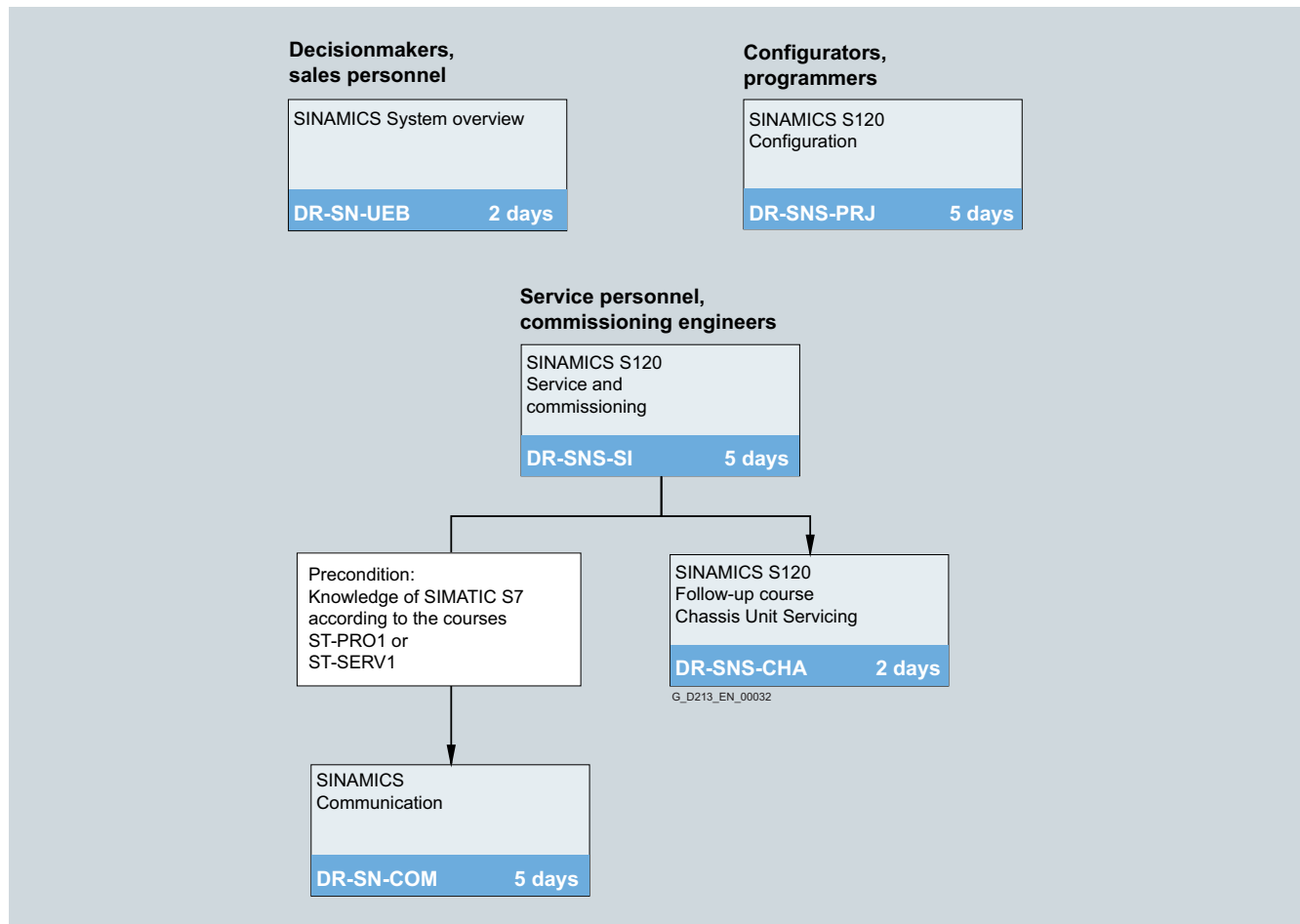
The intensive and direct training on the drive system is carried out in small groups.

More information on course contents and dates is available on the Internet at: <http://www.siemens.com/sitrain>

Training courses for SINAMICS S120

Title	Target group						Duration	Course code
	Decision-makers, sales personnel	Project managers, project assistants	Programmers	Commissioning engineers, configurators	Service personnel	Maintenance personnel		
SINAMICS system overview	✓	✓					2 days	DR-SN-UEB
SINAMICS S120 Configuration		✓		✓			5 days	DR-SNS-PRJ
SINAMICS S120 Service and Commissioning			✓	✓	✓	✓	5 days	DR-SNS-SI
SINAMICS S120 follow-up course Chassis Unit Servicing				✓	✓	✓	2 days	DR-SNS-CHA
SINAMICS communication			✓	✓	✓		5 days	DR-SN-COM

SINAMICS S120 training program



Taining courses

Training courses for SINAMICS G150/G130/S150

Title	Target group						Duration	Course code
	Decision-makers, sales personnel	Project managers, project assistants	Commissioning engineers, configurators	Service personnel	Operators, users	Maintenance personnel		
SINAMICS system overview	✓	✓					2 days	DR-SN-UEB
SINAMICS G150/G130/S150 Configuration		✓	✓				3 days	DR-SNG-PRJ
SINAMICS G150/G130/S150 advanced servicing course on chassis/cabinet units			✓	✓		✓	5 days	DR-SNG-EXP
SINAMICS G150/G130/S150 Operator course					✓	✓	2 days	DR-SNG-SI
SINAMICS refresher practical course			✓	✓		✓	1 day	DR-SNG-PR

SINAMICS G150/G130/S150 training program

Decision makers, sales personnel

SINAMICS system overview

DR-SN-UEB 2 days

Configurators, project assistants

SINAMICS G150/G130/S150 Configuration

DR-SNG-PRJ 3 days

Operators, users

SINAMICS G150/G130/S150 Operator course

DR-SNG-SI 2 days

Service personnel, commissioning engineers

SINAMICS G150/G130/S150 Advanced servicing course on chassis/cabinet units

DR-SNG-EXP 5 days

Precondition:
Knowledge of SIMATIC S7 according to the courses ST-PRO1 or ST-SERV1

SINAMICS Communication

DR-SN-COM 3 days

SINAMICS Refresher practical course

DR-SNG-PR 1 day

G_D213_EN_00086



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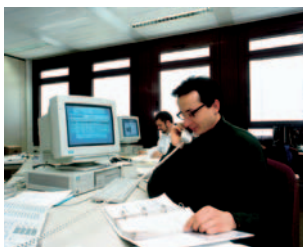
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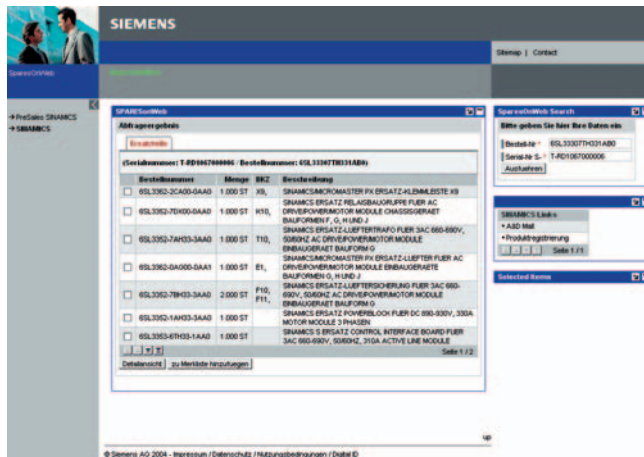
To guarantee our servicing performance (availability of spare parts, hotline function, readiness of personnel), we offer you product registration for our SINAMICS drive equipment. Feedback on the final position (installation/operation location) and naming of contact partners allow a servicing response without delay. The feedback can be made either using a feedback form (enclosed with each converter) or over the internet.

<http://www.siemens.com/req>

¹⁾ For country-specific telephone numbers go to our Internet site at:
<http://www.siemens.com/automation/service&support>

Overview

SPARESonWeb - Online spare parts catalog



SPARESonWeb is a web-based tool for selecting the spare parts available for the SINAMICS system. After you have registered and entered the serial number and order number, the spare parts available for the relevant unit are displayed.

The delivery state for specific orders can be displayed for all shipped SINAMICS products.

<http://workplace.automation.siemens.com/sparesonweb>

Documentation***S120 Cabinet Modules & S150 Drive Converter Cabinet Units***

The documentation is delivered in PDF format on CD-ROM as standard and consists of the following sections:

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

as well as of equipment-specific documents like circuit diagrams, dimension drawings, arrangement diagrams and terminal diagrams.

Documentation in English/German is supplied as standard with the device.

A CD-ROM containing the STARTER commissioning tool is also included in the scope of delivery.

If one of the languages listed below is required, the corresponding order code should be added when ordering the converter (→ description of the options):

Language	Order code
English/French	D58
English/Spanish	D60
English/Italian	D80

SINAMICS S120 Chassis Units

The manuals must be ordered separately (in the required language and quantities) from the actual equipment.

Information is available in the following formats:

- **Paper version**, printed copy
- **PDF file** available on Internet as DOConWEB - application with 'search all documents' function
<http://www.siemens.com/automation/doconweb>

For further information about the availability of publications and languages, go to

<http://www.siemens.com/motioncontrol/docu>

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Glossary

Absolute encoder

After switching on the supply voltage, this position encoder immediately provides the position of the drive as an absolute actual value. For single-turn encoders, the detection range is one turn, whereas multiturn encoders have a detection range of several turns (a typical number is, for example, 4096 turns). If an absolute encoder is used as a position encoder, no search for reference is required after the switch-on and the reference switch (e.g. BERO), which is normally required, not necessary in this case.

There are rotary and linear absolute encoders.

Example of an absolute encoder:

1FK and 1FT motors can be delivered with integrated multiturn absolute encoders with 2048 sinusoidal/cosinusoidal signals per turn, over 4096 turns absolute and → "EnDat protocol".

Active Infeed

Overall functionality of an infeed with → Active Line Module, including the required additional components (filters, switching devices, computing power portion of a → Control Unit, voltage sensing, etc.).

Active Interface Module

This module includes the line-side components required for an → Active Line Module like, for example, the pre-charging input circuit (pre-charging contactors and bypass contactor).

Active Line Module

A controlled, self-commutating feed/feedback unit (with IGBTs in feed/feedback direction) which supplies a constant DC link voltage for the → Motor Modules. The Active Line Module operates together with the → Line reactor as a step-up converter.

Advanced Operator Panel (AOP)

User-friendly, graphics-enabled operator panel measured values displayed in plain text or in a quasi-analog bar display.

Asynchronous (induction) motor

The asynchronous motor is an AC motor whose speed runs "behind" the synchronous speed. Asynchronous motors can be connected to the three-phase system either directly in a star or delta connection or via a converter. In combination with a converter, the asynchronous motor becomes a variable-speed drive system. Other commonly used terms: squirrel-cage motor, cage motor. See also → Synchronous motor.

Automatic restart

Typical applications of the automatic restart: pump/fan/compressor drives working as single drives and often do not provide local control options. The automatic restart function is not used for coordinated drives for continuous material webs and motion control.

The following variants of this function can be set by means of parameters for SINAMICS:

- restart after a power failure if the 24 V electronic supply does not yet exist
- restart after a failure of the 24 V electronic supply
- restart after any shut down on fault

The following actions can be specified via parameters:

- only acknowledgement of the mains failure message (e.g. for multi-motor drives, DC compound)
- ON command upon expiry of the parameterized delay time
- ON command with flying restart

The number of possible restart trials within a parameterizable time can be specified.

It is also possible to activate the → Flying restart function in addition to the automatic restart function to ensure a bumpless switching to a possibly still rotating motor.

Auxiliary Power Supply Module (APSM)

Auxiliary Power Supply Modules supply power to the auxiliary voltage busbar system of the SINAMICS S120 Cabinet Modules. Fans of the SINAMICS S120 devices and electronics modules with external 24 V DC voltage are connected to these modules, for example.

Basic Line Filter

In combination with a line reactor, line filters limit the conducted electromagnetic interference emission in accordance with EMC legislation.

Basic Line Module

Unregulated infeed unit (diode bridge or thyristor bridge, without power feedback) for rectifying the line voltage of the → DC link.

Basic Operator Panel

Simple small operator panel for plugging on a SINAMICS → Control Unit with numeric display and some keys.

BOP20 is part of the SINAMICS product range.

Blocksize

Volume-optimized, cubic construction of a drive unit. Mostly used for operating a motor.

See → Booksize, → Chassis unit.

Booksize

Book-shaped construction of the components of a drive group appropriate for back-mounting. Designed primarily for operating several → Motors.

Booksize Base Cabinet

Booksize Base Cabinets are cabinet modules for holding devices in Booksize design. They include all cabinet-side components for operating the devices. Booksize Base Cabinets are always supplied together with the required devices in Booksize design as complete Booksize Cabinet Kits as part of the SINAMICS S120 Cabinet Modules.

Booksize Cabinet Kit

Motor Modules in Booksize design are installed as Booksize Cabinet Kits in Booksize Base Cabinets at the factory and supplied as complete unit together with the cabinet-side connection components. A Cabinet Kit contains all the necessary components required for operating a SINAMICS S120 Booksize.

Brake control

Software function specifying the instant when an existing mechanical holding brake or operational brake has to be applied; either within the framework of a load cycle in the case of a momentary standstill, or in the case of a fault.

Brake Relay

Component with a 24 V relay for brake control. Brakes can be switched using this relay with a rating of 24 V DC/12 A or 440 V AC/12 A.

Braking Module

Electronic switch or chopper (brake chopper), which connects a → Braking resistor with a specific pulse/pause ratio to the DC link voltage to convert regenerative (braking) energy to heat energy and to finally restrict the DC link voltage to permissible values. For SINAMICS, no braking resistor is incorporated in the braking module. It must be mounted outside the braking module.

Braking power

Regenerative power injected into the → DC link by one or several → Motor Modules, e.g. when lowering a load or decelerating a motor.

See → Braking resistor.

Braking resistor

Resistor which reduces the excess energy in the → DC link. The resistor is connected to a → Braking Module.

In this way, the resulting thermal loss is displaced outside the cabinet.

See → Braking power.

Capacitor Module

The module is used for increasing and buffering the DC link capacity.

It can be used for compensating a short-time power failure or for intermediate storage of the braking energy.

CBC10 Communication Board

Module for connection to a bus system according to the CAN protocol (Controller Area Network). The associated driver software fulfills the standards of the following CANopen specifications 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
- Signals the operating state according to DSP 305

CBE20 Communication Board

A module for operation with → PROFINET (the open Industrial Ethernet standard of PROFIBUS International for automation systems). PROFINET IO with IRT (Isochronous Real Time) and PROFINET IO with RT (Real Time) are supported. The module is plugged into the Option Slot of a → Control Unit.

Central Braking Module (CBM)

The CBM limits the DC link voltage at a central location in the drive line-up when the motors are operating in generator mode and energy recovery to the supply system is not possible.

Chassis unit

In the upper output power range, chassis units are mostly used for incorporation in control panels. The components are mounted on supporting panels or frames.

See → Booksize → Blocksize.

Glossary

Cold plate

The cold plate is a flat aluminum plate that is used as a thermal interface by the SINAMICS power modules with the Cooling method → Cold plate cooling.

Cold plate cooling

Cold plate cooling is a Cooling method for SINAMICS power modules that is only available currently for the → Booksize units. The cold plate is fixed to the rear of the unit instead of the normal ribbed heat sink.

Command data set

Parameter data set consisting of the binector inputs (e.g. for control commands) and the connector inputs (e.g. for setpoints).

The individual data sets are represented as indexed parameters. The changeover is performed via input signals.

The appropriate parameterization of several command data sets and the changeover of the data sets allows the optional operation of the drive with different preconfigured signal sources.

Communication Board

A module for external communication, e.g. → PROFIBUS, → PROFINET, CAN or Ethernet. It is plugged into the option slot of a → Control Unit.

CompactFlash Card

Memory card for non-volatile storing of the drive software and of the corresponding parameters. The memory card can be plugged into the → Control Unit from outside.

Control Supply Module

24 V power supply module for the electronic circuitry of components in a SINAMICS drive group.

The Control Supply Module is supplied via two inputs: The incoming supply and the → "DC link". The DC link connection ensures that the electronics power supply is buffered in the event of a power failure or voltage dip, thereby enabling emergency retraction and kinetic buffering.

Control Unit

Central control unit: the feedforward and feedback control functions for several SINAMICS → Line Modules and/or → "Motor Modules" are implemented in this module.

DC link

The component of the converter (or converter system) that connects the input current converter (rectifier) and the output current converter (one or more converters).

With voltage source DC link converters like SINAMICS, a constant DC voltage is present in the DC link (rectified line voltage).

Direct measuring system

Position encoder which is connected directly to the moving machine part as well as to the associated evaluation electronics. In the case of linear axes, it is also possible to use linear scales for this purpose.

In many cases, a direct measuring system must be used because the → Motor encoder for position sensing and control does not suit this purpose, e.g. due to excessive elasticity and backlash in the drive train.

Double Motor Module

Two motors can be connected to and operated with a Double Motor Module.

See → Motor Module, → Single Motor Module.

Drive system

A drive system includes all components of a family of products (e.g. SINAMICS) belonging to a drive. A drive system includes components such as → Line Modules, → Motor Modules, → Encoders, → Motors, → Terminal Modules and → Sensor Modules, as well as complementary components such as reactors, filters, lines, etc.

DRIVE-CLiQ

Abbreviation of "Drive Component Link with IQ".

Communication system for connecting the various components of a SINAMICS drive system, such as the → Control Unit, the → Line Modules, the → Motor Modules, the → Motors and speed/position encoders.

The DRIVE-CLiQ hardware is based on the Industrial Ethernet standard and uses twisted-pair lines. The DRIVE-CLiQ line provides the transmitted and received signals and also the +24 V power supply.

Droop

Droop involves making the speed controller artificially "soft" by entering an adjustable percentage of the speed controller output signal with negative sign at the speed controller input. This means that the speed is slightly reduced at higher load torques. The droop function is used to reduce the response to load surges and for certain variations of load sharing control for drives which are coupled with one another through a continuous material web. The / component or the summed output signal can be used as speed output signal. The droop can be switched-on and switched-off using a control command.

Dynamic Servo Control

Dynamic Servo Control (DSC) allows the position actual value to be evaluated in a fast speed control clock cycle directly in the drive. The position reference value (position setpoint) is entered in the position controller clock cycle from the higher-level control via the isochronous → PROFIBUS with → PROFIdrive telegrams.

With sophisticated signal filtering and pre-control, DSC ensures optimum dynamics in the position control loop with a low bus bandwidth load.

DSC allows high control gains to be achieved and therefore a high level of stiffness - for instance to quickly compensate and correct load-related track/path deviations.

Edge modulation

Type of modulation for a drive converter gating unit, where the pulses "chopped" from the DC link voltage do not appear in a fixed time grid. The edges of the output voltage which is generated are formed by several short pulses near the zero crossing, while a wide pulse is generated at the center of every half-wave. This allows a high output voltage roughly approximating to 100 % of the line connection voltage and therefore ensuring good motor utilization.

Electronic rating plate

Each component of the SINAMICS drive system, which is connected via → DRIVE-CLiQ has an electronic rating plate.

This plate can be read out via the → STARTER commissioning tool and provides the following information: type, order number, version, manufacturer, serial number and rated technical data.

Encoder

An encoder is a measuring system capturing actual values for the speed and/or angular/position values and provides them for electronic processing. Depending on the mechanical construction, encoders can be incorporated in the → Motors (→ Motor encoder) or mounted on the external mechanics ("external encoder"). Depending on the individual type of movement, we distinguish between rotary encoders and translatory encoders (e.g. linear encoder). In terms of measured-value provision, we distinguish between → Absolute encoders (code sensors) and → Incremental encoders.

See → Incremental encoder TTL/HTL, → Incremental encoder sin/cos 1 Vpp, → Resolver.

EnDat protocol

Serial transmission protocol for transmitting position/angular actual values from an → Absolute encoder to the drive or positioning control.

The EnDat protocol also allows parameterization and diagnostics of the encoder.

Fault buffer

Once a fault has occurred, the drive enters it in a fault buffer. The fault buffer can be read out via parameters.

Field weakening

The term field weakening designates the reduction of the magnetizing current of an electric motor to further increase the speed upon reaching the rated current.

Flexible response

With this function, the converter can be operated even in case of a voltage dip up to a minimum DC link voltage of approx. 50 % of the rated value (or of the parameterized line connection voltage value). In case of a voltage dip, the maximum output power of the converter decreases analogous to the current line voltage.

In contrast to the "kinetic buffering", a significant speed decrease can be avoided as long as the remaining power is sufficient for operating the drive with the required torque.

Glossary

Flying measurement

When a hardware signal is received, the instantaneous position actual value is saved and, for example, is made available via PROFIBUS. The hardware signal can, for instance, be received from a measuring probe or a print index sensor (mechanical switch, BERO proximity switch or optical sensor). The active edge of the hardware signal can be parameterized (rising, falling or both).

Flying restart

After Power on, the Flying restart function automatically switches a converter to a possibly coasting motor. When switching to the rotating motor, the motor first needs to be magnetized → by an → Asynchronous (induction) motor. For drives without an encoder, a search for the current speed is carried out. Afterwards, the current speed setpoint in the ramp-up generator is set to the current actual speed value. The ramp-up to the definitive speed setpoint is performed from this value. The "flying restart" function may shorten the ramp-up procedure after Power on while the load is still coasting.

Application example:

After a power failure, the Flying restart function ensures that a fan drive can be switched back to the running fan wheel as soon as possible.

See → Automatic restart.

Heat dissipation

The thermal losses are conducted away from the converter and/or motor so that the permissible temperatures are not exceeded.

Hub

Central connecting element in a network based on star connection technology. A hub distributes arriving data packages to all devices connected.

Incremental encoder

Incremental position and speed encoder. In contrast to the → Absolute encoder, this encoder does not output an actual position value signal corresponding to the absolute path, but outputs incremental "delta position or angular signals" instead.

The following three types of incremental encoders are available → Incremental encoder TTL/HTL, → Incremental encoder sin/cos 1 V_{pp} and → Resolver.

Incremental encoder sin/cos 1 V_{pp}

An incremental encoder sin/cos 1 V_{pp} is defined as a high-resolution optical sine/cosine encoder which can, for example, be incorporated in 1FK motors as a → Motor encoder.

As a rule, the following signals are output:

- Two signals displaced by 90 degrees, with respectively 2048 sinusoidal signal periods per revolution as differential signals with a 1 V_{pp} amplitude ("A/B sinusoidal encoder tracks").
- A reference signal (zero pulse) per revolution as a differential signal with a 0.5 V_{pp} amplitude.
- For some types, additionally two sinusoidal signal periods displaced by 90 degrees as differential signals with a 1V_{pp} amplitude ("C/D track").

For determining the actual position or angular value, the zero crossings of the sinusoidal encoder tracks are evaluated first (rough evaluation, e.g. totally 4 x 2048 = 8192 zero crossings per revolution). In addition to this, a fine evaluation can be performed by means of an analog detection of the amplitude. By combining the rough and fine evaluation, resolutions of more than 1,000,000 increments can be achieved per encoder revolution.

Examples of typical sin/cos encoders: ERN1387, ERN1381.

Incremental encoder TTL/HTL

Incremental position and speed measuring encoder (→ Incremental encoder). In most cases, it outputs two pulse chains (tracks) displaced by 90 degrees with rectangular output signals and often additionally one zero pulse per revolution, respectively. The output signals feature TTL levels (in most cases +5 V RS422 differential signals; TTL = Transistor-Transistor Logic) or HTL levels (+15 or +24 V logic level; HTL = High Level Transistor Logic).

Line Connection Module

Line Connection Modules contain the line-side infeed with main circuit breaker and fuse switch disconnect or circuit breaker and provide the connection between the plant power system and the → Line Modules.

Line filter

Line filters are filters in the converter input which protect the network from harmonic loads and/or interference voltages created in the converter.

Line filters can be passive or active filters, for the lower-frequency harmonics (designated with the term line feedback) with 5, 7, 11, 13, etc. times the line frequency, and also filters for high frequency interference voltages from 10 kHz onward (i.e. RI suppression filters).

With SINAMICS, the term line filter only designates passive RI suppression filters.

Line Module

A Line Module is a power component which creates the DC link voltage for one or several → Motor Modules from a three-phase line voltage.

The following three Line Module types are used for SINAMICS:

→ Basic Line Module, → Smart Line Module and → Active Line Module.

Line reactor

Line reactors are used for reducing the line-side harmonic currents and harmonic effects. With the → Active Line Modules, line reactors are used as an additional energy storage.

Line-side power components

Power components arranged between the line and the converter unit, such as line reactors, line filters, line contactors, etc.

Liquid cooling

Liquid cooling is a cooling method for SINAMICS power modules and is only available for the → Chassis units. For this cooling method, a liquid cooler with inlet and outlet nozzles is permanently integrated. The specifications quoted by Siemens AG are applicable to the liquid quality, volumetric flow (quantity of liquid per time unit) and liquid pressure. Liquid cooling can also be retrofitted by the customer in the case of the → Cold plate cooling method (for Booksize).

Motor

For the electric motors which can be driven by SINAMICS, a principle distinction is made between rotary and linear motors with regard to their moving direction, and between synchronous and asynchronous (induction) motors with regard to their electromagnetic operating principle. For SINAMICS, the motors are connected to a → Motor Module.

See → Synchronous motor, → Asynchronous (induction) motor, → Motor encoder.

Motor encoder

An → Encoder integrated in the motor or built on the motor, e.g. → Resolver, → Incremental encoder TTL/HTL or → Incremental encoder sin/cos 1 V_{pp}.

The encoder detects the motor speed and, in the case of synchronous motors, also the rotor position angle (of the commutation angle for the motor currents).

For drives without an additional → Direct measuring system, it is also used as a position encoder for position controlling.

Motor Module

A Motor Module is a power unit (DC-AC inverter) ensuring the power supply for the connected motor.

Power is supplied through the → DC link of the drive group.

A Motor Module must be connected to a → Control Unit via → DRIVE-CLiQ. The open-loop and closed-loop control functions of the Motor Module are stored in the Control Unit.

There are → Single Motor Modules and for Booksize also → Double Motor Modules.

Motor potentiometer

This function is used to simulate an electromechanical motor potentiometer for setpoint input. The setpoint is adjusted via one control command for "higher" and one for "lower".

Motor reactor

Reactor (inductance) in the converter or inverter output for reducing the capacitive charge/discharge currents of long power cables.

Motor with DRIVE-CLiQ

The motors with → DRIVE-CLiQ comprise a motor, encoder and an integrated encoder evaluation system. To operate these motors, a power cable and a → DRIVE-CLiQ cable must be connected to the → Motor Module.

Motor-side power components

Power components arranged between the converter unit and the motor, e.g. output filters, output reactors, etc.

Optimized pulse patterns

Complicated modulation procedure of a converter gating unit, where the voltage pulses are arranged in such a way that the output current has a sinusoidal curve at an optimum approximation. This is of primary importance for achieving a high gate factor and a particularly slow torque ripple.

Power Module

A Power Module is an AC-AC converter, which does not have a built-in → Control Unit.

Glossary

Power supply unit

This component provides electric energy for electric and electronic components.

The power supply can be ensured by a conventional power supply unit available on the market (e.g. SITOP power) or via a → Control Supply Module.

PROFIBUS

Field bus in accordance with the IEC 61158 standard, sections 2 to 6.

PROFIdrive

This PROFIBUS profile was specified for speed- and position-controlled drives by PI (PROFIBUS & PROFINET International).

The PROFIdrive V4 profile is the latest version.

PROFINET

This is an open component-based industrial communication system using Ethernet for distributed automation systems.

Resolver

Mechanically and electrically very robust and cost-efficient → Motor encoder which does not require any incorporated electronics and which operates according to a fully electromagnetic principle: one sine and cosine signal, respectively, are induced in two coils displaced by 90 degrees. The resolver delivers all signals required for speed-controlled operation of the converter or for position control. The number of sine and cosine periods per revolution is equal to the number of pole pairs of the resolver. In the case of a 2-pole resolver, the evaluation electronics may output an additional zero pulse per encoder revolution. This zero pulse ensures a unique assignment of the position information in relation to an encoder revolution. A 2-pole resolver can be used as a single-turn encoder.

2-pole resolvers are suitable for motors with any pole number. In the case of multi-pole resolvers, the pole pair number of the motor and of the resolver are always identical. For this reason, multi-pole resolvers ensure a higher resolution than 2-pole resolvers.

Safe Brake Control

Function associated with → Safety Integrated.

For SINAMICS → Booksize units the motor holding brake is controlled through two channels each with an electronic switch in the +24 V channel and in the ground channel. Both of these channels are monitored. If one of the two channels fails, then this is detected and signaled. For the Booksize drive units, the braking cables are integrated into the power cable.

See → Brake control.

Safe Brake Relay

Certified components for the safe control of a 24 V brake coil.

See → Brake Relay.

Safe standstill

Function "Safe Torque Off" associated with → Safety Integrated (according to the new definition it replaces the term "Safe standstill")

In case of an error or in combination with a machine function, this function is used to safely disconnect the torque-generating energy flow to the motor. This procedure is executed drive-specific and contactless. See → Safety Integrated.

Safe Stop 1 (SS1)

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 independently brakes along a quick stop ramp and automatically activates Safe Torque Off when the parameterized safety delay timer has expired.

Safe Torque Off (STO)

This function is a mechanism that prevents the drive from restarting unexpectedly, in accordance with EN 60204-1, Section 5.4. Thus the drive pulses are deleted and the power supply to the motor is interrupted. The drive is reliably torque-free.

Safety Integrated

These safety functions are integrated into the products and ensure efficient personal and machine protection in accordance with the EC 98/37/EG machinery directive.

By means of the integrated safety functions, the requirements of safety class 3 in accordance with DIN EN ISO 13849-1 (formerly EN 954-1) as well as Performance Level (PL) d and according to IEC 61508 (SIL) 2 can be met in a simple and efficient way.

Sensor Module

Hardware module for evaluating speed/position encoder signals.

Single Motor Module

A Single Motor Module is a → Motor Module to which one single motor can be connected and operated.

See also → Double Motor Module.

Sine-wave filter

The sine-wave filter is connected to the converter or inverter output on the motor side. This filter has been designed for the generation of a converter output voltage with an almost sinusoidal shape.

This method protects motors whose isolation system could be damaged by voltage peaks.

In addition to this, a shielded power cable is not required in many cases.

Sine-wave filters are often required in the chemical industry, e.g. to ensure that the permissible isolation voltage in the motor terminal box is not exceeded.

SIZER

SIZER is a tool for configuring the SINAMICS and MICRO-MASTER drive systems. SIZER assists with the correct technical specifications for the drive systems and selection of the drive components required for the system.

See → STARTER.

Skip frequency band

A skip frequency band is a speed/frequency setpoint range in which the drive must not be operated. The upper and lower limits of the skip frequency band can be parameterized. If a signal value is entered from an external or internal setpoint source within the skip frequency band, this signal value is replaced by one of the skip frequency limits. This function allows for the suppression of undesirable mechanical resonant oscillation by suppressing those speeds which could possibly excite this type of resonant oscillation.

Smart Line Module

Unregulated line infeed/feedback unit with a diode bridge for feeding; stall-protected, line-commutated feedback via IGBTs (Insulated Gate Bipolar Transistor).

The Smart Line Module provides the DC link voltage for the → Motor Module.

SS1

See → Safe Stop 1.

STARTER

The STARTER commissioning tool has been designed for the startup and parameterization of drive units. Moreover, diagnostic functions required for service tasks (e.g. PROFIBUS diagnostics, function generator, trace) can be executed.

See → SIZER.

STO 1

See → Safe Torque Off.

Synchronous motor

Synchronous motors run at the same frequency with which they are operated. They do not have a slip (like → Asynchronous (induction) motors). Synchronous motors require different feed forward and feedback control concepts depending on their design to ensure that they can be operated with converters.

Synchronous motors are distinguished by the following features:

- Permanent-magnet/separately excited
- With/without damping cage
- With/without position encoder

Synchronous motors are used for different reasons:

- High drive dynamic response (→ Synchronous servo motors)
- High overload capability
- High speed accuracy with exactly specified frequency (SIEMOSYN motors)

Synchronous servo motor

Synchronous servo motors (e.g. 1FK, 1FT) are permanent-field → Synchronous motors with position encoders such as an → Absolute encoder. As the moments of self-inertia are low, the drive is extremely dynamic, e.g. because there are no power losses due to the electric resistance of copper in the rotor, a high power density is achieved with a low construction volume. Synchronous servo motors can only be operated in combination with converters. Due to the servo control required for this purpose, the motor current is moment-dependent. The momentary phase relation of the motor current is derived from the (mechanical) rotor position detected by the position encoder.

Terminal Board

Terminal extension module for plugging into a → Control Unit.

With SINAMICS, the Terminal Board TB30 is available with analog and digital I/O terminals.

Terminal Module

Terminal expansion module that snaps onto the installation rail, for installation in the control cabinet.

With SINAMICS, there is, for example, the Terminal Module TM31 available with analog and digital I/O terminals.

Glossary

Third-party motor

A motor is designated as a third-party motor if its motor data is not known to the drive line-up and it cannot be identified by means of its order number.

The motor data of an external motor is required for commissioning. It must be manually entered in the corresponding parameters.

Topology

The topology describes the structure of a drive system with → Control Unit, → Motor Modules, → Motors, → Encoders, → Terminal Modules, including the connection system.

Travel to a fixed stop

With this function, a motor can be travelled to a fixed stop with a defined torque/force, without any fault message. As soon as the fixed stop is reached, the torque/force defined via parameters is built up and persists.

Vector control

Vector control (field-oriented control) is a high-performance control type for asynchronous (induction) machines. It is based on an exact model calculation of the motor and of two current components which control the flow and the torque by means of software algorithms. In this way, the predefined speeds and torques can be respected and limited accurately and with a good dynamic response.

There are two vector control types:

- Frequency control (sensorless vector control)
- Speed-torque control with speed feedback (→ Encoder).

Voltage Clamping Module

Component which limits the → DC link voltage and therefore also the motor voltages to permissible values in the case of resonance.

With power cables of excessive length, excitation of the system's resonant frequency under adverse conditions can cause over-voltages to develop in the DC link. In such cases, the insulation systems of the connected motors are particularly at risk and partial discharges can occur.

This component must be used if the total length of all power cables exceeds 350 m (shielded cables) and 500 m (unshielded cables).

Voltage Sensing Module

Component which measures the actual DC link voltage and makes the measured data available via → DRIVE-CLiQ. Used in conjunction with an → Active Line Module (→ Smart Line Module, → Motor Module) for feeding back the actual line voltage value.

It can be mounted on a top-hat rail and also features 2 analog inputs and a connection for a temperature sensor.







Overview

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 engineering 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
- cus 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
- cus 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

Overview

Software types

Software requiring a license is categorized into types. The following software types have been defined:

- Engineering software
- Runtime software

Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing. Data generated with engineering software and executable programs can be duplicated for your own use or for use by third parties free-of-charge.

Runtime software

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License types

Siemens Automation & Drives offers various types of software license:

- Floating license
- Single license
- Rental license
- Trial license
- Factory license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started. A license is required for each concurrent user.

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Unlike the floating license, a single license permits only one installation of the software. The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per device, per axis, per channel, etc.

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A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific number of hours (the operating hours do not have to be consecutive). One license is required for each installation of the software.

Trial license

A trial license supports "short-term use" of the software in a nonproductive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

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With the Factory License the user has the right to install and use the software at one permanent establishment only. The permanent establishment is defined by one address only. The number of hardware devices on which the software may be installed results from the order data or the Certificate of License (CoL).

Certificate of license

The Certificate of License (CoL) is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated. The following delivery versions

- PowerPack
- Upgrade
- Hotfix

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.

A separate PowerPack must be purchased for each original license of the software to be replaced.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.

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ServicePack

ServicePacks are used to debug existing products. ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

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Overview

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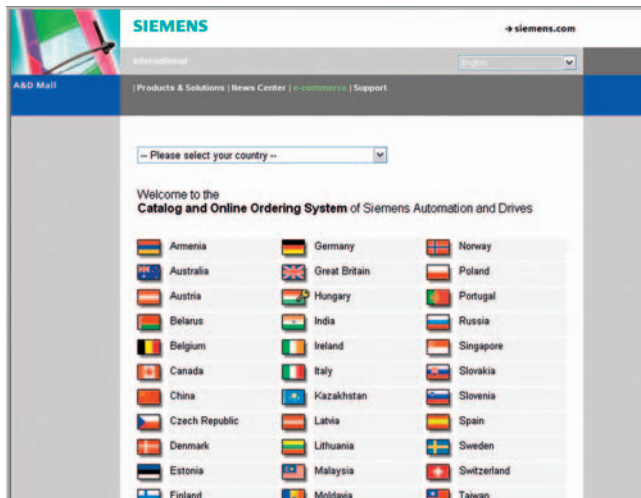
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The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches only apply to devices for export.

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.

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Export regulations

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AL	<p>Number of the <u>German Export List</u></p> <p>Products marked other than "N" require an export license.</p> <p>In the case of software products, the export designations of the relevant data medium must also be generally adhered to.</p> <p>Goods labeled with an "<u>AL</u>" not equal to "N" are subject to a European or German export authorization when being exported out of the EU.</p>
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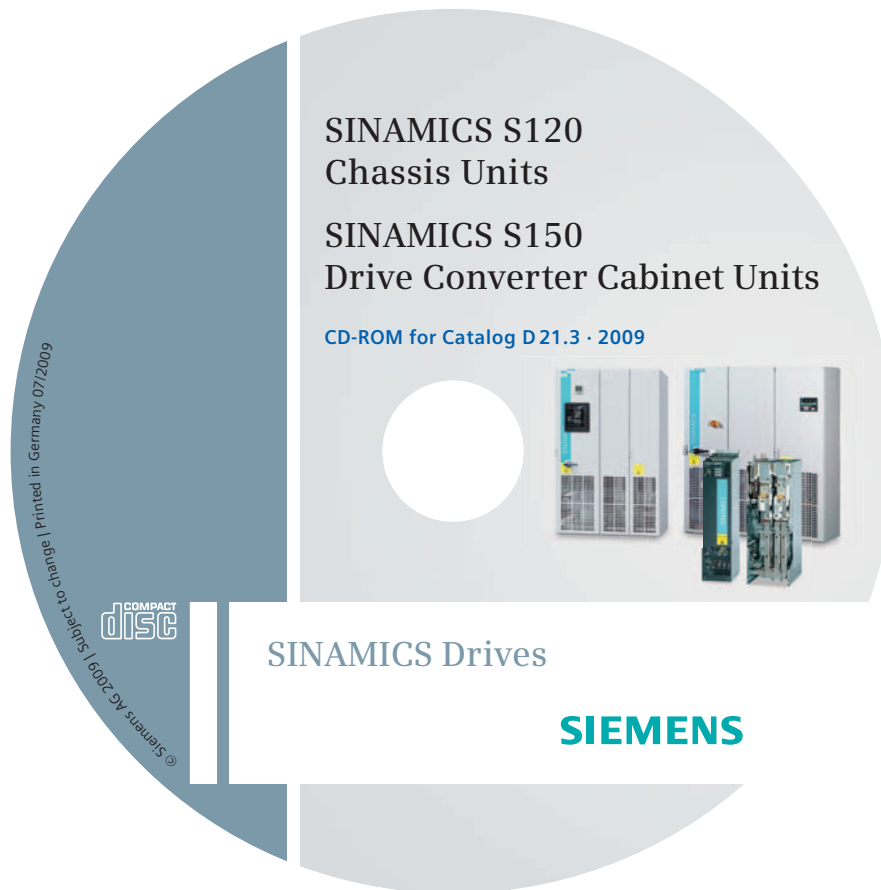
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A&D/VuL_ohne MZ/En 05.09.06

CD-ROM for Catalog D 21.3 · 2009

In the CD-ROM that accompanies Catalog D 21.3 · 2009 you will find the following information for planning and configuring:

- Dimension drawings of the Inverter Chassis Units and the Drive Converter Cabinet Units (PDF format)
- Catalog D 21.3 · 2009, SINAMICS S120 / SINAMICS S150 (PDF format)
- Engineering Manual SINAMICS – Low Voltage (PDF format)



Hardware and software requirements

- CD-ROM drive
- Windows 2000/XP or higher
- Acrobat Reader
- MS Internet Explorer V5.5 or higher

Start

Insert the CD-ROM into the CD-ROM drive. The program starts automatically. If the AutoRun function is not activated in your system, start file "start.hta" From the CD-ROM using the Windows Explorer.

Note

Installation is not necessary to view the information on this CD-ROM.

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<u>Variable-Speed Drives</u>			
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Inverter Chassis Units			
SINAMICS G120D			
Distributed Frequency Inverters			
SINAMICS G130 Drive Converter Chassis Units, SINAMICS G150 Drive Converter Cabinet Units	D 11		
SINAMICS GM150/SINAMICS SM150	D 12		
Medium-Voltage Converters			
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Siemens AG
Industry Sector
Drive Technologies
Postfach 47 43
90025 NÜRNBERG
GERMANY

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SINAMICS S120, SINAMICS S150