



# sinamics

## Sinamics s120 catalog

**SIEMENS**



Siemens Sinamics S120 Modular Drive System is a range of industrial inverters suitable for a wide range of control solutions.

Main characteristics of Sinamics S120 high-performance drives are:

- S120 series includes single drives and coordinated drives that can be combined in numerous variations.
- Device suits perfectly to motion control and high-performance apps for mechanical and engineering purpose.
- Drives have a modular design that means the user can choose from the range of additional devices and integrate them.
- Series models can be chosen among book-size, chassis and block-size formats.
- Modules are interconnected with innovative digital interface DRIVE-CLiQ.

To find out stock ability and delivery time to your region, please contact our manager.



[info@eltra-trade.com](mailto:info@eltra-trade.com)

## SINAMICS S120 drive system

**Flexibility for successful machine design**

As part of the SINAMICS drive family, the SINAMICS S120 drive is a modular system for high-performance applications in machine construction and plant engineering. SINAMICS S120 offers high-performance single-axis and multi-axis drives for a very broad range of industrial applications. By virtue of its scalability and flexibility, SINAMICS S120 is the ideal system for satisfying the ever increasing demand for more axes and better performance. SINAMICS S120 supports flexible machine designs and faster implementation of customized drive solutions.

**The response to ever increasing demands**

Today modern machines must be built at lower cost, but deliver greater productivity. The SINAMICS S120 drive concept meets both these challenges! It is easy to configure and thus helps to reduce project completion times. Its excellent dynamic response and accuracy permit higher cycle rates for maximum productivity.

**Applications in machine and plant engineering**

Regardless of whether the application involves continuous material webs or cyclic, highly dynamic processes – SINAMICS S120 means increased machine performance in many sectors:

- Packaging machines
- Plastics processing machines
- Textile machines
- Printing machines
- Paper machines
- Hoisting equipment
- Handling and assembly systems
- Machine tools
- Rolling mills
- Test stands

**Modularity for machine construction**

SINAMICS S120 is designed to allow free combination of power and control performance. Multi-axis drives with higher-level motion control can be implemented with the SINAMICS S120 modular system as easily as single-drive solutions.

**Greater flexibility with central control intelligence**

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

These units are capable of controlling drives in Vector, Servo and V/f modes. They also perform the speed and torque control functions plus other intelligent drive functions.

**Free performance selection for Vector and Servo control modes**

The use of a SINAMICS S120 in Vector control mode 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.

Servo control with SINAMICS S120 is employed for cyclic processes with precise, highly dynamic position control and servo motors, e.g. in textile, packaging, printing machines and machine tools.

**SINAMICS S120 – functions for better efficiency**

- Basic functions: Speed control, torque control, positioning functions
- Intelligent starting functions for independent restart after power supply interruption
- BICO technology with interconnection of drive-related I/Os for easy adaptation of the drive system to its operating environment
- Integrated safety functions for realizing the implementation of safety concepts
- Regulated infeed/regenerative feedback functions for preventing undesirable reactions on the supply, allowing recovery of braking energy and ensuring greater stability against line fluctuations.

**DRIVE-CLiQ – the digital interface between all components**

All SINAMICS S120 components, including the motors and encoders, are interconnected by a shared serial interface called DRIVE-CLiQ. DRIVE-CLiQ forms the backplane for the complete drive system. The standardized cables and connectors reduce the variety of different parts and cut storage costs. Converter boards (Sensor Modules) for converting standard encoder signals to DRIVE-CLiQ are available for third-party motors and retrofit applications.

**Swift and automatic: The electronic rating plate**

An important digital linkage element of the SINAMICS S120 drive system is the electronic rating plates integrated in every component. They allow all drive components to be detected automatically via a DRIVE-CLiQ link. As a result, data does not need to be entered manually during commissioning or component replacement – helping to ensure that drives are commissioned quickly and successfully! The electronic rating plates of the motors contain, for example, the parameters of the electrical equivalent circuit diagram and the characteristic data of the built-in motor encoder, information such as order and identification numbers.



## SINAMICS S120 drive system

### Modular design ensures flexibility and scalability

The multi-axis design, also, referred to as common DC bus, is very modular with a power offering of Line Modules and Motor Modules – both available in booksize and chassis formats. Line Modules function as the central energy supply to the voltage-source DC link. Line Modules are optionally available with regulated infeed/regenerative feedback to provide a constant DC link voltage. Motor Modules (DC/AC units) supply the motors with energy from the DC link. All the drive intelligence is organized into Control Units. The control units perform all the closed-loop control functions for the drive grouping. They also handle all other drive functions such as the interconnection of drive related I/O's, positioning functions, etc. and feature PROFIBUS DP or PROFINET as the central interface for linking to higher level automation systems.

On single axis units, also referred to as AC drives, the rectifier and inverter power section are contained in one device, the Power Module – available in blocksize and chassis formats. For single axis applications, drive control functions are performed by a single axis Control Unit (e.g. CU310) mounted on to the Power Module. This separation of power and intelligence allows for maximum flexibility and scalability. Integration into multi-axis applications is easily accomplished by connecting a DRIVE CLiQ link to a multi-axis Control Unit (e.g. CU320). This is accomplished by mounting a CU adapter (CUA31) on a block size Power Module in place of the single axis Control Unit.

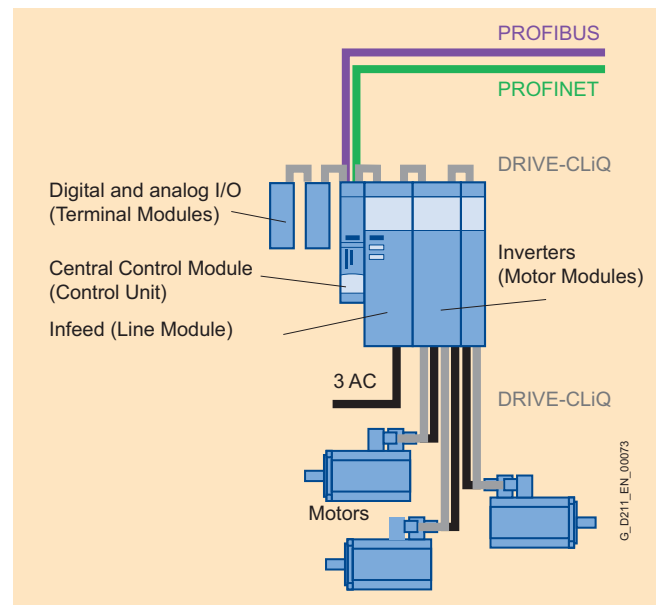
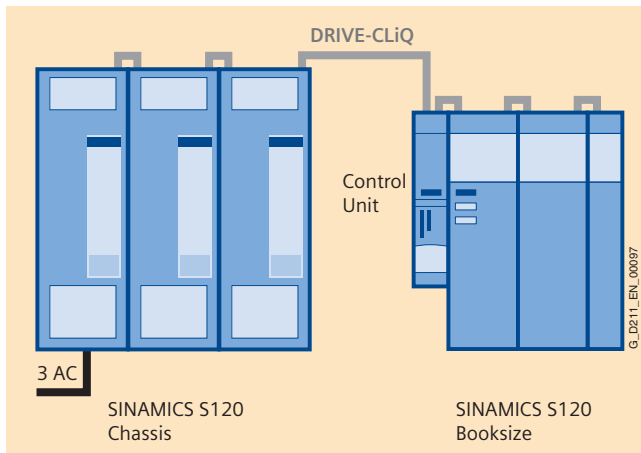
Together this integrated line offers the most optimal drive solution for any application servo or vector.



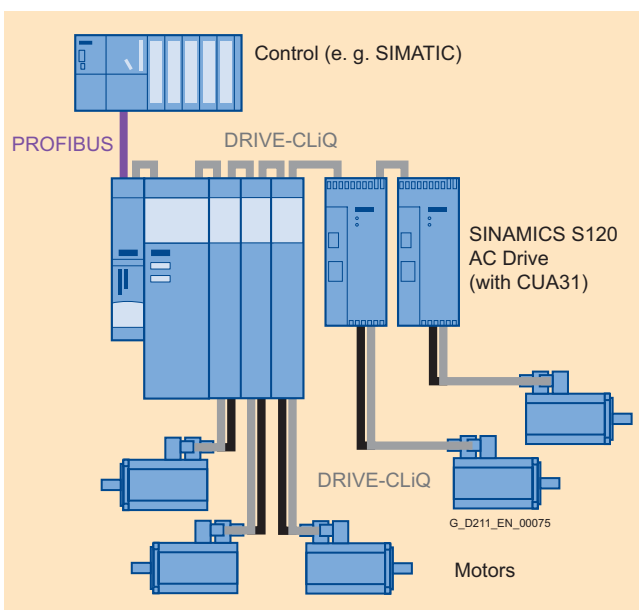
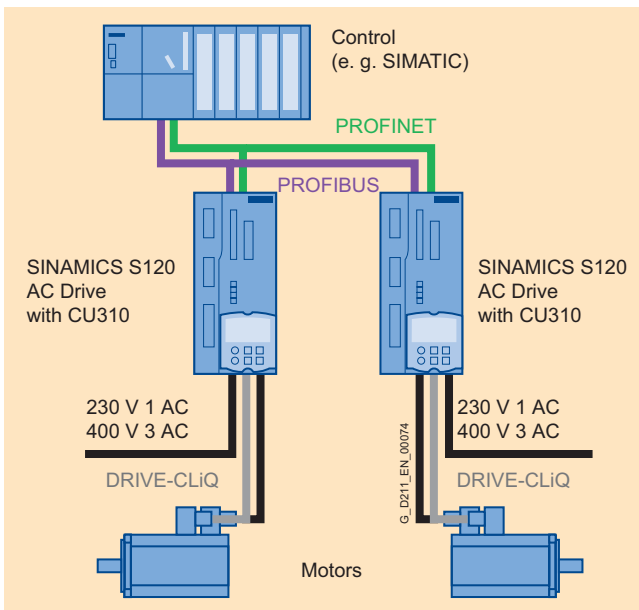
Blocksize, booksize and chassis formats

### All formats can be combined freely

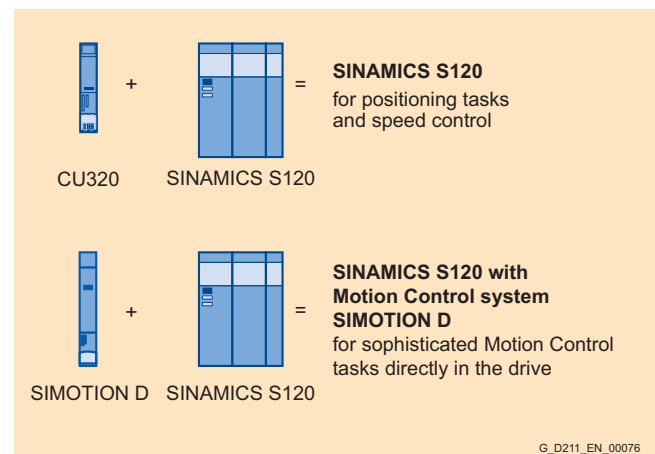
The different SINAMICS S120 formats can be combined freely thanks to their DRIVE-CLiQ interfaces, e.g. Line Modules in chassis format can be freely combined with Motor Modules in booksize format for multi-axis applications with high or varying total output requirements.



## SINAMICS S120 drive system

**SINAMICS S120 and SIMOTION – the perfect team**

Modern machines must be capable of handling ever more complex motion control tasks and performing the task with increasing accuracy and speed. In regards to this requirement, the SIMOTION Motion Control System and high-performance SINAMICS S120 drive system form a perfect team. The SIMOTION D variant, which is physically integrated in the SINAMICS S120 drive, is the ideal solution for machines with a large number of axes and stringent precision requirements. This distributed automation structure allows the machine to be segmented into various axis groupings, with each grouping controlled by a separate SIMOTION Motion Control System. The SIMOTION systems communicate either via PROFIBUS DP or PROFINET. Another important aspect: The compact machine design, thanks to the distributed automation structure and a Control Unit directly in the drive.

**Totally Integrated Automation – the unique automation platform**

With Totally Integrated Automation (TIA), Siemens is the only single-source provider to offer an integrated spectrum of products and systems for all sectors. Tailored to meet individual customer requirements, sector-specific automation solutions can be implemented efficiently on the basis of TIA. Lower life-cycle costs for plant operation and a significant reduction in the time to market result in a marked improvement in productivity and greater investment security.

Easy – Totally Integrated Automation with SINAMICS S120

Apart from SIMATIC, SIMOTION and SINUMERIK, SINAMICS is also one of the core components of TIA. The STARTER commissioning tool is therefore an integral element of the TIA platform. It is thus possible to parameterize, program and commission all components in the automation system using a standardized engineering platform and without any gaps. The system-wide data management functions ensure consistent data and simplify archiving of the entire plant project.

PROFIBUS – the No. 1 fieldbus

PROFIBUS DP, the standard fieldbus of the TIA system, is supported by all SINAMICS S120 variants. It provides a high-performance system-wide communication network which links all automation components: HMI, controls, drives and I/O devices.

PROFINET – for enhanced performance and open IT communication

SINAMICS S120 is also available with a PROFINET interface. This Ethernet-based bus enables control data to be exchanged at high speed via PROFINET IO with IRT or RT and makes SINAMICS S120 a suitable choice for integration in top-performance multi-axis applications.

At the same time, PROFINET also uses standard IT mechanisms (TCP/IP) to transport information, e.g. operating and diagnostic data, to higher-level systems. A SINAMICS S120 with this interface can thus easily be integrated into factory IT networks.

## SINAMICS S120 drive system

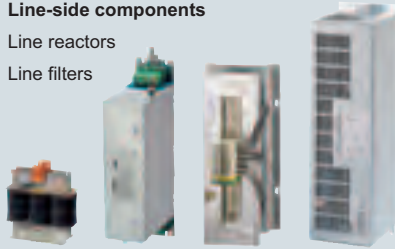
The components of the SINAMICS S120 drive system

### SINAMICS S120 drive system

#### Line-side components

Line reactors

Line filters



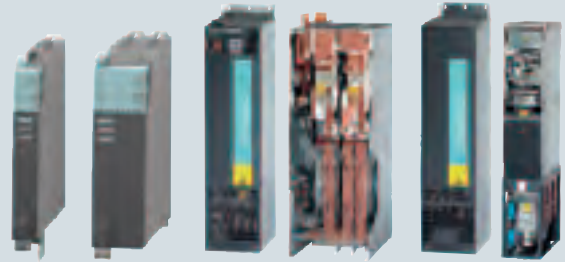
#### Line Modules

Basic Line Modules

Smart Line Modules

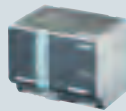
Active Line Modules

Active Interface Modules



#### Power supply

For applicable 24 V device, see Catalog KT 10.1



#### DC link components

Braking Module

Braking resistors

Capacitor Module

Control Supply Module



#### Control Units

CU310

CU320



#### SIMOTION Control Units

D425

D435

D445

CX32



#### Motor Modules

Single Motor Modules

Double Motor Modules



#### Sensor Modules

SMC10/SMC20

SMC30

SME20/SME25



#### Power Modules



#### Load-side components

Motor reactors

Sinusoidal filters



### AC motors

#### Synchronous motors

1FT6 motors

1FK7 motors

1FS6 motors

1FW3 torque motors

Gear units

Geared motors

#### Asynchronous motors

1PH7 motors

1PL6 motors

1PH4 motors

### Connection system

#### MOTION-CONNECT

Power cables

Signal cables

## SINAMICS S120



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## System overview

### Overview

With its separate power unit and 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 the energy requirements of the system. The connection between the Control Unit and power unit is made very simply using the digital system interface DRIVE-CLiQ.

### Control Units



CU310 DP, CU320 and SIMOTION D Control Units

#### CU310 DP and CU310 PN Control Unit

CU310 Control Units are designed to control a single drive. They feature as standard a PROFIBUS interface (CU310 DP) or PROFINET interface (CU310 PN) and a TTL/HTL encoder evaluation circuit.

#### CU320 Control Unit

The CU320 Control Unit has been designed to control multiple drives. A CU320 is capable of operating up to

- 8 drives in  $V/f$  control mode or
- 6 drives in Servo control mode or
- 4 drives in Vector control mode.

The CU320 Control Unit can be used to create links between individual drives and implement simple technology functions.

#### SIMOTION D425, D435, D445 Control Units

A SIMOTION D Control Unit is used for applications requiring coordinated motion control such as synchronous operation, electronic gear, cam disk or complex technology functions. SIMOTION D Control Units are available in a range of performance variants:

- A SIMOTION D425 Control Unit can control up to 16 axes,
- A SIMOTION D435 Control Unit can control up to 32 axes,
- A SIMOTION D445 Control Unit can control up to 64 axes.

The STARTER commissioning tool is used to commission and diagnose the various types of Control Units. The SCOUT engineering system, which includes the STARTER tool, is required for SIMOTION D Control Units.

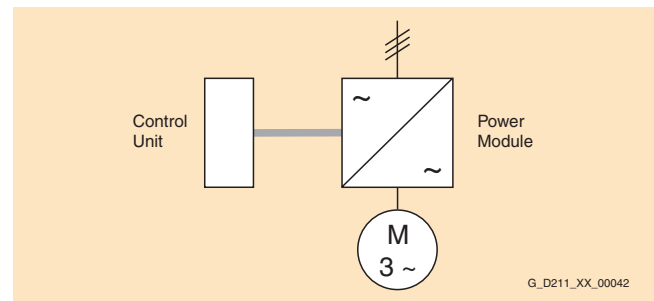
For further information about STARTER and SCOUT, see Engineering Software.

### Power Modules

The stand alone version of a SINAMICS S120 drive system consists of a CU310 Control Unit and a Power Module. A mains rectifier, a voltage-source DC link and an inverter for supplying a motor are integrated in the Power Module.



Power Module in blocksize format with CU310 DP Control Unit



Power Modules are designed for single drives which are not capable of regenerating energy to the supply. Generated energy produced during braking is converted to heat via braking resistors.

Power Modules can also be operated by a CU320 or a SIMOTION D Control Unit, e.g. in configurations where a single drive has been added to a multi-axis drive grouping. In this case, the Power Modules in blocksize format must be equipped with the CUA31 Control Unit Adapter. This is connected with the CU320 or SIMOTION D Control Unit using DRIVE-CLiQ. Power Modules in chassis format can be directly connected to the multi-axis Control Unit using a DRIVE-CLiQ cable.



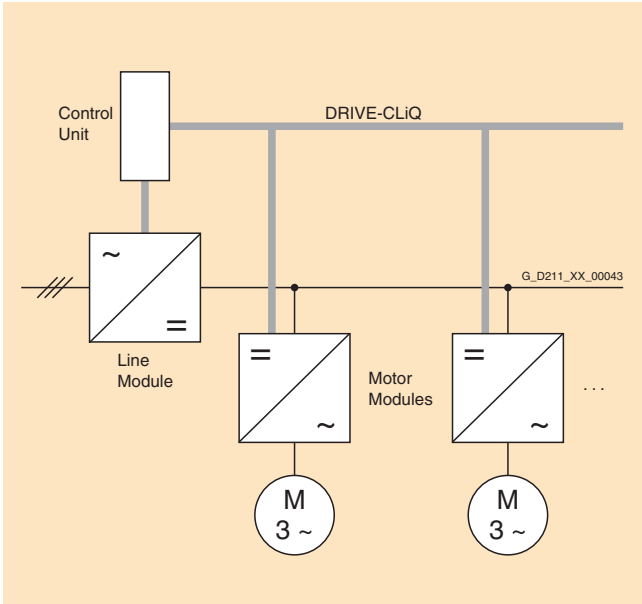
### Overview (continued)

#### Motor Modules

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



CU320 Control Unit, Line Module and two Motor Modules in booksize format



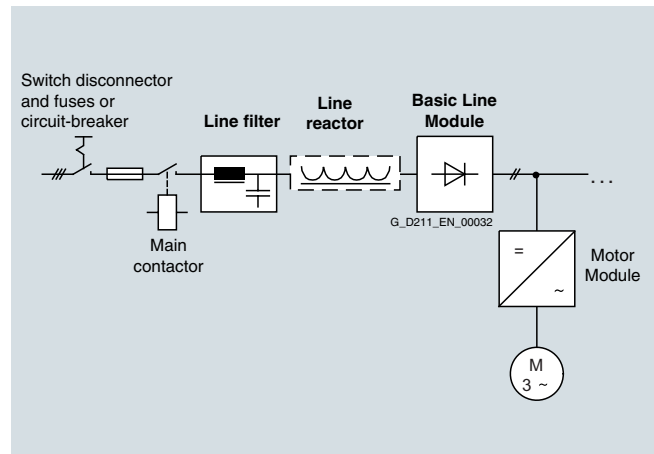
Motor Modules are designed for multi-axis drive systems and are controlled by either a CU320 or a SIMOTION D Control Unit. Motor Modules are interconnected by means of a shared DC busbar. Since the Motor Modules share the same DC link, they can exchange energy with one another, i.e. if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode. The voltage-source DC link is supplied with mains voltage by a Line Module.

#### Line Modules

Line Modules generate a DC voltage from the line voltage and supply Motor Modules with energy via the voltage-source DC link.

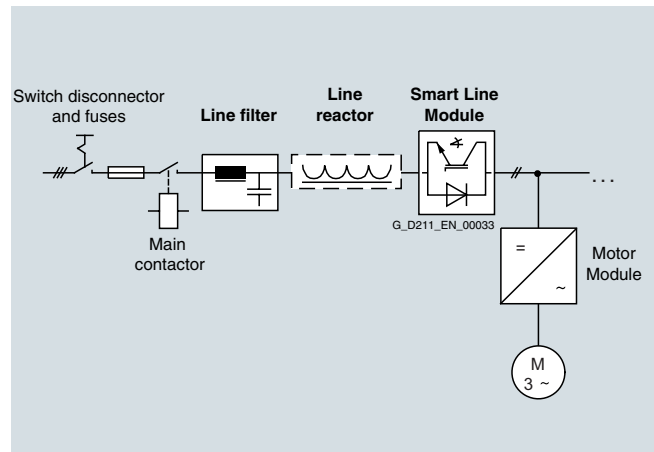
##### Basic Line Modules

Basic Line Modules are designed only for infeed operation, i.e. they are not capable of recovering regenerative energy to the supply system. 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. When a Basic Line Module is used as the infeed, the matching line reactor must be installed. A line filter can be installed optionally to restrict conducted interference to Class C2 limits (EN 61800-3).



##### Smart Line Modules

Smart 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). When a Smart Line Module is used as the infeed, the matching line reactor must be installed. A line filter can be installed optionally to restrict conducted interference to Class C2 limits (EN 61800-3).



## System overview

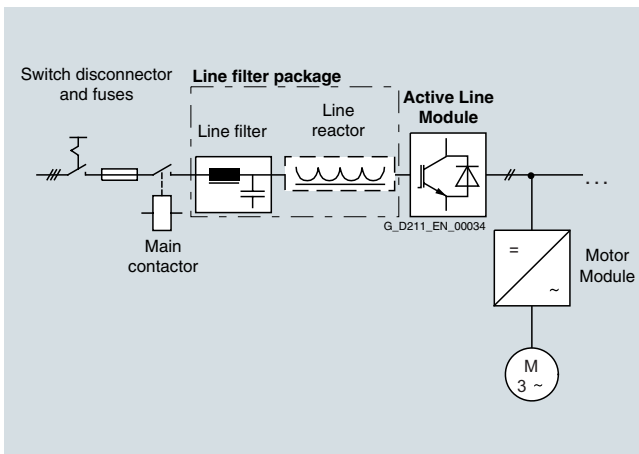
### Overview (continued)

#### 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, however, Active Line Modules generate a regulated DC voltage which remains constant despite fluctuations in the line voltage. 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 harmonics.

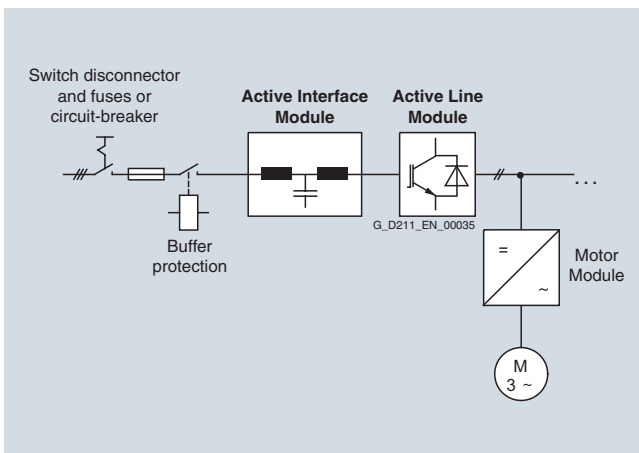
- Active Line Modules in booksize format

When an Active Line Module is used as the infeed, the matching line reactor must be installed. To minimize interference emission, the Active Line Module should always be operated with a combination of line filter and line reactor.



- Active Line Modules in chassis format

All the components required to operate an Active Line Module are integrated in the Active Interface Module. An external bypass contactor is required in addition for sizes HX and JX.



Please refer to the System Description for more information about designing a drive system with SINAMICS S120.

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

- Power Modules in blocksize and chassis formats for single axis,
- Motor Modules and Line Modules for multi axis in booksize and chassis formats.

#### Booksize format

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



The booksize format offers a greater range of cooling options:

#### 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 routed to the interior of the control cabinet.

#### External air cooling

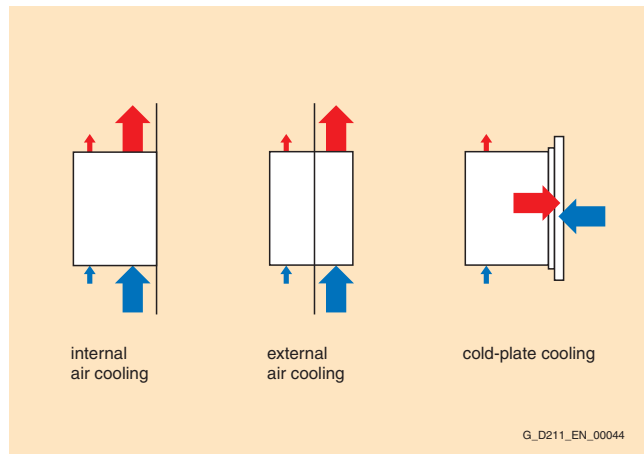
External air cooling uses the "through-hole" method. The components' power unit heat sinks pass through the mounting surface in the control cabinet and can thus release the heat losses of the power circuit to a separate external cooling circuit. The only heat loss that remains in the cabinet is emitted by the electronics. Degree of protection IP54 can be achieved at this "mechanical interface". 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 area, which can also open outwards.

### Overview (continued)

#### Cold-plate cooling

Units designed with cold-plate cooling can pass the power unit heat losses to an external heat sink via a thermal interface on the unit's rear panel. This external heat sink is water-cooled, for example. For further information about cold-plate cooling, please contact:

Siemens A&D  
TCC Cabinet Cooling  
E-mail: [cc.cabinetcooling@siemens.com](mailto:cc.cabinetcooling@siemens.com)



#### Blocksize format

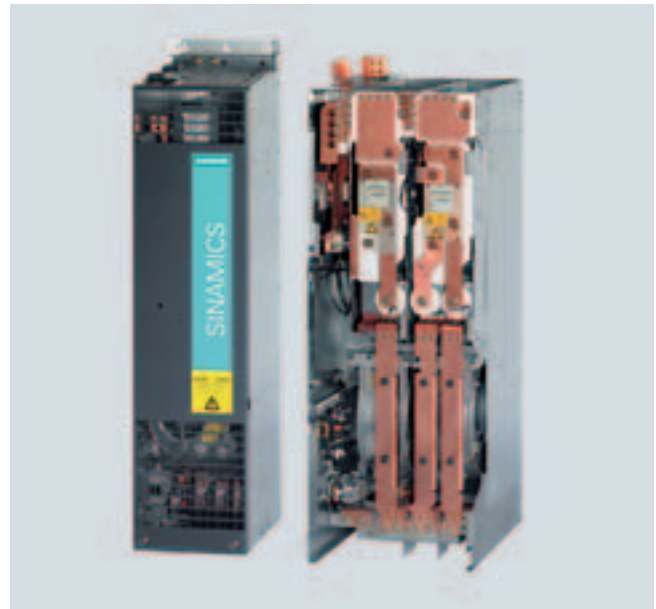
Blocksize format units are optimized for single-axis applications and are available only as Power Modules.

The CU310 Control Unit can be snapped onto them directly. The units are cooled by an internal air cooling circuit.



#### Chassis format

Higher-output units (approximately 100 kW (150 HP) and above) are constructed in chassis format. These are available as Line Modules, Power Modules and Motor Modules. Chassis format units are cooled by an internal air cooling circuit. The CU310 Control Unit can be integrated in the Power Modules.



#### Varnished modules

The following units are equipped as standard with varnished coating:

- Blocksize format units
- Booksize format units for external air cooling
- Booksize format units with cold-plate cooling
- Control Units (SIMOTION D345 and SIMOTION D445 in preparation)
- Sensor Modules
- Terminal modules

All booksize format units for internal air cooling are available with varnished modules.

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

The selection of Control Unit and Power section defines the structure of the drive system. The range of system components provided allows optimum adaptation of the drive system to the application.

System components are divided into the following categories:

- **DC link components**  
e.g. Braking Modules and braking resistors,
- **Load-side power components**  
e.g. motor reactors,
- **Supplementary system components**  
e.g. Terminal Modules, operator panels and communication boards
- **Encoder system interface**  
for connecting various types of encoder to SINAMICS S120.

# SINAMICS S120

## System data

### General technical data

#### Technical data

Unless specified otherwise, the following technical specifications are valid for all the following components of the SINAMICS S120 drive system.

Electrical data	
Electronics power supply	24 V DC, 15/+ 20%
Mechanical data	
Vibratory load	
• Transport <sup>1)</sup>	Class 2M3 to EN 60721-3-2
- All units and components except for chassis format	
- Chassis format units	Class 2M2 to EN 60721-3-2
• Operation	Test values in accordance with EN 60068-2-6 test Fc: 10 Hz to 58 Hz: Constant deflection 0.075 mm (0.003 in) 58 Hz to 150 Hz: Constant acceleration = 9.81 m/s <sup>2</sup> (3.2 ft/s <sup>2</sup> ) (1 × g)
- All units and components except for chassis format	
- Chassis format units	
• Operation	Test values in accordance with EN 60068-2-27 test Ea: 147 m/s <sup>2</sup> (482 ft/s <sup>2</sup> ) (15 × g)/11 ms
- Booksize and blocksize formats FSA to FSC	
- Blocksize format FSD to FSF	
- Chassis format	98 m/s <sup>2</sup> (321 ft/s <sup>2</sup> ) (10 × g)/20 ms
Ambient conditions	
Protection Class	Class I (with protective conductor system) and class III (PELV) to EN 61800-5-1
Shock protection	DIN VDE 0106 Part 100 and BGV A 3 when used properly
Permissible ambient/coolant temperature (air) during operation	
• for line-side components, Power Modules, Line Modules and Motor Modules	0 °C to + 40 °C (32 °F to +104 °F) without derating, >40 °C to + 55 °C (>104 °F to +131 °F) see derating characteristics
• for Control Units, additional system components, DC link components and Sensor Modules	0 °C to + 55 °C (32 °F to +131 °F) up to 2000 m (6562 ft) above sea level
Climatic ambient conditions	
• Storage <sup>1)</sup>	Class 1K3 to EN 60721-3-1 Temperature: – 40 °C to + 70 °C (– 40 °F to + 158 °F)
• Transport <sup>1)</sup>	
• Operation	Class 2K4 to EN 60721-3-2 Temperature – 40 °C to + 70 °C (– 40 °F to + 158 °F) Max. air humidity 95% at 40 °C (104 °F) Class 3K3 to EN 60721-3-3 Condensation, splashwater and ice formation are not permitted (EN 60204, Part 1)
Environmental class/harmful chemical substances	
• Storage <sup>1)</sup>	Class 1C2 to EN 60721-3-1 Class 2C2 to EN 60721-3-2 Class 3C2 to EN 60721-3-3
• Transport <sup>1)</sup>	
• Operation	
Organic/biological influences	
• Storage <sup>1)</sup>	Class 1B1 to EN 60721-3-1 Class 2B1 to EN 60721-3-2 Class 3B1 to EN 60721-3-3
• Transport <sup>1)</sup>	
• Operation	
Degree of contamination	2 to EN 61800-5-1

<sup>1)</sup> In transport packaging

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 50370-1	Electromagnetic compatibility (EMC) – Product family standard for machine tools Part 1: Emissions
EN 55011	Industrial, scientific and medical high-frequency devices (ISM devices) – radio interference – limit values and measuring techniques
EN 60204-1	Electrical equipment of machines Part 1: General definitions
EN 61800-3	Variable-speed electric drives Part 3: EMC product standard including specific test methods
EN 61800-5-1	Adjustable-speed electrical power drive systems Part 5: Safety requirements Main section 1: Electrical and thermal requirements
North American standards	
UL508C	Power Conversion Equipment
CSA C22.2 No. 14	Industrial Control Equipment

Approvals	
cULus	Testing by UL (Underwriters Laboratories) <a href="http://www.ul.com">http://www.ul.com</a> according to UL and CSA standards



### Overview

Most production machines use digital communication bus systems. These handle the communication between the control level, the machine control and the executing components, i.e. the sensors and actuators. There are two types of communication: process communication and data communication.

#### Process communication

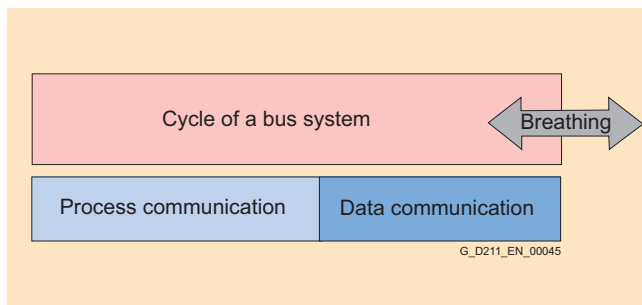
Process communication involves cyclically transmitting control data and setpoints. The quantity of transfer data is comparatively small. For example, a drive can communicate with between 4 and 32 bytes. The number of connected sensors and actuators is usually specified by the configuration which makes 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 are sporadically (acyclically) exchanged with connected devices. The volume of this communication can be very large with over 100 bytes per device and communication task.

#### Bus cycle

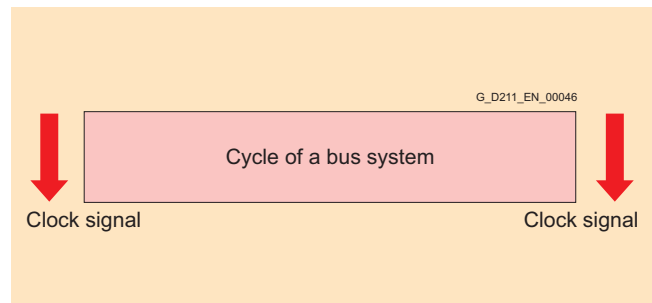
The bus cycle comprises of process communication and data communication. The cycle of the bus system is much shorter without data communication. Some say: the bus cycle breathes. However, this breathing is unsuitable for highly accurate applications in drive technology.



Communication types of a bus system

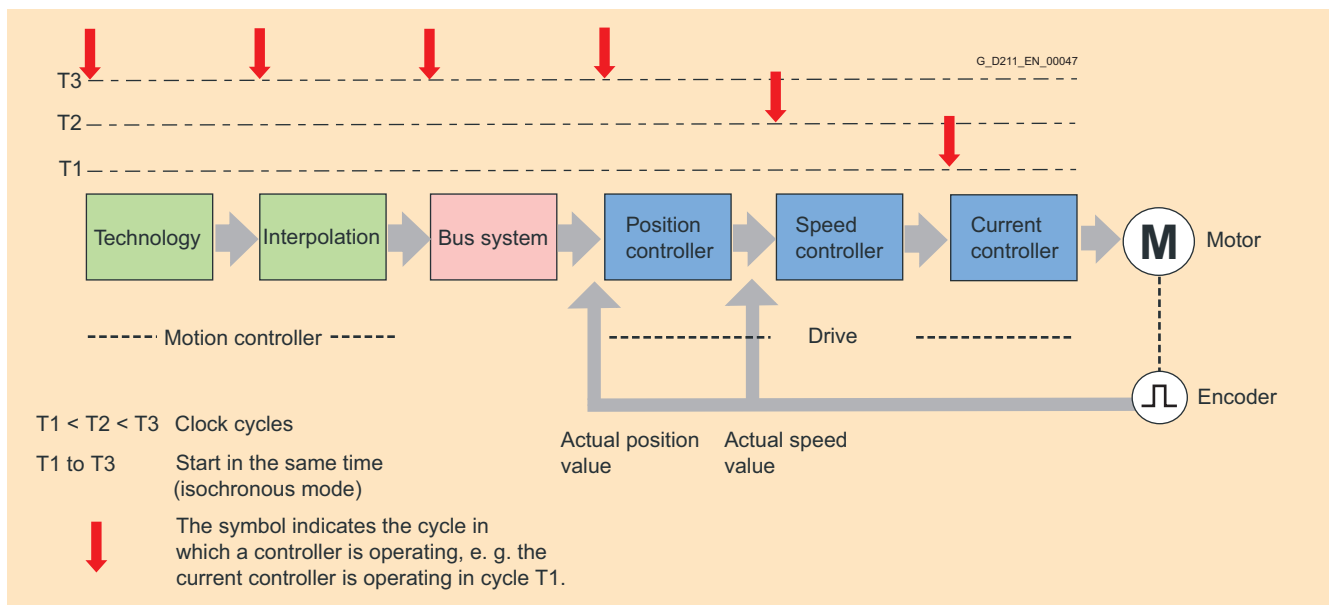
#### Requirements of drive controls

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 and to accurately maintain the controlled variable and/or to achieve it quickly. 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. This bus system must be as synchronized as the closed-loop controls. This is referred to as isochronous operation. 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 deviates only very slightly. This is then no longer referred to as the breathing of the bus cycle (large deviations), but as jitter (small deviations). Acceptable values are  $<1 \mu\text{s}$ . This synchronization is achieved through clock signals.



Constant bus cycle

So that a bus system can be used for Motion Control applications it must permit process communication and isochronous operation. An additional bus system is often used for data communication. PROFIBUS and PROFINET can combine all of these requirements in a single bus system. Industrial Ethernet, the predecessor of PROFINET, does not fulfill the requirements with respect to real-time communication.



The principle of digital drive controls

#### Overview

##### *What are profiles?*

Profiles used in automation technology define certain characteristics and responses for devices, device groups or whole systems which specify their main and unique properties. Only devices with manufacturer-neutral, identical profiles can "interoperate" on a fieldbus and thus fully exploit the advantages of a fieldbus for the user.

Profiles are specifications defined by manufacturers and users for certain characteristics, performance features and behaviors of devices and systems. They aim to ensure that devices and systems which belong to one product family by virtue of their "product-compliant" development are interoperable and, to a certain degree, exchangeable in bus operation.

##### *Profile types*

Different types of profile can be distinguished as so-called application profiles (general or specific) and system profiles:

- Application 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.

##### *PROFdrive*

The PROFdrive profile is a specific application profile.

#### Design

##### *PROFdrive in drive applications*

The PROFdrive profile defines the device behavior and the access procedure to drive data for electrical drives on PROFIBUS, from simple frequency converters up to high performance servo controllers.

It contains a detailed description of how the communication functions "slave-to-slave communication", "equidistance" and "isochronous operation" are used meaningfully for drive applications. In addition, it specifies all device characteristics which influence interfaces connected to a controller over PROFIBUS or PROFINET. This includes the sequence control system, encoder interface, standardization of values, definition of standard messages, and access to drive parameters, etc.

The PROFdrive profile supports both central and distributed Motion Control concepts.

##### *The basic philosophy: Keep it simple*

The PROFdrive 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.

##### *Segmentation into application/utilization 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, PROFdrive 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**
- Category 5 – Motion Control Drives with Central, Higher-Level Motion Control Intelligence and the Patented "Dynamic Servo Control" Position Concept
- Category 6 – Motion Control Drives with Distributed Motion Control Intelligence Integrated in the Drives

### Design (continued)

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 the so-called DP-V1 parameter channel.

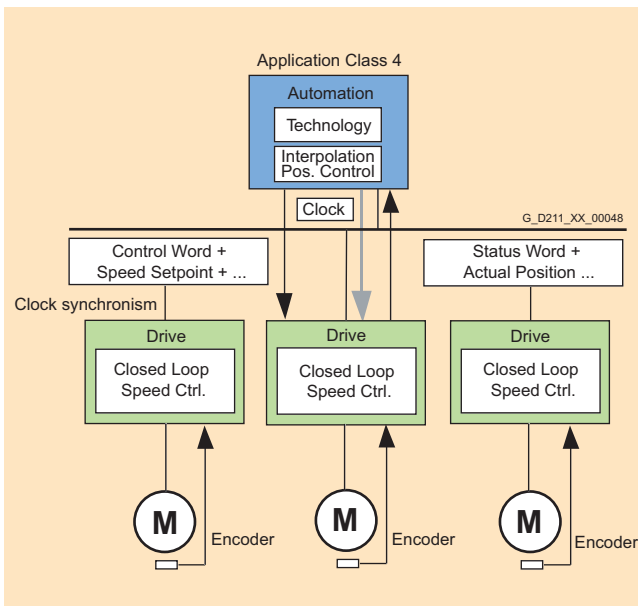
As a communication protocol, PROFdrive uses DP-V0, DP-V1, and the DP-V2 expansions for PROFIBUS including the functions "Slave-to-Slave Communication" and "Isochronous Operation", or PROFINET IO with real-time classes RT and IRT.

### PROFdrive and SINAMICS

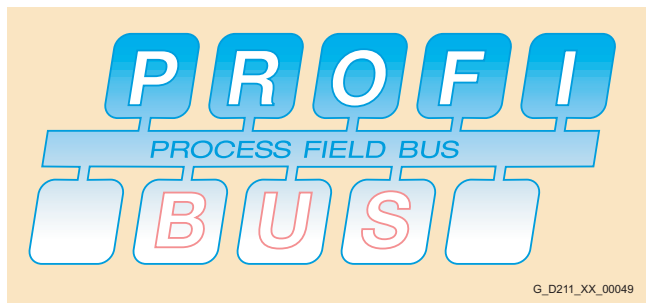
Utilization category 4 is the most important category for highly dynamic and highly complex Motion Control tasks. This application category describes in detail the master/slave relationship between the controller and the drives which are connected to each other over PROFIBUS and PROFINET.

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  $\mu$ s for SINAMICS S) and thus limits dead times exclusively to the control behavior.

In SINAMICS S the drive interface has been implemented according to the PROFdrive profile V4 and Utilization Categories 1 to 4 (Category 4 with and without DSC) and is referred to below as the PROFdrive interface.



#### Overview



#### What is PROFIBUS?

PROFIBUS is the most successful open fieldbus used for automation technology which can be used for a wide range of applications. Standardization to IEC 61158 / EN 50170 provides future protection for your investment.

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.

The demands of users for an open, vendor-independent communication system resulted in the specification and standardization of the PROFIBUS protocol.

#### Multi-vendor installations

Through the conformity and interoperability test performed by the test laboratories authorized by the PROFIBUS user organization (PNO) and the certification of the devices by the PNO, the user can rest assured that quality and functionality are also ensured for multi-vendor installations.

#### PROFIBUS variants

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. The outstanding features of PROFIBUS DP are

- Very short response times
- High interference immunity

PROFIBUS replaces cost-intensive parallel signal transmission with 24 V and the measured value transmission with 0/4 mA to 20 mA technology.

#### PROFIBUS and SINAMICS

SINAMICS uses the PROFIBUS protocol PROFIBUS DP.

#### Design

##### Bus station

PROFIBUS DP distinguishes between two different master classes and one slave class:

##### Class 1 DP master

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.

##### Class 2 DP master

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

##### Functions on PROFIBUS DP

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

The DP master functions (DP-V0) comprise of the functions "Configuration", "Parameter assignment", "Read diagnostic data", as well as "Cyclic reading of input data/actual values" and "Writing output data/setpoints".

##### DP-V1

The additional DP function expansions (DP-V1) make it possible to perform non-isochronous 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 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 useful data transfer. Detailed diagnostic information can be transferred in the same way.

##### DP-V2

The extended DP master functions (DP-V2) mainly comprise functions for isochronous operation and direct data exchange between DP slaves.

Isochronous mode is implemented by means of a signal with a constant bus cycle for the bus system. This isochronous, constant cycle is sent by the DP master to all bus stations in the form of a global control message. The master and slaves can then synchronize their applications with this signal. The signal jitter between cycles is less than 1  $\mu$ s.

The so-called publisher/subscriber model is used to implement direct 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.

##### SINAMICS systems and PROFIBUS DP

SINAMICS S drives can operate only as DP slaves and support all communication functions, i.e. DP-V0, DP-V1 and DP-V2.



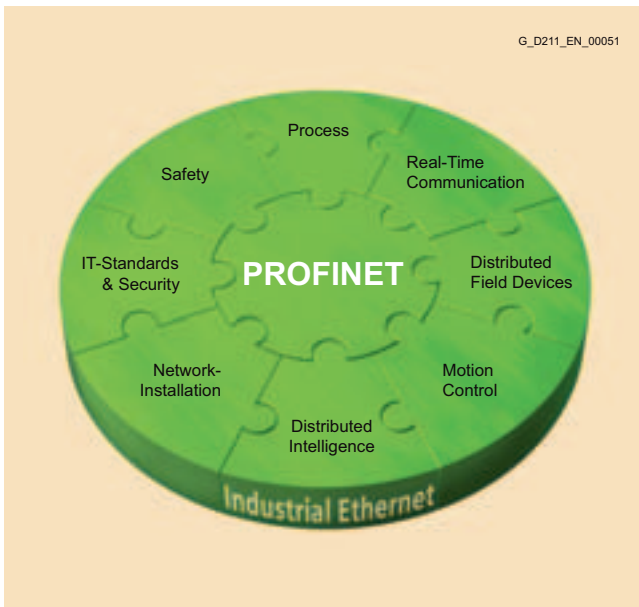
### Overview



PROFINET is the innovative and open Industrial Ethernet standard (IEC 61158) for industrial automation. With PROFINET, devices can be linked up from the field level through to the management level.

PROFINET enables system-wide communication, supports plant-wide engineering and applies IT standards right down to the field level. IT communication, data communication and cyclic process communication are combined on the basis of Industrial Ethernet.

Existing fieldbus systems such as PROFIBUS can be easily integrated without any modification of existing devices.

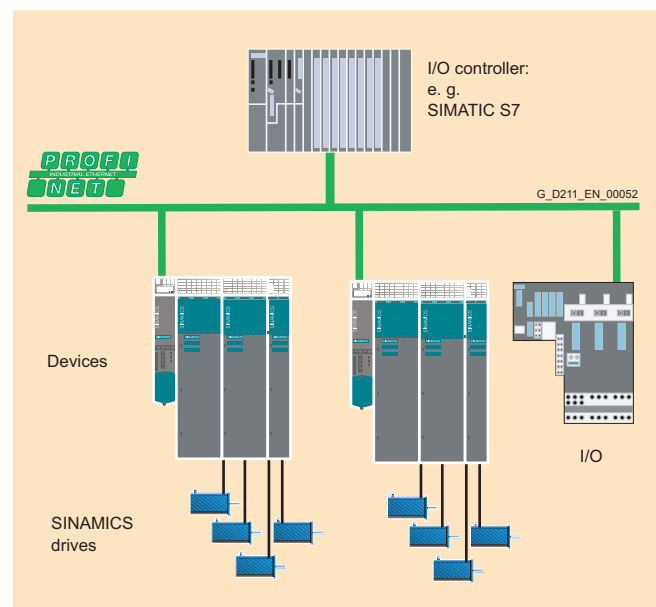


### Design

#### PROFINET device concept

PROFINET distinguishes between the controller and devices assigned to it. These are initialized and parameterized by the controllers on power-up. The controller and its devices together constitute a PROFINET I/O system (compare master/slave system for PROFIBUS).

For PROFINET, cyclic communication between an I/O controller and its I/O devices is performed in the same way as for PROFIBUS over the process image. The process image is updated cyclically, depending on the requirements and device characteristic this takes place in real-time (RT, devices are typically distributed I/O devices) or isochronous real-time (IRT, devices are typically servo drives). In addition, PROFINET permits communication between controllers and devices of different I/O systems.



#### PROFINET IO with RT for simple standard drive applications

With typical cycle times of between 4 ms and 10 ms, PROFINET IO with RT offers the same performance characteristics as PROFIBUS as regards cyclic data transmission.

With this performance level, all standard drive applications belonging to PROFIdrive application categories 1 to 3 can be automated, i.e. those categories requiring the specification of speed, torque and current setpoints or target positions which do not need to be linked isochronously.

# SINAMICS S120

## Communication

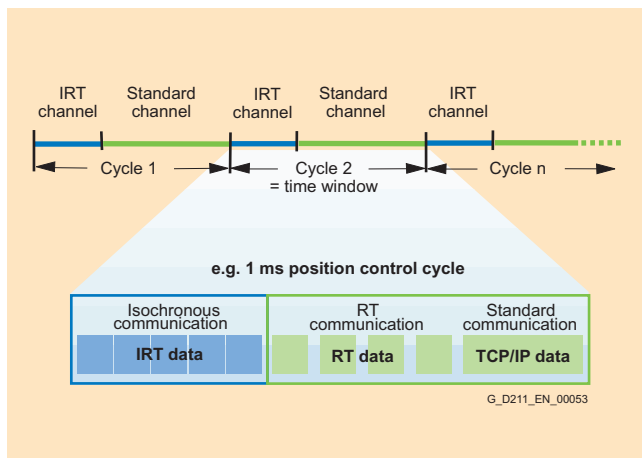
### PROFINET

#### Design (continued)

##### PROFINET IO with IRT for Motion Control

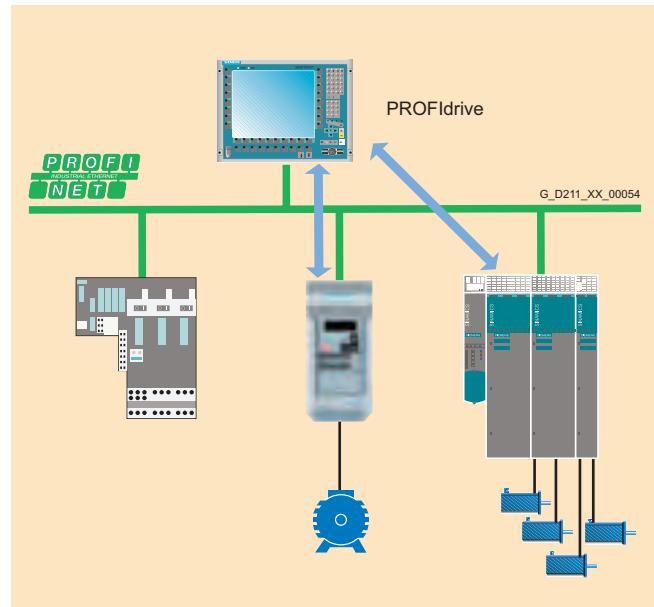
In this case, a Motion Control system (e.g. SIMOTION) controls or synchronizes axes using the PROFINET network. This requires cyclic, isochronous data exchange with the drives. PROFINET IO with IRT fulfils this requirement. The communication cycle is subdivided into different, time-specific channels for this purpose. The first channel is used for isochronous real-time communication (IRT), followed by real-time communication (RT) and standard TCP/IP communication. By configuring the application, e.g. synchronous operation of two axes, the IRT messages are determined implicitly and the corresponding configuration data are generated.

The optimum time sequence of the individual messages for each network section is 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.



##### Transition from PROFIBUS to PROFINET

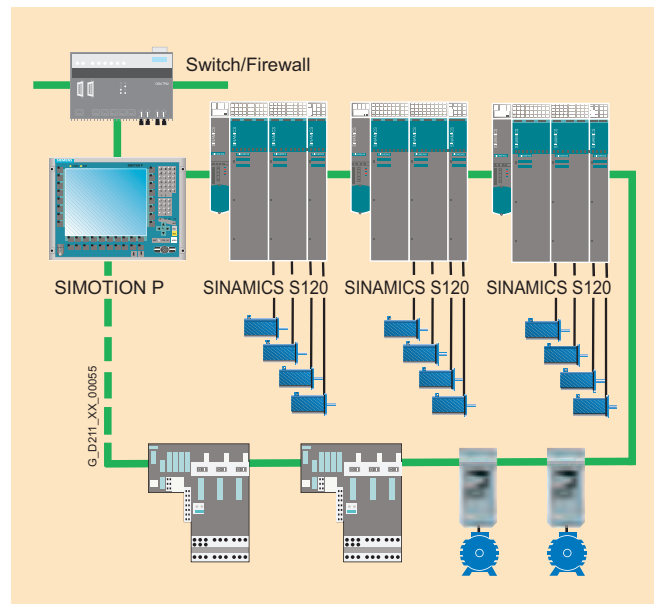
The functional interface between the controller and the SINAMICS drives for PROFINET and PROFIBUS is defined by the PROFdrive drive profile V4 of PROFIBUS International. It is not necessary to change an application program for the transfer between PROFIBUS and PROFINET.



PROFINET with PROFdrive

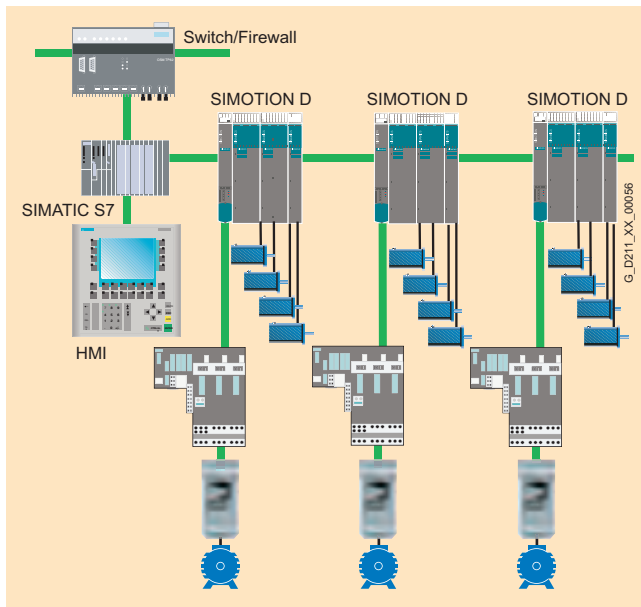
##### Motion Control concepts with PROFINET

With SINAMICS, PROFINET supports the implementation of different automation structures. Distributed drive-based Motion Control concepts (e.g. with SIMOTION D) or central architectures with a control (e.g. SIMOTION P) are supported in the same way as distributed automation solutions with modular automation components.



Central Motion Control architecture

#### Design (continued)



Distributed Motion Control architecture

#### PROFINET interface on SINAMICS

- SINAMICS S with a CU320 Control Unit and a CBE20 Communication Board  
The CU320 Control Unit on SINAMICS S is linked to the PROFINET IO network via the CBE20 Communication Board. The CBE20 Communication Board includes the PROFINET ASIC ERTEC400.
  - 4 ports with one RJ45 socket each
  - Integrated 4-port switch
  - 100 Mbit/s full duplex
  - PROFINET IO device
  - PROFINET IO with RT and IRT
  - TCP/IP communication to engineering
- SIMOTION D  
The SIMOTION D4x5 are linked to the PROFINET IO network via the CBE30 Communication Board. The CBE30 Communication Board includes the PROFINET ASIC ERTEC400.
  - 4 ports with one RJ45 socket each
  - Integrated 4-port switch
  - 100 Mbit/s full duplex
  - PROFINET IO controller
  - PROFINET IO with RT and IRT
  - Standard TCP/IP, UDP communication
  - PG/OP communication for connection of HMI and PG, IT communication

#### Function

##### Real-time communication with PROFINET IO

PROFINET uses standard TCP/IP for parameter assignment, configuration and diagnostics. Real-time communication for the transmission of process data is performed on the same line. PROFINET has the following real-time features:

- Real-time (RT)  
uses the option of prioritizing the communication stack of the stations. This permits high-performance data transmission with standard network components.
- Isochronous Real-Time (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 so-called ERTEC (Enhanced Real Time Ethernet Controller), in the corresponding interfaces (switch integrated into device) or network components (switch).

##### Automation with PROFINET

With these and other features PROFINET fulfills all automation requirements: Industry-compatible installation technology, real-time capability, deterministic responses, integration of distributed field devices, simple network administration and diagnostics, protection against unauthorized access, efficient vendor-independent engineering as well as isochronous motion control applications.

PROFINET relies on switch technology and has expanded this technology for real-time applications (IRT). This has the advantage that the network topology can be optimally utilized and adapted to the requirements of the machine. Collisions are prevented and an optimal data throughput is achieved.

# SINAMICS S120

## Control Units

### Control Units

#### Overview

##### New system architecture with a central Control Unit

Electronically coordinated individual drives work together to perform your drive tasks. Higher-level controllers operate the drives to achieve the required coordinated movement. This requires cyclic data exchange between the controller and the drives. This exchange usually took place via a field bus, which required a great deal of time and effort for installation and configuration. SINAMICS S120 takes a different approach: 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.

- Simple technological tasks can be carried out automatically by the SINAMICS S120 Control Unit
- The **CU310 DP** or **CU310 PN** Control Unit are available for single drives
- The **CU320** Control Unit is designed for multi-axis applications
- Sophisticated motion control tasks can be implemented with the support of the more powerful Control Units **D425**, **D435** and **D445** of **SIMOTION D** (graded according to performance)

Each of these Control Units is based on an object-oriented SINAMICS S120 standard firmware which contains all the most popular control modes and can be scaled to meet even the most advanced performance requirements.

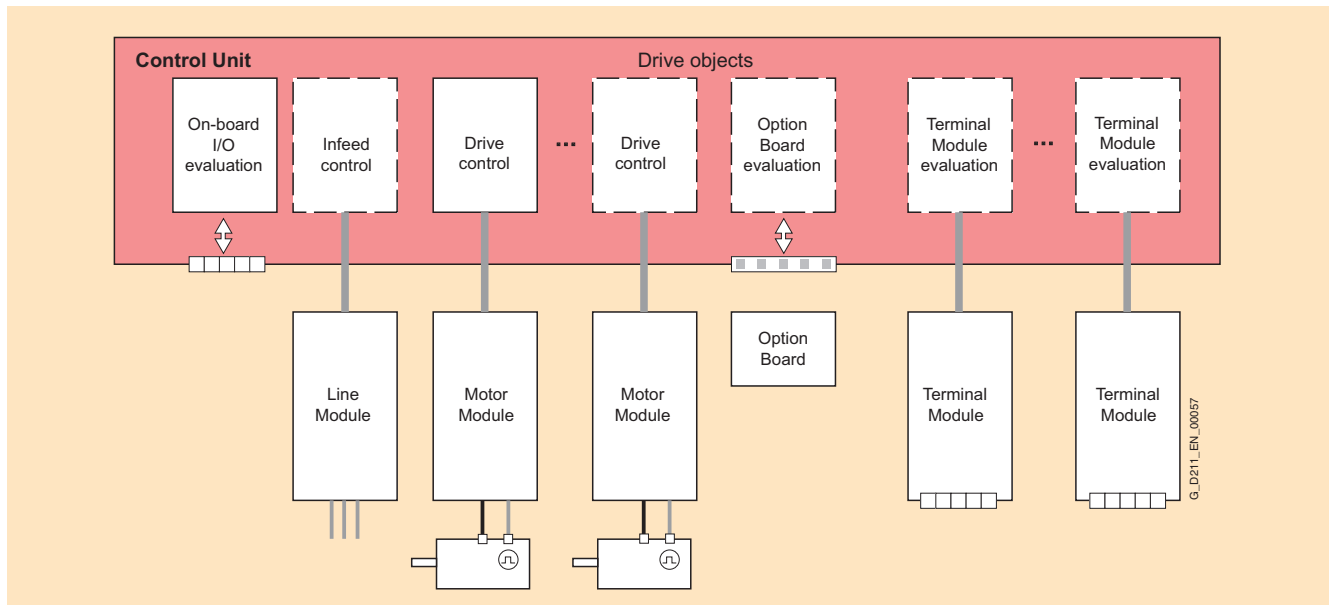
The drive controls are supplied as ready-to-configure drive objects:

- for the "Infeed Control",
- for the broad scope of rugged asynchronous (induction) motor applications "Vector Control" and V/f control
- for permanent-field synchronous motors with demanding dynamic requirements "Servo Control".

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, for example, group drives with SIEMOSYN motors.

#### Drive objects

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



G\_DP11\_EN\_00057



#### Overview (continued)

#### 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 operational reliability and excellent flexibility of application.

#### 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
<b>Infeed Control</b>	<ul style="list-style-type: none"> <li>• Booksize                             <ul style="list-style-type: none"> <li>- Current control with/without mains sensor</li> <li>- <math>V_{DC}</math> control with/without mains sensor</li> </ul> </li> <li>• Chassis                             <ul style="list-style-type: none"> <li>- Current control with mains sensor</li> <li>- <math>V_{DC}</math> control with mains sensor</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Booksize                             <ul style="list-style-type: none"> <li>- Smart Line Modules can be selected</li> </ul> </li> <li>• Chassis                             <ul style="list-style-type: none"> <li>- Basic Line Modules can be selected</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Mains identification</li> <li>• Controller optimization</li> <li>• Harmonics filter</li> <li>• Automatic restart</li> </ul>	The mains sensor is the VSM 10 Voltage Sensing Module; "current" is the line current; 3-phase with line frequency
<b>Vector Control</b>	<ul style="list-style-type: none"> <li>• Asynchronous motor                             <ul style="list-style-type: none"> <li>- Torque control with/without encoder</li> <li>- Speed control with/without encoder</li> </ul> </li> <li>• Torque motor                             <ul style="list-style-type: none"> <li>- Torque control with encoder</li> <li>- Speed control with/without encoder</li> </ul> </li> <li>• For asynchronous and torque motors                             <ul style="list-style-type: none"> <li>- Position control with encoder</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Linear/parabolic characteristic</li> <li>- Fixed-frequency characteristic (textiles)</li> <li>- Independent voltage setpoint input</li> </ul>	<ul style="list-style-type: none"> <li>• Data set changeover</li> <li>• Extended setpoint input</li> <li>• Motor identification</li> <li>• Current/speed controller optimization</li> <li>• Technology controller</li> <li>• Basic positioner</li> <li>• Automatic restart</li> <li>• Flying restart with/without encoder</li> <li>• Kinetic buffering</li> <li>• Synchronization</li> <li>• Droop</li> </ul>	<p>Mixed operation with <math>V/f</math> control modes is possible; it is for this reason that the <math>V/f</math> 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> <p>Synchronous motors (1FK and 1FT) and linear motors can be operated only in Servo mode.</p>
<b>Servo control</b>	<ul style="list-style-type: none"> <li>• Asynchronous motor                             <ul style="list-style-type: none"> <li>- Torque control with encoder</li> <li>- Speed control with/without encoder</li> </ul> </li> <li>• Synchronous motor, linear motor and torque motor                             <ul style="list-style-type: none"> <li>- Torque control with encoder</li> <li>- Speed control with encoder</li> </ul> </li> <li>• For all motor types                             <ul style="list-style-type: none"> <li>- Position control with encoder</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Linear/parabolic characteristic</li> <li>- Fixed-frequency characteristic (textiles)</li> <li>- Independent voltage setpoint input</li> </ul>	<ul style="list-style-type: none"> <li>• Data set changeover</li> <li>• Setpoint input</li> <li>• Motor identification</li> <li>• Damping application</li> <li>• Technology controller</li> <li>• Basic positioner</li> </ul>	<p>Mixed operation with <math>V/f</math> control modes is possible; it is for this reason that the <math>V/f</math> 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>

#### Technology packages

SIMOTION D Control Units support the coordinated motion control of multiple drives. In addition to drive objects, these Control Units also offer technology objects such as, for example, "cam controller", "synchronism", "cam disk" and "temperature control", and these objects are grouped to form technology packages. Users can create their own objects and set up links between all configured objects.

# SINAMICS S120

## Control Units

### Control Units

#### Overview (continued)

##### **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.

##### **Function modules**

The "basic positioner" is used for the absolute/relative positioning of linear and rotary axes (modulo) with motor encoders (indirect measuring system) or machine encoders (direct measuring system). The "technology controller" is designed as a PID controller. It is suitable for implementing controls for regulating variables such as fill level, temperature, tension, pressure, flow rate and dancer position.

##### **Integrated safety functions**

The Control Units support safety functions such as "Safe standstill" (STO = Safe Torque Off)

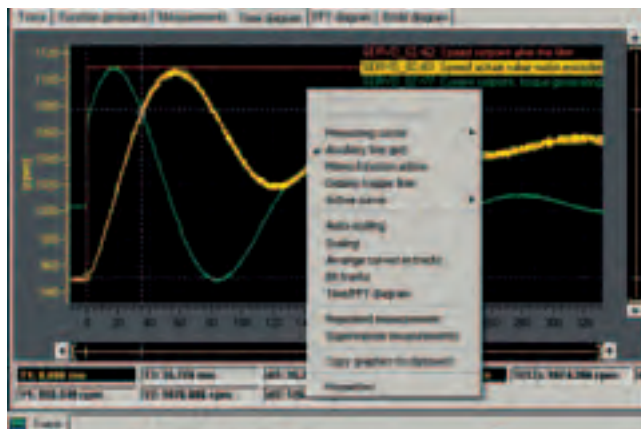
##### **CompactFlash card**

The functions of the SINAMICS S120 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 are 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.

##### **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. The trace can record up to 4 signals simultaneously. A recording can be triggered as a function of freely selectable boundary conditions, e.g. the value of an input or output variable.



#### Overview



The CU310 DP Control Unit provides the communications and openloop/closed-loop control functions for a Power Module. The CU310 DP combined with a Power Module and CompactFlash card creates a powerful single axis AC drive with a PROFIBUS interface to a higher-level control.

#### Design

CU310 DP Control Units feature the following interfaces as standard:

- 1 DRIVE-CLiQ socket for communication with other DRIVE-CLiQ devices, e.g. Sensor or Terminal Modules
- 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 HTL/TTL encoder evaluation circuit
- 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 power supply connector
- 1 PE (protective earth) connection

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

A BOP20 Basic Operator Panel can also 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.

#### Selection and ordering data

Description	Order No.
<b>CU310 DP Control Unit</b> (without CompactFlash card)	<b>6SL3040-0LA00-0AA0</b>

#### Accessories

Description	Order No.
PROFIBUS connector <u>without</u> PG/PC connection	<b>6ES7972-0BA41-0XA0</b>
PROFIBUS connector <u>with</u> PG/PC connection	<b>6ES7972-0BB41-0XA0</b>
STARTER commissioning tool	<b>6SL3072-0AA00-0AG0</b>

#### Integration

The CU310 DP Control Unit drives Power Modules in blocksize format via the PM-IF interface. In this case, other DRIVE-CLiQ components such as Sensor or Terminal Modules, can be connected to the DRIVE-CLiQ socket on the CU310 DP Control Unit.

Power Modules in chassis format are driven by the CU310 DP Control Unit via the DRIVE-CLiQ interface. With this option, Sensor and Terminal Modules must be connected to the free DRIVE-CLiQ sockets on the Power Module.

Parameter settings can be changed with the BOP20 Basic Operator Panel. The BOP20 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.

The integrated safety functions such as e.g. "Safe Torque Off" (= "Safe standstill") must be selected in two channels. Two digital inputs on the CU310 DP Control Unit are required for this purpose.

An external 24 V supply can be connected to the CU310 to power the control unit when the incoming supply to the Power Module is not energized.

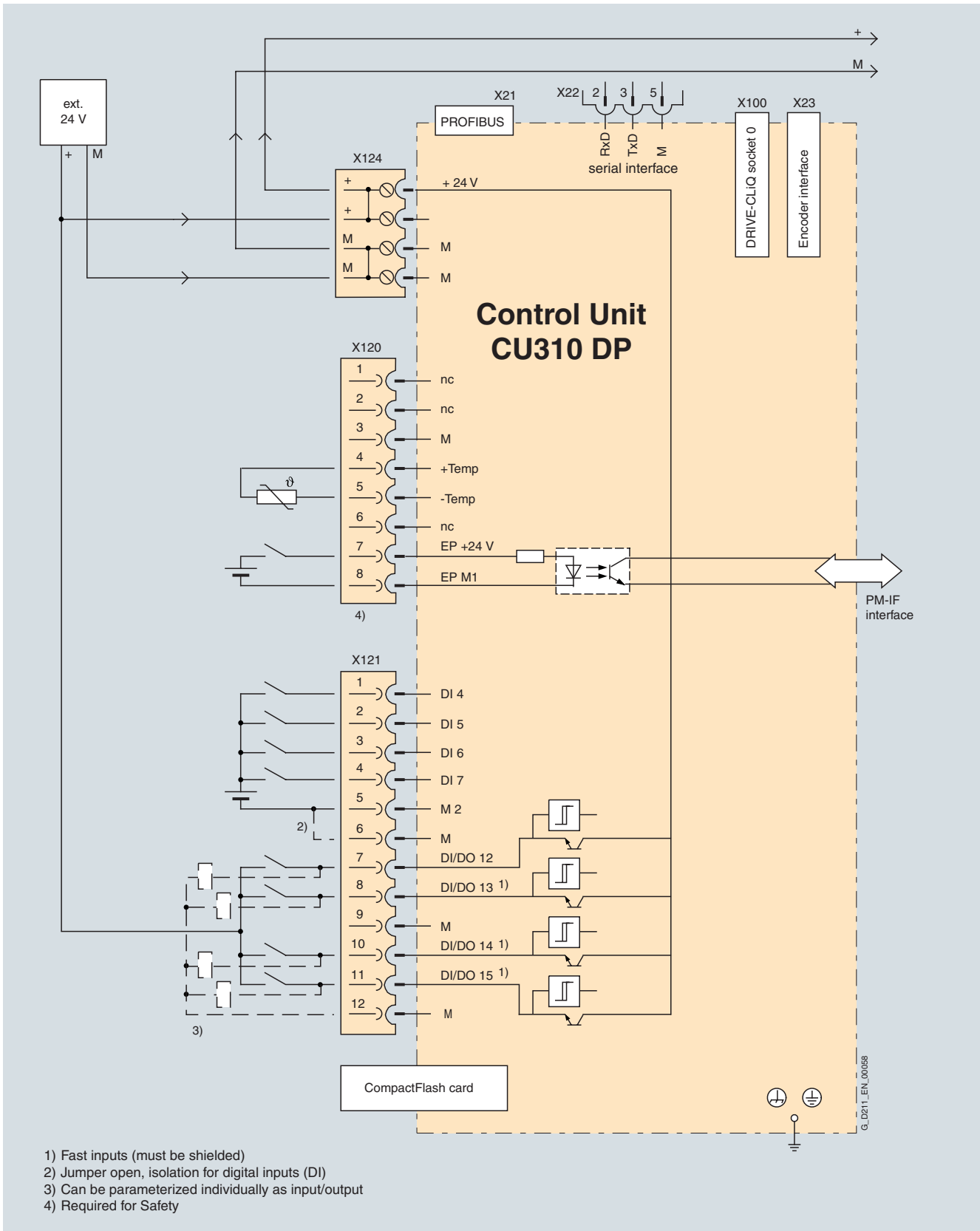
# SINAMICS S120

## Control Units

### CU310 DP Control Unit

#### Integration (continued)

2



Connection example of CU310 DP Control Unit

#### Technical data

##### CU310 DP Control Unit

Max. current requirement (at 24 V DC) without taking account of digital outputs and DRIVE-CLiQ supply	0.85 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Digital inputs	4 x floating digital inputs 4 bidirectional non-floating digital inputs/digital outputs
• Voltage	– 3 V to 30 V
• Low level (an open digital input is interpreted as "low")	– 3 V to + 5 V
• High level	15 V to + 30 V
• Current consumption (typ. at 24 V DC)	10 mA
• Signal propagation delays for digital inputs <sup>1)</sup>	L → H: approx. 50 μs H → L: approx. 100 μs
• Signal propagation delays for high-speed digital inputs <sup>1)</sup> (high-speed digital inputs can be used for position detection)	L → H: approx. 5 μs H → L: approx. 50 μs
• Max. connectable cross section	0.5 mm <sup>2</sup>
Digital outputs (continued-short-circuit-proof)	4 bidirectional non-floating digital inputs/digital outputs
• Voltage	24 V DC
• Max. load current per digital output <sup>2)</sup>	500 mA
• Delay time of the digital outputs	approx. ≈ 150 μs
• Max. connectable cross section	0.5 mm <sup>2</sup>
Encoder evaluation	TTL or HTL incremental encoders (with adjustable parameters)
• Cut-off frequency	500 kHz
• Max. cable length for TTL incremental encoder	100 m (328 ft) (only bipolar signals permitted)
• Max. cable length for HTL incremental encoder	100 m (328 ft) for unipolar signals 300 m (984 ft) for bipolar signals
Power loss	< 20 W
PE connection	On housing with M5 screw
Width	73 mm (2.9 in)
Height	183.2 mm (7.2 in)
Depth	89.6 mm (3.5 in)
Weight, approx.	0.95 kg (2 lb)
Approvals	cULus (File No.: E164110)

<sup>1)</sup> The specified signal propagation delays refer to the hardware. The actual reaction time depends on the time slot in which the digital input or output is processed.

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



# SINAMICS S120

## Control Units

### CU310 PN Control Unit

#### Overview



The CU310 PN Control Unit is designed for the communication and open-loop/closed-loop control functions of a Power Module. The CU310 PN combined with a Power Module and CompactFlash card creates a powerful single axis AC drive. The communication link to the higher-level control is provided by PROFINET IO.

#### Design

CU310 PN Control Unit features the following interfaces as standard:

- 1 DRIVE-CLiQ socket for communication with other DRIVE-CLiQ devices, e.g. Sensor or Terminal Modules
- 1 PM-IF interface for communication with Power Modules in blocksize format
- 1 interface to the BOP20 Basic Operator Panel
- 2 x PROFINET interfaces (RJ45 sockets) with PROFIdrive V4 profile
- 1 HTL/TTL encoder evaluation circuit
- 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 power supply connector
- 1 PE (protective earth) connection

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

A BOP20 Basic Operator Panel can also 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 tools.

#### Selection and ordering data

Description	Order No.
<b>CU310 PN Control Unit</b> (without CompactFlash card)	<b>6SL3040-0LA01-0AA0</b>

#### Accessories

Description	Order No.
STARTER commissioning tool	<b>6SL3072-0AA00-0AG0</b>
Industrial Ethernet FC RJ45 plug 180 (1x)	<b>6GK1901-1BB10-2AA0</b>
Industrial Ethernet FC RJ45 plug 180 (10x)	<b>6GK1901-1BB10-2AB0</b>
Industrial Ethernet FC stripping tool	<b>6GK1901-1GA00</b>
Industrial Ethernet FC standard cable GP 2x2	<b>6XV1840-2AH10</b>
Industrial Ethernet FC flexible cable GP 2x2	<b>6XV1870-2B</b>
Industrial Ethernet FC trailing cable GP 2x2	<b>6XV1870-2D</b>
Industrial Ethernet FC trailing cable 2x2	<b>6XV1840-3AH10</b>
Industrial Ethernet FC marine cable 2x2	<b>6XV1840-4AH10</b>

Further details about plugs and cables are available in the IK PI catalog.

#### Integration

The CU310 PN Control Unit drives Power Modules in blocksize format via the PM-IF interface. In this case, other DRIVE-CLiQ components such as Sensor or Terminal Modules can be connected to the DRIVE-CLiQ socket on the CU310 PN Control Unit.

Power Modules in chassis format are driven by the CU310 DP Control Unit via the DRIVE-CLiQ interface. With this option, Sensor and Terminal Modules must be connected to the free DRIVE-CLiQ sockets on the Power Module.

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

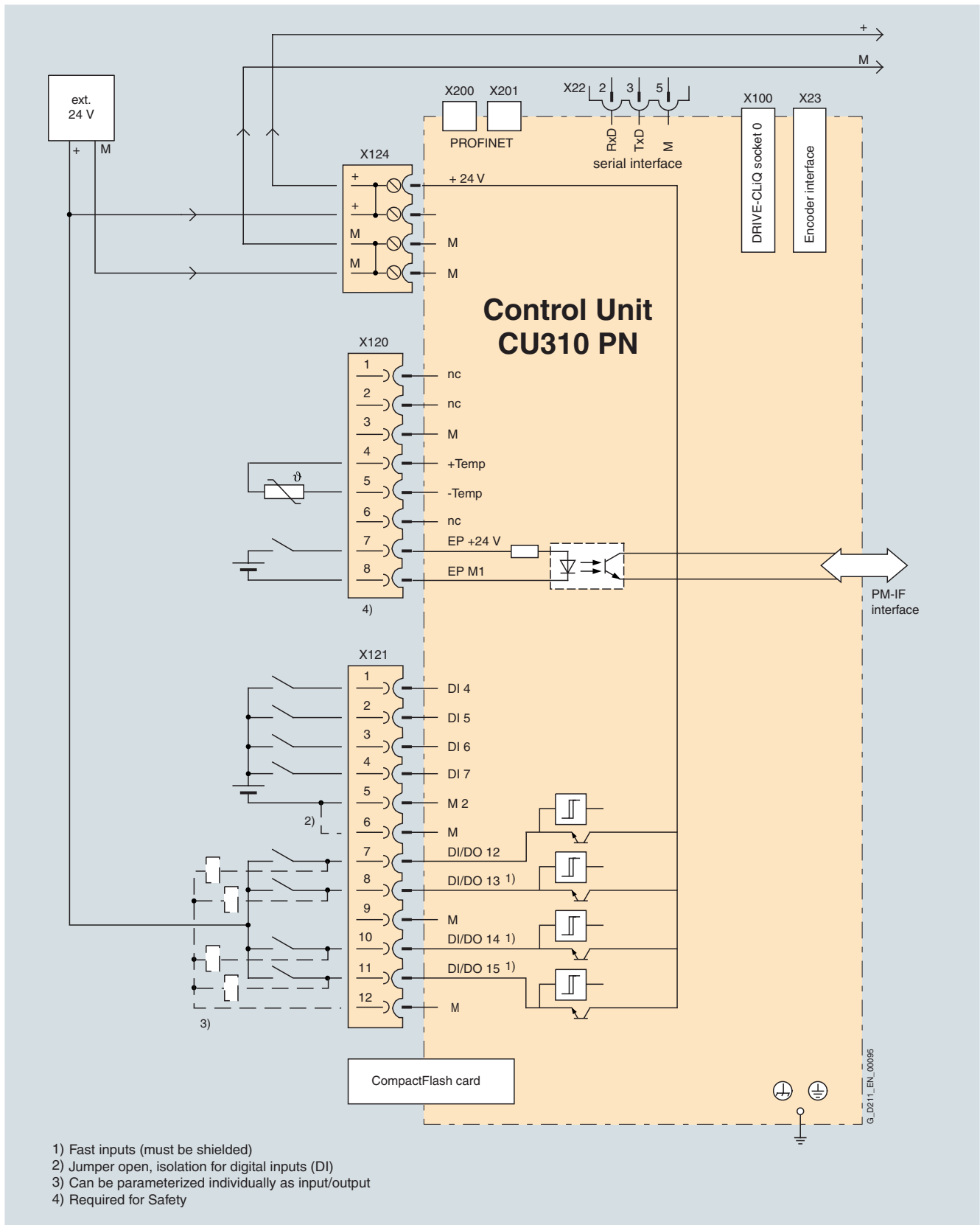
The CU310 PN Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool.

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

The integrated safety functions such as e.g. "Safe Torque Off" (= "Safe standstill") must be selected in two channels. Two digital inputs on the CU310 PN Control Unit are required for this purpose.

An external 24 V supply can be connected to the CU310 to power the control unit when the incoming supply to the Power Module is not energized.

### Integration (continued)



Connection example of CU310 PN Control Unit

# SINAMICS S120

## Control Units

### CU310 PN Control Unit

#### Technical data

##### CU310 PN Control Unit

Max. current requirement (at 24 V DC) without taking account of digital outputs and DRIVE-CLiQ supply	0.9 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Digital inputs	4 x floating digital inputs 4 bidirectional non-floating digital inputs/digital outputs
<ul style="list-style-type: none"> <li>• Voltage</li> <li>• Low level (an open digital input is interpreted as "low")</li> <li>• High level</li> <li>• Current consumption (typ. at 24 V DC)</li> <li>• Signal propagation delays for digital inputs <sup>1)</sup></li> </ul>	– 3 V to + 30 V – 3 V to + 5 V 15 V to 30 V 10 mA L → H: approx. 50 μs H → L: approx. 100 μs
<ul style="list-style-type: none"> <li>• Signal propagation delays for high-speed digital inputs<sup>1)</sup> (high-speed digital inputs can be used for position detection)</li> <li>• Max. connectable cross section</li> </ul>	L → H: approx. 5 μs H → L: approx. 50 μs 0.5 mm <sup>2</sup>
Digital outputs (continued-short-circuit-proof)	4 bidirectional non-floating digital inputs/digital outputs
<ul style="list-style-type: none"> <li>• Voltage</li> <li>• Max. load current per digital output <sup>2)</sup></li> <li>• Max. connectable cross section</li> </ul>	24 V DC 500 mA 0.5 mm <sup>2</sup>
Encoder evaluation	TTL or HTL incremental encoders (with adjustable parameters)
<ul style="list-style-type: none"> <li>• Cut-off frequency</li> <li>• Max. cable length for TTL incremental encoder</li> <li>• Max. cable length for HTL incremental encoder</li> </ul>	500 kHz 100 m (328 ft) (only bipolar signals permitted) 100 m (328 ft) for unipolar signals 300 m (984 ft) for bipolar signals
Power loss	< 20 W
PE connection	On housing with M5 screw
Width	73 mm (2.9 in)
Height	183.2 mm (7.2 in)
Depth	89.6 mm (3.5 in)
Weight, approx.	0.95 kg (2 lb)
Approvals	cULus (File No.: E164110)

<sup>1)</sup> The specified signal propagation delays refer to the hardware. The actual reaction time depends on the time slot in which the digital input or output is processed.

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

#### Overview



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. The CU320 Control Unit is designed for multi-axis operation.

#### Design



CU320 Control Unit, without guard cover

CU320 Control Unit features the following interfaces as standard:

- 4 x DRIVE-CLiQ sockets for communication with other DRIVE-CLiQ devices, e.g., Motor Modules, Active 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
- 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 power supply connector
- 1 PE (protective earth) connection
- 1 ground connection

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

The available option slot is used to expand the interfaces, for example, to include additional terminals or for communication purposes.

The status of the CU320 Control Unit is indicated via multi-color LEDs.

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 (10.63 in).

#### Integration

DRIVE-CLiQ components, for example, 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 BOP20 panel can also be snapped onto the CU320 Control Unit during operation to perform troubleshooting procedures.

The CU320 Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool.

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

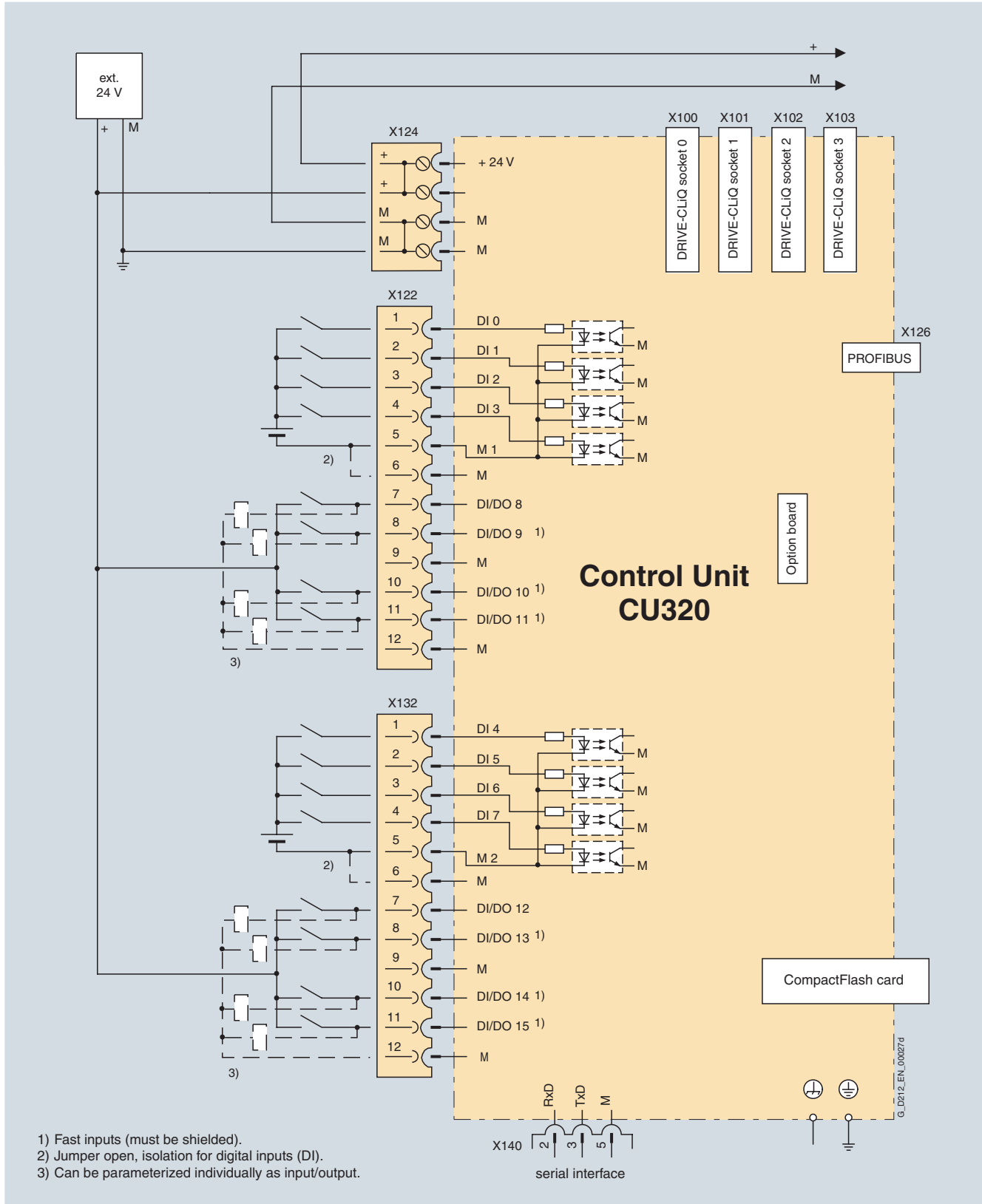
If an application requires more than one Control Unit, the number can be increased accordingly. The Control Units are then interconnected on a higher-level controller via PROFIBUS with the PROFIdrive V4 profile.

The integrated safety functions such as e.g. "Safe brake control" ("Safe standstill") must be selected in two channels. Two digital inputs are required for this purpose.

### CU320 Control Unit

#### Integration (continued)

2



Connection example of CU320 control unit



#### Technical data

##### CU320 Control Unit

Max. current requirements (at 24 V DC) without taking account of digital outputs, option slot expansion and DRIVE-CLiQ supply	0.8 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Digital inputs	8 x floating digital inputs 8 bidirectional non-floating digital inputs/digital outputs
• Voltage	– 3 V to 30 V
• Low level (an open digital input is interpreted as "low")	– 3 V to 5 V
• High level	15 V to 30 V
• Current consumption (typ. at 24 V DC)	10 mA
• Signal propagation delays for digital inputs <sup>1)</sup>	L → H: approx. 50 μs H → L: approx. 100 μs
• Signal propagation delays for high-speed digital inputs <sup>1)</sup> (high-speed digital inputs can be used for position detection)	L → H: approx. 5 μs H → L: approx. 50 μs
• Max. connectable cross section	0.5 mm <sup>2</sup>
Digital outputs (continued-short-circuit-proof)	8 bidirectional non-floating digital inputs/digital outputs
• Voltage	24 V DC
• Max. load current per digital output	500 mA
• Max. connectable cross section	0.5 mm <sup>2</sup>
Power loss	20 W
PE connection	On housing with M5 screw
Ground connection	On housing with M5 screw
Width	50 mm (1.97 in)
Height	270 mm (10.93 in)
Depth	226 mm (8.9 in)
Weight, approx.	1.5 kg (3 lb)
Approvals	cULus (File No.: E164110)

#### Selection and ordering data

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

#### Accessories

Description	Order No.
PROFIBUS connector <u>without</u> PG/PC connection	<b>6ES7972-0BA41-0XA0</b>
PROFIBUS connector <u>with</u> PG/PC connection	<b>6ES7972-0BB41-0XA0</b>
Spacers (2 x), for increasing the depth of the CU320 Control Unit to 270 mm (10.63 in) (if the brackets on the side are not to be used, the depth still has to be 270 mm (10.63 in)).	<b>6SL3064-1BB00-0AA0</b>
STARTER commissioning tool	<b>6SL3072-0AA00-0AG0</b>

<sup>1)</sup> The specified signal propagation delays refer to the hardware. The actual reaction time depends on the time slot in which the digital input or output is processed.

# SINAMICS S120

## Control Units

### CompactFlash Card for CU310 and CU320

#### Overview



The CompactFlash card contains the firmware and parameter settings. It is inserted into the appropriate slot on the CU310 or CU320 Control Unit.

#### Design

A CU320 Control Unit can perform the communication, open-loop and closed-loop control functions for several Motor Modules. The computing capacity requirement increases in proportion to the number of connected Motor Modules 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 computing capacity requirement and utilization of the CU320 Control Unit can be calculated with the SIZER configuration tool. The firmware options are supplied in license form, which are written to the CompactFlash card in the factory as license codes.

The firmware options can also be enabled on-site, for example, if the performance expansions required are not known at the time of placing the order. You will need the serial number of the CompactFlash card and the order number of the firmware option to be enabled. With this information, you can purchase the associated license code from a license database and enable the firmware option. The license code is only valid for the CompactFlash card declared and cannot be transferred to other CompactFlash cards.

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

#### Selection and ordering data

Description	Order No.
<b>CompactFlash card for CU310 DP, CU310 PN, CU320 Control Units</b> with current firmware version including certificate of license	
• <u>without</u> performance expansion	<b>6SL3054-0AA00-1AA0</b>
• <u>with</u> performance expansion 1 firmware option	<b>6SL3054-0AA01-1AA0</b>
<b>Firmware license</b> Performance expansion 1 firmware option for CompactFlash card including certificate of license	<b>6SL3074-0AA01-0AA0</b>

#### Further information

##### Firmware version

The firmware version is encoded in the order (part) number of the CompactFlash card supplied. For the above order number the most recent firmware version is always installed on shipped CompactFlash cards, i.e. the order number on the shipped CompactFlash cards may not necessarily match the order number of the ordered CompactFlash cards.

The firmware version is encoded as follows in the order number:

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

**Example:** A CompactFlash card with the order number 6SL3054-0AA00-1AA0 is ordered (as specified in the catalog). The CompactFlash card with the most recent firmware version is confirmed and shipped, e.g. order number 6SL3054-0CE00-1AA0 for firmware version 2.4. In this way, it is possible to specify a specific firmware version or the most recent firmware version in a replacement part order.

#### Overview

SIMOTION D is the compact, drives-based version of SIMOTION based on the SINAMICS drives family. With SIMOTION D, the logic, technology functions, motion control and drive control run on a single, compact hardware platform.

SIMOTION D is available in different performance variants. This ensures the highest degree of scalability and flexibility. The IEC 61131-3-compliant PLC integrated in SIMOTION D means that the system is not just capable of controlling sequences of motions, but the entire machine as well.

HMI devices can be connected via the onboard PROFIBUS or Ethernet interface for operator control and monitoring. Functions such as remote maintenance, diagnostics and teleservice can also be used via these interfaces.

#### Function

The SIMOTION D controllers basic functionality is supplied with the CompactFlash card and is loaded when the system is powered on. The basic scope of functions includes the following software components:

- SINAMICS S120 drive control
- SIMOTION runtime system
  - Programmable with several languages conforming to IEC 61131
  - Various runtime levels (cyclic, sequential, event-driven)
  - PLC and arithmetic functionality
  - Communications and management functions
  - Motion control functions (Motion Control Basic)
- Test and diagnostic interfaces

#### **Technology packages (TP)**

A special feature of SIMOTION is that the basic functionality can be expanded by loading technology packages, such as:

- Motion control with technology packages:
  - Positioning – POS
  - Synchronous operation/electronic gear – GEAR
  - Cam disk – CAM
- Temperature controller – TControl

Since the technology functions have modular licenses, you only pay for what you really need.

# SINAMICS S120

## Control Units

### SIMOTION D Control Units

#### Overview



SIMOTION D Control Units are available in a range of performance variants. This ensures the highest degree of scalability and flexibility. The individual variants SIMOTION D425, SIMOTION D435 and SIMOTION D445 differ in terms of performance characteristics (Motion Control + PLC) and the following features:

	SIMOTION D425	SIMOTION D435	SIMOTION D445
Maximum number of axes	16	32	64
DRIVE-CLiQ interfaces	4	4	6
Fan/battery module	Option	Option	required

Additional drives can be operated by means of PROFIBUS or PROFINET with the CU320 Control Units. Additional drives can also be directly connected to the SIMOTION D445 Control Unit by means of DRIVE-CLiQ with the SIMOTION CX32 module.

The drives can operate in Servo, Vector or *V/f* control mode.

#### Design

##### Interfaces

- Displays, diagnostics
  - LEDs to display operating states and errors
  - 7-segment status/error display during system power-up
  - 3 test sockets
- Interfaces
  - 4 x DRIVE CLiQ (6 x DRIVE CLiQ for SIMOTION D445)
  - 2 x Industrial Ethernet
  - 2 x PROFIBUS DP
- Integrated I/Os
  - 8 digital inputs
  - 8 digital inputs/outputs
- Various
  - Terminals for 24 V electronics power supply
  - Slot (Option slot) to receive a terminal expansion or additional communications ports

##### Data storage/data backup

SIMOTION D425, D435 and D445 Control Units have 320 KB of non-volatile SRAM (battery-backed for at least 5 days) for process variable storage. There are two options for storing data for a longer period:

- System commands for storing data on the SIMOTION CompactFlash card (CF)
- Use of a battery module

The CompactFlash card stores the runtime software and the user data and programs.

##### I/O

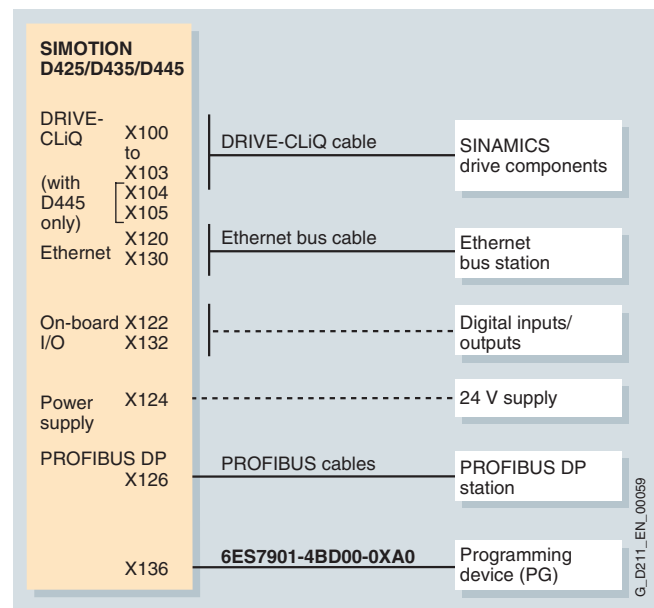
###### PROFIBUS DP

- Certified PROFIBUS standard slaves (DP/V0, DP/V1, DP/V2)
- SIMATIC ET 200S/M/X/eco/pro distributed I/O systems

###### DRIVE-CLiQ

- Modules from the SINAMICS range
- DRIVE-CLiQ cables, which are required to connect Line/Motor Modules to SIMOTION D, are supplied with the Line/Motor Modules (standard length).

#### Integration



Connection overview of SIMOTION D425, D435, D445

The maximum permissible cable lengths should be taken into account when planning the cable layout.

Malfunctions may occur if longer lengths are used.

The permissible length of PROFIBUS DP cables depends on the configuration.

#### Technical data

		<b>SIMOTION D425 Control Unit Basic Performance 6AU1425-0AA00-0AA0</b>	<b>SIMOTION D435 Control Unit Standard Performance 6AU1435-0AA00-0AA1</b>	<b>SIMOTION D445 Control Unit High Performance 6AU1445-0AA00-0AA0</b>
<b>Power supply</b>				
• Rated value	V DC	24	24	24
• Permissible range	V	20.4 to 28.8	20.4 to 28.8	20.4 to 28.8
Current consumption (at 24 V DC), not taking into account digital out- puts, typ.	A	0.6	0.6	2
Inrush current, typ.	A	6	6	6
Power loss	W	15	15	50
<b>Permissible ambient temperature</b>				
• Storage and transport	°C	- 40 to + 70 (- 40 °F to +158 °F)	- 40 to + 70 (- 40 °F to +158 °F)	- 40 to + 70 (- 40 °F to +158 °F)
• Operation	°C	0 to +55 (32 °F to +131 °F)	0 to +55 (32 °F to +131 °F)	0 to +55 (32 °F to +131 °F)
Permissible relative humidity (without condensation)	%	5 to 95	5 to 95	5 to 95
Air pressure	hPa	700 to 1060	700 to 1060	700 to 1060
Degree of protection to IEC 529		IP20	IP20	IP20
Width	mm	50 (1.97 in)	50 (1.97 in)	50 (1.97 in)
Height	mm	380 (14.96 in)	380 (14.96 in)	380 (14.96 in)
Depth	mm	230 (9.1 in)	230 (9.1 in)	270 (10.6 in)
<b>Weight</b>				
• SIMOTION D	kg	2.5 (5 lb)	2.5 (5 lb)	3.6 (8 lb)
• CompactFlash card	g	7 (0.02 lb)	7 (0.02 lb)	7 (0.02 lb)
<b>Digital inputs</b>		<b>8</b>	<b>8</b>	<b>8</b>
Rated value	V DC	24	24	24
• For signal "1"	V	15 to 30	15 to 30	15 to 30
• For signal "0"	V	- 3 to + 5	- 3 to + 5	- 3 to + 5
Isolation		Yes, in groups of 4	Yes, in groups of 4	Yes, in groups of 4
Current consumption at 24 V, typ. for signal level 1	mA	10	10	10
Signal propagation delays	µs	100	100	100
<b>Digital inputs/outputs (parameterizable)</b>		<b>8</b>	<b>8</b>	<b>8</b>
<b>When used as an input</b>				
• Input voltage				
- Rated value	V DC	24	24	24
- For signal "1"	V	15 to 30	15 to 30	15 to 30
- For signal "0"	V	- 3 to + 5	- 3 to + 5	- 3 to + 5
• Isolation		No	No	No
• Current consumption at 24 V, typ. for signal level 1	mA	10	10	10
• Signal propagation delays	µs	100 (1 µs as measuring probe)	100 (1 µs as measuring probe)	100 (1 µs as measuring probe)
<b>When used as an output</b>				
• Rated load voltage				
- Rated value	V DC	24	24	24
- Permissible range	V	20.4 to 28.8	20.4 to 28.8	20.4 to 28.8
• Output voltage				
- For signal "1", max.	V	15 to 30	15 to 30	15 to 30
• Isolation		No	No	No
• Current load, max.	mA	500 per output	500 per output	500 per output
• Residual current, max.	mA	2	2	2
• Switching frequency of the outputs				
- With ohmic load	Hz	100	100	100
- With inductive load	Hz	2	2	2
• Short-circuit protection		yes	yes	yes
<b>Real-time clock/SRAM backup</b>				
• Backup time, min.		5 days	5 days	5 days
• Charging time, typ.		Only a few minutes	Only a few minutes	Only a few minutes
<b>Approvals</b>		cULus (File No.: E164110)	cULus (File No.: E164110)	cULus (File No.: E164110)



# SINAMICS S120

## Control Units

### SIMOTION D Control Units

#### Selection and ordering data

Description	Order No.
<b>Control Unit</b> <ul style="list-style-type: none"><li>• SIMOTION D425</li><li>• SIMOTION D435</li><li>• SIMOTION D445</li></ul>	<b>6AU1425-0AA00-0AA0</b> <b>6AU1435-0AA00-0AA1</b> <b>6AU1445-0AA00-0AA0</b>
<b>CompactFlash card 512 MB</b> with SINAMICS drive software version V2.4 and SIMOTION kernel	<b>6AU1400-2NA00-0AA0</b>
<b>Spacers</b> (for D425 and D435; included as standard with D445) Kit, 2 spacers	<b>6SL3064-1BB00-0AA0</b>
<b>Battery</b>	<b>6FC5247-0AA18-0AA0</b>
<b>Battery and fan module</b> for non-volatile data storage (optional for D425 and D435; required for D445)	<b>6FC5348-0AA01-0AA0</b>

#### Further information

Further information

- on PROFIBUS DP and Industrial Ethernet can be found in Catalog IK PI or in the Interactive Catalog under "Automation Systems/SIMATIC NET Communication Systems" and under "Communication".
- on the SIMOTION Motion Control System Catalog PM10 can be found

### SIMOTION CX32 Controller Extension

#### Overview



The CX32 Controller Extension is a SINAMICS S120-type component and permits the drive-side computing power for the SIMOTION D product range to be scaled. Each CX32 can control up to six additional servo axes.

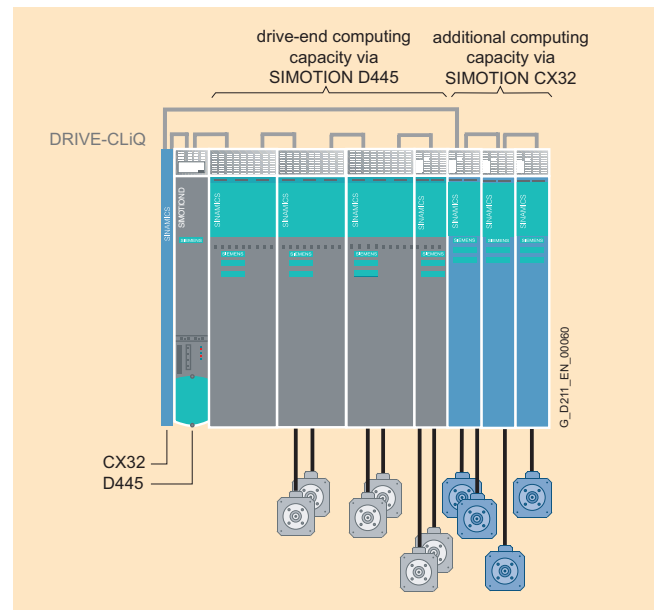
The controller is connected to SIMOTION D with DRIVE-CLiQ which ensures high-performance isochronous drive control without additional modules. The communication interfaces on the SIMOTION D modules remain available for other connections. With a width of 25 mm (0.98 in) the module requires very little space and is therefore perfectly suited for use in compact machines.

The data for the SIMOTION CX32 is stored exclusively on the SIMOTION D module which means no action has to be taken if the module is replaced. The SIMOTION CX32 can be operated on the SIMOTION D445 and D435 Control Units.

#### Design

Automation solutions with many axes can be implemented with SIMOTION D and the SIMOTION CX32 Controller Extension. SIMOTION D can manage and control the motion of up to 64 axes and already has the drive control for up to 6 servo axes plus the infeed integrated. Alternatively, vector axes or *V/f* axes can be operated. The drive control for up to 6 additional servo axes can be implemented with the SIMOTION CX32 Controller Extension. More than one SIMOTION CX32 Controller Extension can be used in an axis group.

Additional CU320s can be operated via PROFIBUS on a SIMOTION D425, D435 or D445.



Example of an axis group for 10 axes

#### Technical data

##### SIMOTION CX32 Controller Extension

Power supply	
• Rated value	24 V DC
• Permissible range	20.4 V to 28.8 V
Current consumption (at 24 V DC) without taking account of digital outputs and DRIVE-CLiQ supply, typ.	0.8 A
Inrush current, typ.	1.6 A
Permissible ambient temperature	
• Storage and transport	- 40 °C to +70 °C (- 40 °F to +158 °F)
• Operation	0 °C to + 55 °C (32 °F to +131 °F)
Permissible relative humidity (without condensation)	5% to 95%
Air pressure	700 to 1060 hPa
Degree of protection to IEC 529	IP20
Width	25 mm (0.98 in)
Height	380 mm (14.96 in)
Depth	230 mm (9.1 in)
Weight	1.5 kg (3 lb)
Approvals	cULus (File No.: E164110)
Digital inputs	4
Digital inputs/outputs	4, programmable

#### Selection and ordering data

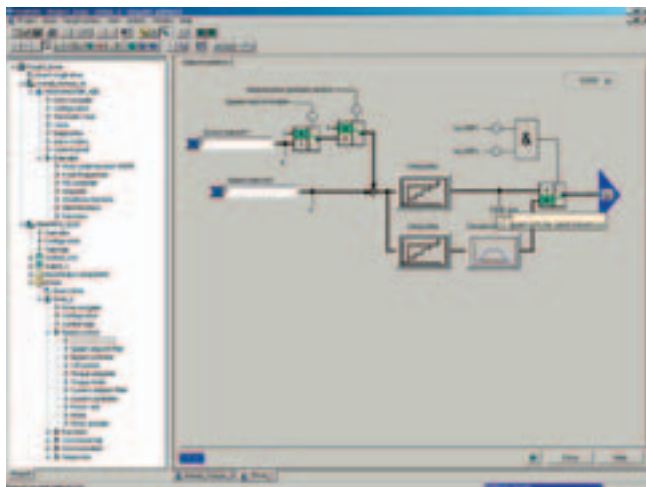
Description	Order No.
<b>SIMOTION CX32 Controller Extension</b>	<b>6SL3040-0NA00-0AA0</b>

# SINAMICS S120

## Engineering software

### STARTER drive/commissioning software

#### Overview



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

- commissioning,
- optimization 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.

First-time users 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 enables a drive to be up and running after only setting a small number of parameters within the drive configuration process.

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

Examples of individual settings that can be made include:

- terminals
- bus interface
- setpoint channel (e.g. fixed setpoints)
- speed control (e.g. ramp-function generator, limits)
- BICO interconnections
- diagnostics

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

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

- self-optimization
- trace (depending on drive)

Diagnostics functions provide information about:

- control/status words
- parameter status
- operating conditions
- communication states

#### Performance

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

#### Minimum hardware and software requirements

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

256 MB RAM (512 MB recommended)

Monitor resolution, 1024 × 768 pixels

Windows™ 2000 SP3, XP Professional SP1

Microsoft Internet Explorer 5.01

#### Integration

A PROFIBUS Communication Module and a connection cable are required to make the communication link between the PG/PC and a Control Unit.

For example, PROFIBUS Communication Module CP 5512 (PCMCIA type 2 card + adapter with 9-pole SUB-D socket for connection to PROFIBUS). For Windows 2000/XP Professional and PCMCIA 32)

Order No.: 6GK1551-2AA00

and connection cable between CP 5512 and PROFIBUS

Order No.: 6ES7901-4BD00-0XA0

PC converter connection sets are available for MICROMASTER 4, SINAMICS G110 and SINAMICS G120 for a safe point-to-point connection to the PC.

Order No. for MICROMASTER 4: 6SE6400-1PC00-0AA0

(the scope of supply includes a 9-pole SUB-D connector and an RS 232 standard cable, 3 m (9.8 ft))

Order No. for SINAMICS G110 and SINAMICS G120:

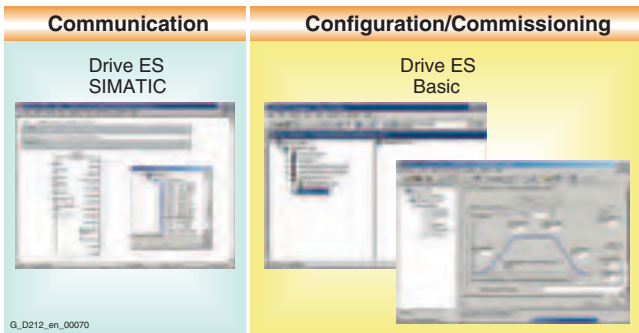
6SL3255-0AA00-2AA1

(the scope of supply includes a 9-pole SUB-D connector and an RS 232 standard cable, 3 m (9.8 ft), and the STARTER startup tool on CD-ROM)

#### Selection and ordering data

Description	Order No.
STARTER commissioning tool for SINAMICS and MICROMASTER English/German/French/Italian	<b>6SL3072-0AA00-0AG0</b>

#### 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 of the world of Totally Integrated Automation and the option for routing beyond network limits along with 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 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.
- Drive ES SIMATIC**  
simple parameterization of the STEP 7 communication instead of programming.  
In order to use Drive ES SIMATIC, STEP 7 must be installed. It features a SIMATIC function block library, thereby making the programming of the PROFIBUS interface in the SIMATIC CPU for the drives easy and secure. There is no need for separate, time-consuming programming of the data exchange between the SIMATIC CPU and the drive.  
All Drive ES users need to remember is:  
**Copy – Modify – Download – Ready.**  
**Customized, fully-developed function blocks** are copied from the library into user-specific projects.  
Frequently-used functions are set to run in program format:
  - Read out complete diagnostics buffer automatically from the drive
  - Download complete parameter set automatically from the SIMATIC CPU into the drive – e.g. when a device has to be replaced.
  - Load part parameter sets (e.g. for recipe and product change) automatically from the SIMATIC CPU
  - Read back, i.e. update, complete parameterization or part parameter sets are uploaded from the drive into the SIMATIC CPU.
- 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.

For further information please visit us on the Internet at:

<http://www.siemens.com/drivesolutions>

#### Selection and ordering data

Description	Order No.
<b>Drive ES Basic V 5.4</b> <ul style="list-style-type: none"> <li>• Configuration software for the integration of drives into Totally Integrated Automation</li> <li>• Requirement: STEP 7 V5.3 and higher, SP3</li> <li>• Supply format: on CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation</li> </ul>	
Single-user license	<b>6SW1700-5JA00-4AA0</b>
Multi-user license, 60x	<b>6SW1700-5JA00-4AA1</b>
Update service for single-user license	<b>6SW1700-0JA00-0AB2</b>
Update service for multi-user license	<b>6SW1700-0JA00-1AB2</b>
Upgrade from V 5.x to V 5.4	<b>6SW1700-5JA00-4AA4</b>
<b>Drive ES SIMATIC V 5.4</b> <ul style="list-style-type: none"> <li>• Function block library for SIMATIC for the parameterization of communication with the drives</li> <li>• Requirement: STEP 7 V5.3 and higher, SP3</li> <li>• Supply format: on CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation</li> </ul>	
Single-user license, incl. 1 x runtime license	<b>6SW1700-5JC00-4AA0</b>
Runtime license	<b>6SW1700-5JC00-1AC0</b>
Update service for single-user license	<b>6SW1700-0JC00-0AB2</b>
Upgrade from V 5.x to V 5.4	<b>6SW1700-5JC00-4AA4</b>
<b>Drive ES PCS 7 V 6.1</b> <ul style="list-style-type: none"> <li>• Function block library for PCS 7 for the integration of drives</li> <li>• Requirement: PCS 7 V 6.1 and higher</li> <li>• Supply format: on CD-ROM Ger., Eng., Fr., Sp., It. with electronic documentation</li> </ul>	
Single-user license, incl. 1 x runtime license	<b>6SW1700-6JD00-0AA0</b>
Runtime license	<b>6SW1700-5JD00-1AC0</b>
Update service for single-user license	<b>6SW1700-0JD00-0AB2</b>
Upgrade from V 5.x to V 6.1	<b>6SW1700-6JD00-0AA4</b>

#### Overview

The SCOUT engineering software enables the solution of Motion Control, PLC and technology tasks in the SIMOTION Motion Control system and supplies all tools for this purpose, such as programming and parameterization, testing and commissioning, as well as diagnostics.

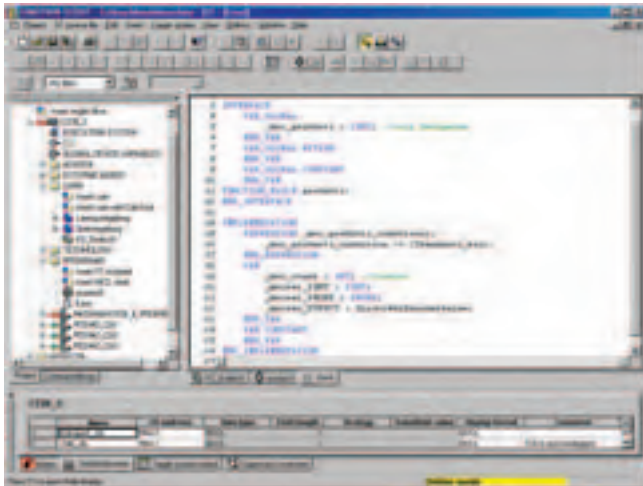
The SIMOTION D Control Units contain as standard a basic functionality (Kernel), which is programmable in accordance with IEC 61131.

Loadable technology packages provide further functionalities, such as positioning, synchronous operation, electronic cams and temperature channels.

These technology packages enable the creation of technological objects, which offer an easy and overall view of associated functions.

There are various technological objects, which are all created, configured and parameterized in the same way.

Additionally the technological objects comprise of a programming interface, making it possible to use the functionality out of the user program.



The high-level language Structured Text (ST) provides all language resources in the form of commands. This permits the generation of well-structured applications.

The basic commands implement all requirements for:

- data management,
- computing functions,
- control structures
- I/O operations

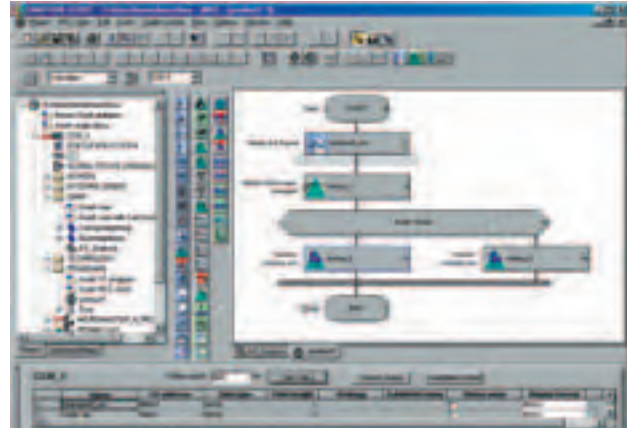
The addition of the technology packages for Motion Control increases the scope of commands by adding powerful, highly flexible Motion Control commands (e. g.: `_pos(...)` for position controlled axis positioning).

An ST source file basically consists of continuous text. This text can be divided and structured in sections, which represent logical sections of an ST source file.

These sections can consist of the following:

- Program assigned to a runtime task
- Function block with a dedicated memory
- Function without a dedicated memory

Functions and function blocks are not assigned to a runtime task. They are called from programs.



Motion Control Chart (MCC) can be used to formulate the processes of a machine graphically with simple and logical tools. The result is one or more flowcharts showing the chronological sequence of the individual actions.

Above all, MCC supports the simple description of the motion sequences of machines with many axes with the help of powerful Motion Control commands (e. g. reference axis, position axis, synchronize or desynchronize cam, and many more).

Different commands are available for controlling the machine, e. g. if conditions must be fulfilled, I/O signals can be read or set, calculations can be formulated and different control structures such as condition (IF), cases (CASE) and loops (WHILE, REPEAT UNTIL) can be programmed.

Several MCC programs may be created to describe different process situations. For example, you can create one MCC program to bring the machine to a defined initial state when it is powered on, a second MCC program for the normal production sequence, and a third MCC program to specify what the machine is to do in the event of a fault.

All commands are available in tool bars (sorted according to functions) and are automatically inserted in the flowchart at the selected point with a click. By clicking on different elements, individual dialogs for further parameterization are opened. Of course, it is also possible to include individual comments to document the sequence.

#### Further information

Further information on characteristics of the SCOUT engineering software, as well as of hardware platforms, runtime software and ordering data of the SIMOTION Motion Control system can be found in Catalog PM10.



#### Design



PM340 Power Modules in blocksize format, frame sizes FSA to FSF

The PM340 Power Modules in blocksize format feature the following connection as standard:

- Supply Connection
- DCP/R1 and DCN DC link terminal
- Terminals DCP/R1 and R2 for connection of an external braking resistor
- PM-IF interface for connection of the PM340 Power Module and CU310 Control Unit or CUA31 Control Unit Adapter. The PM340 Power Module also supplies power to the CU310 Control Unit or CUA31 Control Unit Adapter by means of an integrated power supply
- Motor connection made with screw terminals or screw studs
- Control circuit for the Brake Relay or Safe Brake Relay to control a holding brake
- 2 PE (protective earth) connections

Power Modules without integrated line filter are suitable for connection to both grounded-neutral (TN, TT) and non-grounded (IT) systems.

Power Modules with integrated line filter are suitable only for connection to TN systems.

When utilizing the integrated Braking Unit (Braking Chopper), the temperature of the external braking resistor must be monitored (i.e. thermostatic switch) to provide protection against thermal overloading.

#### Integration



PM340 Power Module in blocksize format with CU310 DP Control Unit



PM340 Power Module in blocksize format with CUA31 Control Unit Adapter

# SINAMICS S120

## Power Modules and line-side components

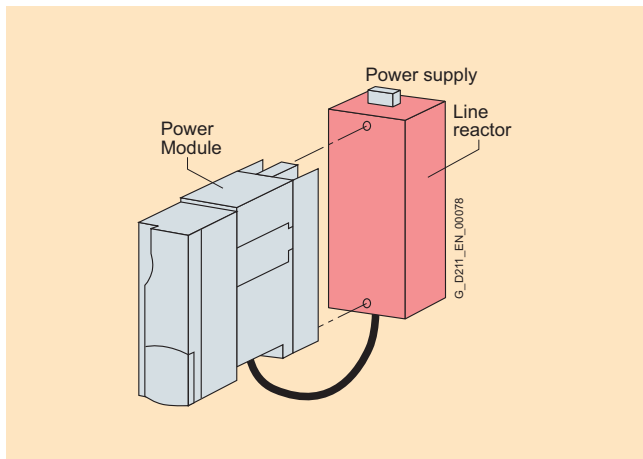
### Power Modules in blocksize format

#### Integration (continued)

Many system components for PM340 Power Modules are designed as base components, i.e. the component is mounted on the baseplate and the PM340 Power Module in front of them in a space-saving construction. Up to two base components can be mounted in front of one another.

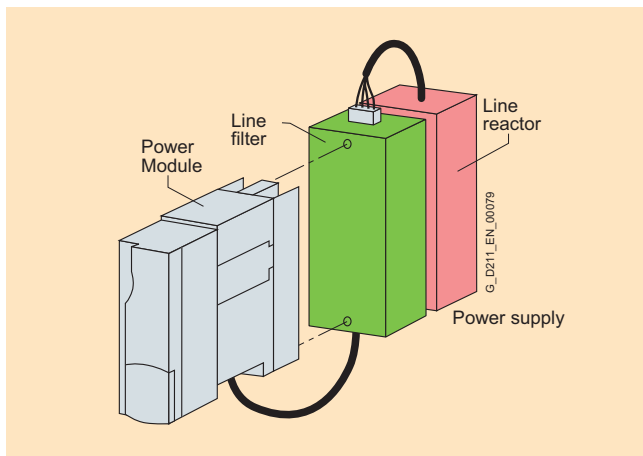
	FSA	FSB	FSC	FSD	FSE	FSF
Line filter	✓					
Line reactor	✓	✓	✓	✓	✓	–
Braking resistor	✓	✓	–	–	–	–
Motor reactor	✓	✓	✓	–	–	–

- ✓ suitable as base type
- not suitable as base type
- not available



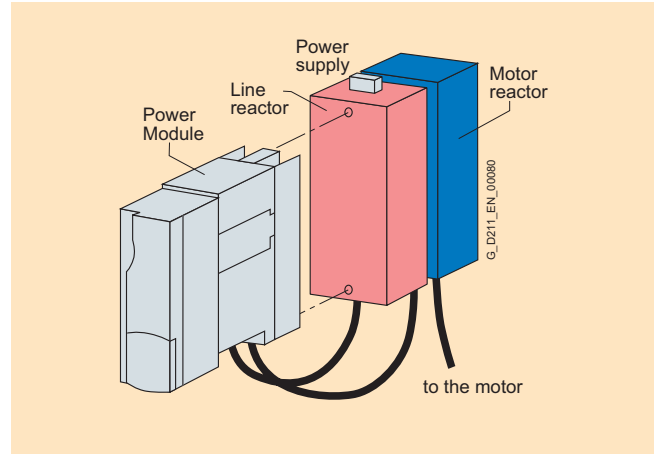
Basic layout of a PM340 Power Module with line reactor as base component

The line-side reactors are equipped with terminals on the line side and with a pre-assembled cable on the Power Module side. When installed, the mains terminals are at the top on frame sizes FSA to FSC, and at the bottom on frame sizes FSD and FSE.



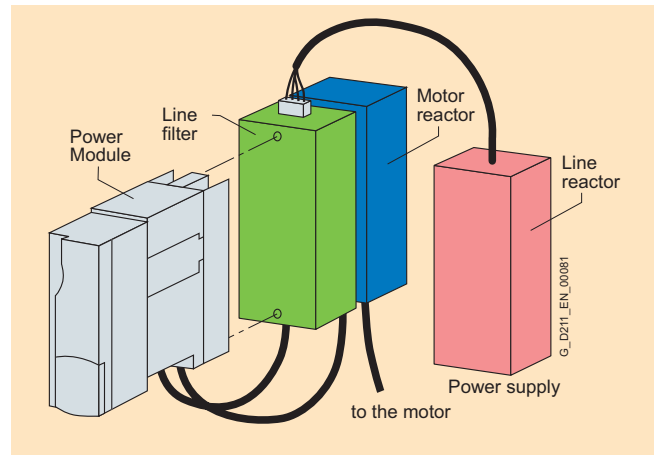
Power Module PM340 frame size FSA with line reactor and line filter

If a line filter is installed in addition to the line reactor on frame size FSA, the components must be arranged as shown in the diagram above. In this case, the mains connection is at the bottom.



Power Module PM340 frame size FSA with line reactor and motor reactor

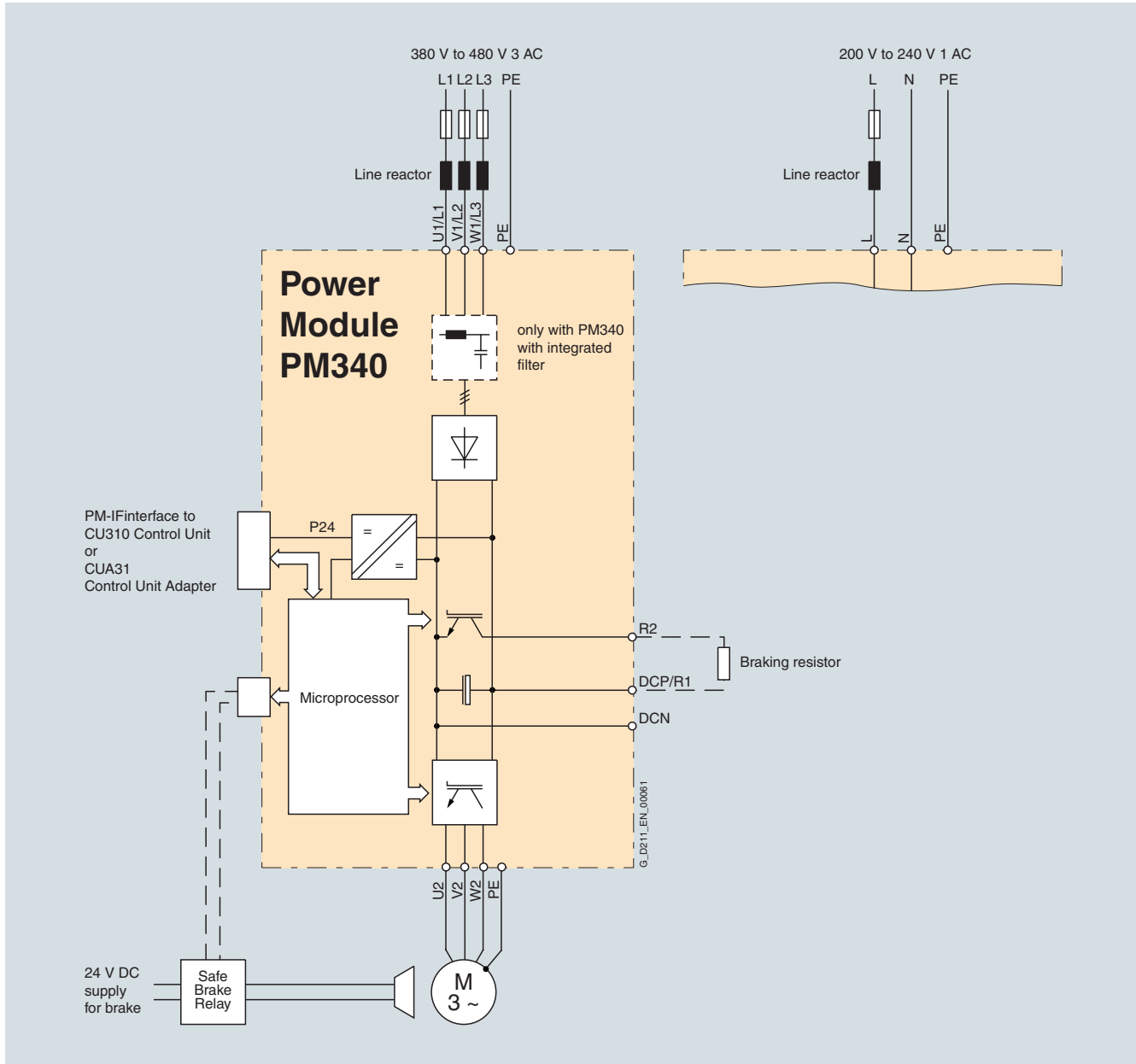
Power Modules of frame size FSB and higher are available with integrated line filters, alleviating the need for an external line filter.



For configurations involving more than two base-type system components, e.g. line reactor + motor reactor + braking resistor, individual components must be mounted to the side of the Power Module. In this instance, the line and motor reactors must be installed behind the Power Module and the braking resistor to the side.

#### Integration (continued)

The PM340 Power Modules in blocksize format communicate with the CU310 Control Unit or the CUA31 Control Unit Adapter via the PM-IF interface.



Connection example of PM340 Power Module in blocksize format

# SINAMICS S120

## Power Modules and line-side components

### Power Modules in blocksize format

#### Technical data

##### General technical data

Electrical data	
Line connection voltage (up to 2000 m (6563 ft) above sea level)	200 V to 240 V 1 AC ±10% (– 15% < 1 min) or 380 V to 480 V 3 AC ±10% (– 15% < 1 min)
Power frequency	47 Hz to 63 Hz
Line power factor at rated output	
• Fundamental Power Factor	> 0.96
• Total ( $\lambda$ )	
- 200 V to 240 V 1 AC	0.45 to 0.7
- 380 V to 480 V 3 AC	0.65 to 0.95
Overvoltage category	Class III to EN 60664-1
DC link precharging frequency	max. 1x every 30 s
DC link voltage	approx. 1.35 x line voltage
Output frequency	
• Control type Servo	0 Hz to 650 Hz <sup>1)</sup>
• Control type Vector	0 Hz to 300 Hz <sup>1)</sup>
• Control type V/f	0 Hz to 300 Hz <sup>1)</sup>
Electronics power supply	24 V DC – 15%/+ 20%
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Class A1 to EN 55011 and Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	Forced air cooling through a built-in fan
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0°C to + 40 °C (32 °F to + 104 °F) without derating, > 40 °C to + 55 °C (> 104 °F to + 131°C) see derating characteristics
Site altitude	Up to 1000 m (3282 ft) above sea level without derating, > 1000 m to 4000 m (> 3280 ft to 13126 ft) above sea level see derating characteristics
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus
- 200 V to 240 V 1 AC	Frame size FSA (File No.: E192450)
- 380 V to 480 V 3 AC	Frame sizes FSA to FSC: (File No.: E121068) Frame sizes FSD to FSF: (File No.: E192450)
Certification (in preparation)	Safety Integrity Level 2 (SIL 2) to IEC 61508, control category 3 to EN 954-1 for Safety Integrated – safe standstill (SH) (STO = Safe Torque Off) and safe brake control (SBC) in conjunction with Safe Brake Relay

<sup>1)</sup> Note correlation between max. output frequency, pulse frequency and current derating, see System Description.

#### Technical data (continued)

Line voltage 200 V to 240 V 1 AC		PM340 Power Modules in blocksize format		
		6SL3210-1SB11-0...	6SL3210-1SB12-3...	6SL3210-1SB14-0...
Rated output current $I_{rated}$	A	0.9	2.3	3.9
Base load current $I_H$	A	0.8	2.0	3.4
Output current for S6 duty (40%) $I_{S6}$	A	1.4	3.3	5.5
Max. output current $I_{max}$	A	2.0	4.6	7.8
Rated power based on $I_{rated}$	kW (HP) <sup>3)</sup>	0.12 (0.2)	0.37 (0.5)	0.75 (0.75)
Rated pulse frequency	kHz	4	4	4
Efficiency $\eta$		0.88	0.93	0.93
Power loss	kW	0.06	0.075	0.11
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.005 (0.02)	0.005 (0.02)	0.005 (0.02)
Sound pressure level	dB(A)	< 45	< 45	< 45
24 V DC power supply for the Control Unit	A	1.0	1.0	1.0
Rated input current <sup>1)</sup> with/without line reactor	A	1.4/2.2	4/6	6.5/10
Resistance value of the external braking resistor	Ohm	≥ 180	≥ 180	≥ 180
Max. cable length to braking resistor	m (ft)	15 (49)	15 (49)	15 (49)
Line supply connection L, N		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>
Motor connection U2, V2, W2		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>
PE connection		On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Max. motor cable length <sup>2)</sup> (without external options)	m (ft)	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded
Degree of protection		IP20	IP20	IP20
Width	mm (inch)	73 (2.87)	73 (2.87)	73 (2.87)
Height	mm (inch)	173 (6.81)	173 (6.81)	173 (6.81)
Depth				
• PM340 Power Module	mm (inch)	145 (5.7)	145 (5.7)	145 (5.7)
• PM340 with CU310	mm (inch)	234.6 (9.24)	234.6 (9.24)	234.6 (9.24)
• PM340 with CUA31	mm (inch)	175.3 (6.9)	175.3 (6.9)	175.3 (6.9)
Size		FSA	FSA	FSA
Weight, approx.	kg (lb)	1.2 (3)	1.3 (3)	1.3 (3)

<sup>1)</sup> The input current depends on the motor load and line impedance. The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>2)</sup> Max. motor cable length 15 m (49 ft) (shielded) for PM340 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

<sup>3)</sup> Nominal HP based on Asynchronous motors (induction motors). For specific sizing select drive based on motor nameplate current and overload.

# SINAMICS S120

## Power Modules and line-side components

### Power Modules in blocksize format

#### Technical data (continued)

Line voltage		PM340 Power Modules in blocksize format				
380 V to 480 V 3 AC		6SL3210-1SE11-3UA0	6SL3210-1SE11-7UA0	6SL3210-1SE12-2UA0	6SL3210-1SE13-1UA0	6SL3210-1SE14-1UA0
Rated output current $I_{rated}$	A	1.3	1.7	2.2	3.1	4.1
Base load current $I_H$	A	1.1	1.5	1.9	2.7	3.6
Output current for S6 duty (40%) $I_{S6}$	A	1.3	2.0	2.5	3.5	4.5
Max. output current $I_{max}$	A	2.6	3.4	4.4	6.2	8.2
Rated power based on $I_{rated}$	kW (HP) <sup>3)</sup>	0.37 (0.5)	0.55 (0.75)	0.75 (1)	1.1 (1.5)	1.5 (2)
Rated power based on $I_H$	kW (HP) <sup>3)</sup>	0.37 (0.5)	0.55 (0.5)	0.75 (0.75)	1.1 (1)	1.5 (2)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency $\eta$		0.90	0.92	0.94	0.95	0.96
Power loss	kW	0.10	0.10	0.10	0.11	0.11
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.005 (0.02)	0.005 (0.02)	0.005 (0.02)	0.005 (0.02)	0.005 (0.02)
Sound pressure level	dB(A)	< 45	< 45	< 45	< 45	< 45
24 V DC power supply for the Control Unit	A	1.0	1.0	1.0	1.0	1.0
Rated input current <sup>1)</sup> with/without line reactor	A	1.3/1.7	1.7/2.2	2.2/2.6	3.1/3.9	4.1/4.8
Resistance value of the external braking resistor	Ohm	≥ 390	≥ 390	≥ 390	≥ 390	≥ 390
Max. cable length to braking resistor	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line supply connection L, N		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>
Motor connection U2, V2, W2		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 2.5 mm <sup>2</sup>
PE connection		On housing with M4 screw	On housing with M4 screw	On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Max. motor cable length <sup>2)</sup>	m (ft)	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded
Degree of protection		IP20	IP20	IP20	IP20	IP20
Width	mm (inch)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)
Height	mm (inch)	173 (6.81)	173 (6.81)	173 (6.81)	173 (6.81)	173 (6.81)
Depth						
• PM340 Power Module	mm (inch)	145 (5.7)	145 (5.7)	145 (5.7)	145 (5.7)	145 (5.7)
• PM340 with CU310	mm (inch)	234.6 (9.24)	234.6 (9.24)	234.6 (9.24)	234.6 (9.24)	234.6 (9.24)
• PM340 with CUA31	mm (inch)	175.3 (6.9)	175.3 (6.9)	175.3 (6.9)	175.3 (6.9)	175.3 (6.9)
Size		FSA	FSA	FSA	FSA	FSA
Weight, approx.	kg (lb)	1.2 (3)	1.2 (3)	1.2 (3)	1.2 (3)	1.2 (3)

<sup>1)</sup> The input current depends on the motor load and line impedance. The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>2)</sup> Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

<sup>3)</sup> Nominal HP based on Asynchronous motors (induction motors) and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.



#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC		PM340 Power Modules in blocksize format					
		6SL3210-1SE16-0...	6SL3210-1SE17-7...	6SL3210-1SE21-0...	6SL3210-1SE21-8...	6SL3210-1SE22-5...	6SL3210-1SE23-2...
Rated output current $I_{rated}$	A	5.9	7.7	10.2	18	25	32
Base load current $I_H$	A	5.2	6.8	9.1	14	21	27
Output current for S6 duty (40%) $I_{S6}$	A	6.4	8.3	10.8	19.6	27.8	37.1
Max. output current $I_{max}$	A	11.8	15.4	20.4	26.4	38	52
Rated power based on $I_{rated}$	kW (HP) <sup>3)</sup>	2.2 (3)	3 (5)	4 (5)	7.5 (10)	11 (15)	15 (20)
Rated power based on $I_H$	kW (HP) <sup>3)</sup>	2.2 (3)	3 (4)	4 (5)	5.5 (10)	7.5 (15)	11 (20)
Rated pulse frequency	kHz	4	4	4	4	4	4
Efficiency $\eta$		0.96	0.97	0.97	0.98	0.98	0.98
Power loss	kW	0.14	0.16	0.18	0.24	0.30	0.40
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.009 (0.03)	0.009 (0.03)	0.009 (0.03)	0.038 (0.12)	0.038 (0.12)	0.038 (0.12)
Sound pressure level	dB(A)	< 50	< 50	< 50	< 60	< 60	< 60
24 V DC power supply for the Control Unit	A	1.0	1.0	1.0	1.0	1.0	1.0
Rated input current <sup>1)</sup> with/without line reactor	A	5.6/6.7	7.5/8.9	9.8/12.4	17.1/23.1	24.6/32.6	33/39
Resistance value of the external braking resistor	Ohm	≥ 160	≥ 160	≥ 160	≥ 56	≥ 56	≥ 56
Max. cable length to braking resistor	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line supply connection L, N		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>
Motor connection U2, V2, W2		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 1.0 mm <sup>2</sup> to 6 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>	Screw-type terminals for cable cross section 2,5 mm <sup>2</sup> to 10 mm <sup>2</sup>
PE connection		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
Max. motor cable length <sup>2)</sup>	m (ft)	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Width	mm (inch)	153 (6.02)	153 (6.02)	153 (6.02)	188.4 (7.42)	188.4 (7.42)	188.4 (7.42)
Height	mm (inch)	270 (10.63)	270 (10.63)	270 (10.63)	333.4 (13.13)	333.4 (13.13)	333.4 (13.13)
Depth							
• PM340 Power Module	mm (inch)	165 (6.5)	165 (6.5)	165 (6.5)	185 (7.28)	185 (7.28)	185 (7.28)
• PM340 with CU310	mm (inch)	254.6 (10.02)	254.6 (10.02)	254.6 (10.02)	274.6 (10.81)	274.6 (10.81)	274.6 (10.81)
• PM340 with CUA31	mm (inch)	195.3 (7.69)	195.3 (7.69)	195.3 (7.69)	215.3 (8.48)	215.3 (8.48)	215.3 (8.48)
Size		FSB	FSB	FSB	FSC	FSC	FSC
Weight, approx.	kg (lb)	4.0 (9)	4.0 (9)	4.0 (9)	6.5 (14)	6.5 (14)	6.5 (14)

<sup>1)</sup> The input current depends on the motor load and line impedance. The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>2)</sup> Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

<sup>3)</sup> Nominal HP based on Asynchronous motors (induction motors) and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

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## Power Modules and line-side components

### Power Modules in blocksize format

#### Technical data (continued)

Line voltage		PM340 Power Modules in blocksize format					
380 V to 480 V 3 AC		6SL3210-1SE23-8...	6SL3210-1SE24-5...	6SL3210-1SE26-0...	6SL3210-1SE27-5...	6SL3210-1SE31-0...	
Rated output current $I_{rated}$	A	38	45	60	75	90	
Base load current $I_H$	A	33	40	48	65	80	
Output current for S6 duty (40%) $I_{S6}$	A	49	58	78	98	117	
Max. output current $I_{max}$	A	64	76	90	124	150	
Rated power based on $I_{rated}$	kW (HP) <sup>3)</sup>	18.5 (25)	22 (30)	30 (40)	37 (50)	45 (60)	
Rated power based on $I_H$	kW (HP) <sup>3)</sup>	15 (20)	18.5 (30)	22 (30)	30 (50)	37 (60)	
Rated pulse frequency	kHz	4	4	4	4	4	
Efficiency $\eta$		0.98	0.98	0.98	0.98	0.98	
Power loss	kW	0.38	0.51	0.69	0.99	1.21	
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.022 (0.07)	0.022 (0.07)	0.039 (0.13)	0.022 (0.07)	0.039 (0.13)	
Sound pressure level	dB(A)	< 60	< 60	< 61	< 60	62	
24 V DC power supply for the Control Unit	A	1.0	1.0	1.0	1.0	1.0	
Rated input current <sup>1)</sup> with/without line reactor	A	40/46	47/53	63/72	78/88	94/105	
Resistance value of the external braking resistor	Ohm	≥ 27	≥ 27	≥ 27	≥ 15	≥ 15	
Max. cable length to braking resistor	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)	
Line supply connection L, N		Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	
Motor connection U2, V2, W2		Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	Stud M6, cable cross section that can be connected 10 mm <sup>2</sup> to 35 mm <sup>2</sup>	
PE connection		On housing with M6 screw	On housing with M6 screw	On housing with M6 screw	On housing with M6 screw	On housing with M6 screw	
Max. motor cable length <sup>2)</sup>	m (ft)	70 (230) shielded 100 (328) unshielded	70 (230) shielded 100 (328) unshielded	70 (230) shielded 100 (328) unshielded	70 (230) shielded 100 (328) unshielded	70 (230) shielded 100 (328) unshielded	
Degree of protection		IP20	IP20	IP20	IP20	IP20	
Width	mm (inch)	275 (10.83)	275 (10.83)	275 (10.83)	275 (10.83)	275 (10.83)	
Height PM340 without/with integrated filter	mm (inch)	418.3/511 (16.47/20.12)	418.3/511 (16.47/20.12)	418.3/511 (16.47/20.12)	498.3/633 (19.62/24.92)	498.3/633 (19.62/24.92)	
Depth							
• PM340 Power Module	mm (inch)	203.5 (8.01)	203.5 (8.01)	203.5 (8.01)	203.5 (8.01)	203.5 (8.01)	
• PM340 with CU310	mm (inch)	293.1 (11.54)	293.1 (11.54)	293.1 (11.54)	293.1 (11.54)	293.1 (11.54)	
• PM340 with CUA31	mm (inch)	233.8 (9.2)	233.8 (9.2)	233.8 (9.2)	233.8 (9.2)	233.8 (9.2)	
Size		FSD	FSD	FSD	FSE	FSE	
Weight, approx. PM340 without/with integrated filter	kg (lb)	15.9/19.3 (35/43)	15.9/19.3 (35/43)	15.9/19.3 (35/43)	19.8/27.1 (44/60)	19.8/27.1 (44/60)	

<sup>1)</sup> The input current depends on the motor load and line impedance. The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>2)</sup> Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

<sup>3)</sup> Nominal HP based on Asynchronous motors (induction motors) and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC		PM340 Power Modules in blocksize format		
		6SL3210-1SE31-1...	6SL3210-1SE31-5...	6SL3210-1SE31-8...
Rated output current $I_{rated}$	A	110	145	178
Base load current $I_H$	A	95	115	155
Output current for S6 duty (40%) $I_{S6}$	A	143	188	231
Max. output current $I_{max}$	A	180	220	290
Rated power based on $I_{rated}$	kW (HP) <sup>3)</sup>	55 (75)	75 (100)	90 (125)
Rated power based on $I_H$	kW (HP) <sup>3)</sup>	45 (60)	55 (75)	75 (100)
Rated pulse frequency	kHz	4	4	4
Efficiency $\eta$		0.98	0.98	0.98
Power loss	kW	1.42	1.93	2.31
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.094 (0.31)	0.094 (0.31)	0.117 (0.38)
Sound pressure level	dB(A)	< 60	< 60	65
24 V DC power supply for the Control Unit	A	1.0	1.0	1.0
Rated input current <sup>1)</sup> with/without line reactor	A	115/129	151/168	186/204
Resistance value of the external braking resistor	Ohm	≥ 8.2	≥ 8.2	≥ 8.2
Max. cable length to braking resistor	m (ft)	15 (49)	15 (49)	15 (49)
Line supply connection U1/L1, V1/L2, W1/L3		Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>	Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>	Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>
Motor connection U2, V2, W2		Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>	Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>	Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>	Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>	Stud M8, max. cable cross section that can be connected 120 mm <sup>2</sup> or 2 x 50 mm <sup>2</sup>
PE connection		On housing with M8 screw	On housing with M8 screw	On housing with M8 screw
Max. motor cable length <sup>2)</sup>	m (ft)	70 (230) shielded 100 (328) unshielded	70 (230) shielded 100 (328) unshielded	70 (230) shielded 100 (328) unshielded
Degree of protection		IP20	IP20	IP20
Width	mm (inch)	350 (13.78)	350 (13.78)	350 (13.78)
Height PM340 without/with integrated filter	mm (inch)	634/934 (24.96/36.77)	634/934 (24.96/36.77)	634/934 (24.96/36.77)
Depth				
• PM340 Power Module	mm (inch)	315.5 (12.42)	315.5 (12.42)	315.5 (12.42)
• PM340 with CU310	mm (inch)	405.1 (15.95)	405.1 (15.95)	405.1 (15.95)
• PM340 with CUA31	mm (inch)	345.8 (13.61)	345.8 (13.61)	345.8 (13.61)
Size		FSF	FSF	FSF
Weight, approx. PM340 without/with integrated filter	kg (lb)	50.7/66.7 (112/147)	50.7/66.7 (112/147)	50.7/66.7 (112/147)

<sup>1)</sup> The input current depends on the motor load and line impedance. The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>2)</sup> Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

<sup>3)</sup> Nominal HP based on Asynchronous motors (induction motors) and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

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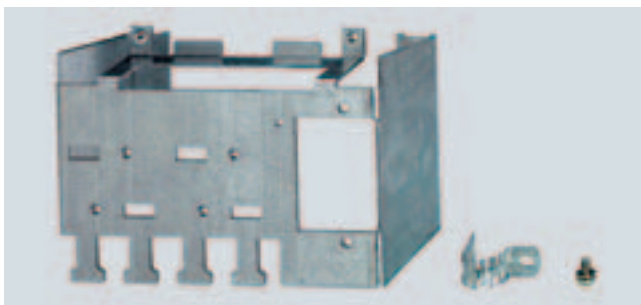
## Power Modules and line-side components

### Power Modules in blocksize format

#### Selection and ordering data

Rated output current	Rated power	Size	PM340 Power Module in blocksize format without line filter	PM340 Power Module in blocksize format with integrated line filter
A	kW (HP) <sup>1)</sup>		Order No.	Order No.
<b>Line voltage 200 V to 240 V 1 AC</b>				
0.9	0.12 (0.2)	FSA	<b>6SL3210-1SB11-0UA0</b>	<b>6SL3210-1SB11-0AA0</b>
2.3	0.37 (0.5)	FSA	<b>6SL3210-1SB12-3UA0</b>	<b>6SL3210-1SB12-3AA0</b>
3.9	0.75 (0.75)	FSA	<b>6SL3210-1SB14-0UA0</b>	<b>6SL3210-1SB14-0AA0</b>
<b>Line voltage 380 V to 480 V 3 AC</b>				
1.3	0.37 (0.5)	FSA	<b>6SL3210-1SE11-3UA0</b>	–
1.7	0.55 (0.75)	FSA	<b>6SL3210-1SE11-7UA0</b>	–
2.2	0.75 (1)	FSA	<b>6SL3210-1SE12-2UA0</b>	–
3.1	1.1 (1.5)	FSA	<b>6SL3210-1SE13-1UA0</b>	–
4.1	1.5 (2)	FSA	<b>6SL3210-1SE14-1UA0</b>	–
5.9	2.2 (3)	FSB	<b>6SL3210-1SE16-0UA0</b>	<b>6SL3210-1SE16-0AA0</b>
7.7	3 (5)	FSB	<b>6SL3210-1SE17-7UA0</b>	<b>6SL3210-1SE17-7AA0</b>
10.2	4 (5)	FSB	<b>6SL3210-1SE21-0UA0</b>	<b>6SL3210-1SE21-0AA0</b>
18	7.5 (10)	FSC	<b>6SL3210-1SE21-8UA0</b>	<b>6SL3210-1SE21-8AA0</b>
25	11 (15)	FSC	<b>6SL3210-1SE22-5UA0</b>	<b>6SL3210-1SE22-5AA0</b>
32	15 (20)	FSC	<b>6SL3210-1SE23-2UA0</b>	<b>6SL3210-1SE23-2AA0</b>
38	18.5 (25)	FCD	<b>6SL3210-1SE23-8UA0</b>	<b>6SL3210-1SE23-8AA0</b>
45	22 (30)	FCD	<b>6SL3210-1SE24-5UA0</b>	<b>6SL3210-1SE24-5AA0</b>
60	30 (40)	FCD	<b>6SL3210-1SE26-0UA0</b>	<b>6SL3210-1SE26-0AA0</b>
75	37 (50)	FSE	<b>6SL3210-1SE27-5UA0</b>	<b>6SL3210-1SE27-5AA0</b>
90	45 (60)	FSE	<b>6SL3210-1SE31-0UA0</b>	<b>6SL3210-1SE31-0AA0</b>
110	55 (75)	FSF	<b>6SL3210-1SE31-1UA0</b>	<b>6SL3210-1SE31-1AA0</b>
145	75 (100)	FSF	<b>6SL3210-1SE31-5UA0</b>	<b>6SL3210-1SE31-5AA0</b>
178	90 (125)	FSF	<b>6SL3210-1SE31-8UA0</b>	<b>6SL3210-1SE31-8AA0</b>

#### Accessories



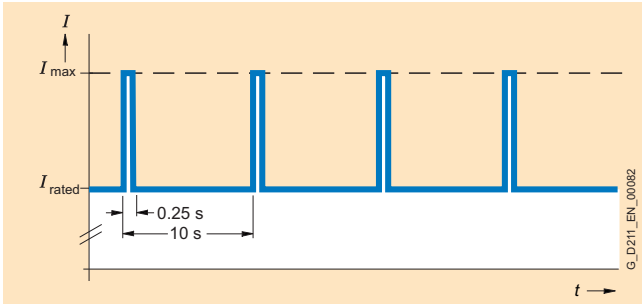
Example of shield connection kit for PM340 frame size FSB

Description	Order No.
<b>Shield connection kit</b> for PM340	
• Frame size FSA	<b>6SL3262-1AA00-0BA0</b>
• Frame size FSB	<b>6SL3262-1AB00-0DA0</b>
• Frame size FSC	<b>6SL3262-1AC00-0DA0</b>
• Frame sizes FSD and FSE	<b>6SL3262-1AD00-0DA0</b>
• Frame size FSF	<b>6SL3262-1AF00-0DA0</b>

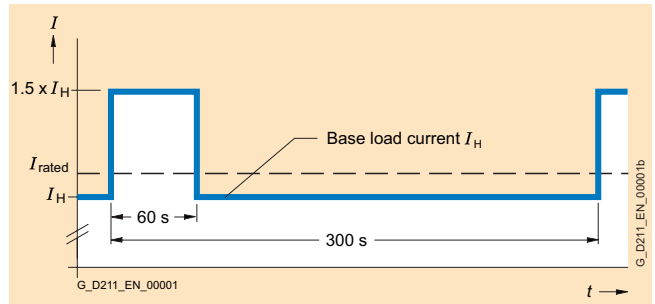
<sup>1)</sup> Nominal HP based on Asynchronous motors (induction motors).  
See technical data for specific sizing.

#### Characteristics

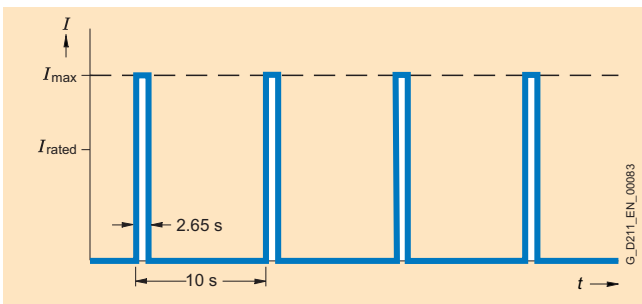
##### Overload capability



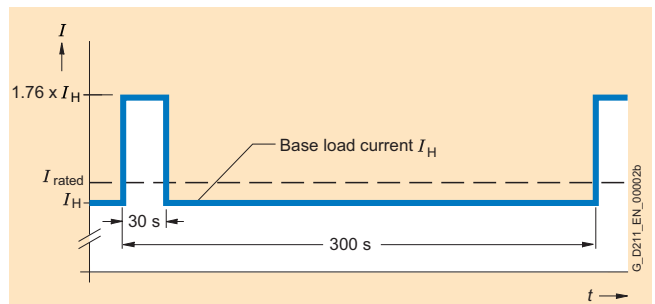
Load cycle with previous load



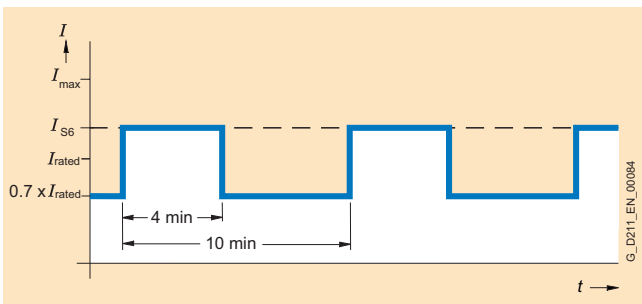
Load cycle with 60 s overload with a load cycle period of 300 s



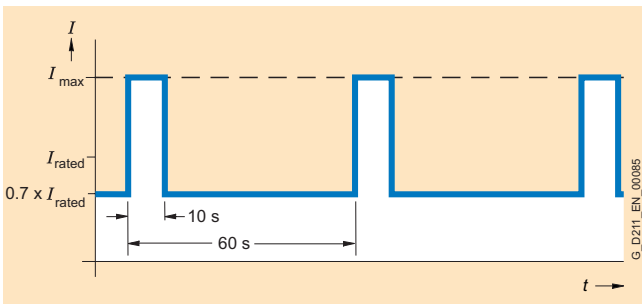
Load cycle without previous load



Load cycle with 30 s overload with a load cycle period of 300 s



S6 load cycle with previous load with a load cycle period of 600 s



S6 load cycle with previous load with a load cycle period of 60 s

# SINAMICS S120

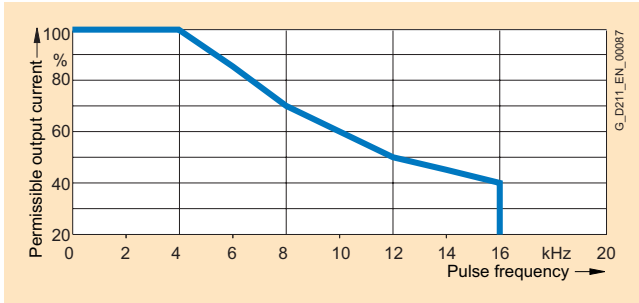
## Power Modules and line-side components

### Power Modules in blocksize format

#### Characteristics (continued)

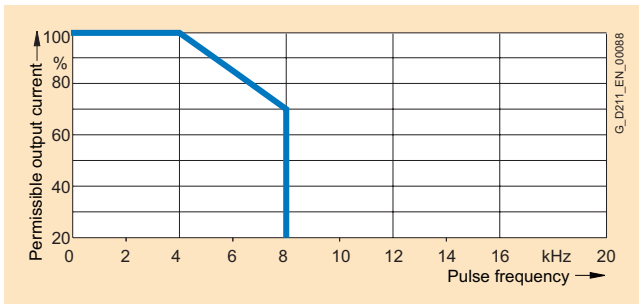
##### Derating characteristics

- Frame sizes FSA to FSE

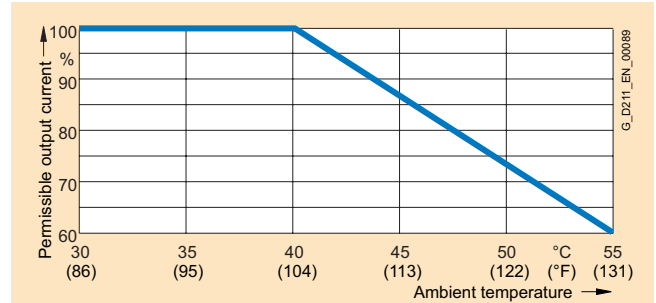


Output current dependent on pulse frequency

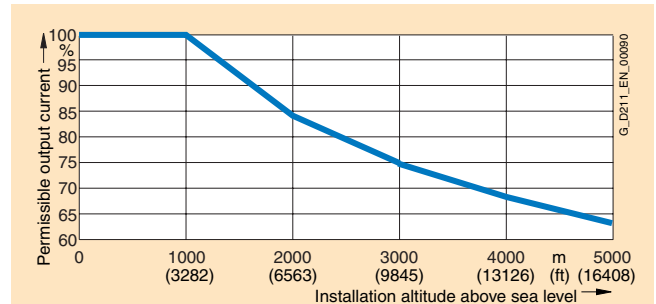
- Frame sizes FSF



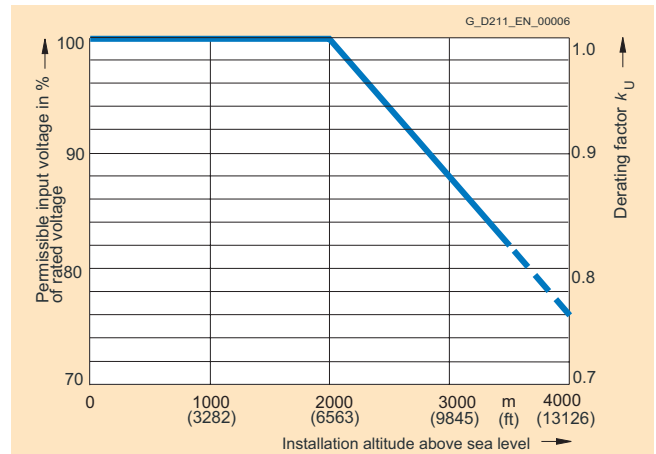
Output current dependent on pulse frequency



Output current dependent on ambient temperature



Output current dependent on installation altitude



Voltage derating dependent on installation altitude



#### Overview



Line reactor for PM340 Power Modules frame sizes FSA to FSE



Line reactor for PM340 Power Modules frame size FSF

Line reactors limit the low-frequency harmonic effects and reduce the load on the rectifiers of the Power Modules. A line reactor is not required where the effective supply impedance equals  $u_k \geq 1\%$ . For further information see System Description.

#### Integration

The line reactors for PM340 Power Modules of frame sizes FSA to FSE are designed as base components. The line reactor is attached to the mounting surface and the Power Module is mounted directly on the line reactor. The cables to the Power Module are already connected at the line reactor.

The line reactor is connected to the line supply through terminals.



PM340 Power Module frame size FSB with base line reactor and shield connection kit

# SINAMICS S120

## Power Modules and line-side components

### Power Modules in blocksize format Line reactors

#### Technical data

Line voltage 200 V to 240 V 1 AC		Line reactor 6SE6400-3CC00-4AB3		6SE6400-3CC01-0AB3	
Rated current	A	3.4		8.1	
Power loss, approx. at 50 Hz/60 Hz	W	12.5/15		11.5/14.5	
Power connection U1, V1, W1		6 mm <sup>2</sup> screw-type terminals		6 mm <sup>2</sup> screw-type terminals	
Load connection		Cable 3 x AWG16 (1.5 mm <sup>2</sup> ) Length approx. 0.38 m (1.25 ft)		Cable 3 x AWG16 (1.5 mm <sup>2</sup> ) Length approx. 0.38 m (1.25 ft)	
PE connection		M5 bolt		M5 bolt	
Degree of protection		IP20		IP20	
Width	mm (inch)	75.5 (2.97)		75.5 (2.97)	
Height	mm (inch)	201 (7.91)		201 (7.91)	
Depth	mm (inch)	50 (1.97)		50 (1.97)	
Weight, approx.	kg (lb)	1.3 (3)		1.3 (3)	
Suitable for PM340 Power Module	Type	6SL3210-1SB11-0... 6SL3210-1SB12-3...		6SL3210-1SB14-0...	

Line voltage 380 V to 480 V 3 AC		Line reactor 6SE6400-3CC00-2AD3		6SE6400-3CC00-4AD3		6SE6400-3CC00-6AD3		6SL3203-0CD21-0AA0		6SL3203-0CD21-4AA0		6SL3203-0CD22-2AA0	
Rated current	A	1.9		3.5		4.8		9		11.6		25	
Power loss at 50 Hz/60 Hz	W	6/7		12.5/15		7.5/9		9/11		27/32		98/118	
Power connection U1, V1, W1		6 mm <sup>2</sup> screw-type terminals		6 mm <sup>2</sup> screw-type terminals		6 mm <sup>2</sup> screw-type terminals		6 mm <sup>2</sup> screw-type terminals		6 mm <sup>2</sup> screw-type terminals		6 mm <sup>2</sup> screw-type terminals	
Load connection		Cable 4 x AGW 16 (1.5 mm <sup>2</sup> ) length approx. 0.38 m (1.25 ft)		Cable 4 x AGW 16 (1.5 mm <sup>2</sup> ) length approx. 0.38 m (1.25 ft)		Cable 4 x AGW 16 (1.5 mm <sup>2</sup> ) length approx. 0.38 m (1.25 ft)		Cable 4 x AGW 16 (1.5 mm <sup>2</sup> ) length approx. 0.46 m (1.51 ft)		Cable 4 x AGW 16 (1.5 mm <sup>2</sup> ) length approx. 0.46 m (1.51 ft)		Cable 4 x AGW 10 (2.5 mm <sup>2</sup> ) length approx. 0.49 m (1.61 ft)	
PE connection		On housing with M5 bolt		On housing with M5 bolt		On housing with M5 bolt		On housing with M5 bolt		On housing with M5 bolt		On housing with M5 bolt	
Degree of protection <sup>1)</sup>		IP20		IP20		IP20		IP20		IP20		IP20	
Width	mm (inch)	75.5 (2.97)		75.5 (2.97)		75.5 (2.97)		153 (6.02)		153 (6.02)		190 (7.48)	
Height	mm (inch)	201 (7.91)		201 (7.91)		201 (7.91)		290 (11.42)		290 (11.42)		370 (14.57)	
Depth	mm (inch)	50 (1.97)		50 (1.97)		50 (1.97)		70 (2.76)		70 (2.76)		50 (1.97)	
Weight, approx.	kg (lb)	1.2 (3)		1.3 (3)		1.3 (3)		3.4 (7)		3.4 (7)		6.3 (14)	
Suitable for PM340 Power Module	Type	6SL3210-1SE11-3... 6SL3210-1SE11-7...		6SL3210-1SE12-2... 6SL3210-1SE13-1...		6SL3210-1SE14-1...		6SL3210-1SE16-0... 6SL3210-1SE17-7...		6SL3210-1SE21-0...		6SL3210-1SE21-8... 6SL3210-1SE22-5...	

<sup>1)</sup> With correctly connected load connection cable.

#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC		Line reactor					
		6SL3203- 0CD23-5AA0	6SL3203- 0CJ24-5AA0	6SL3203- 0CD25-3AA0	6SL3203- 0CJ28-6AA0	6SE6400- 3CC11-2FD0	6SE6400- 3CC11-7FD0
Rated current	A	31.3	54	71	105	178	225
Power loss at 50 Hz/60 Hz	W	37/44	90/115	90/115	170/215	280/360	280/360
Power connection U1, V1, W1		6 mm <sup>2</sup> screw- type terminals	16 mm <sup>2</sup> screw- type terminals	16 mm <sup>2</sup> screw- type terminals	50 mm <sup>2</sup> screw- type terminals	Flat connector for M10 cable lug	Flat connector for M10 cable lug
Load connection		Cable 4 x AWG10 (2.5 mm <sup>2</sup> ) Length approx. 0.49 m (1.61 ft)	Cable 4 x 16 mm <sup>2</sup> length approx. 0.7 m (2.3 ft)	Cable 4 x 16 mm <sup>2</sup> length approx. 0.7 m (2.3 ft)	Cable 4 x 35 mm <sup>2</sup> length approx. 0.7 m (2.3 ft)	Flat connector for M10 cable lug	Flat connector for M10 cable lug
PE connection		On housing with M5 bolt	On housing with M8 screw	On housing with M8 screw	On housing with M8 screw	On housing with M8 bolt	On housing with M8 bolt
Degree of protection <sup>1)</sup>		IP20	IP20	IP20	IP20	IP00	IP00
Width	mm (inch)	190 (7.48)	275 (10.83)	275 (10.83)	275 (10.83)	240 (9.45)	240 (9.45)
Height	mm (inch)	370 (14.57)	455 (17.91)	455 (17.91)	577 (22.72)	228 (8.98)	228 (8.98)
Depth	mm (inch)	50 (1.97)	83.5 (3.29)	83.5 (3.29)	93.5 (3.68)	141 (5.55)	141 (5.55)
Weight, approx.	kg (lb)	6.4 (14)	13 (29)	13 (29)	19 (42)	25 (55)	25 (55)
Suitable for PM340 Power Module	Type	6SL3210- 1SE23-2...	6SL3210- 1SE23-8... 6SL3210- 1SE24-5...	6SL3210- 1SE26-0...	6SL3210- 1SE27-5... 6SL3210- 1SE31-0...	6SL3210- 1SE31-1... 6SL3210- 1SE31-5...	6SL3210- 1SE31-8...

#### Selection and ordering data

Rated output current A	Rated power kW (HP)	Suitable for PM340 Power Module		Line reactor
		Type	Size	Order No.
<b>Line voltage 200 V to 240 V 1 AC</b>				
0.9	0.12 (0.2)	6SL3210-1SB11-0...	FSA	6SE6400-3CC00-4AB3
2.3	0.37 (0.5)	6SL3210-1SB12-3...	FSA	6SE6400-3CC00-4AB3
3.9	0.75 (0.75)	6SL3210-1SB14-0...	FSA	6SE6400-3CC01-0AB3
<b>Line voltage 380 V to 480 V 3 AC</b>				
1.3	0.37 (0.5)	6SL3210-1SE11-3UA0	FSA	6SE6400-3CC00-2AD3
1.7	0.55 (0.75)	6SL3210-1SE11-7UA0	FSA	6SE6400-3CC00-2AD3
2.2	0.75 (1)	6SL3210-1SE12-2UA0	FSA	6SE6400-3CC00-4AD3
3.1	1.1 (1.5)	6SL3210-1SE13-1UA0	FSA	6SE6400-3CC00-4AD3
4.1	1.5 (2)	6SL3210-1SE14-1UA0	FSA	6SE6400-3CC00-6AD3
5.9	2.2 (3)	6SL3210-1SE16-0...	FSB	6SL3203-0CD21-0AA0
7.7	3 (5)	6SL3210-1SE17-7...	FSB	6SL3203-0CD21-0AA0
10	4 (5)	6SL3210-1SE21-0...	FSB	6SL3203-0CD21-4AA0
18	7.5 (10)	6SL3210-1SE21-8...	FSC	6SL3203-0CD22-2AA0
25	11 (15)	6SL3210-1SE22-5...	FSC	6SL3203-0CD22-2AA0
32	15 (20)	6SL3210-1SE23-2...	FSC	6SL3203-0CD23-5AA0
38	18.5 (25)	6SL3210-1SE23-8...	FCD	6SL3203-0CJ24-5AA0
45	22 (30)	6SL3210-1SE24-5...	FCD	6SL3203-0CJ24-5AA0
60	30 (40)	6SL3210-1SE26-0...	FCD	6SL3203-0CD25-3AA0
75	37 (50)	6SL3210-1SE27-5...	FSE	6SL3203-0CJ28-6AA0
90	45 (60)	6SL3210-1SE31-0...	FSE	6SL3203-0CJ28-6AA0
110	55 (75)	6SL3210-1SE31-1...	FSF	6SE6400-3CC11-2FD0
145	75 (100)	6SL3210-1SE31-5...	FSF	6SE6400-3CC11-2FD0
178	90 (125)	6SL3210-1SE31-8...	FSF	6SE6400-3CC11-7FD0

<sup>1)</sup> With correctly connected load connection cable.

# SINAMICS S120

## Power Modules and line-side components

### Power Modules in blocksize format Line filters

#### Overview

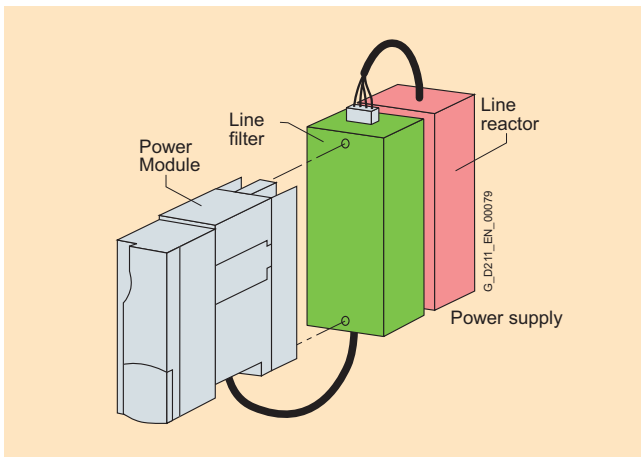


In plants with strict EMC requirements, the line filter for frame size FSA restricts the conducted interference emanating from the PM340 Power Module to the limit values of Class A1 as defined in EN 55011 and Category C2 as defined in EN 61800-3. The line filter is suited only for direct connection to TN (grounded) systems.

**Note:** The line filter is designed only for PM340 Power Modules of frame size FSA and a line voltage of 380 V to 480 V 3 AC. All other PM340 Power Modules are available with integrated line filter.

#### Integration

Line filter, line reactor and Power Module can be mounted in front of one another.



#### Technical data

Line voltage 380 V to 480 V 3 AC	Line filter
Rated current	6 A
Power loss	< 5 W
Line supply connection L1, L2, L3	2.5 mm <sup>2</sup> screw-type terminals
PE connection	On housing with M4 stud
Load connection U, V, W	Shielded cable 3 x 2.5 mm <sup>2</sup> 0.4 m (1.3 ft) long
Degree of protection	IP20 (with correctly connected load connection cable)
Weight, approx.	0.5 kg (1 lb)
Width	73.5 mm (2.89 in)
Height	200 mm (7.87 in)
Depth	44 mm (1.73 in)
Suitable for PM340 Power Module Type	6SL3210-1SE11-... 6SL3210-1SE12-... 6SL3210-1SE13-... 6SL3210-1SE14-...

#### Selection and ordering data

Suitable for PM340 Power Module Frame size FSA	Line filter
Type	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>	
6SL3210-1SE11-...	<b>6SE6400-2FA00-6AD0</b>
6SL3210-1SE12-...	
6SL3210-1SE13-...	
6SL3210-1SE14-...	

# SINAMICS S120

## Power Modules and line-side components

Power Modules in blocksize format  
Recommended line-side components

### Overview

#### Assignment of line-side power components to Power Modules in blocksize format

Suitable line-side power components are assigned depending on the power rating of the Power Modules.

The following tables list recommended components and apply for ambient temperatures up to 40 °C (104 °F).

Further information about the main contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV1, LV1T and BT BI. <sup>1)</sup>

Rated output current	Rated power	Suitable for PM340 Power Module	Main contactor (Insta-contactor)	Miniature circuit breakers	Fuse switch disconnecter	Fuse
A	kW (HP)	Type 6SL3210-...	Type	Order No.	Order No.	Order No.
<b>Line voltage 200 V to 240 V 1 AC</b>						
0.9	0.12 (0.2)	1SB11-0...	5TT57-...	5SY6110-7	3NC1091	3NW6003-1
2.3	0.37 (0.5)	1SB12-3...	5TT57-...	5SY6110-7	3NC1091	3NW6003-1
3.9	0.75 (0.75)	1SB14-0...	5TT57-...	5SY6116-7	3NC1091	3NW6005-1

Rated output current	Rated power	Suitable for PM340 Power Module	Main contactor	Circuit-breaker	Main switch (switch disconnecter)	Fuse switch disconnecter	Switch disconnecter with fuse holders	Low-voltage HRC fuse element
A	kW	Type 6SL3210-...	Type	Order No.	Order No.	Order No.	Order No.	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>								
1.3	0.37 (0.5)	1SE11-3UA0	3RT1015-...	3RV1021-1CA10	3LD2003-1TP51	3NP4010-0CH01	3KL5030-1EB01	3NA3803
1.7	0.55 (0.75)	1SE11-7UA0	3RT1015-...	3RV1021-1DA10	3LD2003-1TP51	3NP4010-0CH01	3KL5030-1EB01	3NA3803
2.2	0.75 (1)	1SE12-2UA0	3RT1015-...	3RV1021-1FA10	3LD2003-1TP51	3NP4010-0CH01	3KL5030-1EB01	3NA3803
3.1	1.1 (1.5)	1SE13-1UA0	3RT1015-...	3RV1021-1GA10	3LD2003-1TP51	3NP4010-0CH01	3KL5030-1EB01	3NA3803
4.1	1.5 (2)	1SE14-1UA0	3RT1015-...	3RV1021-1HA10	3LD2003-1TP51	3NP4010-0CH01	3KL5030-1EB01	3NA3803
5.9	2.2 (3)	1SE16-0...	3RT1015-...	3RV1021-1KA10	3LD2003-1TP51	3NP4010-0CH01	3KL5030-1EB01	3NA3805
7.7	3 (5)	1SE17-7...	3RT1015-...	3RV1021-4AA10	3LD2003-1TP51	3NP4010-0CH01	3KL5030-1EB01	3NA3805
10	4 (5)	1SE21-0...	3RT1016-...	3RV1021-4BA10	3LD2103-1TP51	3NP4010-0CH01	3KL5030-1EB01	3NA3807
18	7.5 (10)	1SE21-8...	3RT1025-...	3RV1031-4EA10	3LD2203-0TK51	3NP4010-0CH01	3KL5030-1EB01	3NA3807
25	11 (15)	1SE22-5...	3RT1026-...	3RV1031-4FA10	3LD2504-0TK51	3NP4010-0CH01	3KL5030-1EB01	3NA3812
32	15 (20)	1SE23-2...	3RT1034-...	3RV1031-4HA10	3LD2504-0TK51	3NP4010-0CH01	3KL5030-1EB01	3NA3814
38	18.5 (25)	1SE23-8...	3RT1035-...	3RV1042-4JA10	3LD2504-0TK51	3NP4010-0CH01	3KL5030-1EB01	3NA3820
45	22 (30)	1SE24-5...	3RT1036-...	3RV1042-4KA10	3LD2504-0TK51	3NP4010-0CH01	3KL5030-1EB01	3NA3822
60	30 (40)	1SE26-0...	3RT1044-...	3RV1042-4MA10	3LD2704-0TK51	3NP4010-0CH01	3KL5230-1EB01	3NA3824
75	37 (50)	1SE27-5...	3RT1045-...	3VL1712-1DD33-0AA0	3LD2704-0TK51	3NP4010-0CH01	3KL5230-1EB01	3NA3830
90	45 (60)	1SE31-0...	3RT1046-...	3VL1716-1DD33-0AA0	3LD2804-0TK51	3NP4070-0CH01	3KL5230-1EB01	3NA3832
110	55 (75)	1SE31-1...	3RT1054-...	3VL3720-1DC36-0AA0	3KA5330-1EE01	3NP4070-0CH01	3KL5330-1EB01	3NA3836
145	75 (100)	1SE31-5...	3RT1056-...	3VL3725-1DC36-0AA0	3KA5530-1EE01	3NP4270-0CA01	3KL5530-1EB01	3NA3140
178	90 (125)	1SE31-8...	3RT1064-...	3VL4731-1DC36-0AA0	3KA5530-1EE01	3NP4270-0CA01	3KL5530-1EB01	3NA3144

1) Component selections are per IEC standards and not necessarily in accordance with UL or NEC requirements. For NEMA components please see North American Industrial Products Catalog and speedfax Catalog.

# SINAMICS S120

## Power Modules and line-side components

### Power Modules in chassis format

#### Design



Power Module in chassis format

The Power Modules in chassis format feature the following connections as standard:

- 1 power connection
- 2 DC link connections for options such as Braking Modules
- 3 DRIVE-CLiQ sockets (eliminates the need for CUA31)
- 1 safe standstill input (enable pulses)
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 electronics power supply connection
- 1 motor connection
- 2 PE (protective earth) connections

The CU310 Control Unit can be mounted in Power Modules of chassis format.

The scope of supply of the Power Modules includes:

- 1 DRIVE-CLiQ cable for connection to the CU310 Control Unit
- 1 24 V supply cable for the CU310 Control Unit
- 1 mounting plate for attaching the CU310 Control Unit

#### Selection and ordering data

Rated output current	Rated power	Power Module in chassis format
A	kW (HP) <sup>1)</sup>	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
210	110 (150)	<b>6SL3310-1TE32-1AA0</b>
260	132 (200)	<b>6SL3310-1TE32-6AA0</b>
310	160 (250)	<b>6SL3310-1TE33-1AA0</b>
380	200 (300)	<b>6SL3310-1TE33-8AA0</b>
490	250 (400)	<b>6SL3310-1TE35-0AA0</b>

#### Warning signs in foreign languages

Warning signs in other languages can be placed on top of the standard warning signs in German or English.

The following signs are supplied with chassis format units: Chinese, Danish, Finnish, French, Greek, Italian, Japanese, Korean, Dutch, Polish, Portuguese, Russian, Swedish, Spanish, Czech and Turkish.

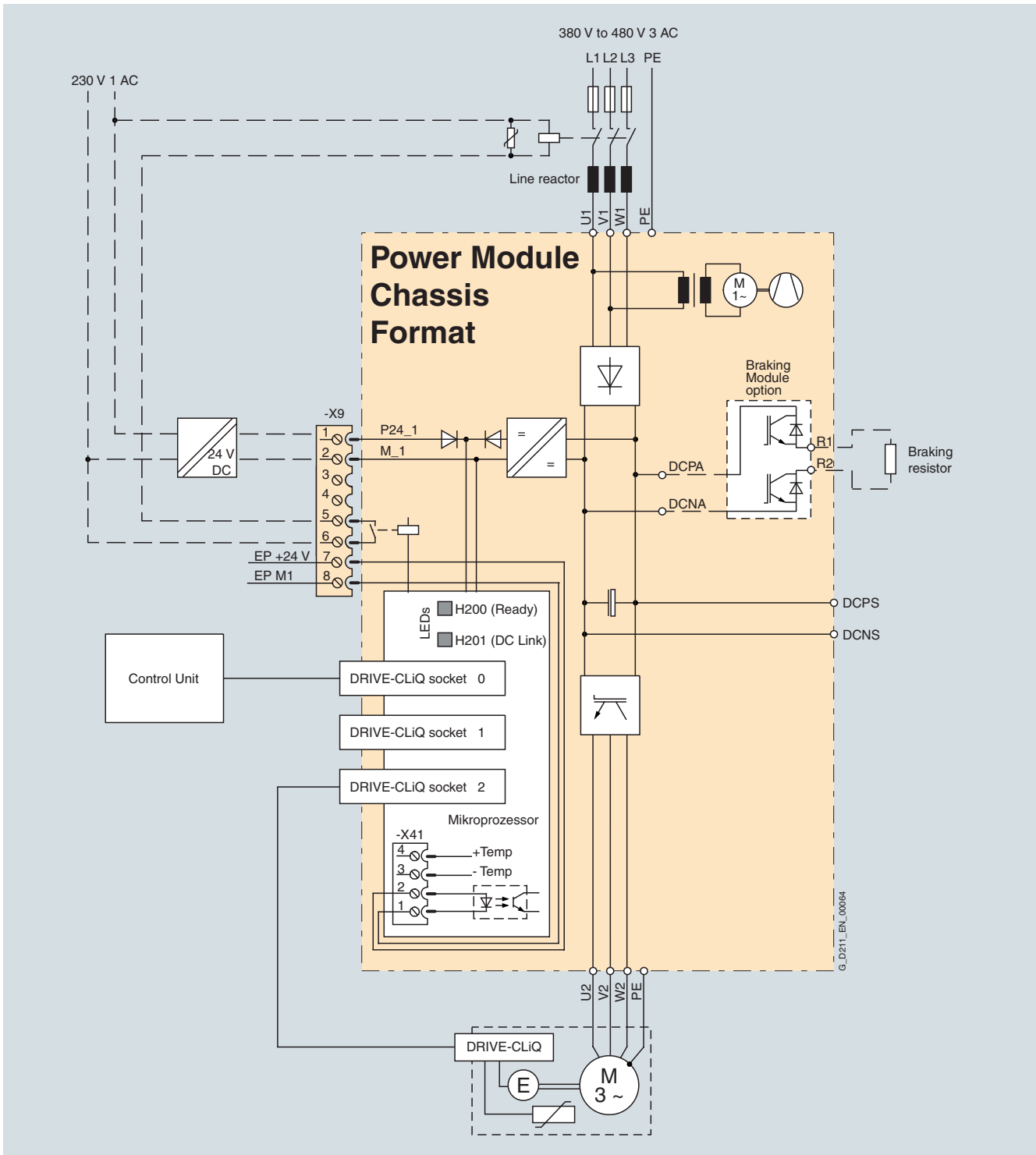
<sup>1)</sup> Nominal HP based on Asynchronous motors (induction motors).  
See technical data for specific sizing.



#### Integration

The Power Modules in chassis format 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.



Connection example of a Power Module in chassis format

# SINAMICS S120

## Power Modules and line-side components

### Power Modules in chassis format

#### Technical data

##### General technical data

Electrical data	
Line connection voltage (up to 2000 m (6563 ft) above sea level)	380 V to 480 V 3 AC $\pm 10\%$ (– 15% < 1 min)
Power frequency	47 Hz to 63 Hz
Line power factor with a 3 AC line connection voltage and rated output	
• Fundamental Power factor	> 0,96
• Total ( $\lambda$ )	0.75 to 0.93
Overvoltage category	Class III to EN 60664-1
DC link precharging frequency	max. 1x every 300 s
DC link voltage	approx. 1.35 x line voltage
Output frequency	
• Control type Servo	0 Hz to 650 Hz <sup>1)</sup>
• Control type Vector	0 Hz to 300 Hz <sup>1)</sup>
• Control type V/f	0 Hz to 300 Hz <sup>1)</sup>
Electronics power supply	24 V DC – 15%/+ 20%
Main contactor control Terminal strip X9/5-6	240 V AC/ max. 8 A 30 V DC/ max. 1 A
Radio interference suppression	
• Standard	Category C3 to EN 61800-3
• With line filter	Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	Forced air cooling through a built-in fan
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0° C to + 40 °C (32 °F to +104 °F) without derating, > 40° C to + 55 °C (> 104 °F to +131 °F) see derating characteristics
Site altitude	Up to 2000 m (6563 ft) above sea level without derating, > 2000 m (6563 ft) to 4000 m (13126 ft) above sea level see derating characteristics
Certificates	
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus (File No.: E192450)
Certification (in preparation)	Safety Integrity Level 2 (SIL 2) to IEC 61508, control category 3 to EN 954-1 for Safety Integrated – safe standstill (STO = Safe Torque Off)

<sup>1)</sup> Note correlation between max. output frequency, pulse frequency and current derating, see System Description.

#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC		Power Modules in chassis format				
		6SL3310-1TE32-1AA0	6SL3310-1TE32-6AA0	6SL3310-1TE33-1AA0	6SL3310-1TE33-8AA0	6SL3310-1TE35-0AA0
Rated output current $I_{rated}$	A	210	260	310	380	490
Base load current $I_H$	A	180	233	277	340	438
Output current for S6 duty (40%) $I_{S6}$	A	230	285	340	430	540
Max. output current $I_{max}$	A	307	375	453	555	715
Rated power based on $I_{rated}$	kW (HP) <sup>3)</sup>	110 (150)	132 (200)	160 (250)	200 (300)	250 (400)
Rated power based on $I_H$	kW (HP) <sup>3)</sup>	90 (150)	110 (150)	132 (200)	160 (250)	200 (350)
Rated pulse frequency	kHz	2	2	2	2	2
Efficiency $\eta$		0.986	0.986	0.986	0.986	0.986
Power loss	kW	2.46	3.27	4.0	4.54	5.78
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.17 (0.56)	0.23 (0.75)	0.36 (1.18)	0.36 (1.18)	0.36 (1.18)
Sound pressure level at 50/60 Hz	dB(A)	66/67	68/72	68/72	68/72	68/72
Rated input current	A	218	270	322	395	510
Power connection U1, V1, W1		Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>
DC link connection, DCPA, DCNA (option Braking Module)		Flat connector for M8 cable lug, max. connection cross section 1 x 35 mm <sup>2</sup>	Flat connector for M8 cable lug, max. connection cross section 1 x 35 mm <sup>2</sup>	Flat connector for M8 cable lug, max. connection cross section 1 x 50 mm <sup>2</sup>	Flat connector for M8 cable lug, max. connection cross section 1 x 50 mm <sup>2</sup>	Flat connector for M8 cable lug, max. connection cross section 1 x 50 mm <sup>2</sup>
DC link connection, DCPS, DCNS (option dv/dt filter)		Flat connector for M8 cable lug, max. connection cross section 1 x 35 mm <sup>2</sup>	Flat connector for M8 cable lug, max. connection cross section 1 x 35 mm <sup>2</sup>	Flat connector for M8 cable lug, max. connection cross section 1 x 70 mm <sup>2</sup>	Flat connector for M8 cable lug, max. connection cross section 1 x 70 mm <sup>2</sup>	Flat connector for M8 cable lug, max. connection cross section 1 x 70 mm <sup>2</sup>
Motor connection U2, V2, W2		Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>
PE connection		Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>	Flat connector for M10 cable lug, max. connection cross section 2 x 185 mm <sup>2</sup>
Max. motor cable length <sup>1)</sup>	m (ft)	300 (984), shielded 450 (1477), unshielded	300 (984), shielded 450 (1477), unshielded	300 (984), shielded 450 (1477), unshielded	300 (984), shielded 450 (1477), unshielded	300 (984), shielded 450 (1477), unshielded
Degree of protection		IP20	IP20	IP20	IP20	IP20
Width	mm (inch)	326 (12.83)	326 (12.83)	326 (12.83)	326 (12.83)	326 (12.83)
Height	mm (inch)	1400 (55.12)	1400 (55.12)	1533 (60.35)	1533 (60.35)	1533 (60.35)
Depth	mm (inch)	356 <sup>2)</sup> (14.02)	356 <sup>2)</sup> (14.02)	545 (21.46)	545 (21.46)	545 (21.46)
Frame size		FX	FX	GX	GX	GX
Weight, approx.	kg (lb)	104 (229)	104 (229)	162 (357)	162 (357)	162 (357)

<sup>1)</sup> Max. motor cable length 100 m (328 ft) (shielded) in conjunction with a line filter to maintain the limit values of EN 61800-3 Category C2.

<sup>2)</sup> Depth = 421 mm (16.6 in) including front cover when CU310 Control Unit is installed.

<sup>3)</sup> Nominal HP based on Asynchronous motors (induction motors) and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

# SINAMICS S120

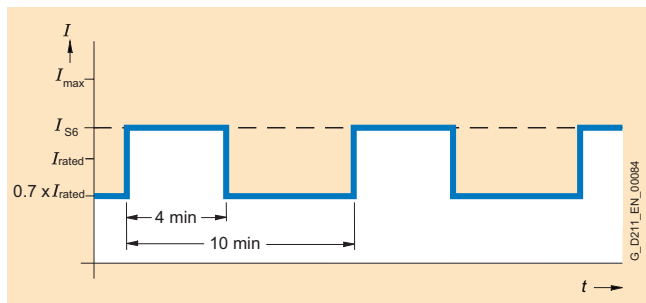
## Power Modules and line-side components

### Power Modules in chassis format

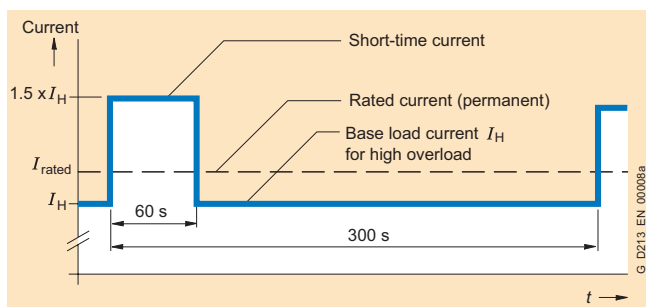
#### Characteristics

##### Overload capability

Load cycle data of Power Modules in chassis format



S6 load cycle with previous load with a load cycle period of 600 s



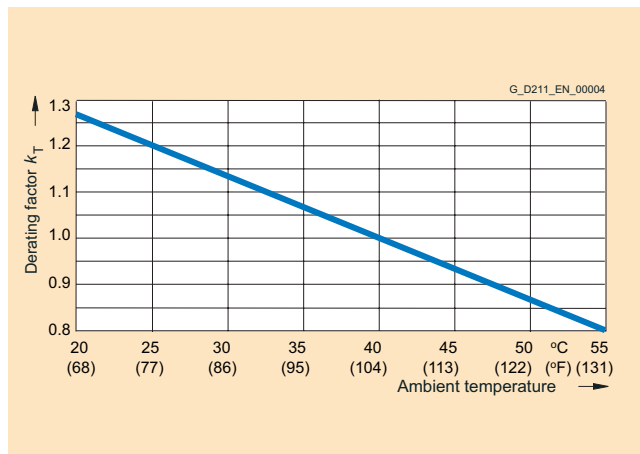
High overload

The base load current  $I_H$  is based on a load cycle of 150% for 60 s or 160% for 10 s with a load cycle period of 300 s.

##### Derating factors

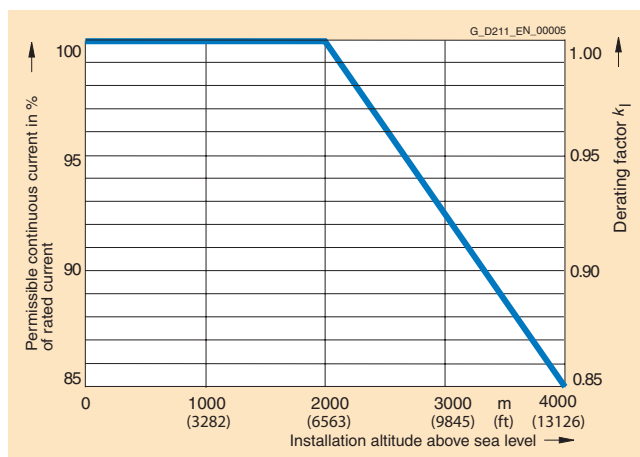
Output current dependent on pulse frequency

Power Module in chassis format	Rated output current A	Derating factor	
		for a pulse frequency of 2.5 kHz	for a pulse frequency of 4 kHz
6SL3310-1TE32-1AA0	210	0.95	0.82
6SL3310-1TE32-6AA0	260	0.95	0.83
6SL3310-1TE33-1AA0	310	0.97	0.88
6SL3310-1TE33-8AA0	380	0.96	0.87
6SL3310-1TE35-0AA0	490	0.94	0.78

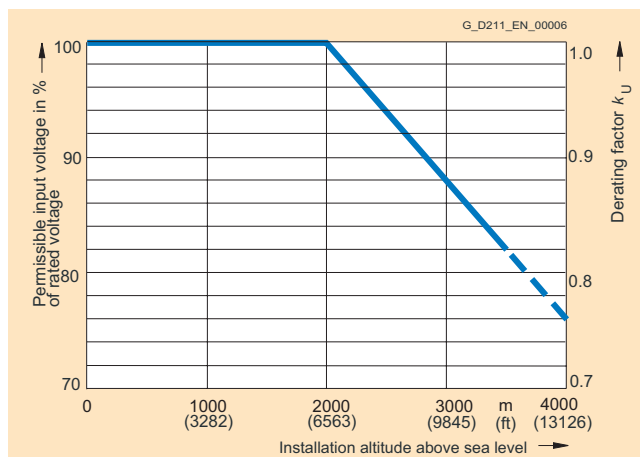


Current derating dependent on ambient temperature

Note: A factor  $k_T > 1$  is to be taken into account only in conjunction with current derating as a function of installation altitude, see System Description.



Current derating dependent on installation altitude



Voltage derating dependent on installation altitude

#### Overview



Line reactors limit the low-frequency harmonic effects and reduce the load on the rectifiers of the Power Modules. The higher the rated output of the Power Modules, the lower the required inductance of the line reactor. A line reactor is not required where the effective supply impedance equals  $u_k > 3\%$ . For further information see "System Description".

#### Technical data

Line voltage 380 V to 480 V 3 AC		Line reactor			
		6SL3000-OCE32-3AA0	6SL3000-OCE32-8AA0	6SL3000-OCE33-3AA0	6SL3000-OCE35-1AA0
Rated current	A	224	278	331	508
Power loss at 50 Hz/60 Hz	kW	0.24/0.27	0.21/0.25	0.23/0.27	0.31/0.37
Line supply connection 1U1, 1V1, 1W1		Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M12 cable lug
Load connection 1U2, 1V2, 1W2		Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M12 cable lug
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00
Width	mm (inch)	270 (10.63)	270 (10.63)	270 (10.63)	300 (11.81)
Height	mm (inch)	248 (9.76)	248 (9.76)	248 (9.76)	269 (10.59)
Depth	mm (inch)	200 (7.87)	200 (7.87)	200 (7.87)	212.5 (8.37)
Weight, approx.	kg (lb)	24.4 (54)	26 (57)	27.8 (61)	38 (84)
Suitable for Power Module	Type	6SL3310-1TE32-1...	6SL3310-1TE32-6...	6SL3310-1TE33-1...	6SL3310-1TE33-8... 6SL3310-1TE35-0...

#### Selection and ordering data

Rated output current A	Rated power kW (HP)	Suitable for Power Module Type	Line reactor Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>			
210	110 (150)	6SL3310-1TE32-1AA0	<b>6SL3000-OCE32-3AA0</b>
260	132 (200)	6SL3310-1TE32-6AA0	<b>6SL3000-OCE32-8AA0</b>
310	160 (250)	6SL3310-1TE33-1AA0	<b>6SL3000-OCE33-3AA0</b>
380	200 (300)	6SL3310-1TE33-8AA0	<b>6SL3000-OCE35-1AA0</b>
490	250 (400)	6SL3310-1TE35-0AA0	<b>6SL3000-OCE35-1AA0</b>

# SINAMICS S120

## Power Modules and line-side components

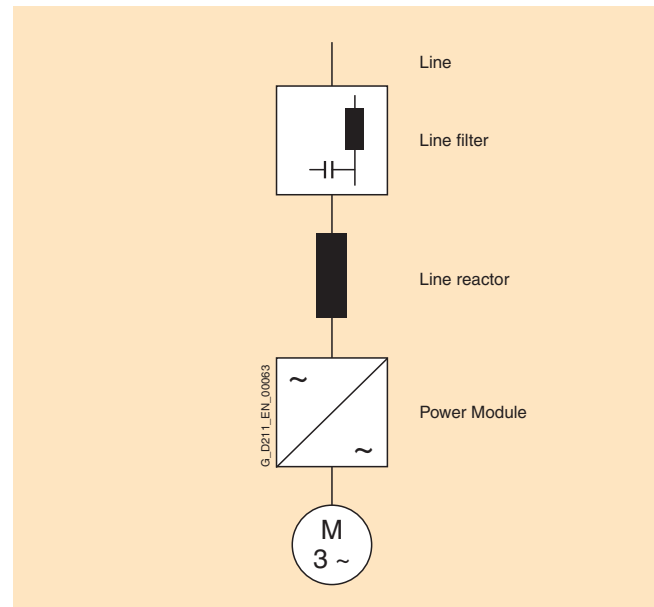
### Power Modules in chassis format Line filters

#### Overview



In plants with strict EMC requirements, line filters work together with line reactors to restrict the conducted interference emanating from the Power Modules to the limit values of Category C2 as defined in EN 61800-3. Line filters are suited only for direct connection to TN (grounded) systems.

#### Integration



#### Technical data

Line voltage 380 V to 480 V 3 AC	Line filter			
	6SL3000-0BE32-5AA0	6SL3000-0BE34-4AA0	6SL3000-0BE36-0AA0	
Rated current	A	250	440	600
Power loss	kW	0.05	0.05	0.06
Line supply connection 1U1, 1V1, 1W1		Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M10 cable lug
Load connection 1U2, 1V2, 1W2		Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M10 cable lug
Degree of protection		IP00	IP00	IP00
Width	mm (inch)	360 (14.17)	360 (14.17)	400 (15.75)
Height	mm (inch)	240 (9.45)	240 (9.45)	265 (10.43)
Depth	mm (inch)	116 (4.57)	116 (4.57)	140 (5.51)
Weight, approx.	kg (lb)	12.5 (28)	12.5 (28)	19 (42)
Suitable for Power Module	Type	6SL3310-1TE32-1...	6SL3310-1TE32-6... 6SL3310-1TE33-1... 6SL3310-1TE33-8...	6SL3310-1TE35-0...

#### Selection and ordering data

Rated output current A	Rated power kW (HP)	Suitable for Power Module Type	Line filter Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>			
210	110 (150)	6SL3310-1TE32-1AA0	<b>6SL3000-0BE32-5AA0</b>
260	132 (200)	6SL3310-1TE32-6AA0	<b>6SL3000-0BE34-4AA0</b>
310	160 (250)	6SL3310-1TE33-1AA0	<b>6SL3000-0BE34-4AA0</b>
380	200 (300)	6SL3310-1TE33-8AA0	<b>6SL3000-0BE34-4AA0</b>
490	250 (400)	6SL3310-1TE35-0AA0	<b>6SL3000-0BE36-0AA0</b>



# SINAMICS S120

## Power Modules and line-side components

### Power Modules in chassis format Recommended line-side components

#### Overview

#### Assignment of line-side power components to Power Modules in blocksize format

Suitable line-side power components are assigned depending on the power rating of the Power Modules.

The following tables list recommended components and apply for ambient temperatures up to 40 °C (104 °F).

Further information about the main contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV1, LV IT and ET BI.<sup>1)</sup>

Rated output current	Rated power	Suitable for PM340 Power Module	Main contactor	Circuit-breaker	Main switch (switch disconnector)	Fuse switch disconnector	Switch disconnector with fuse holders	Fuse
A	kW (HP)	Type 6SL3310-...	Type	Order No.	Order No.	Order No.	Order No.	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>								
210	110 (150)	1TE32-1AA0	3RT1064-...	3VL4725-1DC36-0AA0	3KA5530-1EE01	3NP4270-0CA01	3KL5530-1EB01	3NA3144
260	132 (200)	1TE32-6AA0	3RT1065-...	3VL4731-1DC36-0AA0	3KA5730-1EE01	3NP4370-0CA01	3KL5730-1EB01	3NA3250
310	160 (250)	1TE33-1AA0	3RT1066-...	3VL4740-1DC36-0AA0	3KA5730-1EE01	3NP4370-0CA01	3KL5730-1EB01	3NA3254
380	200 (300)	1TE33-8AA0	3RT1075-...	3VL5750-1DC36-0AA0	3KA5730-1EE01	3NP4370-0CA01	3KL5730-1EB01	3NA3260
490	250 (400)	1TE25-0AA0	3RT1076-...	3VL5763-1DC36-0AA0	3KA5830-1EE01	3NP4470-0CA01	3KL6130-1EB01	3NA3372

<sup>1)</sup> Component selections are per IEC standards and not necessarily in accordance with UL or NEC requirements. For NEMA components please see North American Industrial Products Catalog and Speedfax Catalog.

# SINAMICS S120

## Line Modules and line-side components

### Basic Line Modules in chassis format

#### Overview



A Basic Line Module converts an AC source into an unregulated DC supply. Basic Line Modules are used 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 precharged via the thyristor gate control which supplies a DC voltage equal to 1.35 x the line voltage. Basic Line Modules are designed for connection to grounded-neutral (TN, TT) and non-grounded (IT) supply systems.

#### Design

The Basic Line Modules in chassis format feature the following connections as standard:

- 1 power connection
- 1 connection for the 24 V DC electronics power supply
- 1 DC link connection
- 3 DRIVE-CLiQ sockets

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

The scope of supply of the Basic Line Modules includes:

- 0.6 m (1.97 ft) DRIVE-CLiQ cable for connection to a CU320 or SIMOTION D Control Unit
- 1.45 m (4.76 ft) DRIVE-CLiQ cable for connection between the Control Unit and first Motor Module

#### Selection and ordering data

Infeed power	Basic Line Module in chassis format
kW (HP)	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>	
200 (300)	<b>6SL3330-1TE34-2AA0</b>
250 (400)	<b>6SL3330-1TE35-3AA0</b>
400 (600)	<b>6SL3330-1TE38-2AA0</b>
560 (800)	<b>6SL3330-1TE41-2AA0</b>
710 (1000)	<b>6SL3330-1TE41-5AA0</b>
<b>Line voltage 660 V to 690 V 3 AC</b>	
250 (400)	<b>6SL3330-1TH33-0AA0</b>
355 (476)	<b>6SL3330-1TH34-3AA0</b>
560 (800)	<b>6SL3330-1TH36-8AA0</b>
900 (1207)	<b>6SL3330-1TH41-1AA0</b>
1100 (1475)	<b>6SL3330-1TH41-4AA0</b>

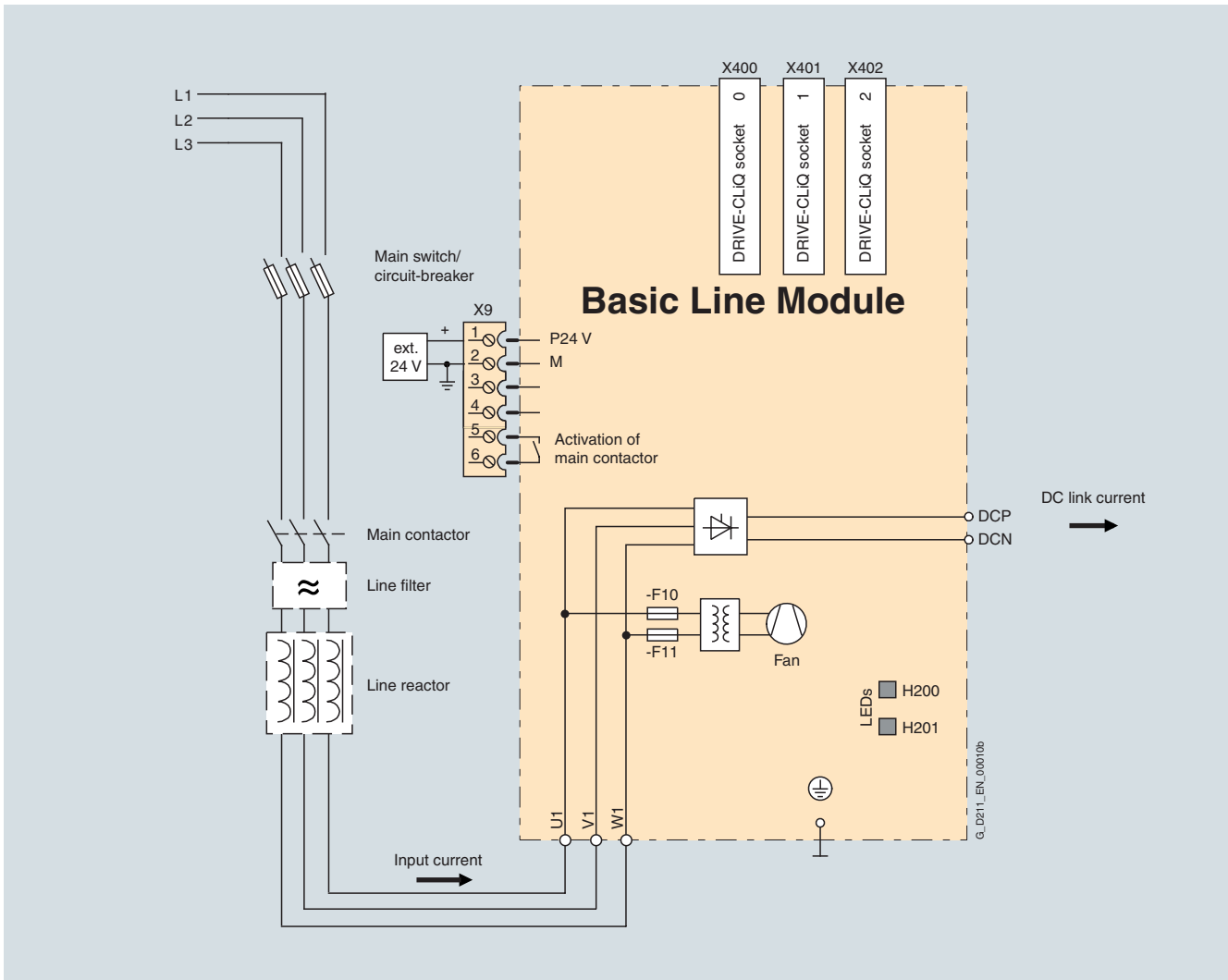
#### Warning signs in foreign languages

Warning signs in other languages can be placed on top of the standard warning signs in German or English.

The following signs are supplied with chassis format units: Chinese, Danish, Finnish, French, Greek, Italian, Japanese, Korean, Dutch, Polish, Portuguese, Russian, Swedish, Spanish, Czech and Turkish.

#### Integration

The Basic Line Module communicates with a CU320 or SIMOTION D Control Unit via DRIVE-CLiQ.



Connection example of Basic Line Module

# SINAMICS S120

## Line Modules and line-side components

### Basic Line Modules in chassis format

#### Technical data

##### General technical data

Electrical data	
Line connection voltage (up to 2000 m (6563 ft) above sea level)	380 V to 480 V 3 AC $\pm$ 10% (– 15% < 1 min) or 660 V to 690 V 3 AC $\pm$ 10% (– 15% < 1 min)
Power frequency	47 Hz to 63 Hz
Line power factor at rated output	
• Fundamental Power factor	> 0.96
• Total ( $\lambda$ )	0.75 to 0.93
Overvoltage category	Class III to EN 60664-1
DC link voltage	approx. 1.35 x line voltage <sup>1)</sup>
Electronics power supply	24 V DC – 15%/+ 20%
Main contactor control	
• Terminal strip X9/5-6	240 V AC/ max. 8 A 30 V DC/ max. 1 A
Radio interference suppression	
• Standard	No radio interference suppression (Category C3 to EN 61800-3 up to 300 m (984 ft) total cable length)
• With line filter	Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	Forced air cooling through a built-in fan
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 °C to + 40 °C (32 °F to +104° F) without derating, > 40 °C to + 55 °C (> 104 °F to +131 °F)see derating characteristics
Installation altitude	Up to 2000 m (6563 ft) above sea level without derating, > 2000 m (6563 ft) to 4000 m (13126 ft) above sea level see derating characteristics
Certificates	
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus (File No.: E192450)

<sup>1)</sup> The DC link voltage is unregulated and load-dependent. For further information see System Description.

#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC		Basic Line Modules in chassis format				
		6SL3330-1TE34-2AA0	6SL3330-1TE35-3AA0	6SL3330-1TE38-2AA0	6SL3330-1TE41-2AA0	6SL3330-1TE41-5AA0
Infeed power $P_{rated}$ with 400 V 3 AC with 460 V 3 AC <sup>1)</sup>	kW (HP)	<b>200 (300)</b>	<b>250 (400)</b>	<b>400 (600)</b>	<b>560 (800)</b>	<b>710 (1000)</b>
Infeed power for S6 duty (40%) $P_{S6}$	kW	On request	On request	On request	On request	On request
Max. infeed power $P_{max}$ (HP)	kW	300 (402)	375 (503)	600 (805)	840 (1126)	1065 (1428)
Rated DC link current $I_{rated\_DC}$	A	420	530	820	1200	1500
DC link current $I_{H\_DC}$	A	328	413	640	936	1170
Max. DC link current $I_{max\_DC}$	A	630	795	1230	1800	2250
Input current at $V_{ine} = 400$ V	A	365	460	710	1010	1265
Max. input current at $V_{ine} = 400$ V	A	547	690	1065	1515	1897
Max. current requirement 24 V DC electronics power supply	A	1.1	1.1	1.1	1.1	1.1
DC link capacitance	μF	7200	9600	14600	23200	29000
Max. DC link capacitance of drive group	μF	57600	76800	116800	185600	232000
Efficiency $\eta$		0.991	0.992	0.992	0.992	0.992
Power loss	kW	1.9	2.1	3.2	4.6	5.5
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.17 (6)	0.17 (6)	0.17 (6)	0.36 (12.71)	0.36 (12.71)
Sound pressure level at 50/60 Hz	dB(A)	67/68	67/68	67/68	72/73	72/73
Power connection U1, V1, W1		Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 6 × 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 6 × 240 mm <sup>2</sup>
DC link connection DCP, DCN		Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 2 × 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 2 × 240 mm <sup>2</sup>
PE connection		On housing with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	On housing with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	On housing with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	On housing with M10 screw, max. cross section 2 × 240 mm <sup>2</sup>	On housing with M10 screw, max. cross section 2 × 240 mm <sup>2</sup>
Max. cable length (total of all motor cables and DC link)	m (ft)	1500 (4921)	1500 (4921)	1500 (4921)	2250 (7382)	2250 (7382)
Degree of protection		IP00	IP00	IP00	IP00	IP00
Width	mm (inch)	305 (12)	305 (12)	305 (12)	305 (12)	305 (12)
Height	mm (inch)	1160 (45.67)	1160 (45.67)	1160 (45.67)	1650 (64.96)	1650 (64.96)
Depth	mm (inch)	351 (13.82)	351 (13.82)	351 (13.82)	550 (21.65)	550 (21.65)
Size		FB	FB	FB	GB	GB
Weight, approx.	kg (lb)	86 (190)	86 (190)	86 (190)	214 (472)	214 (472)

1) Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

# SINAMICS S120

## Line Modules and line-side components

### Basic Line Modules in chassis format

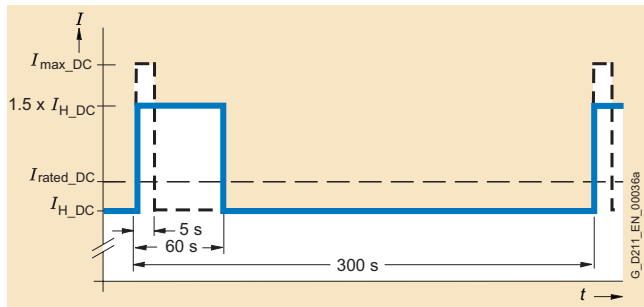
#### Technical data (continued)

Line voltage 660 V to 690 V 3 AC		Basic Line Modules in chassis format				
		6SL3330-1TH33-0AA0	6SL3330-1TH34-3AA0	6SL3330-1TH36-8AA0	6SL3330-1TH41-1AA0	6SL3330-1TH41-4AA0
Infeed power $P_{\text{rated}}$ with 690 V 3 AC	kW	250	355	560	900	1100
Infeed power for S6 duty (40%) $P_{S6}$	kW	On request	On request	On request	On request	On request
Max. infeed power $P_{\text{max}}$ (HP)	kW	375 (503)	532.5 (714)	840 (1126)	1350 (1810)	1650 (2213)
Rated DC link current $I_{\text{rated\_DC}}$	A	300	430	680	1100	1400
DC link current $I_{H\_DC}$	A	234	335	530	858	1092
Max. DC link current $I_{\text{max\_DC}}$	A	450	645	1020	1650	2100
Input current at $V_{\text{line}} = 690$ V	A	260	375	575	925	1180
Max. input current at $V_{\text{line}} = 690$ V	A	390	562.5	862.5	1387.5	1770
Max. current requirement 24 V DC electronics power supply	A	1.1	1.1	1.1	1.1	1.1
DC link capacitance	$\mu\text{F}$	3200	4800	7300	11600	15470
Max. DC link capacitance of drive group	$\mu\text{F}$	25600	38400	58400	92800	123760
Efficiency $\eta$		0.994	0.994	0.995	0.994	0.995
Power loss	kW	1.5	2.1	3.0	5.4	5.8
Cooling air requirement	$\text{m}^3/\text{s}$ ( $\text{ft}^3/\text{s}$ )	0.17 (6)	0.17 (6)	0.17 (6)	0.36 (12.71)	0.36 (12.71)
Sound pressure level at 50/60 Hz	$\text{dB(A)}$	67/68	67/68	67/68	72/73	72/73
Power connection U1, V1, W1		Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$ with adapter max. cross section $3 \times$ $240 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$ with adapter max. cross section $3 \times$ $240 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$ with adapter max. cross section $3 \times$ $240 \text{ mm}^2$	Flange connection for busbar connec- tion with M12 screw or with adapter max. cross section $6 \times 240 \text{ mm}^2$	Flange connection for busbar connec- tion with M12 screw or with adapter max. cross section $6 \times 240 \text{ mm}^2$
DC link connection DCP, DCN		Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$ with adapter max. cross section $3 \times$ $240 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$ with adapter max. cross section $3 \times$ $240 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$ with adapter max. cross section $3 \times$ $240 \text{ mm}^2$	Flange connection for busbar connec- tion with M12 screw or with adapter max. cross section $6 \times 240 \text{ mm}^2$	Flange connection for busbar connec- tion with M12 screw or with adapter max. cross section $6 \times 240 \text{ mm}^2$
PE connection		On housing with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	On housing with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	On housing with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	On housing with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$	On housing with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$
Max. cable length (total of all motor cables and DC link)	m (ft)	1500 (4921)	1500 (4921)	1500 (4921)	2250 (7382)	2250 (7382)
Degree of protection		IP00	IP00	IP00	IP00	IP00
Width	mm (inch)	305 (12)	305 (12)	305 (12)	305 (12)	305 (12)
Height	mm (inch)	1160 (45.67)	1160 (45.67)	1160 (45.67)	1650 (64.96)	1650 (64.96)
Depth	mm (inch)	351 (13.82)	351 (13.82)	351 (13.82)	550 (21.65)	550 (21.65)
Size		FB	FB	FB	GB	GB
Weight, approx.	kg (lb)	86 (190)	86 (190)	86 (190)	214 (472)	214 (472)



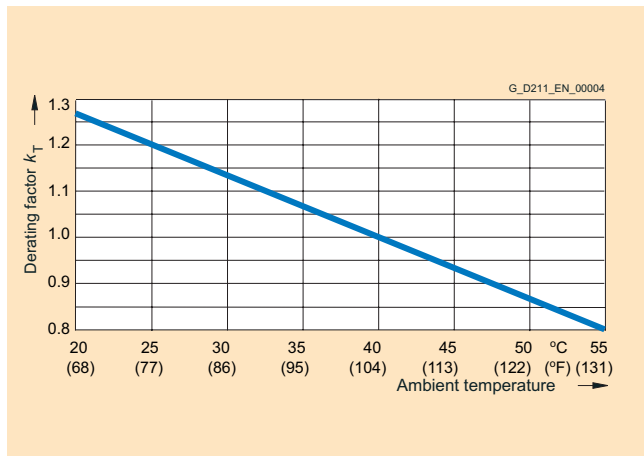
### Characteristics

#### Overload capability



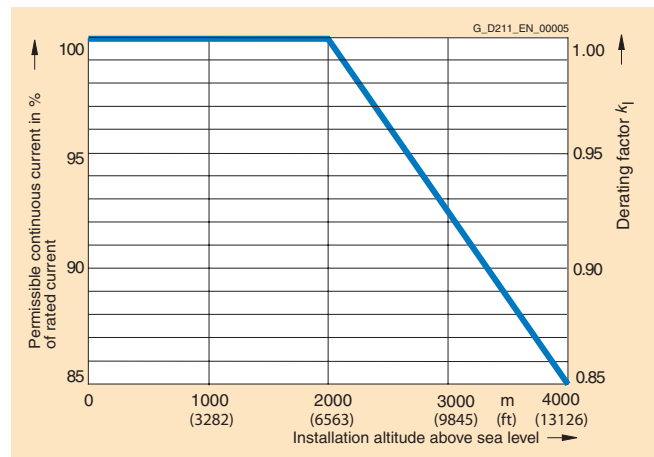
Overload capability

#### Derating characteristics

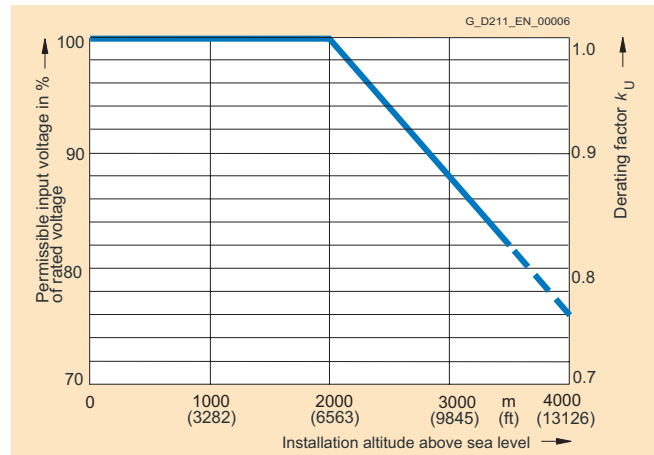


Current derating dependent on ambient temperature

Note: A derating factor  $k_T > 1.0$  is to be taken into account only in conjunction with "current derating dependent on installation altitude". See also System description.



Current derating dependent on installation altitude



Voltage derating dependent on installation altitude

# SINAMICS S120

## Line Modules and line-side components

### Basic Line Modules in chassis format

#### Line reactors

#### Overview



Line reactors reduce harmonic currents on the supply system and limit commutating dips in the Basic Line Module. For this reason, line reactors should always be used.

#### Selection and ordering data

Infeed power of the Basic Line Module kW (HP)	Suitable for Basic Line Module	Line reactor Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
200 (300)	6SL3330-1TE34-2AA0	<b>6SL3000-OCE35-1AA0</b>
250 (400)	6SL3330-1TE35-3AA0	<b>6SL3000-OCE35-1AA0</b>
400 (600)	6SL3330-1TE38-2AA0	<b>6SL3000-OCE37-7AA0</b>
560 (800)	6SL3330-1TE41-2AA0	<b>6SL3000-OCE41-0AA0</b>
710 (1000)	6SL3330-1TE41-5AA0	<b>6SL3000-OCE41-5AA0</b>
<b>Line voltage 660 V to 690 V 3 AC</b>		
250	6SL3330-1TH33-0AA0	<b>6SL3000-OCH32-7AA0</b>
355	6SL3330-1TH34-3AA0	<b>6SL3000-OCH34-8AA0</b>
560	6SL3330-1TH36-8AA0	<b>6SL3000-OCH36-0AA0</b>
900	6SL3330-1TH41-1AA0	<b>6SL3000-OCH41-2AA0</b>
1100	6SL3330-1TH41-4AA0	<b>6SL3000-OCH41-2AA0</b>

#### Technical data

Line voltage 380 V to 480 V 3 AC		Line reactor 6SL3000-OCE35-1AA0				
			6SL3000-OCE37-7AA0	6SL3000-OCE41-0AA0	6SL3000-OCE41-5AA0	
Max. thermal current $I_{th\ max}$	A	508	508	773	1022	1485
Power loss 50 Hz/60 Hz	kW	0.292/0.328	0.323/0.365	0.310/0.351	0.441/0.498	0.687/0.776
Line/load connection		M12 connecting lugs	M12 connecting lugs	M12 connecting lugs	M12 connecting lugs	M12 connecting lugs
Degree of protection		IP00	IP00	IP00	IP00	IP00
Width	mm (inch)	300 (11.81)	300 (11.81)	300 (11.81)	350 (13.78)	460 (18.11)
Height	mm (inch)	269 (10.59)	269 (10.59)	269 (10.59)	321 (12.64)	435 (17.13)
Depth	mm (inch)	212.5 (8.37)	212.5 (8.37)	212.5 (8.37)	211.5 (8.33)	235 (9.25)
Weight, approx.	kg (lb)	38.0 (84)	38.0 (84)	51.3 (113)	69.6 (154)	118 (260)
Suitable for Basic Line Module	Type	6SL3330-1TE34-2AA0	6SL3330-1TE35-3AA0	6SL3330-1TE38-2AA0	6SL3330-1TE41-2AA0	6SL3330-1TE41-5AA0

Line voltage 660 V to 690 V 3 AC		Line reactor				
		6SL3000-OCH32-7AA0	6SL3000-OCH34-8AA0	6SL3000-OCH36-0AA0	6SL3000-OCH41-2AA0	
Max. thermal current $I_{th\ max}$	A	270	482	597	1167	1167
Power loss 50 Hz/60 Hz	kW	0.245/0.277	0.424/0.478	0.430/0.485	0.620/0.697	0.693/0.783
Line/load connection		M10 connecting lugs	M12 connecting lugs	M12 connecting lugs	M12 connecting lugs	M12 connecting lugs
Degree of protection		IP00	IP00	IP00	IP00	IP00
Width	mm (inch)	270 (10.63)	350 (13.78)	350 (13.78)	460 (18.11)	460 (18.11)
Height	mm (inch)	248 (9.76)	321 (12.64)	321 (12.64)	435 (17.13)	435 (17.13)
Depth	mm (inch)	200 (7.87)	232.5 (9.15)	232.5 (9.15)	235 (9.25)	235 (9.25)
Weight, approx.	kg (lb)	27.9 (62)	55.6 (123)	63.8 (141)	147 (324)	147 (324)
Suitable for Basic Line Module	Type	6SL3330-1TH33-0AA0	6SL3330-1TH34-3AA0	6SL3330-1TH36-8AA0	6SL3330-1TH41-1AA0	6SL3330-1TH41-4AA0

# SINAMICS S120

## Line Modules and line-side components

### Basic Line Modules in chassis format Line filters

#### Overview



In plants with strict EMC requirements, line filters work together with line reactors to restrict the conducted interference emanating from the power modules to the limit values of Category C2 as defined in EN 61800-3. Line filters are suited only for direct connection to TN (grounded) systems.

#### Selection and ordering data

Infeed power of the Basic Line Module kW (HP)	Suitable for Basic Line Module	Line filter Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
200 (300)	6SL3330-1TE34-2AA0	<b>6SL3000-0BE34-4AA0</b>
250 (400)	6SL3330-1TE35-3AA0	<b>6SL3000-0BE36-0AA0</b>
400 (600)	6SL3330-1TE38-2AA0	<b>6SL3000-0BE41-2AA0</b>
560 (800)	6SL3330-1TE41-2AA0	<b>6SL3000-0BE41-2AA0</b>
710 (1000)	6SL3330-1TE41-5AA0	<b>6SL3000-0BE41-6AA0</b>
<b>Line voltage 660 V to 690 V 3 AC</b>		
250	6SL3330-1TH33-0AA0	<b>6SL3000-0BG34-4AA0</b>
355	6SL3330-1TH34-3AA0	<b>6SL3000-0BG34-4AA0</b>
560	6SL3330-1TH36-8AA0	<b>6SL3000-0BG36-0AA0</b>
900	6SL3330-1TH41-1AA0	<b>6SL3000-0BG41-2AA0</b>
1100	6SL3330-1TH41-4AA0	<b>6SL3000-0BG41-2AA0</b>

#### Technical data

Line voltage 380 V to 480 V 3 AC		Line filter			
		6SL3000-0BE34-4AA0	6SL3000-0BE36-0AA0	6SL3000-0BE41-2AA0	6SL3000-0BE41-6AA0
Rated current	A	440	600	1200	1600
Power loss	kW	0.049	0.055	0.137	0.182
Line/load connection L1, L2, L3 / L1', L2', L3'		M10 connecting lugs	M10 connecting lugs	M12 connecting lugs	M12 connecting lugs
PE connection		On housing with M8 bolt	On housing with M10 bolt	On housing with M10 bolt	On housing with M10 bolt
Degree of protection		IP00	IP00	IP00	IP00
Width	mm (inch)	360 (14.17)	400 (15.75)	425 (16.73)	505 (19.88)
Height	mm (inch)	240 (9.45)	265 (10.43)	265 (10.43)	265 (10.43)
Depth	mm (inch)	116 (4.57)	140 (5.51)	145 (5.71)	145 (5.71)
Weight, approx.	kg (lb)	12.3 (27)	19.0 (42)	25.2 (56)	28.8 (64)
Suitable for Basic Line Module	Type	6SL3330-1TE34-2AA0	6SL3330-1TE35-3AA0	6SL3330-1TE38-2AA0 6SL3330-1TE41-5AA0	6SL3330-1TE41-5AA0

Line voltage 660 V to 690 V 3 AC		Line filter		
		6SL3000-0BG34-4AA0	6SL3000-0BG36-0AA0	6SL3000-0BG41-2AA0
Rated current	A	440	600	1200
Power loss	kW	0.049	0.055	0.137
Line/load connection L1, L2, L3 / L1', L2', L3'		M10 connecting lugs	M10 connecting lugs	M12 connecting lugs
PE connection		On housing with M8 bolt	On housing with M10 bolt	On housing with M10 bolt
Degree of protection		IP00	IP00	IP00
Width	mm (inch)	360 (14.17)	360 (14.17)	425 (16.73)
Height	mm (inch)	240 (9.45)	240 (9.45)	265 (10.43)
Depth	mm (inch)	116 (4.57)	116 (4.57)	145 (5.71)
Weight, approx.	kg (lb)	12.3 (27)	19.0 (42)	25.2 (56)
Suitable for Basic Line Module	Type	6SL3330-1TH33-0AA0 6SL3330-1TH34-3AA0	6SL3330-1TH36-8AA0	6SL3330-1TH41-1AA0 6SL3330-1TH41-4AA0

# SINAMICS S120

## Line Modules and line-side components

### Basic Line Modules in chassis format Recommended line-side components

#### Overview

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

Suitable line-side power components are assigned depending on the power rating of the Basic Line Module.

The tables below list recommended components.

Further information about the main contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1, LV IT and ET Bl.<sup>1)</sup>

Infeed power	Input current	Suitable for Basic Line Module	Main contactor	Fixed-mounted circuit-breaker	Switch disconnector without handle and shaft	Switch disconnector with handle and shaft
kW (HP)	A	Type 6SL3330-...	Type	Order No.	Order No.	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>						
200 (300)	365	1TE34-2AA0	<b>3RT1075-...</b>	–	<b>3KL6130-1AB02</b>	<b>3KL6130-1EB02</b>
250 (400)	460	1TE35-3AA0	<b>3RT1076-...</b>	–	<b>3KL6130-1AB02</b>	<b>3KL6130-1EB02</b>
400 (600)	710	1TE38-2AA0	<b>3RT1066-...</b> (x 3)	–	<b>3KL6230-1AB02</b>	<b>3KL6230-1EB02</b>
560 (800)	1010	1TE41-2AA0	–	<b>3WL1112-2BB34-4AN2-Z C22</b>	–	–
710 (1000)	1265	1TE41-5AA0	–	<b>3WL1116-2BB34-4AN2-Z C22</b>	–	–
<b>Line voltage 660 V to 690 V 3 AC</b>						
250	260	1TH33-0AA0	<b>3RT1066-...</b>	–	<b>3KL5730-1AB01</b>	<b>3KL5730-1EB01</b>
355	375	1TH34-3AA0	<b>3RT1476-6AP36</b>	–	<b>3KL6130-1AB02</b>	<b>3KL6130-1EB02</b>
560	575	1TH36-8AA0	<b>3RT1476-6AP36</b>	–	<b>3KL6130-1AB02</b>	<b>3KL6130-1EB02</b>
900	925	1TH41-1AA0	–	<b>3WL1210-4BB34-4AN2-Z C22</b>	–	–
1100	1180	1TH41-4AA0	–	<b>3WL1212-4BB34-4AN2-Z C22</b>	–	–

Infeed power	Input current	Suitable for Basic Line Module	Cable protection fuse		Cable protection fuse incl. semiconductor protection	
kW (HP)	A	Type 6SL3330-...	Order No.	Rated current A	Order No.	Rated current A
<b>Line voltage 380 V to 480 V 3 AC</b>						
200 (300)	365	1TE34-2AA0	<b>3NA3365</b>	500	<b>3NE1333-2</b>	450
250 (400)	460	1TE35-3AA0	<b>3NA3372</b>	630	<b>3NE1334-2</b>	500
400 (600)	710	1TE38-2AA0	<b>3NA3475</b>	800	<b>3NE1448-2<sup>*)</sup></b>	800
560 (800)	1010	1TE41-2AA0	<b>3NA3482</b>	1250	<b>3NE1435-2</b> (x 2)	2 × 560
710 (1000)	1265	1TE41-5AA0	<b>3NA3475</b> (x 2)	2 × 800	<b>3NE1437-2</b> (x 2)	2 × 710
<b>Line voltage 660 V to 690 V 3 AC</b>						
250	260	1TH33-0AA0	<b>3NA3252-6</b>	315	<b>3NE1230-2</b>	315
355	375	1TH34-3AA0	<b>3NA3365-6</b>	500	<b>3NE1333-2<sup>*)</sup></b>	450
560	575	1TH36-8AA0	<b>3NA3252-6</b> (x 2)	2 × 315	<b>3NE1436-2<sup>*)</sup></b>	630
900	925	1TH41-1AA0	<b>3NA3365-6</b> (x 2)	2 × 500	<b>3NE1334-2</b> (x 2)	2 × 500
1100	1180	1TH41-4AA0	<b>3NA3365-6</b> (x 3)	3 × 500	<b>3NE1436-2<sup>*)</sup></b> (x 2)	2 × 630

<sup>1)</sup> Component selections are per IEC standards and not necessarily in accordance with UL or NEC requirements. For NEMA components please see North American Industrial Products Catalog and Speedfax Catalog.

<sup>\*)</sup> No semiconductor protection.

## Overview



Smart Line Modules are non-regulated feed/feedback units (diode bridge for incoming supply; line-commutated feedback via IGBTs) with 100% regenerative feedback power. The regenerative feedback capability of the modules can be deactivated by means of a digital input. Smart Line Modules are designed for connection to grounded-neutral (TN, TT) and non-grounded (IT) supply systems.

The DC link is pre-charged via integrated precharging resistors.

## Design

The Smart Line Modules in booksize format feature the following interfaces as standard:

- 1 power connection via screw-type terminals
- 1 connection for the 24 V DC electronics power supply via the 24 V terminal adapter included in the scope of supply
- 1 DC link connection via integrated DC link busbars
- 2 PE (protective earth) connections
- 2 digital inputs (5 kW (5 HP) and 10 kW (10 HP) on Smart Line Modules only)
- 1 x digital output (5 kW (5 HP) and 10 kW (10 HP) on Smart Line Modules only)
- 3 DRIVE-CLiQ sockets (16 kW (18 HP) and 36 kW (40 HP) on Smart Line Modules only)

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

The signal cable shield can be connected to the Line Module by means of a shield connection terminal, e.g. Weidmüller type KLBU 3-8 SC.

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit on the immediate left for drive control (on 16 kW (18 HP) and 36 kW (40 HP) Smart Line Modules only)
- DRIVE-CLiQ cable (length depends on module width) to connect Smart Line Modules to adjacent Motor Module
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21 for digital inputs and outputs
- Connector X22 for digital inputs and outputs (5 kW (5 HP) and 10 kW (10 HP) on Smart Line Modules only)
- Connector X1 for line supply connection (5 kW (5 HP) and 10 kW (10 HP) on Smart Line Modules only)

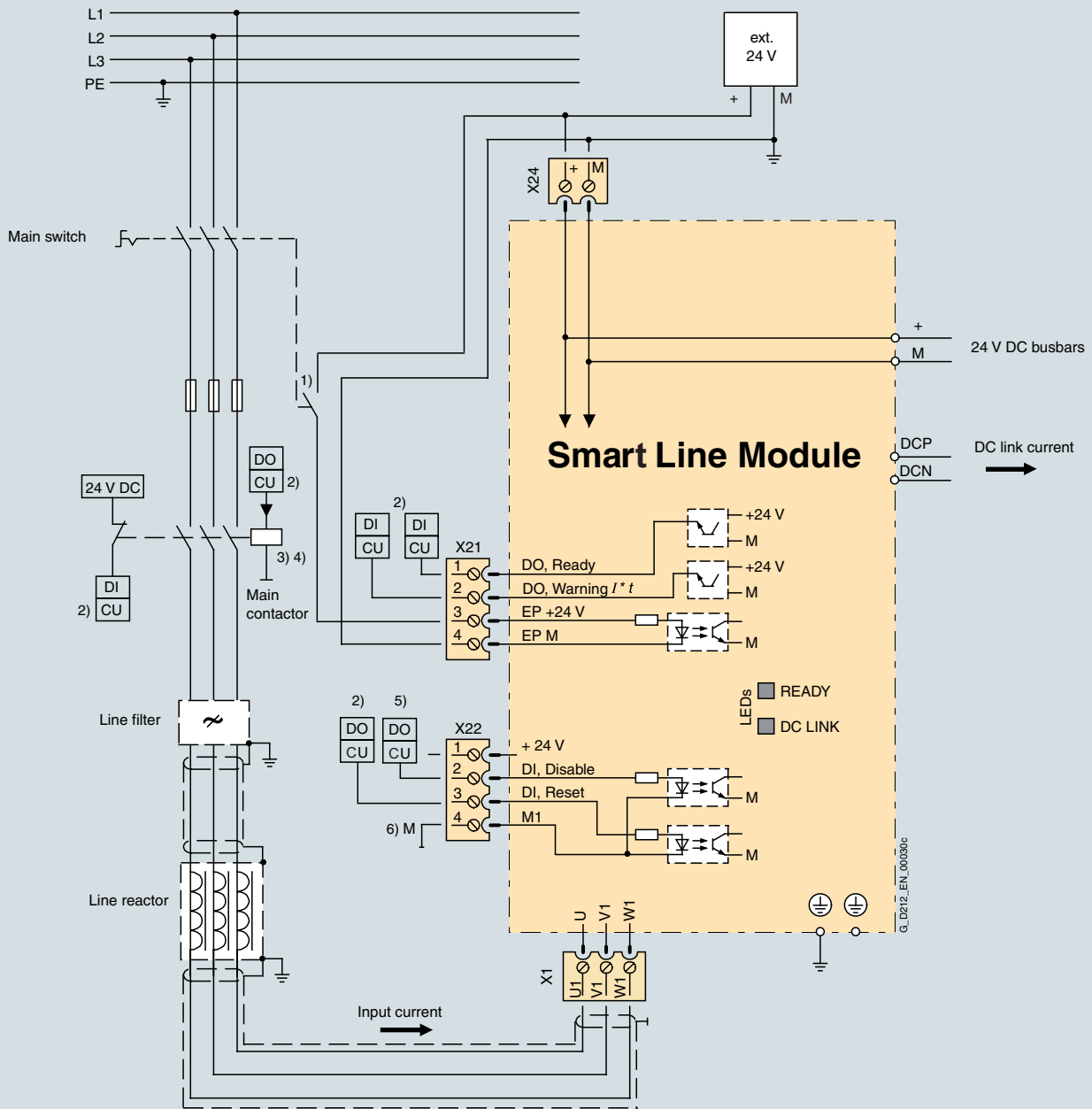
# SINAMICS S120

## Line Modules and line-side components

### Smart Line Modules in booksize format

#### Integration

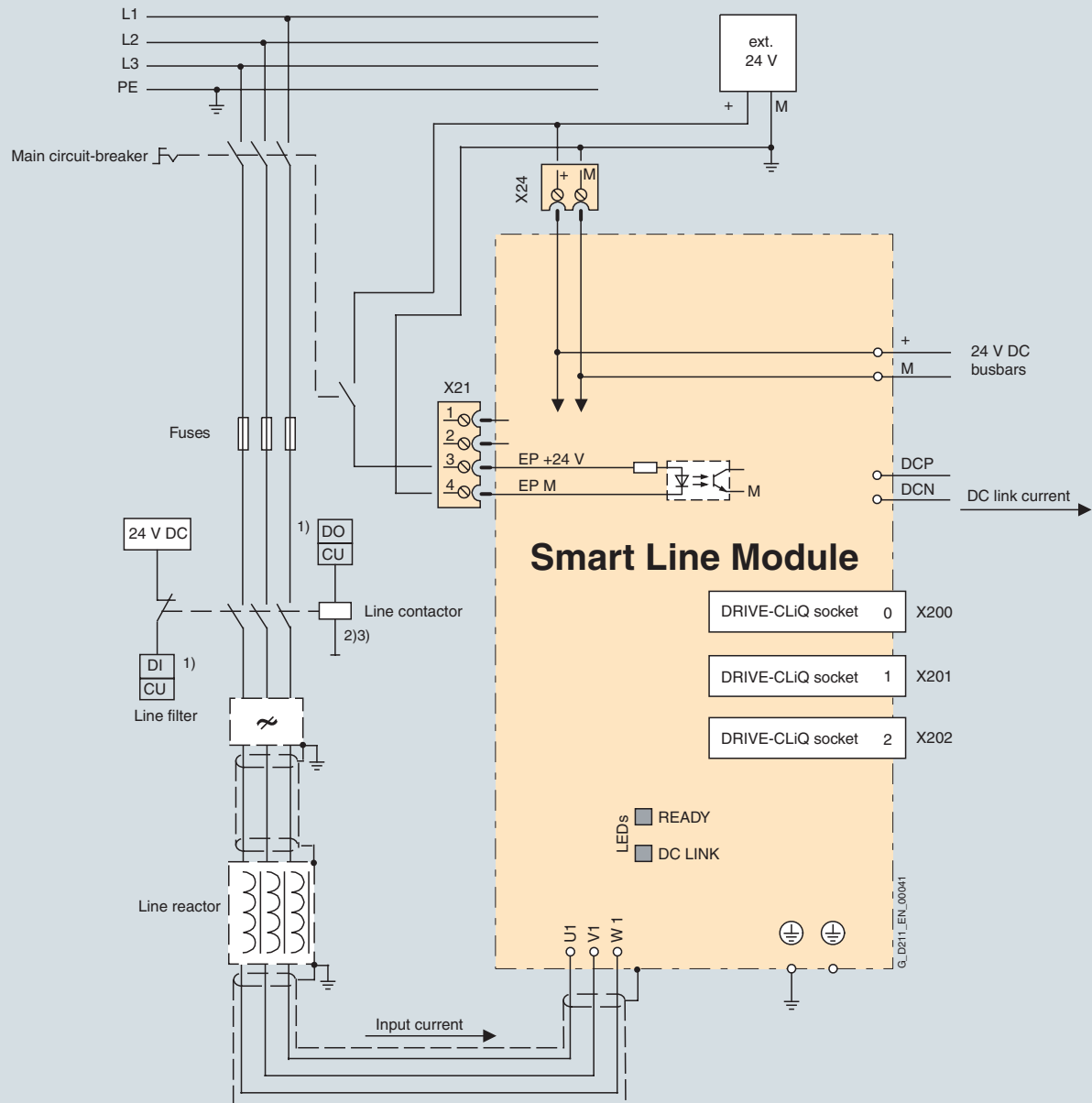
2



- 1) Leading NC contact  $t > 10$  ms, 24 V DC and ground must be connected for operation.
- 2) Digital input (DI) or digital output (DO) controlled by the Control Unit.
- 3) No additional load permitted downstream of the main contactor.
- 4) The current capacity of the digital output (DO) must be taken into account; an output interface element may have to be used.
- 5) Digital output (DO) = High means: feedback deactivated (a jumper can be inserted between X22 pins 1 and 2 for permanent deactivation).
- 6) X22 pin 4 must be connected to ground (ext. 24 V).

Connection example of 5 kW (5 HP) and 10 kW (10 HP) Smart Line Modules

#### Integration (continued)



- 1) Digital input (DI) or digital output (DO), controlled via Control Unit.
- 2) No additional load permitted downstream of the line contactor.
- 3) The current load of the digital output (DO) must be observed; an output interface may have to be used.

Connection example of 16 kW (18 HP) and 36 kW (40 HP) Smart Line Modules



# SINAMICS S120

## Line Modules and line-side components

### Smart Line Modules in booksize format

#### Technical data

##### General technical data

Electrical data	
Line connection voltage (up to 2000 m (6563 ft) above sea level)	380 V to 480 V 3 AC $\pm 10\%$ (– 15% < 1 min)
Power frequency	47 Hz to 63 Hz
Line power factor at rated output	
• Fundamental Power Factor	> 0.96
• Total ( $\lambda$ )	0.65 to 0.90
Overvoltage category	Class III to EN 60664-1
DC link voltage	approx. 1.35 x line voltage <sup>1)</sup>
Electronics power supply	24 V DC – 15%/+ 20%
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Class A1 to EN 55011 and Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	Forced air cooling through a built-in fan
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 °C to + 40 °C (32 °F to +104°F) without derating, > 40°C to + 55 °C (> 104 °F to +131 °F) see derating characteristics
Installation altitude	Up to 1000 m (1328 ft) above sea level without derating, > 1000 m (1328 ft) to 4000 (13126 ft) m above sea level see derating characteristics
Certificates	
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus (File No.: E192450)

<sup>1)</sup> The DC link voltage is unregulated and load-dependent. For further information see System Description.

#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC	Smart Line Modules in booksize format				
Internal air cooling		<b>6SL3130-6AE15-0AA0</b>	<b>6SL3130-6AE21-0AA0</b>	–	–
Internal air cooling with varnished modules		<b>6SL3130-6AE15-0AB0</b>	<b>6SL3130-6AE21-0AB0</b>	<b>6SL3130-6TE21-6AB0</b>	<b>6SL3130-6TE23-6AB0</b>
External air cooling		<b>6SL3131-6AE15-0AA0</b>	<b>6SL3131-6AE21-0AA0</b>	–	–
Rated feed/feedback power $P_{rated}$ with 380 V 3 AC with 460 V 3 AC <sup>2)</sup>	kW (HP)	<b>5 (5)</b>	<b>10 (10)</b>	<b>16 (18)</b>	<b>36 (40)</b>
I/RF power for S6 duty (40%) $P_{S6}$	kW	6.5	13	21	47
Max. I/RF power $P_{max}$	kW	10	20	35	70
DC link current at 600 V DC	A	8.3	16.6	27	60
DC link current for S6 duty (40%)	A	11	22	35	79
Max. DC link current	A	16.6	33.2	59	117
Rated input current with 380 V 3 AC	A	12	24	26	58
Input current for S6 duty (40%)	A	15.6	31.2	35	79
Max. input current	A	22	44	59	117
Max. current requirement 24 V DC electronics power supply	A	1.0	1.3	1.1	1.5
24 V DC busbar current capacity	A	20	20	20	20
DC link capacitance	μF	220	330	710	1410
Max. DC link capacitance of drive group	μF	6000	6000	20000	20000
DC link busbar current capacity	A	100	100	100	100
Efficiency $\eta$		0.98	0.98	0.99	0.99
Power loss <sup>1)</sup> with internal air cooling	kW	0.09	0.17	0.17	0.37
Power loss <sup>1)</sup> with external air cooling int./ext.	kW	0.04/0.05	0.065/0.105	–	–
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.008 (0.283)	0.008 (0.283)	0.016 (0.565)	0.031 (1.095)
Sound pressure level	dB(A)	< 60	< 60	< 60	< 60
Power connection U1, V1, W1		Screw-type terminals 2.5 mm <sup>2</sup> to 6 mm <sup>2</sup> (X1)	Screw-type terminals 2.5 mm <sup>2</sup> to 6 mm <sup>2</sup> (X1)	Screw-type terminals 2.5 mm <sup>2</sup> to 10 mm <sup>2</sup> (X1)	M6 screw studs for ring terminal ends 2.5 mm <sup>2</sup> to 50 mm <sup>2</sup> (X1)
Shield connection		Cable shield connec- tion plate integrated into the connector	Cable shield connec- tion plate integrated into the connector	Cable shield connec- tion plate integrated into the connector	see Accessories
PE connection		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M6 screw
Max. cable length (total of all motor power cables and DC link)	m (ft)	350 (1150) shielded 560 (1838) unshielded	350 (1150) shielded 560 (1838) unshielded	350 (1150) shielded 560 (1838) unshielded	350 (1150) shielded 560 (1838) unshielded
Degree of protection		IP20	IP20	IP20	IP20
Width	mm (inch)	50 (1.97)	50 (1.97)	100 (3.94)	150 (5.91)
Height	mm (inch)	380 (14.96)	380 (14.96)	380 (14.96)	380 (14.96)
Depth with internal air cooling	mm (inch)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)
Depth with external air cooling on/behind mounting surface	mm (inch)	226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)	–	–
Approx. weight with internal air cooling	kg (lb)	4.7 (10)	4.8 (11)	7 (15)	10.3 (23)
Approx. weight with external air cooling	kg (lb)	5.3 (12)	5.4 (12)	–	–

<sup>1)</sup> Power loss of Smart Line Module at rated output without losses of 24 V DC electronics power supply.

<sup>2)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

# SINAMICS S120

## Line Modules and line-side components

### Smart Line Modules in booksize format

#### Selection and ordering data

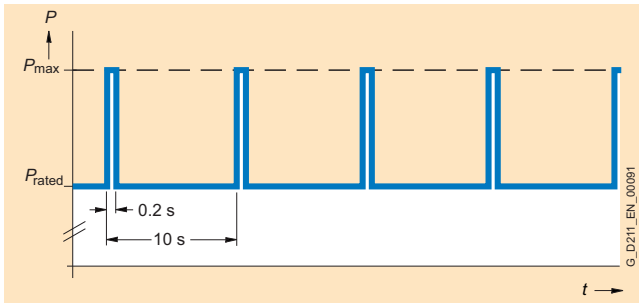
Rated infeed power kW (HP)	Smart Line Module in booksize format		
	Internal air cooling Order No.	Internal air cooling with varnished modules Order No.	External air cooling Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>			
5 (5)	<b>6SL3130-6AE15-0AA0</b>	<b>6SL3130-6AE15-0AB0</b>	<b>6SL3131-6AE15-0AA0</b>
10 (10)	<b>6SL3130-6AE21-0AA0</b>	<b>6SL3130-6AE21-0AB0</b>	<b>6SL3131-6AE21-0AA0</b>
16 (18)	–	<b>6SL3130-6TE21-6AB0</b>	–
36 (40)	–	<b>6SL3130-6TE23-6AB0</b>	–

#### Accessories

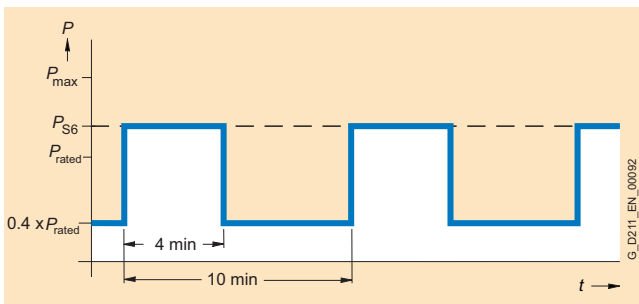
Description	Order No.
<b>Shield connection kit</b> for Line/Motor Modules in booksize format with a width of 150 mm (5.91 in)	<b>6SL3162-1AF00-0AA0</b>
<b>DC link supply adapter for direct infeed of DC link voltage</b> • Screw-type terminals 0.5 mm <sup>2</sup> to 10 mm <sup>2</sup> for Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in) • Screw-type terminals 35 mm <sup>2</sup> to 95 mm <sup>2</sup> for Line Modules and Motor Modules in booksize format with a width of 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in)	<b>6SL3162-2BD00-0AA0</b> <b>6SL3162-2BM00-0AA0</b>
<b>DC link adapters (2x)</b> for multi-tier configuration Screw-type terminals 35 mm <sup>2</sup> to 95 mm <sup>2</sup> for all Line Modules and Motor Modules in booksize format	<b>6SL3162-2BM01-0AA0</b>
<b>24 V terminal adapter</b> for all Line Modules and Motor Modules in booksize format	<b>6SL3162-2AA00-0AA0</b>
<b>24 V jumper</b> for connection of the 24 V busbars (for booksize format)	<b>6SL3162-2AA01-0AA0</b>
<b>Warning signs in foreign languages</b> This set of foreign language warning signs can be placed on top of the standard German or English signs. One sign in each of the following languages is provided in each set: Chinese Simplified, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Portuguese, Spanish and Swedish.	<b>6SL3166-3AB00-0AA0</b>

### Characteristics

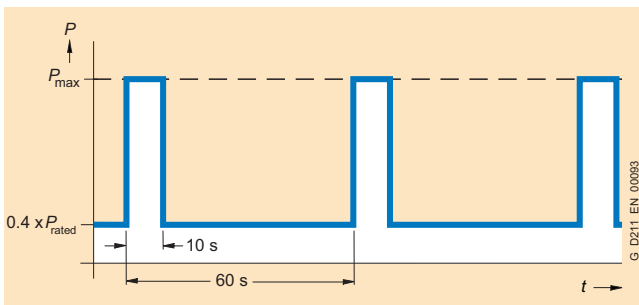
#### Overload capability



Load cycle with previous load

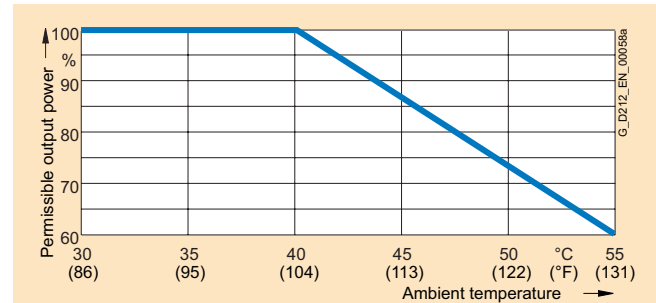


S6 load cycle with previous load

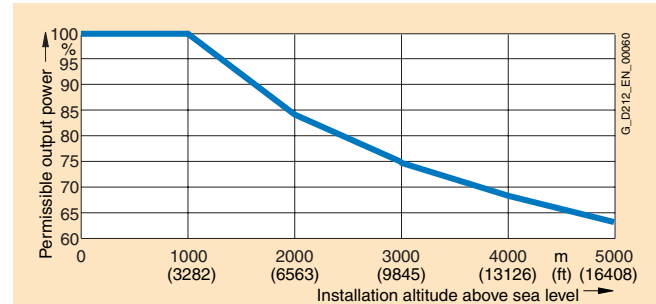


S6 load cycle with previous load

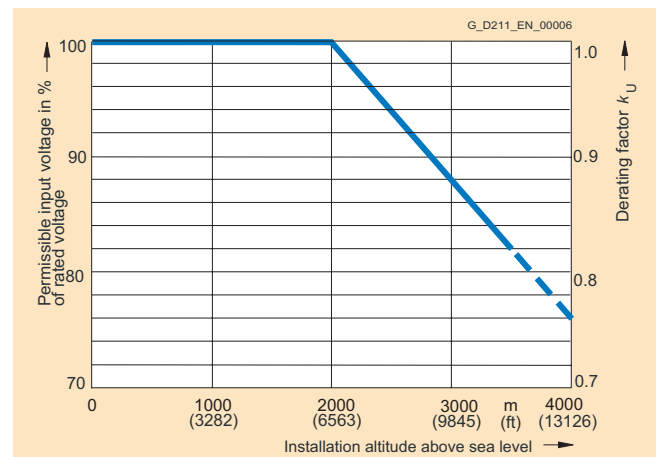
#### Derating characteristics



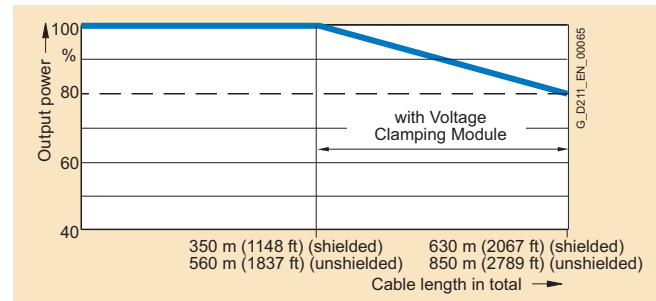
Output rating dependent on ambient temperature



Output rating dependent on installation altitude



Voltage derating dependent on installation altitude



Output rating dependent on total cable length

# SINAMICS S120

## Line Modules and line-side components

### Smart Line Modules in booksize format Line reactors

#### Overview



Smart Line Modules are not warranted to operate without the specified line reactors. The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

#### Selection and ordering data

Rated infeed power of the Smart Line Module kW (HP)	Suitable for Smart Line Module	Line reactor Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
5 (5)	6SL3130-6AE15-0AA0 6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0	<b>6SL3000-OCE15-0AA0</b>
10 (10)	6SL3130-6AE21-0AA0 6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0	<b>6SL3000-OCE21-0AA0</b>
16 (18)	6SL3130-6TE21-6AB0	<b>6SL3000-OCE21-6AA0</b>
36 (40)	6SL3130-6TE23-6AB0	<b>6SL3000-OCE23-6AA0</b>

#### Technical data

Line voltage 380 V to 480 V 3 AC		Line reactor			
		6SL3000-OCE15-0AA0	6SL3000-OCE21-0AA0	6SL3000-OCE21-6AA0	6SL3000-OCE23-6AA0
Rated current	A	14	28	35	69
Power loss	kW	0.062	0.116	0.11	0.17
Line/load connection 1U1, 1V1, 1W1 / 1U2, 1V2, 1W2		4 mm <sup>2</sup> screw-type terminals	10 mm <sup>2</sup> screw-type terminals	10 mm <sup>2</sup> screw-type terminals	16 mm <sup>2</sup> screw-type terminals
PE connection		4 mm <sup>2</sup> screw-type terminals	10 mm <sup>2</sup> screw-type terminals	10 mm <sup>2</sup> screw-type terminals	16 mm <sup>2</sup> screw-type terminals
Degree of protection		IP20	IP20	IP20	IP20
Width	mm (inch)	150 (5.91)	177 (6.97)	219 (8.62)	228 (8.98)
Height	mm (inch)	175 (6.89)	196 (7.72)	180 (7.09)	235 (9.25)
Depth	mm (inch)	90 (3.54)	110 (4.33)	144 (5.67)	224 (8.82)
Weight, approx.	kg (lb)	3.7 (8)	7.5 (17)	9.5 (21)	17 (38)
Suitable for Smart Line Module	Type	6SL3130-6AE15-0AA0 6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0	6SL3130-6AE21-0AA0 6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0	6SL3130-6TE21-6AB0	6SL3130-6TE23-6AB0

# SINAMICS S120

## Line Modules and line-side components

Smart Line Modules in booksize format  
Line filters

### Overview



In plants with strict EMC requirements, line filters work together with line reactors to restrict the conducted interference emanating from the Power Modules to the limit values of Class A1 as defined in EN 55011 and Category C2 as defined in EN 61800-3. Line filters are suited only for direct connection to TN (grounded) systems.

### Selection and ordering data

Rated infeed power of the Smart Line Module kW (HP)	Suitable for Smart Line Module	Line filter Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
5 (5)	6SL3130-6AE15-0AA0 6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0	<b>6SL3000-0HE15-0AA0</b>
10 (10)	6SL3130-6AE21-0AA0 6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0	<b>6SL3000-0HE21-0AA0</b>
16 (18)	6SL3130-6TE21-6AB0	<b>6SL3000-0BE21-6DA0</b>
36 (40)	6SL3130-6TE23-6AB0	<b>6SL3000-0BE23-6DA0</b>

### Technical data

Line voltage 380 V to 480 V 3 AC		Line filter			
		6SL3000-0HE15-0AA0	6SL3000-0HE21-0AA0	6SL3000-0BE21-6DA0	6SL3000-0BE23-6DA0
Rated current	A	16	25	36	65
Power loss	W	20	20	6	10
Line/load connection L1, L2, L3 / U, V, W		10 mm <sup>2</sup> screw-type terminals	10 mm <sup>2</sup> screw-type terminals	10 mm <sup>2</sup> screw-type terminals	35 mm <sup>2</sup> screw-type terminals
PE connection		On housing with M6 bolt	On housing with M6 bolt	On housing with M6 bolt	On housing with M6 bolt
Degree of protection		IP20	IP20	IP20	IP20
Width	mm (inch)	60 (2.36)	60 (2.36)	50 (1.97)	75 (2.95)
Height	mm (inch)	285 (11.22)	285 (11.22)	420 (16.54)	420 (16.54)
Depth	mm (inch)	122 (4.8)	122 (4.8)	226 (8.9)	226 (8.9)
Weight, approx.	kg( lb)	3.8 (8)	5.7 (13)	5.0 (11)	6.5 (14)
Suitable for Smart Line Module	Type	6SL3130-6AE15-0AA0 6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0	6SL3130-6AE21-0AA0 6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0	6SL3130-6TE21-6AB0	6SL3130-6TE23-6AB0

# SINAMICS S120

## Line Modules and line-side components

### Smart Line Modules in booksize format Recommended line-side components

#### Overview

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

Suitable line-side power components are assigned depending on the power rating of the Smart Line Module.

The tables below list recommended components.

Further information about the main contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1, LV 1T and ET B1. <sup>1)</sup>

Rated infeed power kW (HP)	Assignment to Smart Line Module Type 6SL3...	Main contactor Type	Circuit-breaker Order No.	Main switch Order No.	Fuse switch disconnecter Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>					
5 (5)	130-6AE15-0AA0 130-6AE15-0AB0 131-6AE15-0AA0	<b>3RT1023-...</b>	<b>3RV1031-4BA10</b>	<b>3LD2003-0TK51</b>	<b>3NP4010-0CH01</b>
10 (10)	130-6AE21-0AA0 130-6AE21-0AB0 131-6AE21-0AA0	<b>3RT1026-...</b>	<b>3RV1031-4FA10</b>	<b>3LD2203-0TK51</b>	<b>3NP4010-0CH01</b>
16 (18)	130-6AE21-6AB0	<b>3RT1035-...</b>	<b>3RV1031-4FA10</b>	<b>3LD2504-0TK51</b>	<b>3NP4010-0CH01</b>
36 (40)	130-6AE23-6AB0	<b>3RT1045-...</b>	<b>3RV1041-4LA10</b>	<b>3LD2704-0TK51</b>	<b>3NP4010-0CH01</b>

Rated infeed power kW (HP)	Assignment to Smart Line Module Type 6SL3...	Switch disconnecter with fuse holders Order No.	NH fuse (gL/gG) Order No.		
				Rated current A	Size
<b>Line voltage 380 V to 480 V 3 AC</b>					
5 (5)	130-6AE15-0AA0 130-6AE15-0AB0 131-6AE15-0AA0	<b>3KL5030-1EB01</b>	<b>3NA3805</b>	16	000
10 (10)	130-6AE21-0AA0 130-6AE21-0AB0 131-6AE21-0AA0	<b>3KL5030-1EB01</b>	<b>3NA3814</b>	35	000
16 (18)	130-6AE21-6AB0	<b>3KL5030-1EB01</b>	<b>3NA3814</b>	35	000
36 (40)	130-6AE23-6AB0	<b>3KL5230-1EB01</b>	<b>3NA3824</b>	80	000

1) Component selections are per IEC standards and not necessarily in accordance with UL or NEC requirements. For NEMA components please see North American Industrial Products Catalog and Speedfax Catalog.



#### Overview



The self-commutated feed/feedback units (with IGBTs in infeed and regenerative feedback 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. Active Line Modules are designed for connection to grounded-neutral (TN, TT) and non-grounded (IT) supply systems.

The DC link is pre-charged via integrated precharging resistors.

#### Design

The Active Line Modules in booksize format feature the following interfaces as standard:

- 1 power connection via screw-type terminals
- 1 connection for the 24 V DC electronics power supply via the 24 V terminal adapter included in the scope of supply
- 1 DC link connection via integrated DC link busbars
- 3 DRIVE-CLiQ sockets
- 2 PE (protective earth) connections

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

On the 100 mm (3.94 in) wide Active Line Module, the shield for the power supply cable can be connected to the integrated shield connection plate via a shield connection terminal or tube clip, e.g., Weidmüller type KLBÜ CO 4. The shield connection terminal must not be used for strain relief. Shield connection kits are available for the 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in) wide modules.

The signal cable shield can be connected to the Line Module by means of a shield connection terminal, e.g. Weidmüller type KLBÜ 3-8 SC.

The scope of supply of the Active Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit for drive control on the immediate left
- DRIVE-CLiQ cable (length depends on module width) to connect Active Line Module to adjacent Motor Module
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21 for digital inputs

# SINAMICS S120

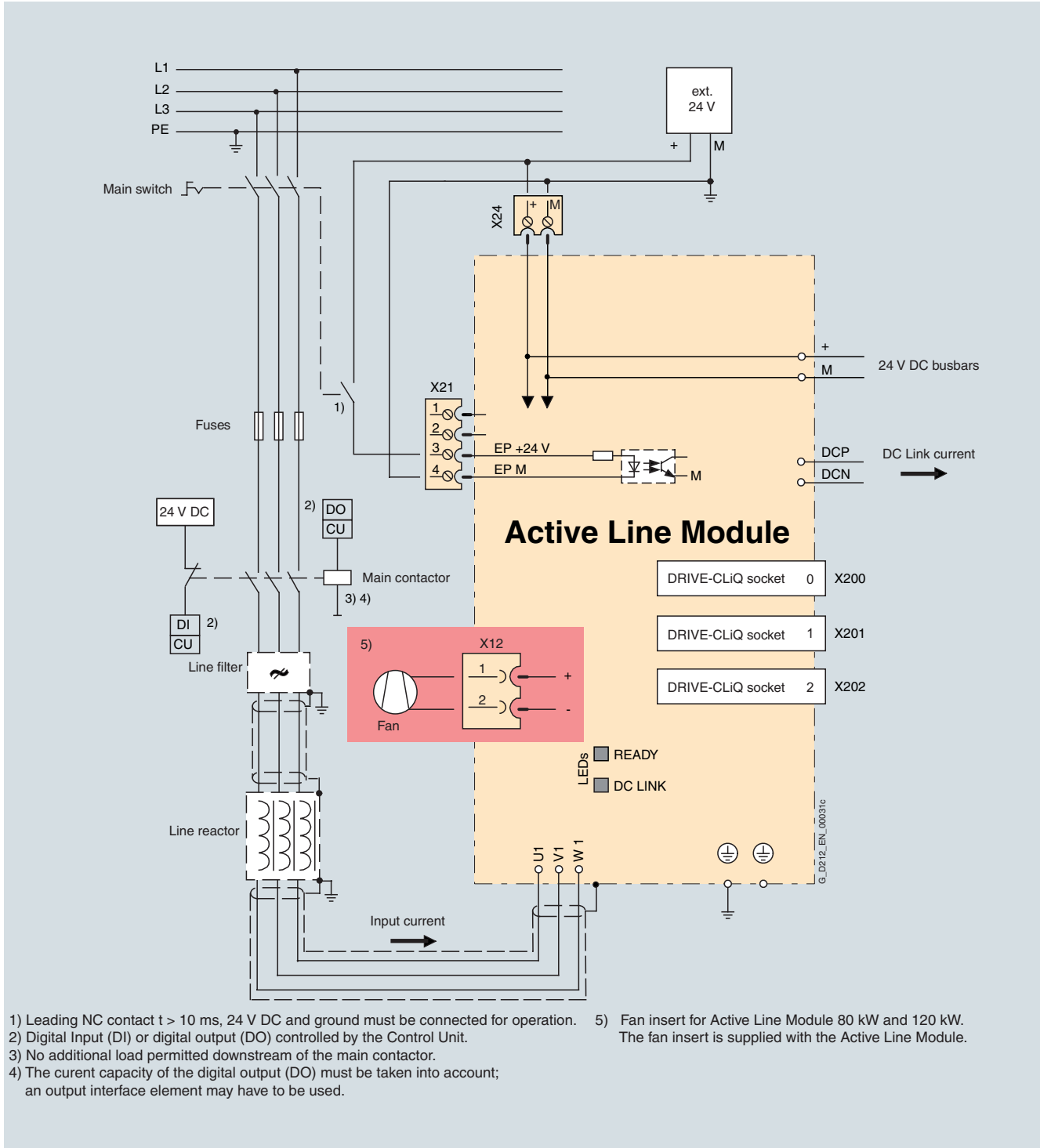
## Line Modules and line-side components

### Active Line Modules in booksize format

#### Integration

The Active Line Module communicates with the CU 320 Control Unit via DRIVE-CLiQ and receives its control information via this route.

2



Connection example of Active Line Module in booksize format

#### Technical data

##### General technical data

Electrical data	
Line connection voltage (up to 2000 m (6563 ft) above sea level)	380 V to 480 V 3 AC $\pm 10\%$ (– 15% < 1 min)
Power frequency	47 Hz to 63 Hz
Power factor	
• Active mode	
- Fundamental Power Factor	1.0 (factory setting), can be altered by input of a reactive current setpoint
- Total ( $\lambda$ )	1.0 (factory setting)
• Smart mode	
- Fundamental mode	> 0.96
- Overall	0.65 to 0.90
Overtoltage category	Class III to EN 60664-1
DC link voltage $V_d$	In "Active Mode" the DC link voltage is regulated and can be adjusted as a voltage decoupled from the line voltage. In "Smart Mode" the DC link voltage is regulated in proportion to the line voltage to the mean rectified line voltage value. Factory setting for DC link voltage: 380 V to 400 V 3 AC: 600 V (Active Mode) 400 V to 415 V 3 AC: 625 V (Active Mode) 416 V to 480 V 3 AC: 1.35 x line voltage (Smart Mode)
Electronics power supply	24 V DC – 15%/+ 20%
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Class A1 to EN 55011 and Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	Forced air cooling through a built-in fan
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 °C to + 40 °C (32° F to +104 °F) without derating, > 40°C to + 55 °C (> 104 °F to +131 °F) see derating characteristics
Site altitude	Up to 1000 m (1328 ft) above sea level without derating, > 1000 m (1328 ft) to 4000 m (13126 ft) above sea level see derating characteristics
Certificates	
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus (File No.: E192450)

# SINAMICS S120

## Line Modules and line-side components

### Active Line Modules in booksize format

#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC		Active Line Modules in booksize format				
Internal air cooling		6SL3130-7TE21-6AA1	6SL3130-7TE23-6AA1	6SL3130-7TE25-5AA2	6SL3130-7TE28-0AA1	6SL3130-7TE31-2AA1
Internal air cooling with varnished modules		6SL3130-7TE21-6AB0	6SL3130-7TE23-6AB0	6SL3130-7TE25-5AB0	6SL3130-7TE28-0AB0	6SL3130-7TE31-2AB0
External air cooling		6SL3131-7TE21-6AA0	6SL3131-7TE23-6AA0	6SL3131-7TE25-5AA0	6SL3131-7TE28-0AA0	6SL3131-7TE31-2AA0
Rated feed/feedback power $P_{rated}$ with 380 V 3 AC with 460 V 3 AC <sup>3)</sup>	kW (HP)	16 (18)	36 (40)	55 (60)	80 (100)	120 (150)
I/RF power for S6 duty (40%) $P_{S6}$	kW	21	47	71	106	158
Max. I/RF power $P_{max}$	kW	35	70	91	131	175
DC link current at 600 V DC	A	27	60	92	134	200
DC link current for S6 duty (40%)	A	35	79	121	176	244
Max. DC link current	A	59	117	152	218	292
Rated input current with 380 V 3 AC	A	26	58	88	128	192
Input current for S6 duty (40%)	A	35	79	121	176	244
Max. input current	A	59	117	152	195	292
Max. current requirement 24 V DC electronics power supply	A	1.1	1.5	1.9	2.0	2.5
24 V DC busbar current capacity	A	20	20	20	20	20
DC link capacitance	μF	710	1410	1880	2820	3995
Max. DC link capacitance of drive group	μF	20000	20000	20000	20000	20000
DC link busbar current capacity	A	100	100	200	200	200
Efficiency $\eta$		0.98	0.98	0.98	0.98	0.98
Power loss <sup>1)</sup> with internal air cooling	kW	0.26	0.63	0.90	1.35	2.20
Power loss <sup>1)</sup> with external air cooling int./ext.	kW	0.06/0.2	0.135/0.495	0.2/0.7	0.305/1.045	0.49/1.71
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.016 (0.565)	0.031 (1.095)	0.044 (1.554)	0.144 (5.085)	0.144 (5.085)
Sound pressure level	dB(A)	< 60	< 65	< 60	< 75	< 75
Power connection U1, V1, W1		Screw-type terminals 2.5 mm <sup>2</sup> to 10 mm <sup>2</sup> (X1)	M6 screw studs for ring terminal ends 2.5 mm <sup>2</sup> to 50 mm <sup>2</sup> (X1)	M8 screw studs for ring terminal ends 2.5 mm <sup>2</sup> to 95 mm <sup>2</sup> , 2 x 35 mm <sup>2</sup> (X1)	M8 screw studs for ring terminal ends 2.5 mm <sup>2</sup> to 120 mm <sup>2</sup> , 2 x 50 mm <sup>2</sup> (X1)	M8 screw studs for ring terminal ends 2.5 mm <sup>2</sup> to 120 mm <sup>2</sup> , 2 x 50 mm <sup>2</sup> (X1)
Shield connection		Integrated into the connector	see Accessories	see Accessories	see Accessories	see Accessories
PE connection		On housing with M5 screw	On housing with M6 screw	On housing with M6 screw	On housing with M8 screw	On housing with M8 screw
Max. cable length (total of all motor power cables and DC link)	m (ft)	350 (1150) shielded 560 (1840) unshielded	350 (1150) shielded 560 (1840) unshielded	350 (1150) shielded 560 (1840) unshielded	350 (1150) shielded 560 (1840) unshielded	350 (1150) shielded 560 (1840) unshielded
Degree of protection		IP20	IP20	IP20	IP20	IP20
Width	mm (inch)	100 (3.94)	150 (5.91)	200 (7.87)	300 (11.81)	300 (11.81)
Height	mm (inch)	380 (14.96)	380 (14.96)	380 (14.96)	380 (14.96) with fan <sup>2)</sup> : 629 (24.8)	380 (14.96) with fan <sup>2)</sup> : 629 (24.8)
Depth with internal air cooling	mm (inch)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)
Depth with external air cooling on/behind mounting surface	mm (inch)	226/66.5 (8.9/2.6)	226/71 (8.9/2.8)	226/92 (8.9/3.6)	226/82 (8.9/3.2)	226/82 (8.9/3.2)
Approx. weight with internal air cooling	kg (lb)	7 (15)	10.3 (23)	17 (38)	23 (51)	23 (51)
Approx. weight with external air cooling	kg (lb)	8.8 (19)	13.8 (30)	18.5 (41)	27.7 (61)	30.7 (68)

<sup>1)</sup> Power loss of Active Line Module at rated output without losses of 24 V DC electronics power supply.

<sup>2)</sup> The fan is supplied with the Active Line Module and must be installed before the Active Line Module is commissioned.

<sup>3)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

2

#### Selection and ordering data

Rated infeed power kW (HP)	Active Line Module in booksize format		
	Internal air cooling	Internal air cooling with varnished modules	External air cooling
	Order No.	Order No.	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>			
16 (18)	<b>6SL3130-7TE21-6AA1</b>	<b>6SL3130-7TE21-6AB0</b>	<b>6SL3131-7TE21-6AA0</b>
36 (40)	<b>6SL3130-7TE23-6AA1</b>	<b>6SL3130-7TE23-6AB0</b>	<b>6SL3131-7TE23-6AA0</b>
55 (60)	<b>6SL3130-7TE25-5AA2</b>	<b>6SL3130-7TE25-5AB0</b>	<b>6SL3131-7TE25-5AA0</b>
80 (100)	<b>6SL3130-7TE28-0AA1</b>	<b>6SL3130-7TE28-0AB0</b>	<b>6SL3131-7TE28-0AA0</b>
120 (150)	<b>6SL3130-7TE31-2AA1</b>	<b>6SL3130-7TE31-2AB0</b>	<b>6SL3131-7TE31-2AA0</b>

#### Accessories

Description	Order No.
<b>Shield connection kit</b> for Line/Motor Modules in booksize format <ul style="list-style-type: none"> <li>• 150 mm (5.91 in) wide for internal air cooling</li> <li>• 150 mm (5.91 in) wide for external air cooling</li> <li>• 200 mm (7.87 in) wide for internal air cooling</li> <li>• 200 mm (7.87 in) wide for external air cooling</li> <li>• 300 mm (11.81 in) wide</li> </ul>	<b>6SL3162-1AF00-0AA1</b> <b>6SL3162-1AF00-0BA0</b> <b>6SL3162-1AH01-0AA0</b> <b>6SL3162-1AH01-0BA0</b> <b>6SL3162-1AH00-0AA0</b>
<b>DC link supply adapter</b> for direct infeed of DC link voltage <ul style="list-style-type: none"> <li>• Screw-type terminals 0.5 mm<sup>2</sup> to 10 mm<sup>2</sup> for Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)</li> <li>• Screw-type terminals 35 mm<sup>2</sup> to 95 mm<sup>2</sup> for Line Modules and Motor Modules in booksize format with a width of 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in)</li> </ul>	<b>6SL3162-2BD00-0AA0</b> <b>6SL3162-2BM00-0AA0</b>
<b>DC link adapters (2x)</b> for multi-tier configuration Screw-type terminals 35 mm <sup>2</sup> to 95 mm <sup>2</sup> for all Line Modules and Motor Modules in booksize format	<b>6SL3162-2BM01-0AA0</b>
<b>24 V terminal adapter</b> for all Line Modules and Motor Modules in booksize format	<b>6SL3162-2AA00-0AA0</b>
<b>24 V jumper</b> for connection of the 24 V busbars (for booksize format)	<b>6SL3162-2AA01-0AA0</b>
<b>Warning signs in foreign languages</b> This set of foreign language warning signs can be placed on top of the standard German or English signs. One sign in each of the following languages is provided in each set: Simplified Chinese, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Portuguese, Spanish and Swedish.	<b>6SL3166-3AB00-0AA0</b>

# SINAMICS S120

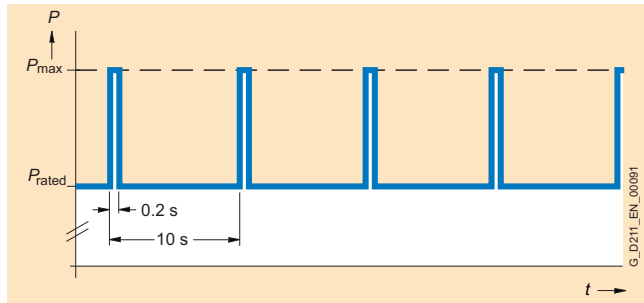
## Line Modules and line-side components

### Active Line Modules in booksize format

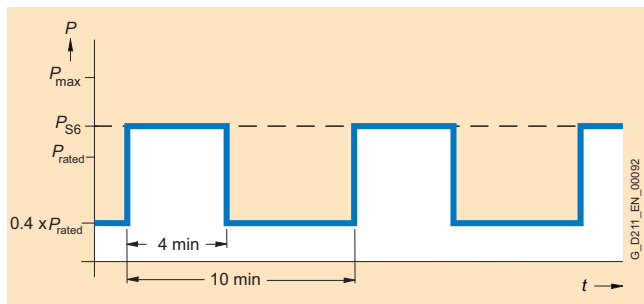
2

#### Characteristics

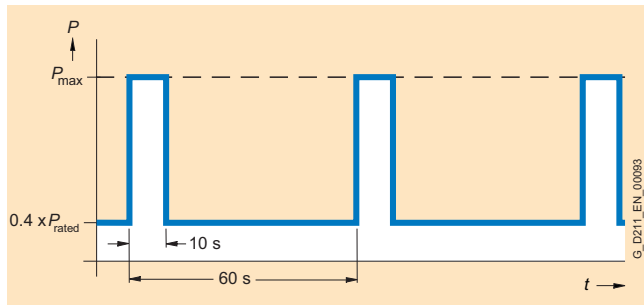
##### Overload capability



Load cycle with previous load

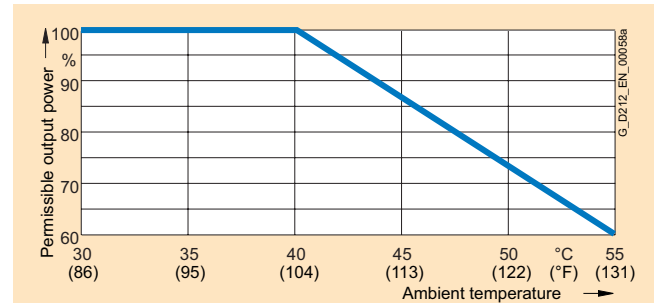


S6 load cycle with previous load

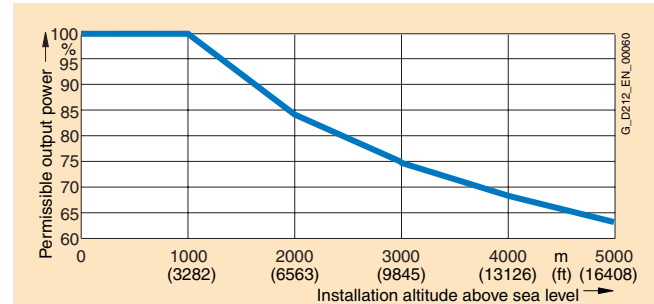


S6 load cycle with previous load

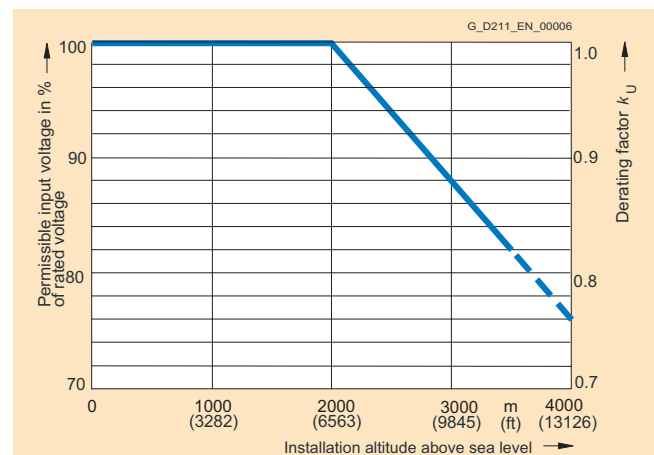
##### Derating characteristics



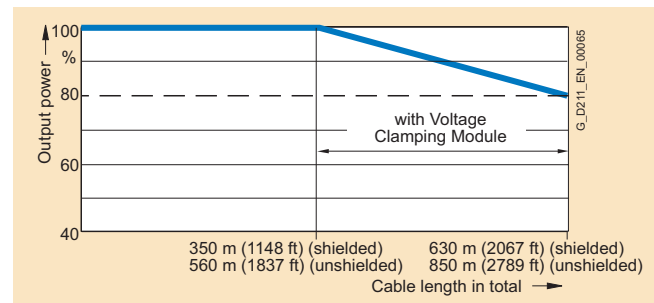
Output rating dependent on ambient temperature



Output rating dependent on installation altitude



Voltage derating dependent on installation altitude



Output rating dependent on total cable length

# SINAMICS S120

## Line Modules and line-side components

Active Line Modules in booksize format  
Line reactors

### Overview



Active Line Modules cannot operate without the specified line reactors. The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

### Selection and ordering data

Rated input power of the Active Line Module kW (HP)	Suitable for Active Line Module	Line reactor Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
16 (18)	6SL3130-7TE21-6AA1 6SL3130-7TE21-6AB0 6SL3131-7TE21-6AA0	<b>6SN1111-0AA00-0BA1</b>
36 (40)	6SL3130-7TE23-6AA1 6SL3130-7TE23-6AB0 6SL3131-7TE23-6AA0	<b>6SN1111-0AA00-0CA1</b>
55 (60)	6SL3130-7TE25-5AA2 6SL3130-7TE25-5AB0 6SL3131-7TE25-5AA0	<b>6SN1111-0AA00-0DA1</b>
80 (100)	6SL3130-7TE28-0AA1 6SL3130-7TE28-0AB0 6SL3131-7TE28-0AA0	<b>6SN1111-0AA00-1EA0</b>
120 (150)	6SL3130-7TE31-2AA1 6SL3130-7TE31-2AB0 6SL3131-7TE31-2AA0	<b>6SL3000-0DE31-2BA0</b>

### Technical data

Line voltage 380 V to 480 V 3 AC		Line reactor <b>6SN1111-0AA00-0BA1</b>	<b>6SN1111-0AA00-0CA1</b>	<b>6SN1111-0AA00-0DA1</b>	<b>6SN1111-0AA00-1EA0</b>	<b>6SL3000-0DE31-2BA0</b>
Rated current	A	30	67	103	150	225
Power loss	kW	0.17	0.25	0.35	0.45	0.59
Line/load connection 1U1, 1V1, 1W1 / 1U2, 1V2, 1W2		16 mm <sup>2</sup> screw-type terminals	35 mm <sup>2</sup> screw-type terminals	70 mm <sup>2</sup> screw-type terminals	M10 connecting lugs	M10 connecting lugs
PE connection		16 mm <sup>2</sup> screw-type terminals	35 mm <sup>2</sup> screw-type terminals	70 mm <sup>2</sup> screw-type terminals	M10 connecting lugs	M10 connecting lugs
Degree of protection		IP20	IP20	IP20	IP00	IP00
Width	mm (inch)	150 (5.91)	150 (5.91)	150 (5.91)	225 (8.86)	225 (8.86)
Height	mm (inch)	330 (12.99)	330 (12.99)	330 (12.99)	380 (14.96)	490 (19.29)
Depth	mm (inch)	145 (5.71)	230 (9.05)	280 (11.02)	220 (8.66)	250 (9.84)
Weight, approx.	kg (lb)	8.5 (19)	13 (29)	18 (40)	40 (88)	64 (141)
Suitable for Active Line Module	Type	6SL3130-7TE21-6AA1 6SL3130-7TE21-6AB0 6SL3131-7TE21-6AA0	6SL3130-7TE23-6AA1 6SL3130-7TE23-6AB0 6SL3131-7TE23-6AA0	6SL3130-7TE25-5AA2 6SL3130-7TE25-5AB0 6SL3131-7TE25-5AA0	6SL3130-7TE28-0AA1 6SL3130-7TE28-0AB0 6SL3131-7TE28-0AA0	6SL3130-7TE31-2AA1 6SL3130-7TE31-2AB0 6SL3131-7TE31-2AA0



# SINAMICS S120

## Line Modules and line-side components

### Active Line Modules in booksize format Line filters

#### Overview

In plants which have strict EMC requirements, line filters work together with line reactors to restrict the conducted interference emanating from the Power Modules to the limit values of Class A1 as defined in EN 55011 and Category C2 as defined in EN 61800-3. Line filters are suited only for direct connection to TN (grounded) systems.

Optional line filter ranges that are coordinated with the power range are available for the SINAMICS S120 drive system:

- Wideband Line Filters
- Basic Line Filters

These line filters differ with regard to the frequency range in which they reduce the conducted emissions.

Note: According to product standard IEC 61800-3 or EN 50370-1, RI suppression commensurate with the relevant operating conditions must be provided and is a legal requirement in the EU (EMC Directive). Line filters and line reactors are required for this purpose. The use of filters of other makes can lead to limit value violations, resonance, overvoltages and irreparable damage to motors or other equipment. The machine manufacturer must provide verification that the machinery to be operated with the drive products and the installed suppression elements, e.g. line filters, are CE/EMC-compliant before the machines are approved for delivery.

### Active Line Modules in booksize format Wideband Line Filters (in line filter package)

#### Overview



The damping characteristics of Wideband Line Filters for Active Line Modules not only conform with the requirements of EMC standards for the frequency range of 150 kHz to 30 MHz but also include low frequencies of 2 kHz and above. As a result, these line filters have an extended functional range, allowing a certain independence with respect to the machine installation location in cases where the line properties are generally unknown (e.g., line impedance).

#### Selection and ordering data

Line filters for Active Line Modules in booksize format are available only in combination with the relevant line reactor as a line filter package. The order number for the line filter package includes the Wideband Line Filter and the line reactor.

Rated input power of the Active Line Module kW (HP)	Suitable for Active Line Module	Line filter package (Wideband Line Filter and line reactor) Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
16 (18)	6SL3130-7TE21-6AA1 6SL3130-7TE21-6AB0 6SL3131-7TE21-6AA0	<b>6SL3000-0FE21-6AA0</b>
36 (40)	6SL3130-7TE23-6AA1 6SL3130-7TE23-6AB0 6SL3131-7TE23-6AA0	<b>6SL3000-0FE23-6AA0</b>
55 (60)	6SL3130-7TE25-5AA2 6SL3130-7TE25-5AB0 6SL3131-7TE25-5AA0	<b>6SL3000-0FE25-5AA0</b>
80 (100)	6SL3130-7TE28-0AA1 6SL3130-7TE28-0AB0 6SL3131-7TE28-0AA0	<b>6SL3000-0FE28-0AA0</b>
120 (150)	6SL3130-7TE31-2AA1 6SL3130-7TE31-2AB0 6SL3131-7TE31-2AA0	<b>6SL3000-0FE31-2AA1</b>

# SINAMICS S120

## Line Modules and line-side components

Active Line Modules in booksize format  
Wideband Line Filters (in line filter package)

### Technical data

Line voltage 380 V to 480 V 3 AC	Wideband Line Filter (included in each line filter package)					
		6SL3000-0FE21-6AA0	6SL3000-0FE23-6AA0	6SL3000-0FE25-5AA0	6SL3000-0FE28-0AA0	6SL3000-0FE31-2AA1
Rated current	A	30	67	103	150	225
Power loss	kW	0.07	0.09	0.11	0.15	0.20
Line/load connection L1, L2, L3 / U, V, W		10 mm <sup>2</sup> screw-type terminals	50 mm <sup>2</sup> screw-type terminals	50 mm <sup>2</sup> screw-type terminals	95 mm <sup>2</sup> screw-type terminals	M10 connecting lugs
PE connection		On housing with M5 bolt	On housing with M8 bolt	On housing with M8 bolt	On housing with M8 bolt	On housing with M8 bolt
Degree of protection		IP20	IP20	IP20	IP20	IP00
Width	mm (inch)	130 (5.12)	130 (5.12)	130 (5.12)	200 (7.87)	300 (11.81)
Height	mm (inch)	480 (18.9)	480 (18.9)	480 (18.9)	480 (18.9)	480 (18.9)
Depth	mm (inch)	150 (5.91)	245 (9.65)	260 (10.24)	260 (10.24)	260 (10.24)
Weight, approx.	kg (lb)	9 (20)	16 (35)	19 (42)	22 (49)	32 (71)
Suitable for Active Line Module	Type	6SL3130-7TE21-6AA1 6SL3130-7TE21-6AB0 6SL3131-7TE21-6AA0	6SL3130-7TE23-6AA1 6SL3130-7TE23-6AB0 6SL3131-7TE23-6AA0	6SL3130-7TE25-5AA2 6SL3130-7TE25-5AB0 6SL3131-7TE25-5AA0	6SL3130-7TE28-0AA1 6SL3130-7TE28-0AB0 6SL3131-7TE28-0AA0	6SL3130-7TE31-2AA1 6SL3130-7TE31-2AB0 6SL3131-7TE31-2AA0

### Accessories



Line filter package assembled with an adapter set

The adapter sets for units in booksize format are designed for very compact mounting. They enable line filters and line reactors to be installed compactly one above the other in the control cabinet.

Active Line Module power output kW (HP)	Line filter package	Adapter set Order No.
16 (18)	6SL3000-0FE21-6AA0	<b>6SL3060-1FE21-6AA0</b>
36 (40)	6SL3000-0FE23-6AA0	<b>6SN1162-0GA00-0CA0</b>

# SINAMICS S120

## Line Modules and line-side components

### Active Line Modules in booksize format Basic Line Filters

#### Overview



Basic Line Filters are used on machines on which conducted interference emissions in the frequency range between 150 kHz and 30 MHz need to be damped in accordance with the requirements of CE-EMC legislation.

#### Selection and ordering data

Rated input power of the Active Line Module kW (HP)	Suitable for Active Line Module	Basic Line Filter Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
16 (18)	6SL3130-7TE21-6AA1 6SL3130-7TE21-6AB0 6SL3131-7TE21-6AA0	<b>6SL3000-0BE21-6DA0</b>
36 (40)	6SL3130-7TE23-6AA1 6SL3130-7TE23-6AB0 6SL3131-7TE23-6AA0	<b>6SL3000-0BE23-6DA0</b>
55 (60)	6SL3130-7TE25-5AA2 6SL3130-7TE25-5AB0 6SL3131-7TE25-5AA0	<b>6SL3000-0BE25-5DA0</b>

#### Further information

You must follow the instructions in the Equipment Manual when using Basic Line Filters in conjunction with Active Line Modules on your machine: SINAMICS S120 booksize power units.

#### Technical data

Line voltage 380 V to 480 V 3 AC	Basic Line Filters			
		6SL3000-0BE21-6DA0	6SL3000-0BE23-6DA0	6SL3000-0BE25-5DA0
Rated current	A	36	65	105
Power loss	kW	0.006	0.010	0.015
Line/load connection L1, L2, L3 / U, V, W		10 mm <sup>2</sup> screw-type terminals	35 mm <sup>2</sup> screw-type terminals	50 mm <sup>2</sup> screw-type terminals
PE connection		On housing with M6 bolt	On housing with M6 bolt	On housing with M8 bolt
Degree of protection		IP20	IP20	IP20
Width	mm (inch)	50 (1.97)	75 (2.95)	100 (3.94)
Height	mm (inch)	420 (16.54)	420 (16.54)	420 (16.54)
Depth	mm (inch)	226 (8.9)	226 (8.9)	226 (8.9)
Weight, approx.	kg (lb)	5 (11)	6.5 (14)	11.5 (25)
Suitable for Active Line Module	Type	6SL3130-7TE21-6AA1 6SL3130-7TE21-6AB0 6SL3131-7TE21-6AA0	6SL3130-7TE23-6AA1 6SL3130-7TE23-6AB0 6SL3131-7TE23-6AA0	6SL3130-7TE25-5AA2 6SL3130-7TE25-5AB0 6SL3131-7TE25-5AA0

# SINAMICS S120

## Line Modules and line-side components

Active Line Modules in booksize format  
Recommended line-side components

### Overview

#### Assignment of line-side power components to Active Line Modules in booksize format

Suitable line-side power components are assigned depending on the power rating of the Active Line Modules.

The tables below list recommended components.

Further information about the main contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1 and LV 1T.<sup>1)</sup>

Rated infeed power kW (HP)	Assignment to Active Line Module Type 6SL3...	Main contactor Type	Output interface for main contactor (relay coupler) Order No.	Main switch (switch disconnector) Order No.	Leading auxiliary circuit switch for main switch Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>					
16 (18)	130-7TE21-6AA1 130-7TE21-6AB0 131-7TE21-6AA0	3RT1035-...	3TX7004-1LB00	3LD2504-0TK51	3LD9200-5B
36 (40)	130-7TE23-6AA1 130-7TE23-6AB0 131-7TE23-6AA0	3RT1045-...	3TX7004-1LB00	3LD2704-0TK51	3LD9200-5B
55 (60)	130-7TE25-5AA2 130-7TE25-5AB0 131-7TE25-5AA0	3RT1054-...	3TX7004-1LB00	3KA5330-1EE01	3KX3552-3EA01
80 (100)	130-7TE28-0AA1 130-7TE28-0AB0 131-7TE28-0AA0	3RT1056-...	3TX7004-1LB00	3KA5330-1EE01	3KX3552-3EA01
120 (150)	130-7TE31-2AA1 130-7TE31-2AB0 131-7TE31-2AA0	3RT1065-...	3TX7004-1LB00	3KA5730-1EE01	3KX3552-3EA01
Rated infeed power kW (HP)	Assignment to Active Line Module Type 6SL3...	Circuit-breaker Order No.	Fuse switch disconnector Order No.	Switch disconnector with fuse holders Order No.	Leading auxiliary switch for switch disconnector with fuse holders Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>					
16 (18)	130-7TE21-6AA1 130-7TE21-6AB0 131-7TE21-6AA0	3RV1031-4FA10	3NP4010-0CH01	3KL5030-1EB01	3KX3552-3EA01
36 (40)	130-7TE23-6AA1 130-7TE23-6AB0 131-7TE23-6AA0	3RV1041-4LA10	3NP4010-0CH01	3KL5230-1EB01	3KX3552-3EA01
55 (60)	130-7TE25-5AA2 130-7TE25-5AB0 131-7TE25-5AA0	3VL2712-3DC33-0AA0	3NP4270-0CA01	3KL5530-1EB01	3KX3552-3EA01
80 (100)	130-7TE28-0AA1 130-7TE28-0AB0 131-7TE28-0AA0	3VL2716-3DC33-0AA0	3NP4270-0CA01	3KL5530-1EB01	3KX3552-3EA01
120 (150)	130-7TE31-2AA1 130-7TE31-2AB0 131-7TE31-2AA0	3VL3725-3DC36-0AA0	3NP5360-0CA00	3KL5730-1EB01	3KX3552-3EA01

1) Component selections are per IEC standards and not necessarily in accordance with UL or NEC requirements. For NEMA components please see North American Industrial Products Catalog and Speedfax Catalog.

# SINAMICS S120

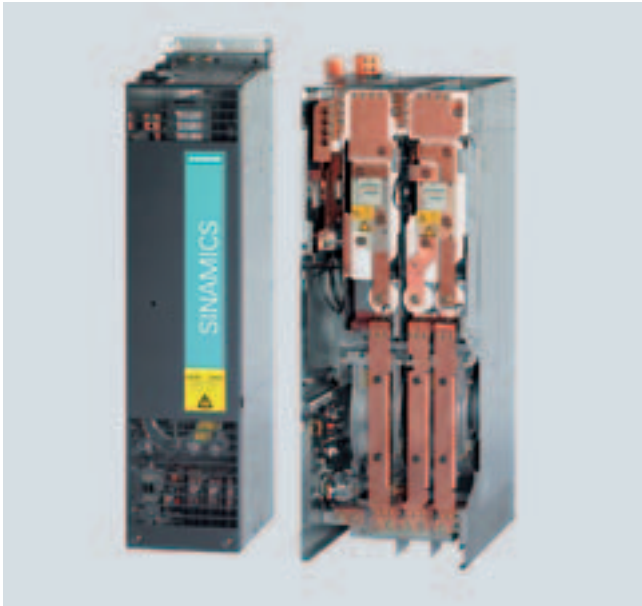
## Line Modules and line-side components

### Active Line Modules in booksize format Recommended line-side components

#### Overview (continued)

Rated infeed power	Assignment to Active Line Module	NEOZED fuse (gL/gG)			DIAZED fuse (gL/gG)			NH fuse (gL/gG)			UL/CSA fuse, Class J Available from: Ferraz Shawmut <a href="http://www.ferrazshawmut.com">http://www.ferrazshawmut.com</a>		
		Order No.	Rated current	Size	Order No.	Rated current	Size	Order No.	Rated current	Size	Reference No.	Rated current	Size
kW (HP)	Type 6SL3...												
<b>Line voltage 380 V to 480 V 3 AC</b>													
16 (18)	130-7TE21-6AA1 130-7TE21-6AB0 131-7TE21-6AA0	<b>5SE2335</b>	35 A	D02	<b>5SB411</b>	35 A	DIII	<b>3NA3814</b>	35 A	000	AJT35	35 A	27 × 60
36 (40)	130-7TE23-6AA1 130-7TE23-6AB0 131-7TE23-6AA0	–	–	–	<b>5SC211</b>	80 A	DIVH	<b>3NA3824</b>	80 A	000	AJT80	80 A	29 × 117
55 (60)	130-7TE25-5AA2 130-7TE25-5AB0 131-7TE25-5AA0	–	–	–	–	–	–	<b>3NA3132</b>	125 A	1	AJT125	125 A	41 × 146
80 (100)	130-7TE28-0AA1 130-7TE28-0AB0 131-7TE28-0AA0	–	–	–	–	–	–	<b>3NA3136</b>	160 A	1	AJT175	175 A	41 × 146
120 (150)	130-7TE31-2AA1 130-7TE31-2AB0 131-7TE31-2AA0	–	–	–	–	–	–	<b>3NA3144</b>	250 A	1	AJT250	250 A	54 × 181

#### Overview



The self-commutated feed/feedback units (with IGBTs in infeed and regenerative feedback 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-neutral (TN, TT) and non-grounded (IT) supply systems.

#### Design

The Active Line Modules in chassis format feature the following interfaces as standard:

- 1 power connection
- 1 connection for the 24 V DC electronics power supply
- 1 DC link connection
- 3 DRIVE-CLiQ sockets
- 2 PE (protective earth) 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:

- Types FX and GX:
  - 0.60 m (1.97 ft) DRIVE-CLiQ cable for connection to the CU320 or SIMOTION D Control Unit
- Types HX and JX
  - 0.35 m (1.15 ft) DRIVE-CLiQ cable for connection to the CU320 or SIMOTION D Control Unit
  - 2.10 m (6.89 ft) DRIVE-CLiQ cable for connection to the first Motor Module

#### Selection and ordering data

Infeed power kW (HP)	Active Line Modules in chassis format Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>	
132 (200)	<b>6SL3330-7TE32-1AA0</b>
160 (225)	<b>6SL3330-7TE32-6AA0</b>
235 (350)	<b>6SL3330-7TE33-8AA0</b>
300 (450)	<b>6SL3330-7TE35-0AA0</b>
380 (550)	<b>6SL3330-7TE36-1AA0</b>
500 (700)	<b>6SL3330-7TE38-4AA0</b>
630 (800)	<b>6SL3330-7TE41-0AA0</b>
900 (1150)	<b>6SL3330-7TE41-4AA0</b>
<b>Line voltage 660 V to 690 V 3 AC</b>	
560	<b>6SL3330-7TH35-8AA0</b>
800	<b>6SL3330-7TH37-4AA0</b>
1100	<b>6SL3330-7TH41-0AA0</b>
1400	<b>6SL3330-7TH41-3AA0</b>

#### Warning signs in foreign languages

Warning signs in other languages can be placed on top of the standard warning signs in German or English.

The following signs are supplied with chassis format units: Chinese, Danish, Finnish, French, Greek, Italian, Japanese, Korean, Dutch, Polish, Portuguese, Russian, Swedish, Spanish, Czech and Turkish.

# SINAMICS S120

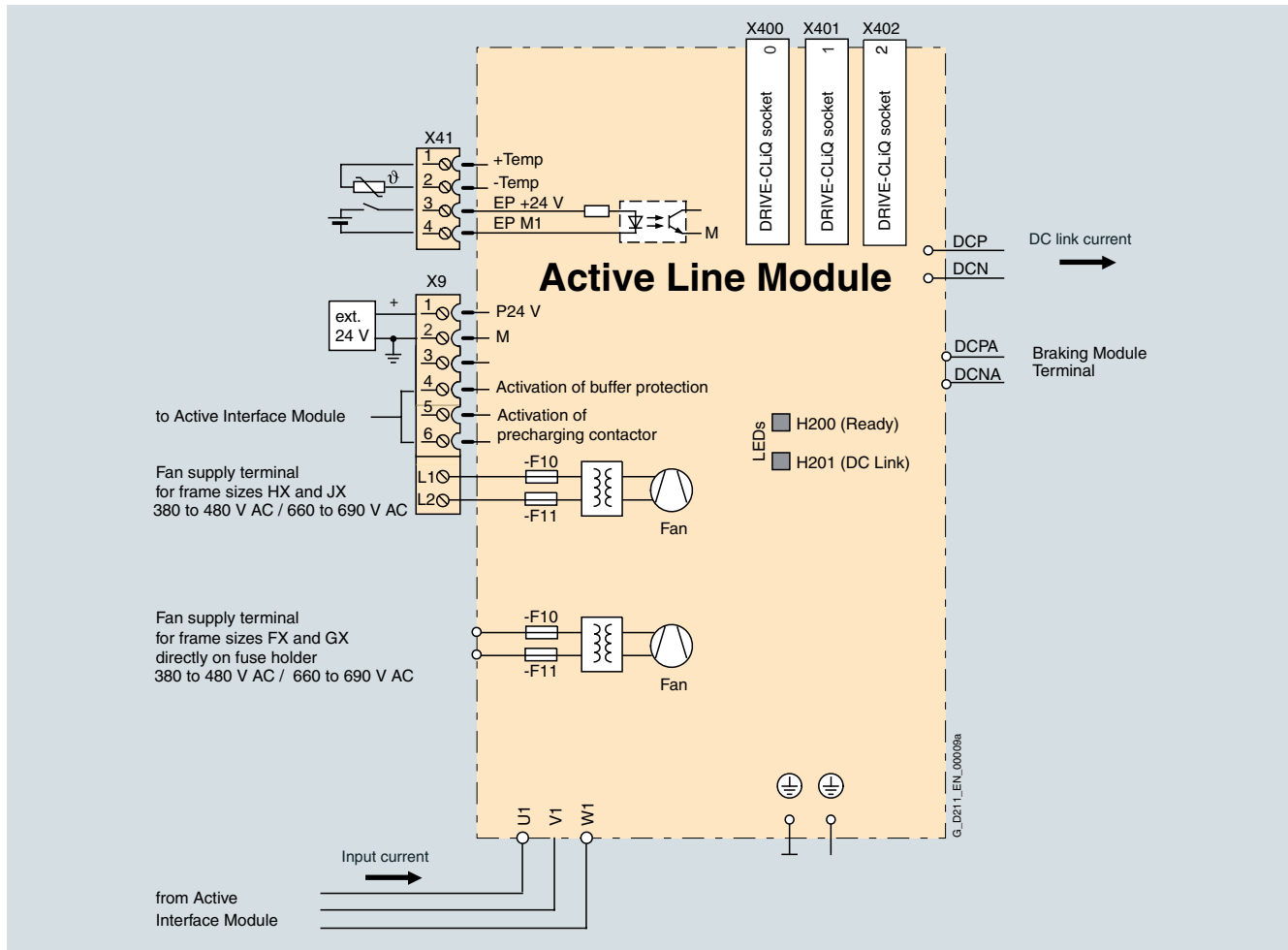
## Line Modules and line-side components

### Active Line Modules in chassis format

#### Integration

The Active Line Module communicates with the CU320 or SIMOTION D Control Unit via DRIVE-CLiQ.

2



Connection example of Active Line Module in chassis format



#### Technical data

##### General technical data

Electrical data	
Line connection voltage (up to 2000 m (6563 ft) above sea level)	380 V to 480 V 3 AC ± 10% (– 15% < 1 min) or 660 V to 690 V 3 AC ± 10% (– 15% < 1 min)
Power frequency	47 Hz to 63 Hz
Power factor	
• Fundamental Power Factor	1.0 (factory setting), can be altered by input of a reactive current setpoint
• Total ( $\lambda$ )	1.0 (factory setting)
Overvoltage category	Class III to EN 60664-1
DC link voltage $U_d$	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 x line voltage
Electronics power supply	24 V DC – 15%/+ 20%
Radio interference suppression	
• Standard (with Active Interface Module)	Category C3 to EN 61800-3
• With line filter (and Active Interface Module)	Class A1 to EN 55011 and Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	Forced air cooling through a built-in fan
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 °C to + 40 °C (32 °F to +104 °F) without derating, > 40 °C to + 55 °C (> 104 °F to +131 °F) see derating characteristics
Installation altitude	Up to 2000 m (6563 ft) above sea level without derating, > 2000 m (6563 ft) to 4000 m (13126 ft) above sea level see derating characteristics
Certificates	
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus (File No.: E192450)

# SINAMICS S120

## Line Modules and line-side components

### Active Line Modules in chassis format

#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC		Active Line Modules in chassis format			
		6SL3330-7TE32-1AA0	6SL3330-7TE32-6AA0	6SL3330-7TE33-8AA0	6SL3330-7TE35-0AA0
Feed/feedback power $P_{\text{rated}}$ with 400 V 3 AC with 460 V 3 AC <sup>1)</sup>	kW (HP)	<b>132</b> <b>(200)</b>	<b>160</b> <b>(225)</b>	<b>235</b> <b>(350)</b>	<b>300</b> <b>(450)</b>
Feed/feedback power for S6 duty (40%) $P_{\text{S6}}$	kW	On request	On request	On request	On request
Max. I/RF power $P_{\text{max}}$	kW	198	240	352.5	450
Rated DC link current $I_{\text{rated\_DC}}$	A	235	291	425	549
DC link current $I_{\text{H\_DC}}$	A	209	259	378	489
Max. DC link current $I_{\text{max\_DC}}$	A	352	436	637	823
Input current for 3 AC 400 V	A	210	260	380	490
Input current for S6 duty (40%)	A	On request	On request	On request	On request
Max. input current	A	315	390	570	735
Max. current requirement 24 V DC electronics power supply	A	1.1	1.1	1.35	1.35
DC link capacitance	μF	4200	5200	7800	9600
Max. current requirements (fan supply) at 400 V 2 AC	A	0.63	2.0	2.6	2.6
Efficiency $\eta$		0.98	0.98	0.98	0.98
Power loss	kW	2.2	2.7	3.9	4.8
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.17 (6)	0.23 (8.12)	0.36 (12.71)	0.36 (12.71)
Sound pressure level <sup>2)</sup> 50 Hz/60 Hz	dB(A)	74/76	75/77	76/78	76/78
Power connection U1, V1, W1		Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>
DC link connection DCP, DCN		Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 × 185 mm <sup>2</sup>
PE connection		On housing with M10 screw, max. cross section PE1/GND 1 × 185 mm <sup>2</sup> PE2/GND 2 × 185 mm <sup>2</sup>	On housing with M10 screw, max. cross section PE1/GND 1 × 185 mm <sup>2</sup> PE2/GND 2 × 185 mm <sup>2</sup>	On housing with M10 screw, max. cross section PE1/GND 1 × 185 mm <sup>2</sup> PE2/GND 2 × 185 mm <sup>2</sup>	On housing with M10 screw, max. cross section PE1/GND 1 × 185 mm <sup>2</sup> PE2/GND 2 × 185 mm <sup>2</sup>
Max. cable length (total of all motor cables and DC link)	m (ft)	1000 (1328)	1000 (1328)	1000 (1328)	1000 (1328)
Degree of protection		IP20	IP20	IP20	IP20
Width	mm (inch)	326 (12.83)	326 (12.83)	326 (12.83)	326 (12.83)
Height	mm (inch)	1400 (55.12)	1400 (55.12)	1533 (60.35)	1533 (60.35)
Depth	mm (inch)	356 (14.02)	356 (14.02)	543 (21.38)	543 (21.38)
Size		FX	FX	GX	GX
Weight, approx.	kg (lb)	88 (194)	88 (194)	152 (335)	152 (335)

<sup>1)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

<sup>2)</sup> Total sound pressure level of Active Interface Module and Active Line Module.

#### Technical data (continued)

<b>Line voltage</b> <b>380 V to 480 V 3 AC</b>		<b>Active Line Modules in chassis format</b>			
		<b>6SL3330-7TE36-1AA0</b>	<b>6SL3330-7TE38-4AA0</b>	<b>6SL3330-7TE41-0AA0</b>	<b>6SL3330-7TE41-4AA0</b>
Feed/feedback power $P_{\text{rated}}$ with 400 V 3 AC with 460 V 3 AC <sup>1)</sup>	kW (HP)	<b>380 (550)</b>	<b>500 (700)</b>	<b>630 (800)</b>	<b>900 (1150)</b>
Feed/feedback power for S6 duty (40%) $P_{\text{S6}}$	kW	On request	On request	On request	On request
Max. I/RF power $P_{\text{max}}$	kW	570	750	945	1350
Rated DC link current $I_{\text{rated\_DC}}$	A	678	940	1103	1574
DC link current $I_{\text{H\_DC}}$	A	603	837	982	1401
Max. DC link current $I_{\text{max\_DC}}$	A	1017	1410	1654	2361
Input current for 3 AC 400 V	A	605	840	985	1405
Input current for S6 duty (40%)	A	On request	On request	On request	On request
Max. input current	A	907	1260	1477	2107
Max. current requirement 24 V DC electronics power supply	A	1.4	1.4	1.5	1.7
DC link capacitance	μF	12600	16800	18900	28800
Max. current requirements (fan supply) at 400 V 2 AC	A	5.2	5.2	7.8	7.8
Efficiency $\eta$		0.98	0.98	0.98	0.98
Power loss	kW	6.2	7.7	10.1	13.3
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.78 (27.55)	0.78 (27.55)	1.08 (38.14)	1.08 (38.14)
Sound pressure level <sup>2)</sup> 50 Hz/60 Hz	dB(A)	78/80	78/80	78/80	78/80
Power connection U1, V1, W1		Flange connection with M12 screw, max. cross section 4 × 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 4 × 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 6 × 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 6 × 240 mm <sup>2</sup>
DC link connection DCP, DCN		Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection
PE connection		On housing with M12 screw, max. cross section PE1/GND 1 × 240 mm <sup>2</sup> PE2/GND 2 × 240 mm <sup>2</sup>	On housing with M12 screw, max. cross section PE1/GND 1 × 240 mm <sup>2</sup> PE2/GND 2 × 240 mm <sup>2</sup>	On housing with M12 screw, max. cross section PE1/GND 1 × 240 mm <sup>2</sup> PE2/GND 2 × 240 mm <sup>2</sup>	On housing with M12 screw, max. cross section PE1/GND 1 × 240 mm <sup>2</sup> PE2/GND 2 × 240 mm <sup>2</sup>
Max. cable length (total of all motor cables and DC link)	m (ft)	1500 (4921)	1500 (4921)	1500 (4921)	1500 (4921)
Degree of protection		IP00	IP00	IP00	IP00
Width	mm (inch)	503 (19.8)	503 (19.8)	704 (27.72)	704 (27.72)
Height	mm (inch)	1475 (58.07)	1475 (58.07)	1475 (58.07)	1475 (58.07)
Depth	mm (inch)	540 (21.26)	540 (21.26)	540 (21.26)	540 (21.26)
Size		HX	HX	JX	JX
Weight, approx.	kg (lb)	290 (640)	290 (640)	450 (992)	450 (992)

<sup>1)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

<sup>2)</sup> Total sound pressure level of Active Interface Module and Active Line Module.

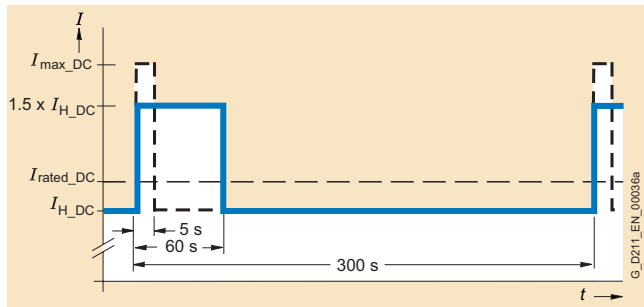
#### Technical data (continued)

Line voltage 660 V to 690 V 3 AC		Active Line Modules in chassis format			
		6SL3330-7TH35-8AA0	6SL3330-7TH37-4AA0	6SL3330-7TH41-0AA0	6SL3330-7TH41-3AA0
Feed/feedback power $P_{\text{rated}}$ with 690 V 3 AC	kW	560	800	1100	1400
Feed/feedback power for S6 duty (40%) $P_{\text{S6}}$	kW	On request	On request	On request	On request
Max. I/RF power $P_{\text{max}}$	kW	840	1200	1650	2100
Rated DC link current $I_{\text{rated\_DC}}$	A	644	823	1148	1422
DC link current $I_{\text{H\_DC}}$	A	573	732	1022	1266
Max. DC link current $I_{\text{max\_DC}}$	A	966	1234	1722	2133
Input current for 3 AC 690 V	A	575	735	1025	1270
Input current for S6 duty (40%)	A	On request	On request	On request	On request
Max. input current	A	862	1102	1537	1905
Max. current requirement 24 V DC electronics power supply	A	1.4	1.5	1.7	1.7
DC link capacitance	$\mu\text{F}$	7400	11100	14400	19200
Max. current requirements (fan supply) at 690 V 2 AC	A	3	4.5	4.5	4.5
Efficiency $\eta$		0.98	0.98	0.98	0.988
Power loss	kW	6.8	10.2	13.6	16.5
Cooling air requirement	$\text{m}^3/\text{s}$ ( $\text{ft}^3/\text{s}$ )	0.78 (27.55)	1.1 (38.85)	1.1 (38.85)	1.1 (38.85)
Sound pressure level <sup>1)</sup> 50 Hz/60 Hz	$\text{dB(A)}$	78/80	78/80	78/80	78/80
Power connection U1, V1, W1		Flange connection with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section $6 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section $6 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section $6 \times 240 \text{ mm}^2$
DC link connection DCP, DCN		Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection
PE connection		On housing with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$	On housing with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$	On housing with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$	On housing with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$
Max. cable length (total of all motor cables and DC link)	m (ft)	1500 (4921)	1500 (4921)	1500 (4921)	1500 (4921)
Degree of protection		IP00	IP00	IP00	IP00
Width	mm (inch)	503 (19.8)	704 (27.72)	704 (27.72)	704 (27.72)
Height	mm (inch)	1475 (58.07)	1475 (58.07)	1475 (58.07)	1475 (58.07)
Depth	mm (inch)	540 (21.26)	540 (21.26)	540 (21.26)	540 (21.26)
Size		HX	JX	JX	JX
Weight, approx.	kg (lb)	290 (640)	450 (992)	450 (992)	450 (992)

<sup>1)</sup> Total sound pressure level of Active Interface Module and Active Line Module.

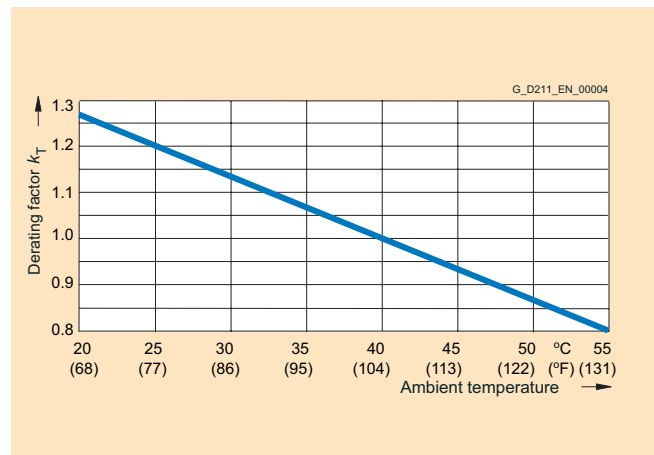
#### Characteristics

##### Overload capability



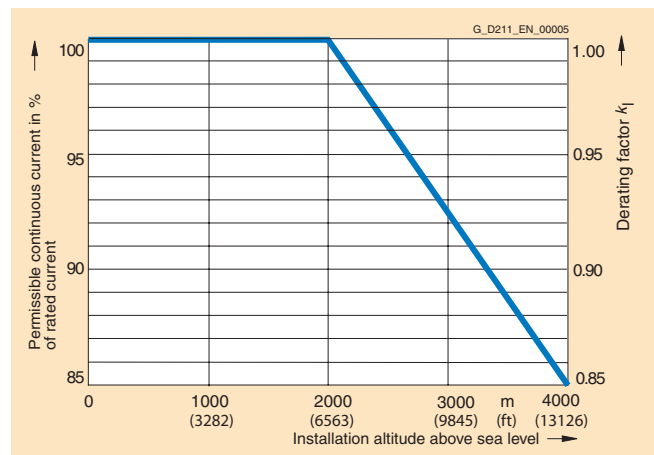
High overload

##### Derating characteristics

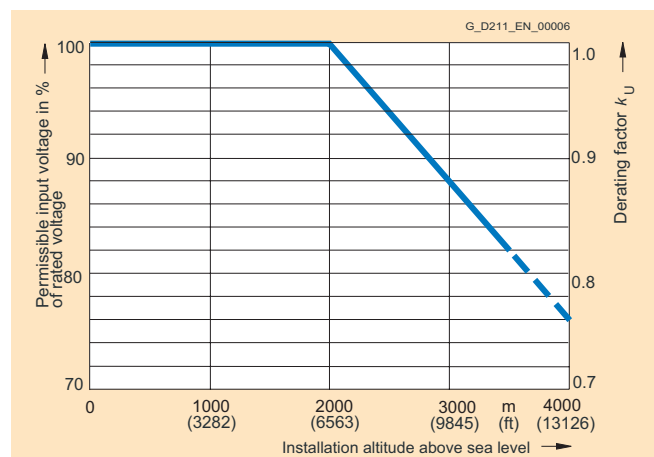


Current derating dependent on ambient temperature

**Note:** A derating factor  $k_T$  1.0 is only possible in connection with the "current derating depending on the installation altitude". See also System description.



Current derating dependent on installation altitude



Voltage derating dependent on installation altitude

# SINAMICS S120

## Line Modules and line-side components

### Active Interface Modules

#### Overview



Active Interface Modules are used in combination with Active Line Modules in chassis format. Active Interface Modules contain a clean power filter with basic RI suppression, the pre-charging circuit for the Active Line Module, the line voltage sensing circuit and monitoring sensors. The bypass contactor is an integral component in types FI and GI, thereby making the module very compact. The bypass contactor must be provided separately for types HI and JI.

The vast majority of line harmonics are suppressed by the clean power filter.

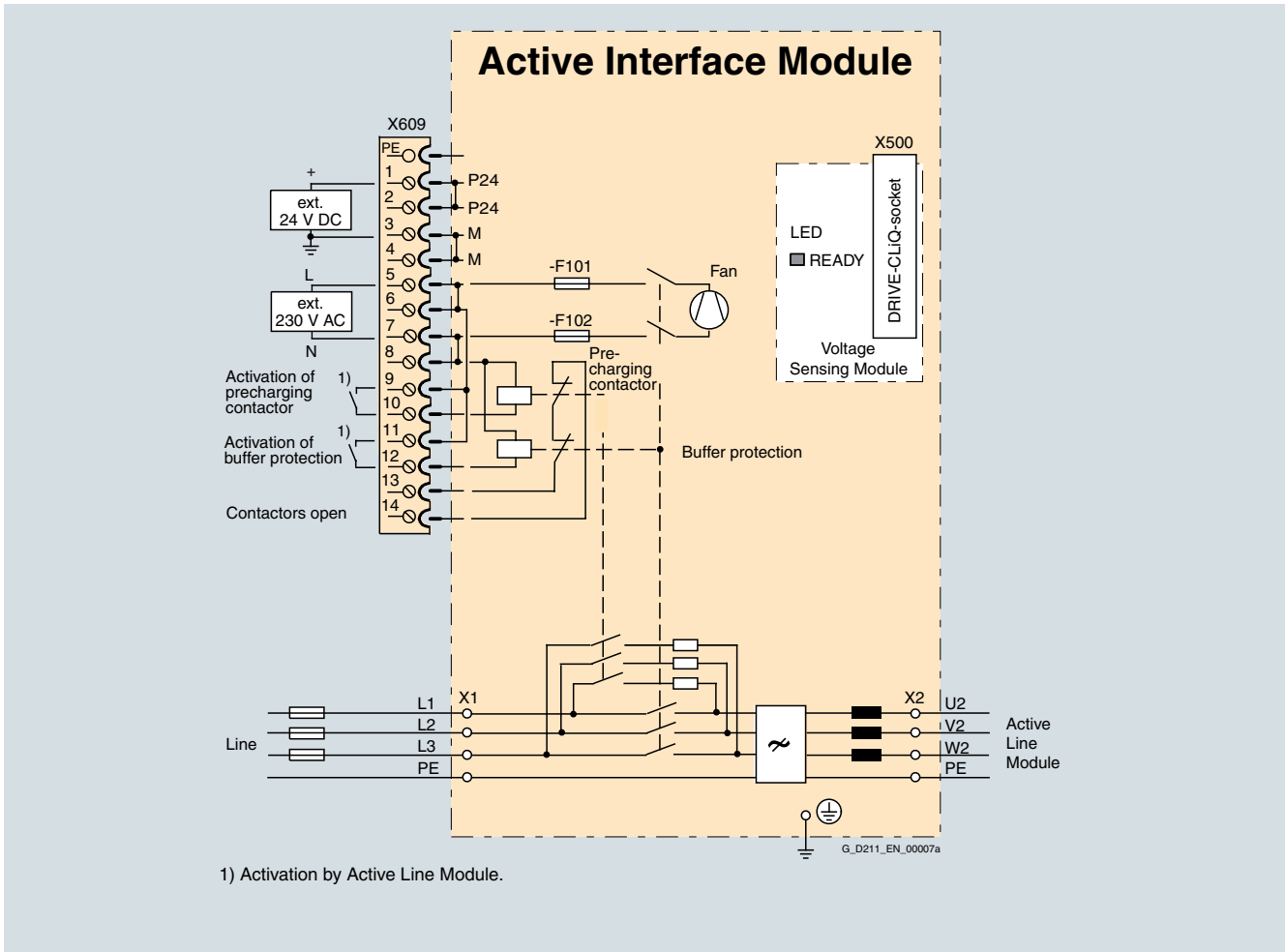
The scope of supply of the Active Interface Modules includes:

- Type FI:
  - 0.60 m (1.97 ft) DRIVE-CLiQ cable for connection between Active Interface Module and Active Line Module
  - 1.45 m (4.76 ft) DRIVE-CLiQ cable for connection between the CU320 or SIMOTION D Control Unit and first Motor Module.
- Type GI:
  - 0.95 m (3.12 ft) DRIVE-CLiQ cable for connection between Active Interface Module and Active Line Module
  - 1.45 m (4.76 ft) DRIVE-CLiQ cable for connection between the CU320 or SIMOTION D Control Unit and first Motor Module.
- Types HI and JI:
  - 2.40 m (7.88 ft) DRIVE-CLiQ cable for connection between Active Interface Module and Active Line Module

#### Selection and ordering data

Active Line Module infeed power kW (HP)	Suitable for Active Line Module	Active Interface Module Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>		
132 (200)	6SL3330-7TE32-1AA0	<b>6SL3300-7TE32-6AA0</b>
160 (225)	6SL3330-7TE32-6AA0	<b>6SL3300-7TE32-6AA0</b>
235 (350)	6SL3330-7TE33-8AA0	<b>6SL3300-7TE33-8AA0</b>
300 (450)	6SL3330-7TE35-0AA0	<b>6SL3300-7TE35-0AA0</b>
380 (550)	6SL3330-7TE36-1AA0	<b>6SL3300-7TE38-4AA0</b>
500 (700)	6SL3330-7TE38-4AA0	<b>6SL3300-7TE38-4AA0</b>
630 (800)	6SL3330-7TE41-0AA0	<b>6SL3300-7TE41-4AA0</b>
900 (1150)	6SL3330-7TE41-4AA0	<b>6SL3300-7TE41-4AA0</b>
<b>Line voltage 660 V to 690 V 3 AC</b>		
560	6SL3330-7TH35-8AA0	<b>6SL3300-7TH35-8AA0</b>
800	6SL3330-7TH37-4AA0	<b>6SL3300-7TH37-4AA0</b>
1100	6SL3330-7TH41-0AA0	<b>6SL3300-7TH41-3AA0</b>
1400	6SL3330-7TH41-3AA0	<b>6SL3300-7TH41-3AA0</b>

#### Integration



Connection example of Active Interface Module with integrated bypass contactor (types FI and GI)



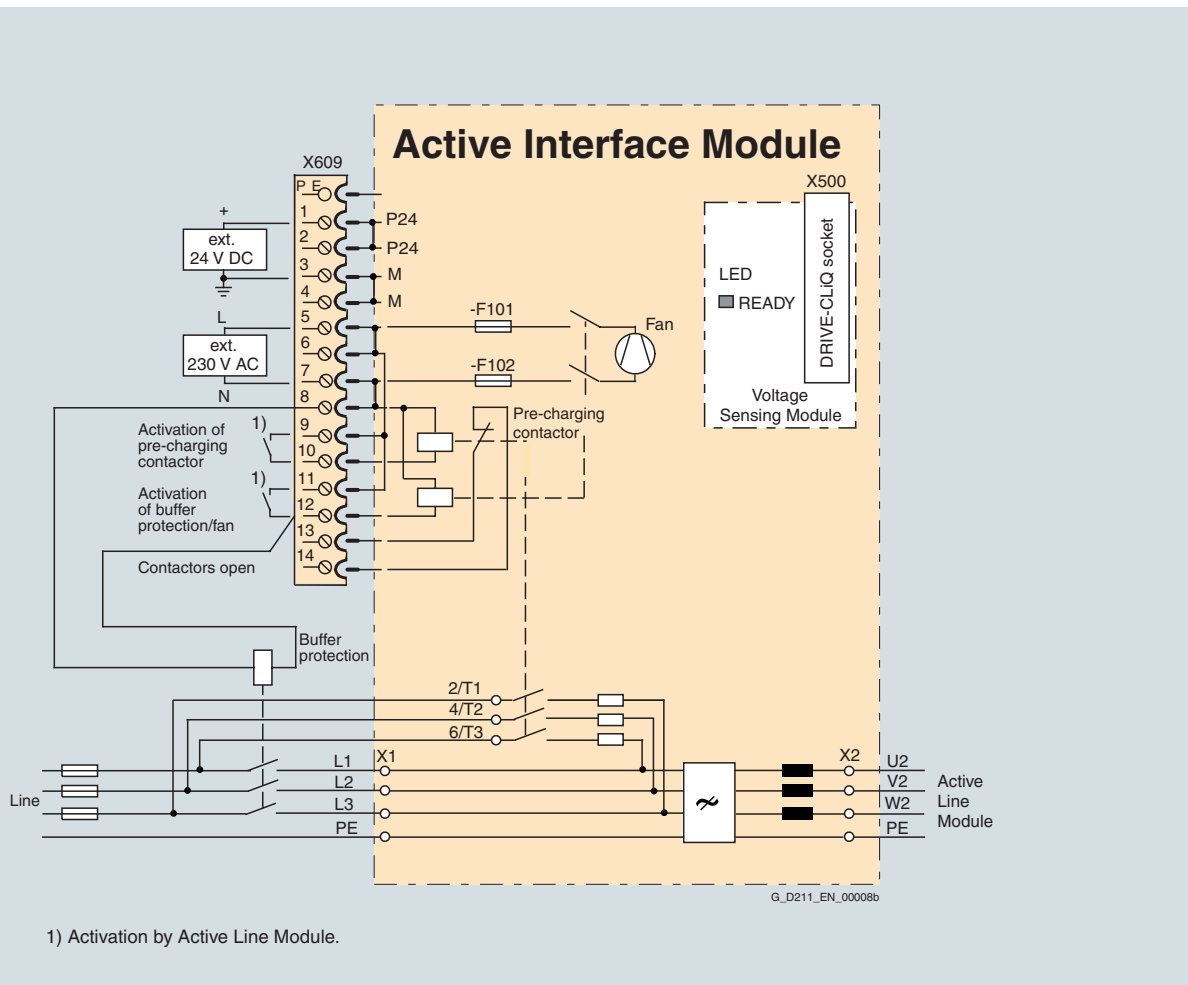
# SINAMICS S120

## Line Modules and line-side components

### Active Interface Modules

Integration (continued)

2



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

#### Technical data

Line voltage 380 V to 480 V 3 AC		Active Interface Modules in chassis format			
		6SL3300-7TE32-6AA0		6SL3300-7TE33-8AA0	6SL3300-7TE35-0AA0
Rated current	A	210	260	380	490
Bypass contactor		included	included	included	included
Max. DC link capacitance of drive group					
• at 400 V/50 Hz	μF	31200	31200	57600	57600
• at 480 V/60 Hz	μF	20800	20800	38400	38400
Max. current requirement 24 V DC electronics power supply	A	0.17	0.17	0.17	0.17
Max. current requirement 230 V AC	A	0.6	0.6	1.2	1.2
Power loss	kW	2.1	2.2	3.0	3.9
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.24 (8.48)	0.24 (8.48)	0.47 (16.6)	0.47 (16.6)
Sound pressure level <sup>1)</sup> 50 Hz/60 Hz	dB(A)	74/76	75/77	76/78	76/78
Line/load connection L1, L2, L3 / U2, V2, W2		Flange connection with M10 screws	Flange connection with M10 screws	Flange connection with M10 screws	Flange connection with M10 screws
Max. conductor cross section		2 × 185 mm <sup>2</sup> per connection	2 × 185 mm <sup>2</sup> per connection	2 × 185 mm <sup>2</sup> per connection	2 × 185 mm <sup>2</sup> per connection
PE connection		M10 screw	M10 screw	M10 screw	M10 screw
Max. conductor cross section		2 × 185 mm <sup>2</sup>	2 × 185 mm <sup>2</sup>	2 × 185 mm <sup>2</sup>	2 × 185 mm <sup>2</sup>
Degree of protection		IP20	IP20	IP20	IP20
Width	mm (inch)	325 (12.8)	325 (12.8)	325 (12.8)	325 (12.8)
Height	mm (inch)	1400 (55.12)	1400 (55.12)	1533 (60.35)	1533 (60.35)
Depth	mm (inch)	355 (13.98)	355 (13.98)	544 (21.42)	544 (21.42)
Size		FI	FI	GI	GI
Weight, approx.	kg (lb)	135 (298)	135 (298)	190 (419)	190 (419)
Suitable for Active Line Module	Type	6SL3330-7TE32-1AA0	6SL3330-7TE32-6AA0	6SL3330-7TE33-8AA0	6SL3330-7TE35-0AA0
Active Line Module infeed power	kW (HP)	132 (200)	160 (225)	235 (350)	300 (450)

<sup>1)</sup> Total sound pressure level of Active Interface Module and Active Line Module.

# SINAMICS S120

## Line Modules and line-side components

### Active Interface Modules

#### Technical data (continued)

Line voltage 380 V to 480 V 3 AC		Active Interface Modules in chassis format			
		6SL3300-7TE38-4AA0	840	6SL3300-7TE41-4AA0	1405
Rated current	A	605	840	985	1405
Bypass contactor		3RT1476-6AP36	3WL1110-2BB34-4AN2-Z C22	3WL1112-2BB34-4AN2-Z C22	3WL2226-2BB34-4AN2-Z C22
Max. DC link capacitance of drive group					
• at 400 V/50 Hz	μF	100800	100800	172800	172800
• at 480 V/60 Hz	μF	67200	67200	115200	115200
Max. current requirement 24 V DC electronics power supply	A	0.17	0.17	0.17	0.17
Max. current requirement 230 V AC	A	4.6	4.6	4.9	4.9
Power loss	kW	5.5	6.1	7.5	8.5
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.4 (14.13)	0.4 (14.13)	0.4 (14.13)	0.4 (14.13)
Sound pressure level <sup>1)</sup> 50 Hz/60 Hz	dB(A)	78/80	78/80	78/80	78/80
Line/load connection L1, L2, L3 / U2, V2, W2		Flange connection with M12 screws	Flange connection with M12 screws	Flange connection with M12 screws	Flange connection with M12 screws
Max. conductor cross section		4 × 240 mm <sup>2</sup> per connection	4 × 240 mm <sup>2</sup> per connection	6 × 240 mm <sup>2</sup> per connection	6 × 240 mm <sup>2</sup> per connection
PE connection		M12 screw	M12 screw	M12 screw	M12 screw
Max. conductor cross section		2 × 240 mm <sup>2</sup>	2 × 240 mm <sup>2</sup>	4 × 240 mm <sup>2</sup>	4 × 240 mm <sup>2</sup>
Degree of protection		IP00	IP00	IP00	IP00
Width	mm (inch)	305 (12)	305 (12)	505 (19.88)	505 (19.88)
Height	mm (inch)	1750 (68.9)	1750 (68.9)	1750 (68.9)	1750 (68.9)
Depth	mm (inch)	545 (21.46)	545 (21.46)	545 (21.46)	545 (21.46)
Size		HI	HI	JI	JI
Weight, approx.	kg (lb)	390 (860)	390 (860)	620 (1367)	620 (1367)
Suitable for Active Line Module	Type	6SL3330-7TE36-1AA0	6SL3330-7TE38-4AA0	6SL3330-7TE41-0AA0	6SL3330-7TE41-4AA0
Active Line Module infeed power	kW (HP)	380 (550)	500 (700)	630 (800)	900 (1150)

<sup>1)</sup> Total sound pressure level of Active Interface Module and Active Line Module.

#### Technical data (continued)

Line voltage 660 V to 690 V 3 AC		Active Interface Modules in chassis format			
		6SL3300-7TH35-8AA0	6SL3300-7TH37-4AA0	6SL3300-7TH41-3AA0	
Rated current	A	575	735	1025	1270
Bypass contactor		3RT1476-6AP36	3WL1210-4BB34-4AN2 <sup>*)</sup>	3WL1212-4BB34-4AN2-Z C22	3WL1216-4BB34-4AN2-Z C22
Max. DC link capacitance of drive group	μF	29600	76800	76800	76800
Max. current requirement 24 V DC electronics power supply	A	0.17	0.17	0.17	0.17
Max. current requirement 230 V AC	A	4.6	4.9	4.9	4.9
Power loss	kW	6.8	9.0	9.6	9.6
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.4 (14.13)	0.4 (14.13)	0.4 (14.13)	0.4 (14.13)
Sound pressure level <sup>1)</sup> 50 Hz/60 Hz	dB(A)	78/80	78/80	78/80	78/80
Line/load connection L1, L2, L3 / U2, V2, W2		Flange connection with M12 screws	Flange connection with M12 screws	Flange connection with M12 screws	Flange connection with M12 screws
Max. conductor cross sec- tion		4 × 240 mm <sup>2</sup> per connection	6 × 240 mm <sup>2</sup> per connection	6 × 240 mm <sup>2</sup> per connection	6 × 240 mm <sup>2</sup> per connection
PE connection		M10 fixing screw	M10 fixing screw	M10 fixing screw	M10 fixing screw
Max. conductor cross sec- tion		2 × 240 mm <sup>2</sup>	4 × 240 mm <sup>2</sup>	4 × 240 mm <sup>2</sup>	4 × 240 mm <sup>2</sup>
Degree of protection		IP00	IP00	IP00	IP00
Width	mm (inch)	305 (12)	505 (19.88)	505 (19.88)	505 (19.88)
Height	mm (inch)	1750 (68.9)	1750 (68.9)	1750 (68.9)	1750 (68.9)
Depth	mm (inch)	545 (21.46)	545 (21.46)	545 (21.46)	545 (21.46)
Size		HI	JI	JI	JI
Weight, approx.	kg (lb)	390 (860)	620 (1367)	620 (1367)	620 (1367)
Suitable for Active Line Module	Type	6SL3330-7TH35-8AA0	6SL3330-7TH37-4AA0	6SL3330-7TH41-0AA0	6SL3330-7TH41-3AA0
Active Line Module infeed power	kW	560	800	1100	1400

<sup>1)</sup> Total sound pressure level of Active Interface Module and Active Line Module.

<sup>\*)</sup> Alternatively 3x 3RT1466-6AP36.

# SINAMICS S120

## Line Modules and line-side components

### Active Line Modules in chassis format Recommended line-side components

#### Overview

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

Suitable line-side power components are assigned depending on the power rating of the Active Line Modules.

The tables below list recommended components.

Further information about the main contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1, LV 1T and ET B1. <sup>1)</sup>

Infeed power	Input current	Assignment to Active Interface Module	Assignment to Active Line Module	Bypass contactor	Fixed-mounted circuit-breaker
kW (HP)	A	Typ 6SL3300-...	Type 6SL3330-...	Order No.	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>					
132 (200)	210	7TE32-6AA0	7TE32-1AA0	included in Active Interface Module	–
160 (225)	260	7TE32-6AA0	7TE32-6AA0	included in Active Interface Module	–
235 (350)	380	7TE33-8AA0	7TE33-8AA0	included in Active Interface Module	–
300 (450)	490	7TE35-0AA0	7TE35-0AA0	included in Active Interface Module	–
380 (550)	605	7TE38-4AA0	7TE36-1AA0	<b>3RT1476-6AP36</b>	–
500 (700)	840	7TE38-4AA0	7TE38-4AA0	<b>3WL1110-2BB34-4AN2</b>	<b>3WL1110-2BB34-4AN2-Z C22</b>
630 (800)	985	7TE41-4AA0	7TE41-0AA0	<b>3WL1112-2BB34-4AN2</b>	<b>3WL1112-2BB34-4AN2-Z C22</b>
900 (1150)	1405	7TE41-4AA0	7TE41-4AA0	<b>3WL1116-2BB34-4AN2</b>	<b>3WL1116-2BB34-4AN2-Z C22</b>
<b>Line voltage 660 V to 690 V 3 AC</b>					
560	575	7TH35-8AA0	7TH35-8AA0	<b>3RT1476-6AP36</b>	–
800	735	7TH37-4AA0	7TH37-4AA0	<b>3WL1210-4BB34-4AN2</b>	<b>3WL1210-4BB34-4AN2-Z C22</b>
1100	1025	7TH41-3AA0	7TH41-0AA0	<b>3WL1212-4BB34-4AN2</b>	<b>3WL1212-4BB34-4AN2-Z C22</b>
1400	1270	7TH41-3AA0	7TH41-3AA0	<b>3WL1216-4BB34-4AN2</b>	<b>3WL1216-4BB34-4AN2-Z C22</b>

Infeed power	Input current	Assignment to Active Interface Module	Switch disconnector without handle and shaft	Switch disconnector with handle and shaft	Cable protection fuse		Cable protection fuse incl. semiconductor protection	
			Order No.	Order No.	Order No.	Rated current	Order No.	Rated current
<b>Line voltage 380 V to 480 V 3 AC</b>								
132 (200)	210	7TE32-6AA0	<b>3KL5530-1AB01</b>	<b>3KL5530-1EB01</b>	<b>3NA3242</b>	224 A	<b>3NE1230-2</b>	315 A
160 (225)	260	7TE32-6AA0	<b>3KL5730-1AB01</b>	<b>3KL5730-1EB01</b>	<b>3NA3252</b>	315 A	<b>3NE1331-2</b>	350 A
235 (350)	380	7TE33-8AA0	<b>3KL5730-1AB01</b>	<b>3KL5730-1EB01</b>	<b>3NA3260</b>	400 A	<b>3NE1334-2</b>	500 A
300 (450)	490	7TE35-0AA0	<b>3KL6130-1AB02</b>	<b>3KL6130-1EB02</b>	<b>3NA3365</b>	500 A	<b>3NE1436-2</b>	630 A
380 (550)	605	7TE38-4AA0	<b>3KL6230-1AB02</b>	<b>3KL6230-1EB02</b>	<b>3NA3372</b>	630 A	<b>3NE1437-2</b>	710 A
500 (700)	840	7TE38-4AA0	–	–	<b>2 × 3NA3362</b>	2 × 425 A	<b>2 × 3NE1334-2</b>	2 × 500 A
630 (800)	985	7TE41-4AA0	–	–	<b>2 × 3NA3365</b>	2 × 500 A	<b>2 × 3NE1436-2</b>	2 × 630 A
900 (1150)	1405	7TE41-4AA0	–	–	<b>3 × 3NA3365</b>	3 × 500 A	<b>3 × 3NE1448-2</b>	2 × 850 A
<b>Line voltage 660 V to 690 V 3 AC</b>								
560	575	7TH35-8AA0	<b>3KL6130-1AB02</b>	<b>3KL6130-1EB02</b>	<b>2 × 3NA3352-6</b>	2 × 315 A	<b>3NE1447-2</b>	670 A
800	735	7TH37-4AA0	<b>3KL6230-1AB02</b>	<b>3KL6230-1EB02</b>	<b>2 × 3NA3360-6</b>	2 × 400 A	<b>3NE1448-2</b>	850 A
1100	1025	7TH41-3AA0	–	–	<b>3 × 3NA3354-6</b>	3 × 355 A	<b>2 × 3NE1436-2</b>	2 × 630 A
1400	1270	7TH41-3AA0	–	–	<b>3 × 3NA3365-6</b>	3 × 500 A	<b>2 × 3NE1438-2</b>	2 × 800 A

1) Component selections are per IEC standards and not necessarily in accordance with UL or NEC requirements. For NEMA components please see North American Industrial Products Catalog and Speedfax Catalog.

### Overview

A wide range of single-axis and two-axis Motor Modules with graded current/power ratings can be supplied:

- Single Motor Modules: Single-axis variant
  - Booksize format with rated output currents of 3 A to 200 A
  - Chassis format with rated output currents of 85 A to 1405 A
- Double Motor Modules: Two-axis variant
  - Booksize format with rated output currents of 3 A to 18 A

In principle, all Single and Double Motor Modules can be operated on Basic Line Modules, Smart Line Modules or Active Line Modules for the appropriate voltage range.

### Single Motor Modules in booksize format

### Design



The Single Motor Modules in booksize format feature the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 1 electronics power supply connection via integrated 24 V DC bars
- 3 DRIVE-CLiQ sockets
- 1 motor connection, plug-in (not included in scope of supply) or screw-stud depending on rated output current
- 1 safe standstill input (enable pulses)
- 1 safe motor brake control
- 1 temperature sensor input (KTY84-130 or PTC)
- 2 PE (protective earth) connections

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

The motor cable shield is inside the connector on 50 mm (1.97 in) and 100 mm (3.94 in) width modules. A shield connection kit can be supplied for 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in) wide modules. On these modules, the motor cable shield can be connected using a tube clip.

The signal cable shield can be connected to the Motor Module by means of a shield connection terminal, e.g. Weidmüller type KLBÜ 3-8 SC.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable (length depends on module width) to connect Motor Module to adjacent module
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- Connector X21
- Connector X11 for the motor brake connection (for Motor Modules with a rated output current of 45 A to 200 A)

# SINAMICS S120

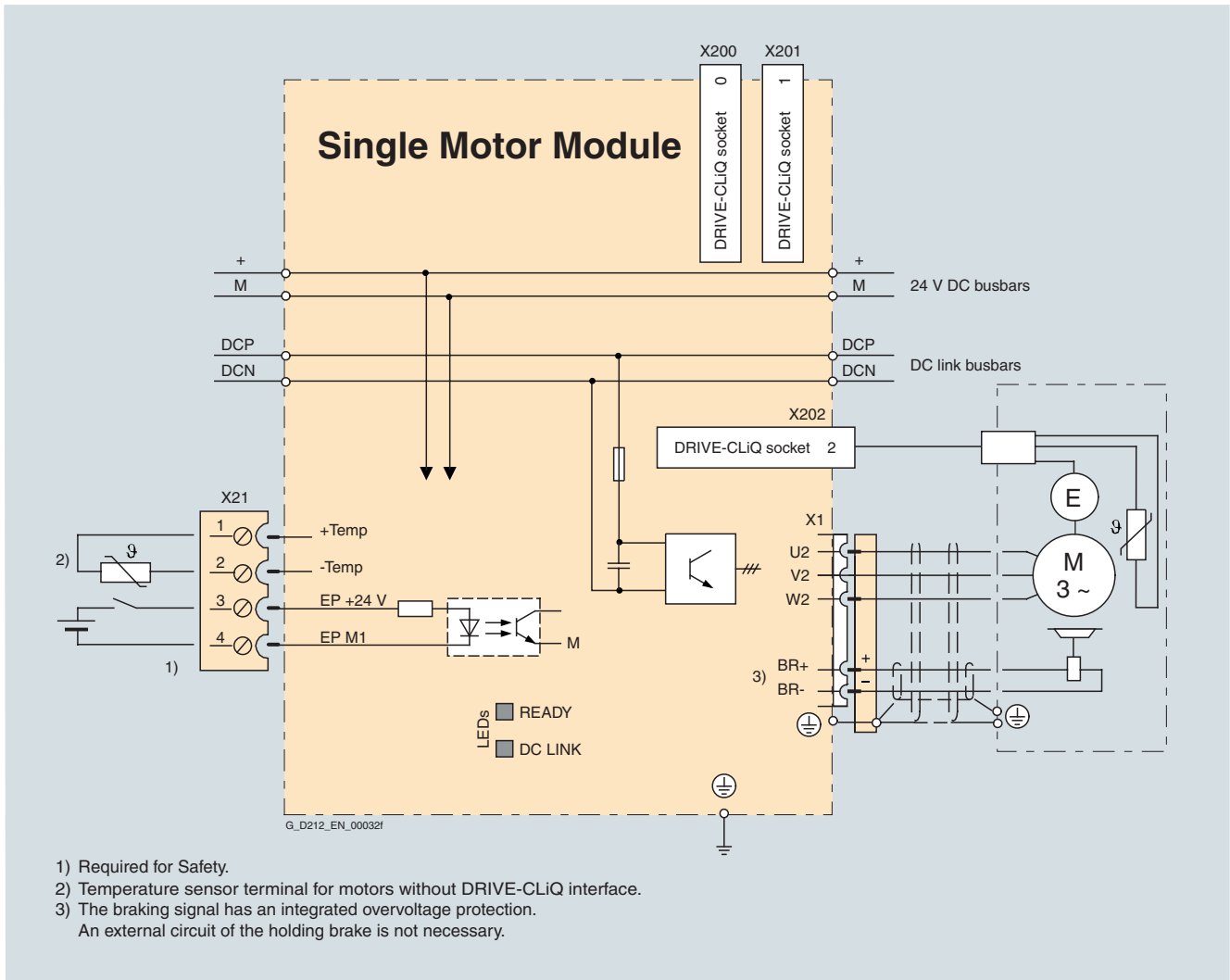
## Motor Modules

### Single Motor Modules in booksize format

#### Integration

Single Motor Modules communicate with the CU320 or SIMOTION D Control Unit via DRIVE-CLiQ.

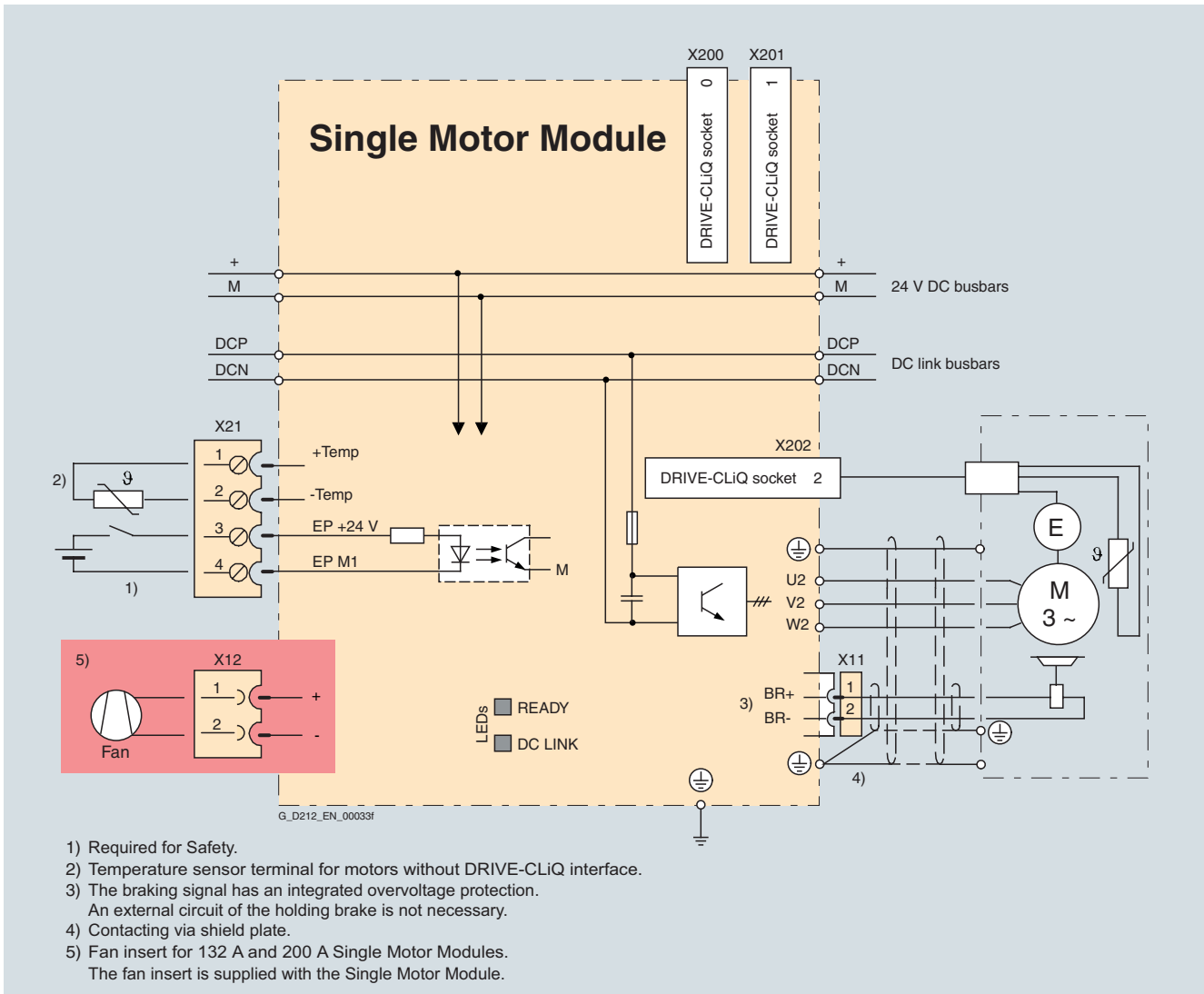
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Connection example of Single Motor Modules in booksize format 3 A to 30 A



### Integration (continued)



Connection example of Single Motor Modules in booksize format 45 A to 200 A

# SINAMICS S120

## Motor Modules

Single Motor Modules in booksize format

### Technical data

#### General technical data

Electrical data	
DC link voltage (up to 2000 m (6563 ft) above sea level)	510 V to 720 V DC (line voltage 380 V to 480 V 3 AC)
max. output voltage, line-to-line (fundamental-wave RMS value)	0.67 x DC link voltage
Output frequency	
• Control type Servo	0 Hz to 650 Hz <sup>1)</sup>
• Control type Vector	0 Hz to 300 Hz <sup>1)</sup>
• Control type V/f	0 Hz to 300 Hz <sup>1)</sup>
Electronics power supply	24 V DC – 15%/+ 20%
Radio interference suppression	
• Standard	No radio interference suppression
• in combination with Line Module incl. line filter and line reactor	Class A1 to EN 55011 and Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	Forced air cooling through built-in fan
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 °C to + 40 °C (32 °F to + 104 °F) without derating, > 40 °C to + 55 °C (> 104 °F to + 131 °F) see derating characteristics
Site altitude	Up to 1000 m (1328 ft) above sea level without derating, > 1000 m (1328 ft) to 4000 m (13126 ft) above sea level see derating characteristics
Certificates	
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus (File No.: E192450)
Certification	Safety Integrity Level 2 (SIL 2) to IEC 61508, control category 3 to EN 954-1 for Safety Integrated – safe standstill (STO = Safe Torque Off) and safe brake control (SBC = Safe Brake Control)

<sup>1)</sup> Note correlation between max. output frequency, pulse frequency and current derating, see System Description.

#### Technical data (continued)

DC link voltage 510 V to 720 V DC		Single Motor Modules in booksize format					
Internal air cooling		<b>6SL3120-1TE13-0AA0</b>	<b>6SL3120-1TE15-0AA0</b>	<b>6SL3120-1TE21-0AA1</b>	<b>6SL3120-1TE21-8AA1</b>	<b>6SL3120-1TE23-0AA1</b>	
Internal air cooling with varnished modules		<b>6SL3120-1TE13-0AB0</b>	<b>6SL3120-1TE15-0AB0</b>	<b>6SL3120-1TE21-0AB0</b>	<b>6SL3120-1TE21-8AB0</b>	<b>6SL3120-1TE23-0AB0</b>	
External air cooling		<b>6SL3121-1TE13-0AA0</b>	<b>6SL3121-1TE15-0AA0</b>	<b>6SL3121-1TE21-0AA0</b>	<b>6SL3121-1TE21-8AA0</b>	<b>6SL3121-1TE23-0AA0</b>	
Rated output current $I_{rated}$	A	3	5	9	18	30	
Base load current $I_H$	A	2.6	4.3	7.7	15.3	25.5	
Output current for S6 duty (40%) $I_{S6}$	A	3.5	6	10	24	40	
Max. output current $I_{max}$	A	6	10	18	36	56	
Rated power for 600 V DC link voltage	kW (HP)	1.6 (1.5)	2.7 (3)	4.8 (5)	9.7 (10)	16.0 (20)	
Power based on $I_H$ for 600 V DC link voltage	kW (HP)	1.4 (1)	2.3 (2.5)	4.1 (5)	8.2 (10)	13.7 (18)	
Rated pulse frequency	kHz	4	4	4	4	4	
DC link current $I_d^{(1)}$	A	3.6	6	11	22	36	
DC link busbar current capacity	A	100	100	100	100	100	
DC link capacitance	μF	110	110	110	220	710	
Max. current requirement at 24 V DC	A	0.85	0.85	0.85	0.85	0.9	
24 V DC busbar current capacity	A	20	20	20	20	20	
		If, due to a number of Line and Motor Modules being mounted side-by-side, the current carrying capacity exceeds 20 A, an additional 24 V DC connection using a 24-V terminal adapter is required (max. cross section 6 mm <sup>2</sup> , max. fuse protection 20 A).					
Efficiency $\eta$		0.97	0.97	0.97	0.97	0.97	
Power loss with internal air cooling in control cabinet	kW	0.035	0.055	0.080	0.165	0.290	
Power loss <sup>2)</sup> with external air cooling int./ext.	kW	0.015/0.015	0.023/0.03	0.035/0.045	0.075/0.09	0.08/0.21	
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.008 (0.283)	0.008 (0.283)	0.008 (0.283)	0.008 (0.283)	0.016 (0.565)	
Sound pressure level	dB(A)	< 60	< 60	< 60	< 60	< 60	
Motor connection U2, V2, W2		Plug-in connector (X1), max. 30 A (not included in scope of supply, see Accessories)	Plug-in connector (X1), max. 30 A (not included in scope of supply, see Accessories)	Plug-in connector (X1), max. 30 A (not included in scope of supply, see Accessories)	Plug-in connector (X1), max. 30 A (not included in scope of supply, see Accessories)	Plug-in connector (X1), max. 30 A (not included in scope of supply, see Accessories)	
Shield connection		integrated in connector (X1)	integrated in connector (X1)	integrated in connector (X1)	integrated in connector (X1)	integrated in connector (X1)	
PE connection		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	
Motor brake connection		Integrated into the plug-in motor connector (X1), 24 V DC, 2 A	Integrated into the plug-in motor connector (X1), 24 V DC, 2 A	Integrated into the plug-in motor connector (X1), 24 V DC, 2 A	Integrated into the plug-in motor connector (X1), 24 V DC, 2 A	Integrated into the plug-in motor connector (X1), 24 V DC, 2 A	
Max. motor cable length	m (ft)	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	70 (230) shielded 100 (328) unshielded	100 (328) shielded 150 (492) unshielded	
Degree of protection		IP20	IP20	IP20	IP20	IP20	
Width	mm (inch)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	100 (3.94)	
Height	mm (inch)	380 (14.98)	380 (14.98)	380 (14.98)	380 (14.98)	380 (14.98)	
Depth with internal air cooling	mm (inch)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)	
Depth with external air cooling on/behind mounting surface	mm (inch)	226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)	
Approx. weight with internal air cooling	kg (lb)	5.1 (11)	5.1 (11)	5.0 (11)	5.0 (11)	6.9 (15)	
Approx. weight with external air cooling	kg (lb)	5.7 (13)	5.7 (13)	5.7 (13)	5.7 (13)	8.5 (19)	

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection. For DC link current calculation for dimensioning the Line Module, see System Description.

<sup>2)</sup> Power loss of Motor Module at rated output without losses of 24 V DC electronics power supply.

# SINAMICS S120

## Motor Modules

### Single Motor Modules in booksize format

#### Technical data (continued)

DC link voltage 510 V to 720 V DC		Single Motor Modules in booksize format					
Internal air cooling		<b>6SL3120-1TE24-5AA1</b>	<b>6SL3120-1TE26-0AA1</b>	<b>6SL3120-1TE28-5AA1</b>	<b>6SL3120-1TE31-3AA0</b>	<b>6SL3120-1TE32-0AA0</b>	
Internal air cooling with varnished modules		<b>6SL3120-1TE24-5AB0</b>	<b>6SL3120-1TE26-0AB0</b>	<b>6SL3120-1TE28-5AB0</b>	<b>6SL3120-1TE31-3AB0</b>	<b>6SL3120-1TE32-0AB0</b>	
External air cooling		<b>6SL3121-1TE24-5AA0</b>	<b>6SL3121-1TE26-0AA0</b>	<b>6SL3121-1TE28-5AA0</b>	<b>6SL3121-1TE31-3AA0</b>	<b>6SL3121-1TE32-0AA0</b>	
Rated output current $I_{rated}$	A	45	60	85	132	200	
Base load current $I_H$	A	38	52	68	105	141	
Output current for S6 duty (40%) $I_{S6}$	A	60	80	110	150	230	
Max. output current $I_{max}$	A	85	113	141	210	282	
Rated pulse frequency	kHz	4	4	4	4	4	
Rated power for 600 V DC link voltage	kW (HP)	24 (30)	32 (40)	46 (60)	71 (100)	107 (150)	
Power based on $I_H$ 600 V DC link voltage	kW (HP)	21 (25)	28 (40)	37 (50)	57 (75)	76 (100)	
DC link current $I_d^{1)}$	A	54	72	102	158	200	
DC link busbar current capacity	A	100	100	200	200	200	
DC link capacitance	μF	1175	1410	1880	2820	3995	
Max. current requirement at 24 V DC	A	1.2	1.2	1.5	1.5	1.5	
24 V DC busbar current capacity	A	20	20	20	20	20	
If, due to a number of Line and Motor Modules being mounted side-by-side, the current carrying capacity exceeds 20 A, an additional 24 V DC connection using a 24 V terminal adapter is required (max. cross section 6 mm <sup>2</sup> , max. fuse protection 20 A).							
Efficiency $\eta$		0.97	0.97	0.97	0.97	0.97	
Power loss with internal air cooling in control cabinet	kW	0.43	0.59	0.75	1.25	2.05	
Power loss <sup>2)</sup> with external air cooling int./ext.	kW	0.11/0.32	0.135/0.455	0.16/0.59	0.25/1.0	0.4/1.65	
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.031 (1.095)	0.031 (1.095)	0.044 (1.554)	0.144 (5.085)	0.144 (5.085)	
Sound pressure level	dB(A)	< 65	< 65	< 60	< 73	< 73	
Motor connection U2, V2, W2		M6 screw studs, 2.5 mm <sup>2</sup> to 50 mm <sup>2</sup> (X1)	M6 screw studs, 2.5 mm <sup>2</sup> to 50 mm <sup>2</sup> (X1)	M8 screw studs, 2.5 mm <sup>2</sup> to 95 mm <sup>2</sup> , 2 x 35 mm <sup>2</sup> (X1)	M8 screw studs, 2.5 mm <sup>2</sup> to 120 mm <sup>2</sup> , 2 x 50 mm <sup>2</sup> (X1)	M8 screw studs, 2.5 mm <sup>2</sup> to 120 mm <sup>2</sup> , 2 x 50 mm <sup>2</sup> (X1)	
Shield connection		see Accessories	see Accessories	see Accessories	see Accessories	see Accessories	
PE connection		On housing with M6 screw	On housing with M6 screw	On housing with M6 screw	On housing with M8 screw	On housing with M8 screw	
Motor brake connection		Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	
Max. motor cable length	m (ft)	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	1100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	
Degree of protection		IP20	IP20	IP20	IP20	IP20	
Width	mm (inch)	150 (5.91)	150 (5.91)	200 (7.87)	300 (11.81)	300 (11.81)	
Height	mm (inch)	380 (14.96)	380 (14.96)	380 (14.96)	380, (14.96) with fan <sup>3)</sup> ; 629 (24.8)	380, (14.96) with fan <sup>3)</sup> ; 629 (24.8)	
Depth with internal air cooling	mm (inch)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)	
Depth with external air cooling on/behind mounting surface	mm (inch)	226/71 (8.9/2.8)	226/71 (8.9/2.8)	226/92 (8.9/3.6)	226/82 (8.9/3.2)	226/82 (8.9/3.2)	
Approx. weight with internal air cooling	kg (lb)	9 (20)	9 (20)	15 (33)	21 (46)	21 (46)	
Approx. weight with external air cooling	kg (lb)	13.2 (29)	13.4 (30)	17.2 (38)	27.2 (60)	30 (66)	

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection. For DC link current calculation for dimensioning the Line Module, see System Description.

<sup>2)</sup> Power loss of Motor Module at rated output without losses of 24 V DC electronics power supply.

<sup>3)</sup> The fan is supplied with the Motor Module and must be installed before the Motor Module is commissioned.

#### Selection and ordering data

Rated output current A	Rated power kW (HP) <sup>1)</sup>	Single Motor Module in booksize format		
		Internal air cooling Order No.	Internal air cooling with varnished modules Order No.	External air cooling Order No.
<b>DC link voltage 510 V to 720 V DC</b>				
3	1.6 (1.5)	6SL3120-1TE13-0AA0	6SL3120-1TE13-0AB0	6SL3121-1TE13-0AA0
5	2.7 (3)	6SL3120-1TE15-0AA0	6SL3120-1TE15-0AB0	6SL3121-1TE15-0AA0
9	4.8 (5)	6SL3120-1TE21-0AA1	6SL3120-1TE21-0AB0	6SL3121-1TE21-0AA0
18	9.7 (10)	6SL3120-1TE21-8AA1	6SL3120-1TE21-8AB0	6SL3121-1TE21-8AA0
30	16 (20)	6SL3120-1TE23-0AA1	6SL3120-1TE23-0AB0	6SL3121-1TE23-0AA0
45	24 (30)	6SL3120-1TE24-5AA1	6SL3120-1TE24-5AB0	6SL3121-1TE24-5AA0
60	32 (40)	6SL3120-1TE26-0AA1	6SL3120-1TE26-0AB0	6SL3121-1TE26-0AA0
85	46 (60)	6SL3120-1TE28-5AA1	6SL3120-1TE28-5AB0	6SL3121-1TE28-5AA0
132	71 (100)	6SL3120-1TE31-3AA0	6SL3120-1TE31-3AB0	6SL3121-1TE31-3AA0
200	107 (150)	6SL3120-1TE32-0AA0	6SL3120-1TE32-0AB0	6SL3121-1TE32-0AA0

#### Accessories

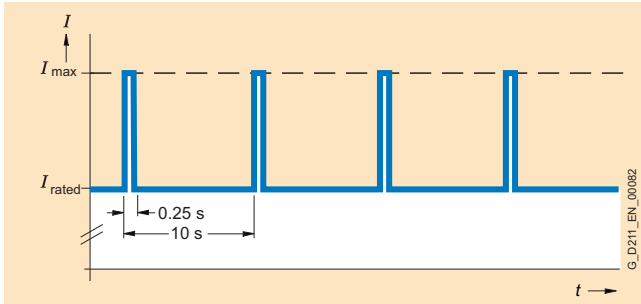
Description	Order No.
<b>Power connector (X1)</b> At Motor Module end, with screw-type terminals 1.5 mm <sup>2</sup> to 10 mm <sup>2</sup> , for Motor Modules with a rated output current of 3 to 30 A	6SL3162-2MA00-0AA0
<b>Shield connection kit</b> for Line/Motor Modules in booksize format <ul style="list-style-type: none"> <li>• 150 mm (5.91 in) wide for internal air cooling</li> <li>• 150 mm (5.91 in) wide for external air cooling</li> <li>• 200 mm (7.87 in) wide for internal air cooling</li> <li>• 200 mm (7.87 in) wide for external air cooling</li> <li>• 300 mm (11.81 in) wide</li> </ul>	6SL3162-1AF00-0AA1 6SL3162-1AF00-0BA0 6SL3162-1AH01-0AA0 6SL3162-1AH01-0BA0 6SL3162-1AH00-0AA0
<b>DC link supply adapter</b> for direct infeed of DC link voltage <ul style="list-style-type: none"> <li>• Screw-type terminals 0.5 mm<sup>2</sup> to 10 mm<sup>2</sup>                              for Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.84 in)</li> <li>• Screw-type terminals 35 mm<sup>2</sup> to 95 mm<sup>2</sup>                              for Line Modules and Motor Modules in booksize format with a width of 150 mm (5.91 in), 200 mm (7.87 in)                              and 300 mm (11.81 in)</li> </ul>	6SL3162-2BD00-0AA0 6SL3162-2BM00-0AA0
<b>DC link adapters (2x)</b> for multi-tier configuration Screw-type terminals 35 mm <sup>2</sup> to 95 mm <sup>2</sup> for all Line Modules/Motor Modules in booksize format	6SL3162-2BM01-0AA0
<b>24 V terminal adapter</b> for all Line Modules/Motor Modules in booksize format	6SL3162-2AA00-0AA0
<b>24 V jumper</b> for connection of the 24 V busbars (for booksize format)	6SL3162-2AA01-0AA0
<b>Warning signs in foreign languages</b> This set of foreign language warning signs can be placed on top of the standard German or English signs. One sign in each of the following languages is provided in each set: Chinese Simplified, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Portuguese, Spanish and Swedish.	6SL3166-3AB00-0AA0
Plug-in motor brake connector for booksize format Motor Modules with a rated output current of 45 A to 200 A Wago <a href="http://www.wago.com">http://www.wago.com</a>	Item No.: 231-102/037-000 (Wago)

<sup>1)</sup> Nominal HP based on Asynchronous motors (induction motors).  
 Match the motor nameplate current for specific sizing.

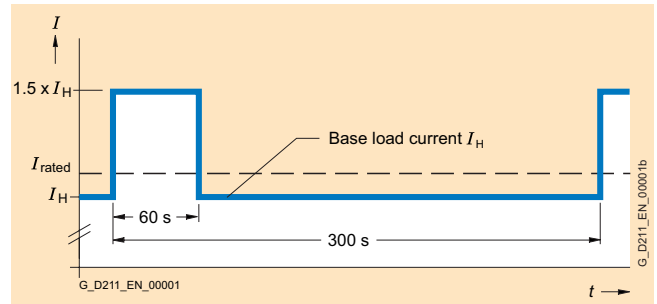
#### Characteristics

#### Overload capability

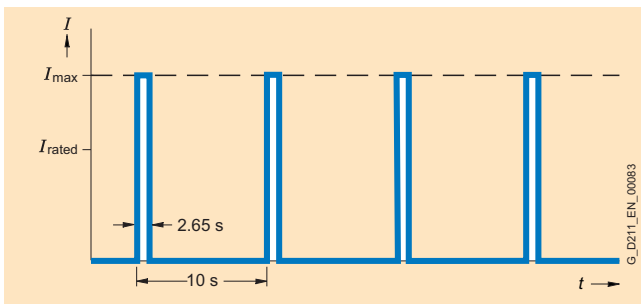
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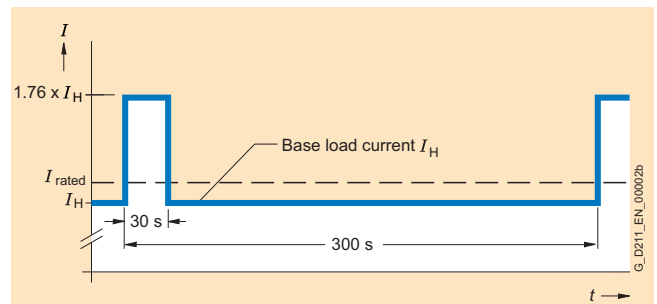
Load cycle with previous load



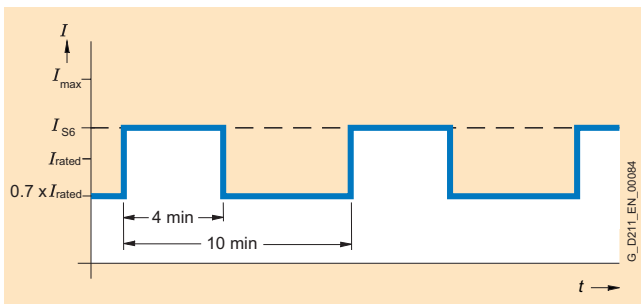
Load cycle with 60 s overload with a load cycle period of 300 s



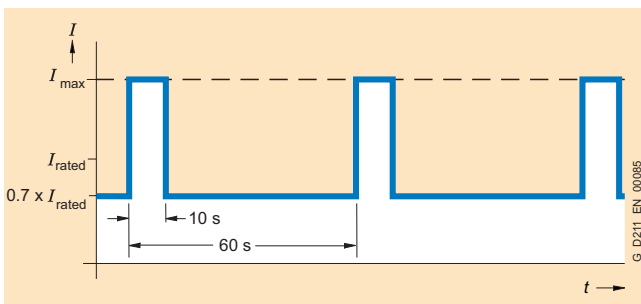
Load cycle without previous load



Load cycle with 30 s overload with a load cycle period of 300 s



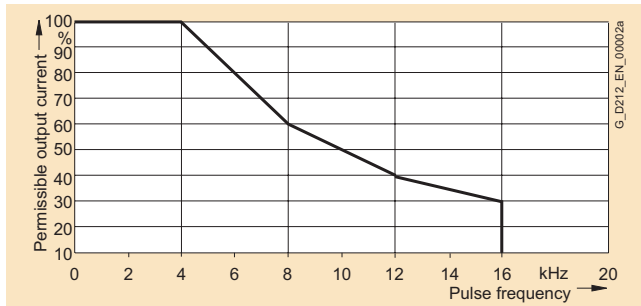
S6 load cycle with previous load with a load cycle period of 600 s



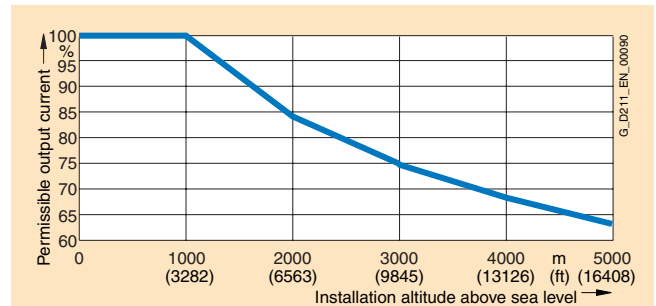
S6 load cycle with previous load with a load cycle period of 60 s

### Characteristics (continued)

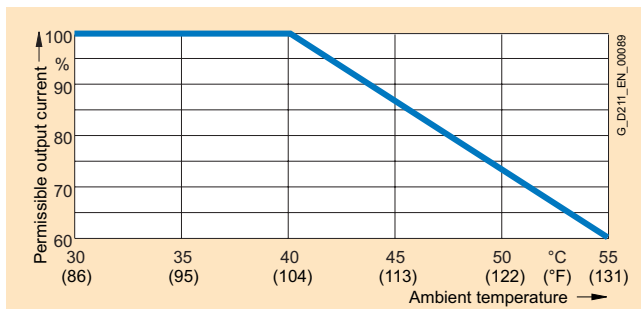
#### Derating characteristics



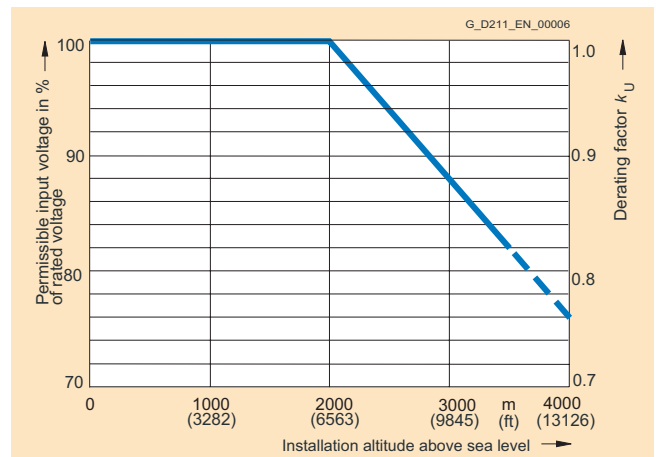
Output current dependent on pulse frequency



Output current dependent on installation altitude



Output current dependent on ambient temperature



Voltage derating dependent on installation altitude

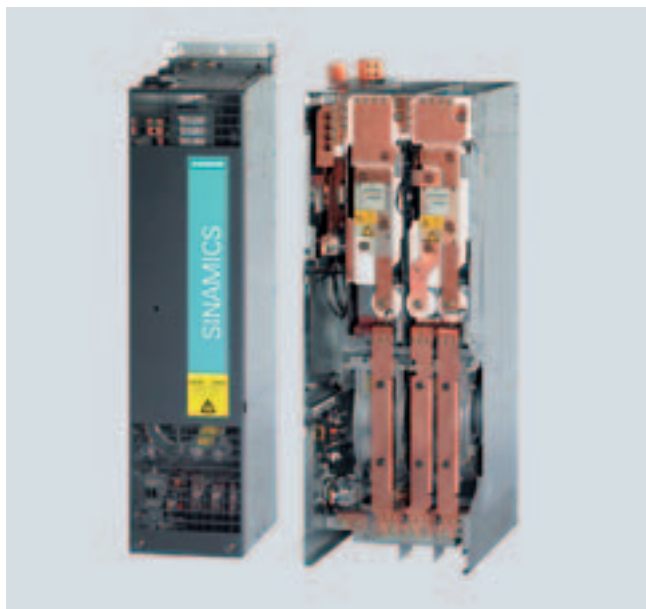


# SINAMICS S120

## Motor Modules

### Single Motor Modules in chassis format

#### Design



The Single Motor Modules in chassis format feature the following interfaces as standard:

- 1 DC link connection
- 1 electronics power supply connection
- 3 DRIVE-CLiQ sockets
- 1 motor connection
- 1 safe standstill input (enable pulses)
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 PE (protective earth) connection

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

The scope of supply of the Motor Modules includes:

- Types FX and GX:
  - 0.60 m (1.97 ft) DRIVE-CLiQ cable for connection to the adjacent Motor Module
- Types HX and JX:
  - 0.35 m (1.15 ft) DRIVE-CLiQ cable for connection to the CU320 or SIMOTION D Control Unit
  - 2.10 m (6.89 ft) DRIVE-CLiQ cable for connection to the adjacent Motor Module

#### Selection and ordering data

Rated output current A	Rated power kW (HP) <sup>1)</sup>	Single Motor Module in chassis format Order No.
<b>DC link voltage 510 V to 720 V DC</b>		
210	110 (150)	<b>6SL3320-1TE32-1AA0</b>
260	132 (200)	<b>6SL3320-1TE32-6AA0</b>
310	160 (250)	<b>6SL3320-1TE33-1AA0</b>
380	200 (300)	<b>6SL3320-1TE33-8AA0</b>
490	250 (400)	<b>6SL3320-1TE35-0AA0</b>
605	315 (500)	<b>6SL3320-1TE36-1AA0</b>
745	400 (600)	<b>6SL3320-1TE37-5AA0</b>
840	450 (700)	<b>6SL3320-1TE38-4AA0</b>
985	560 (800)	<b>6SL3320-1TE41-0AA0</b>
1260	710 (1000)	<b>6SL3320-1TE41-2AA0</b>
1405	800 (1150)	<b>6SL3320-1TE41-4AA0</b>
<b>DC link voltage 890 V to 1035 V DC</b>		
85	75	<b>6SL3320-1TH28-5AA0</b>
100	90	<b>6SL3320-1TH31-0AA0</b>
120	110	<b>6SL3320-1TH31-2AA0</b>
150	132	<b>6SL3320-1TH31-5AA0</b>
175	160	<b>6SL3320-1TH31-8AA0</b>
215	200	<b>6SL3320-1TH32-2AA0</b>
260	250	<b>6SL3320-1TH32-6AA0</b>
330	315	<b>6SL3320-1TH33-3AA0</b>
410	400	<b>6SL3320-1TH34-1AA0</b>
465	450	<b>6SL3320-1TH34-7AA0</b>
575	560	<b>6SL3320-1TH35-8AA0</b>
735	710	<b>6SL3320-1TH37-4AA0</b>
810	800	<b>6SL3320-1TH38-1AA0</b>
910	900	<b>6SL3320-1TH38-8AA0</b>
1025	1000	<b>6SL3320-1TH41-0AA0</b>
1270	1200	<b>6SL3320-1TH41-3AA0</b>

#### Warning signs in foreign languages

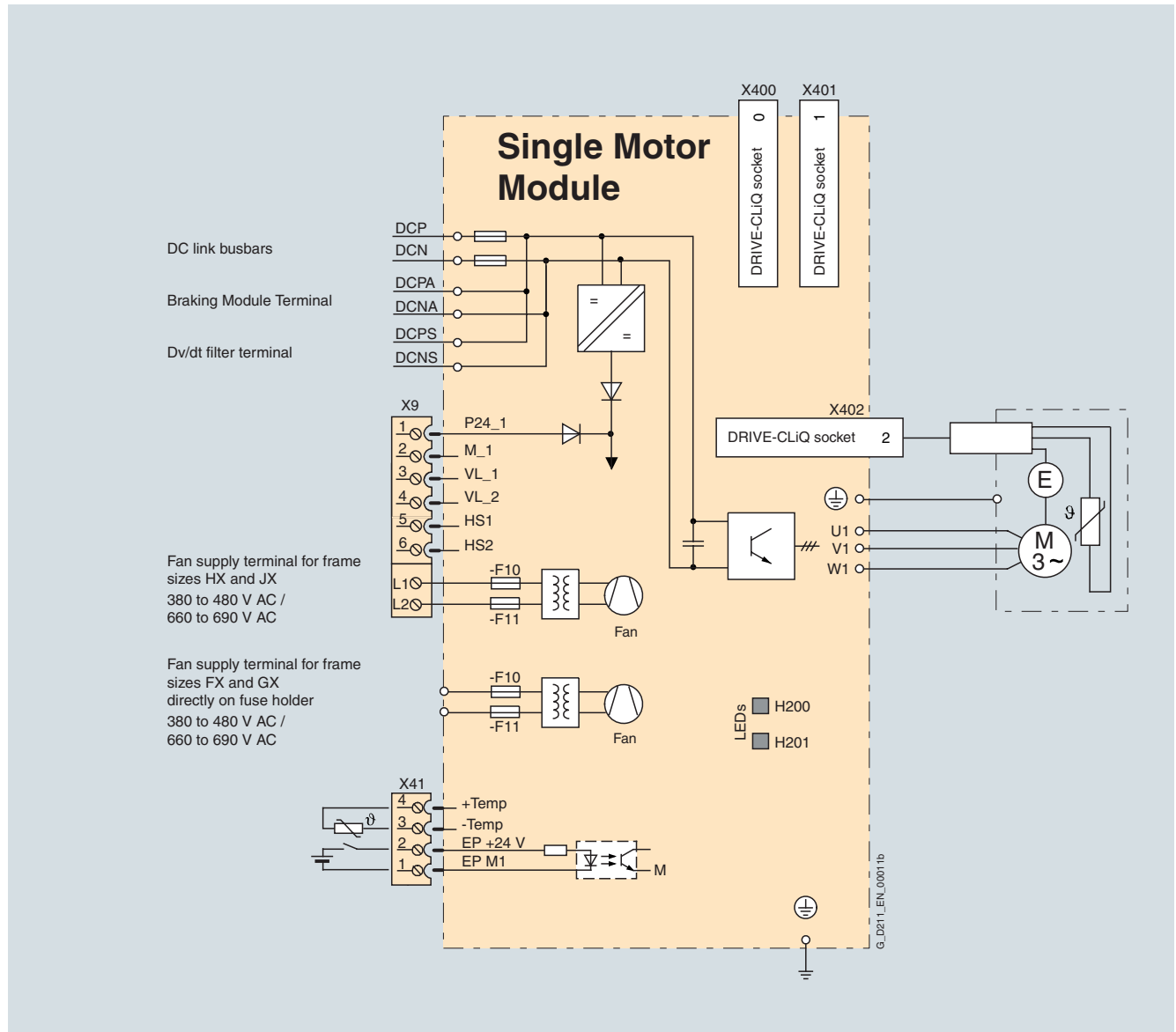
Warning signs in other languages can be placed on top of the standard warning signs in German or English.

The following signs are supplied with chassis format units: Chinese, Danish, Finnish, French, Greek, Italian, Japanese, Korean, Dutch, Polish, Portuguese, Russian, Swedish, Spanish, Czech and Turkish.

<sup>1)</sup> Nominal HP based on Asynchronous motors (induction motors). Match the motor nameplate current for specific sizing.

### Integration

The Single Motor Module communicates with the CU320 or SIMOTION D Control Unit via DRIVE-CLiQ.



Connection example of Single Motor Module in chassis format

# SINAMICS S120

## Motor Modules

### Single Motor Modules in chassis format

#### Technical data

##### General technical data

Electrical data	
DC link voltage (up to 2000 m (6563 ft) above sea level)	510 V to 720 V DC (line voltage 380 V to 480 V 3 AC) or 890 V to 1035 V DC (line voltage 660 V to 690 V 3 AC)
Max output voltage, line-to-line (fundamental-wave RMS value)	0.72 x DC link voltage
Output frequency	
• Control type Servo	0 Hz to 650 Hz <sup>1)</sup>
• Control type Vector	0 Hz to 300 Hz <sup>1)</sup>
• Control type V/f	0 Hz to 300 Hz <sup>1)</sup>
Electronics power supply	24 V DC – 15%/+ 20%
Radio interference suppression	
• Standard	No radio interference suppression
• in combination with Line Module and line reactor	Category C3 to EN 61800-3
• in combination with Line Module incl. line filter and line reactor	Class A1 to EN 55011 and Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	Internal/external air cooling, power units with increased air cooling by means of built-in fan
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 °C to + 40 °C (32 °F to + 104 °F) without derating, > 40 °C to + 55 °C (> 104 °F to + 131 °F) see derating characteristics
Site altitude	Up to 2000 m (6563 ft) above sea level without derating, > 2000 m (6563 ft) to 4000 m (13126 ft) above sea level see derating characteristics
Certificates	
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus (File No.: E192450)
Certification	Safety Integrity Level 2 (SIL 2) to IEC 61508, control category 3 to EN 954-1 for Safety Integrated – safe standstill (STO = Safe Torque Off)

<sup>1)</sup> Note correlation between max. output frequency, pulse frequency and current derating, see System Description.

#### Technical data (continued)

DC link voltage 510 V to 720 V DC		Single Motor Modules in chassis format				
		6SL3320-1TE32-1AA0	6SL3320-1TE32-6AA0	6SL3320-1TE33-1AA0	6SL3320-1TE33-8AA0	6SL3320-1TE35-0AA0
Rated output current $I_{rated}$	A	210	260	310	380	490
Base load current $I_L$	A	205	250	302	370	477
Base load current $I_H$	A	178	233	277	340	438
Max. output current $I_{max}$	A	307	375	453	555	715
Rated power 600 V DC link voltage	kW (HP)	110 (150)	132 (200)	160 (250)	200 (300)	250 (400)
Power based on $I_H$ 600 V DC link voltage	kW (HP)	90 (125)	110 (150)	132 (200)	160 (250)	200 (350)
Rated pulse frequency	kHz	2	2	2	2	2
DC link current $I_d^{1)}$	A	252	312	372	456	588
DC link capacitance	$\mu$ F	4200	5200	6300	7800	9600
Max. current requirement at 24 V DC	A	0.8	0.8	0.9	0.9	0.9
Max. current requirement (fan supply) at 400 V $\sqrt{2}$ AC	A	0.6	1.2	1.6	1.6	1.6
Efficiency $\eta$		0.986	0.986	0.986	0.986	0.986
Power loss	kW	1.86	2.50	2.96	3.67	4.28
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.17 (6)	0.23 (8.12)	0.36 (12.71)	0.36 (12.71)	0.36 (12.71)
Sound pressure level	dB(A)	< 67	< 69	< 69	< 69	< 69
DC link connection DCP, DCN		Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>
Motor connection U2, V2, W2		Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>
PE connection		Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>
Motor brake connection		-	-	-	-	-
Max. motor cable length (without external options)	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Degree of protection		IP20	IP20	IP20	IP20	IP20
Width	mm (inch)	326 (12.83)	326 (12.83)	326 (12.83)	326 (12.83)	326 (12.83)
Height	mm (inch)	1400 (55.12)	1400 (55.12)	1533 (60.35)	1533 (60.35)	1533 (60.35)
Depth	mm (inch)	356 (14.02)	356 (14.02)	545 (21.46)	545 (21.46)	545 (21.46)
Size		FX	FX	GX	GX	GX
Weight, approx.	kg (lb)	88 (194)	88 (194)	152 (335)	152 (335)	152 (335)

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.  
For DC link current calculation for dimensioning the Line Module, see System Description.

# SINAMICS S120

## Motor Modules

### Single Motor Modules in chassis format

#### Technical data (continued)

DC link voltage 510 V to 720 V DC	Single Motor Modules in chassis format			
		6SL3320-1TE36-1AA0	6SL3320-1TE37-5AA0	6SL3320-1TE38-4AA0
Rated output current $I_{rated}$	A	605	745	840
Base load current $I_L$	A	590	725	820
Base load current $I_H$	A	460	570	700
Max. output current $I_{max}$	A	885	1087	1230
Rated power 600 V DC link voltage	kW (HP)	315 (500)	400 (600)	450 (700)
Power based on $I_H$ 600 V DC link voltage	kW (HP)	250 (350)	315 (450)	400 (500)
Rated pulse frequency	kHz	1.25	1.25	1.25
DC link current $I_d^{1)}$	A	726	894	1008
DC link capacitance	$\mu$ F	12600	15600	16800
Max. current requirement at 24 V DC	A	1.0	1.0	1.0
Max. current requirement (fan supply) at 400 V 2 AC	A	3.2	3.2	3.2
Efficiency $\eta$		0.986	0.986	0.986
Power loss	kW	5.84	6.68	7.15
Cooling air requirement	$m^3/s$ ( $ft^3/s$ )	0.78 (27.55)	0.78 (27.55)	0.78 (27.55)
Sound pressure level	dB(A)	< 72	< 72	< 72
DC link connection DCP, DCN		Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection
Motor connection U2, V2, W2		Flange connection with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$
PE connection		On housing with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$	On housing with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$	On housing with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$
Motor brake connection		–	–	–
Max. motor cable length (without external options)	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Degree of protection		IP00	IP00	IP00
Width	mm (inch)	503 (19.8)	503 (19.8)	503 (19.8)
Height	mm (inch)	1475 (58.07)	1475 (58.07)	1475 (58.07)
Depth	mm (inch)	540 (21.26)	540 (21.26)	540 (21.26)
Size		HX	HX	HX
Weight, approx.	kg (lb)	290 (640)	290 (640)	290 (640)

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.  
For DC link current calculation for dimensioning the Line Module, see System Description.

#### Technical data (continued)

DC link voltage 510 V to 720 V DC		Single Motor Modules in chassis format		
		6SL3320-1TE41-0AA0	6SL3320-1TE41-2AA0	6SL3320-1TE41-4AA0
Rated output current $I_{rated}$	A	985	1260	1405
Base load current $I_L$	A	960	1230	1370
Base load current $I_H$	A	860	1127	1257
Max. output current $I_{max}$	A	1440	1845	2055
Rated power 600 V DC link voltage	kW (HP)	560 (800)	710 (1000)	800 (1150)
Power based on $I_H$ 600 V DC link voltage	kW (HP)	450 (700)	560 (900)	710 (1000)
Rated pulse frequency	kHz	1.25	1.25	1.25
DC link current $I_d^{1)}$	A	1182	1512	1686
DC link capacitance	$\mu$ F	18900	26100	28800
Max. current requirement at 24 V DC	A	1.25	1.40	1.40
Max. current requirement (fan supply) at 400 V 2 AC	A	4.7	4.7	4.7
Efficiency $\eta$		0.986	0.986	0.986
Power loss	kW	9.5	11.1	12.0
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	1.1 (38.85)	1.1 (38.85)	1.1 (38.85)
Sound pressure level	dB(A)	< 72	< 72	< 72
DC link connection DCP, DCN		Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection
Motor connection U2, V2, W2		Flange connection with M12 screw, max. cross section 6 × 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 6 × 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 6 × 240 mm <sup>2</sup>
PE connection		On housing with M12 screw, max. cross section PE1/GND 1 × 240 mm <sup>2</sup> PE2/GND 2 × 240 mm <sup>2</sup>	On housing with M12 screw, max. cross section PE1/GND 1 × 240 mm <sup>2</sup> PE2/GND 2 × 240 mm <sup>2</sup>	On housing with M12 screw, max. cross section PE1/GND 1 × 240 mm <sup>2</sup> PE2/GND 2 × 240 mm <sup>2</sup>
Motor brake connection		–	–	–
Max. motor cable length (without external options)	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Degree of protection		IP00	IP00	IP00
Width	mm (inch)	704 (27.72)	704 (27.72)	704 (27.72)
Height	mm (inch)	1475 (58.07)	1475 (58.07)	1475 (58.07)
Depth	mm (inch)	540 (21.26)	540 (21.26)	540 (21.26)
Size		JX	JX	JX
Weight, approx.	kg (lb)	450 (992)	450 (992)	450 (992)

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.  
For DC link current calculation for dimensioning the Line Module, see System Description.

# SINAMICS S120

## Motor Modules

### Single Motor Modules in chassis format

#### Technical data (continued)

DC link voltage 890 V to 1035 V DC		Single Motor Modules in chassis format			
		6SL3320-1TH28-5AA0	6SL3320-1TH31-0AA0	6SL3320-1TH31-2AA0	6SL3320-1TH31-5AA0
Rated output current $I_{rated}$	A	85	100	120	150
Base load current $I_L$	A	80	95	115	142
Base load current $I_H$	A	76	89	107	134
Max. output current $I_{max}$	A	120	142	172	213
Rated power	kW	75	90	110	132
Power based on $I_H$	kW	55	75	90	110
Rated pulse frequency	kHz	1.25	1.25	1.25	1.25
DC link current $I_d^{1)}$	A	102	120	144	180
DC link capacitance	$\mu$ F	1200	1200	1600	2800
Max. current requirement at 24 V DC	A	0.8	0.8	0.8	0.8
Max. current requirement (fan supply) at 690 V 2 AC	A	0.4	0.4	0.4	0.4
Efficiency $\eta$		0.988	0.988	0.986	0.989
Power loss	kW	1.17	1.43	1.89	1.80
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.17 (6)	0.17 (6)	0.17 (6)	0.17 (6)
Sound pressure level	dB(A)	< 67	< 67	< 67	< 67
DC link connection DCP, DCN		Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>
Motor connection U2, V2, W2		Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>	Flange connection with M10 screw, max. cross section 2 x 185 mm <sup>2</sup>
PE connection		Flange connection with M12 screw, max. cross section PE1/GND 2 x 185 mm <sup>2</sup> PE2/GND 2 x 185 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section PE1/GND 2 x 185 mm <sup>2</sup> PE2/GND 2 x 185 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section PE1/GND 2 x 185 mm <sup>2</sup> PE2/GND 2 x 185 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section PE1/GND 2 x 185 mm <sup>2</sup> PE2/GND 2 x 185 mm <sup>2</sup>
Motor brake connection		–	–	–	–
Max. motor cable length (without external options)	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Degree of protection		IP20	IP20	IP20	IP20
Width	mm (inch)	326 (12.83)	326 (12.83)	326 (12.83)	326 (12.83)
Height	mm (inch)	1400 (55.12)	1400 (55.12)	1400 (55.12)	1400 (55.12)
Depth	mm (inch)	356 (14.02)	356 (14.02)	356 (14.02)	356 (14.02)
Size		FX	FX	FX	FX
Weight, approx.	kg (lb)	88 (194)	88 (194)	88 (194)	88 (194)

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.  
For DC link current calculation for dimensioning the Line Module, see System Description.

#### Technical data (continued)

DC link voltage 890 V to 1035 V DC		Single Motor Modules in chassis format			
		6SL3320-1TH31-8AA0	6SL3320-1TH32-2AA0	6SL3320-1TH32-6AA0	6SL3320-1TH33-3AA0
Rated output current $I_{rated}$	A	175	215	260	330
Base load current $I_L$	A	170	208	250	320
Base load current $I_H$	A	157	192	233	280
Max. output current $I_{max}$	A	255	312	375	480
Rated power	kW	160	200	250	315
Power based on $I_H$	kW	132	160	200	250
Rated pulse frequency	kHz	1.25	1.25	1.25	1.25
DC link current $I_d^{1)}$	A	210	258	312	396
DC link capacitance	$\mu$ F	2800	2800	3900	4200
Max. current requirement at 24 V DC	A	0.9	0.9	0.9	0.9
Max. current requirement (fan supply) at 690 V 2 AC	A	0.94	0.94	0.94	0.94
Efficiency $\eta$		0.987	0.988	0.988	0.987
Power loss	kW	2.67	3.09	3.62	4.34
Cooling air requirement	$m^3/s$ (ft <sup>3</sup> /s)	0.36 (12.71)	0.36 (12.71)	0.36 (12.71)	0.36 (12.71)
Sound pressure level	dB(A)	< 69	< 69	< 69	< 69
DC link connection DCP, DCN		Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$
Motor connection U2, V2, W2		Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$	Flange connection with M10 screw, max. cross section $2 \times 185 \text{ mm}^2$
PE connection		Flange connection with M12 screw, max. cross section PE1/GND $2 \times 185 \text{ mm}^2$ PE2/GND $2 \times 185 \text{ mm}^2$	Flange connection with M12 screw, max. cross section PE1/GND $2 \times 185 \text{ mm}^2$ PE2/GND $2 \times 185 \text{ mm}^2$	Flange connection with M12 screw, max. cross section PE1/GND $2 \times 185 \text{ mm}^2$ PE2/GND $2 \times 185 \text{ mm}^2$	Flange connection with M12 screw, max. cross section PE1/GND $2 \times 185 \text{ mm}^2$ PE2/GND $2 \times 185 \text{ mm}^2$
Motor brake connection		–	–	–	–
Max. motor cable length (without external options)	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Degree of protection		IP20	IP20	IP20	IP20
Width	mm (inch)	326 (12.83)	326 (12.83)	326 (12.83)	326 (12.83)
Height	mm (inch)	1533 (60.35)	1533 (60.35)	1533 (60.35)	1533 (60.35)
Depth	mm (inch)	545 (21.46)	545 (21.46)	545 (21.46)	545 (21.46)
Size		GX	GX	GX	GX
Weight, approx.	kg (lb)	152 (335)	152 (335)	152 (335)	152 (335)

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.  
For DC link current calculation for dimensioning the Line Module, see System Description.



# SINAMICS S120

## Motor Modules

### Single Motor Modules in chassis format

#### Technical data (continued)

DC link voltage 890 V to 1035 V DC		Single Motor Modules in chassis format			
		6SL3320-1TH34-1AA0	6SL3320-1TH34-7AA0	6SL3320-1TH35-8AA0	6SL3320-1TH37-4AA0
Rated output current $I_{rated}$	A	410	465	575	735
Base load current $I_L$	A	400	452	560	710
Base load current $I_H$	A	367	416	514	675
Max. output current $I_{max}$	A	600	678	840	1065
Rated power	kW	400	450	560	710
Power based on $I_H$	kW	315	400	450	630
Rated pulse frequency	kHz	1.25	1.25	1.25	1.25
DC link current $I_d^{1)}$	A	492	558	690	882
DC link capacitance	$\mu$ F	7400	7400	7400	11100
Max. current requirement at 24 V DC	A	1.0	1.0	1.0	1.25
Max. current requirement (fan supply) at 690 V 2 AC	A	1.84	1.84	2.74	2.74
Efficiency $\eta$		0.987	0.985	0.988	0.988
Power loss	kW	6.13	6.80	10.3	10.9
Cooling air requirement	$m^3/s$ (ft <sup>3</sup> /s)	0.78 (27.55)	0.78 (27.55)	0.78 (27.55)	1.474 (52.05)
Sound pressure level	dB(A)	< 72	< 72	< 72	< 72
DC link connection DCP, DCN		Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection
Motor connection U2, V2, W2		Flange connection with M12 screw, max. cross section 4 x 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 4 x 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 4 x 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section 4 x 240 mm <sup>2</sup>
PE connection		Flange connection with M12 screw, max. cross section PE1/GND 1 x 240 mm <sup>2</sup> PE2/GND 2 x 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section PE1/GND 1 x 240 mm <sup>2</sup> PE2/GND 2 x 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section PE1/GND 1 x 240 mm <sup>2</sup> PE2/GND 2 x 240 mm <sup>2</sup>	Flange connection with M12 screw, max. cross section PE1/GND 1 x 240 mm <sup>2</sup> PE2/GND 2 x 240 mm <sup>2</sup>
Motor brake connection		-	-	-	-
Max. motor cable length (without external options)	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Degree of protection		IP00	IP00	IP00	IP00
Width	mm (inch)	503 (19.8)	503 (19.8)	503 (19.8)	704 (27.72)
Height	mm (inch)	1475 (58.07)	1475 (58.07)	1475 (58.07)	1475 (58.07)
Depth	mm (inch)	540 (21.26)	540 (21.26)	540 (21.26)	540 (21.26)
Size		HX	HX	HX	JX
Weight, approx.	kg (lb)	290 (640)	290 (640)	290 (640)	450 (992)

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.  
For DC link current calculation for dimensioning the Line Module, see System Description.

#### Technical data (continued)

DC link voltage 890 V to 1035 V DC		Single Motor Modules in chassis format			
		6SL3320-1TH38-1AA0	6SL3320-1TH38-8AA0	6SL3320-1TH41-0AA0	6SL3320-1TH41-3AA0
Rated output current $I_{rated}$	A	810	910	1025	1270
Base load current $I_L$	A	790	880	1000	1230
Base load current $I_H$	A	724	814	917	1136
Max. output current $I_{max}$	A	1185	1320	1500	1845
Rated power	kW	800	900	1000	1200
Power based on $I_H$	kW	710	800	900	1000
Rated pulse frequency	kHz	1.25	1.25	1.25	1.25
DC link current $I_d^{1)}$	A	972	1092	1230	1524
DC link capacitance	$\mu$ F	11100	14400	14400	19200
Max. current requirement at 24 V DC	A	1.25	1.4	1.4	1.4
Max. current requirement (fan supply) at 690 V 2 AC	A	2.74	2.74	2.74	2.74
Efficiency $\eta$		0.988	0.989	0.989	0.989
Power loss	kW	11.5	11.7	13.2	16.0
Cooling air requirement	$m^3/s$ ( $ft^3/s$ )	1.474 (52.05)	1.474 (52.05)	1.474 (52.05)	1.474 (52.05)
Sound pressure level	dB(A)	< 72	< 72	< 72	< 72
DC link connection DCP, DCN		Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection	Flange connection for busbar connection
Motor connection U2, V2, W2		Flange connection with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section $4 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section $6 \times 240 \text{ mm}^2$
PE connection		Flange connection with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$	Flange connection with M12 screw, max. cross section PE1/GND $1 \times 240 \text{ mm}^2$ PE2/GND $2 \times 240 \text{ mm}^2$
Motor brake connection		–	–	–	–
Max. motor cable length (without external options)	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Degree of protection		IP00	IP00	IP00	IP00
Width	mm (inch)	704 (27.72)	704 (27.72)	704 (27.72)	704 (27.72)
Height	mm (inch)	1475 (58.07)	1475 (58.07)	1475 (58.07)	1475 (58.07)
Depth	mm (inch)	540 (21.26)	540 (21.26)	540 (21.26)	540 (21.26)
Size		JX	JX	JX	JX
Weight, approx.	kg (lb)	450 (992)	450 (992)	450 (992)	450 (992)

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.  
For DC link current calculation for dimensioning the Line Module, see System Description.

# SINAMICS S120

## Motor Modules

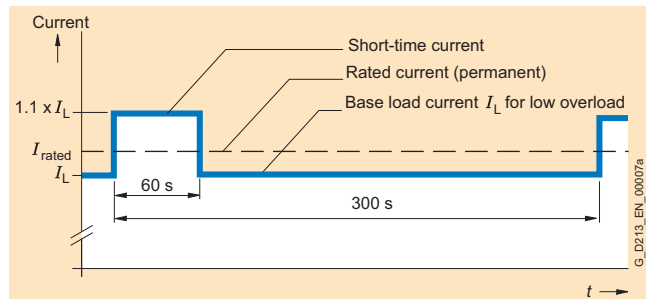
### Single Motor Modules in chassis format

#### Characteristics

##### Overload capability

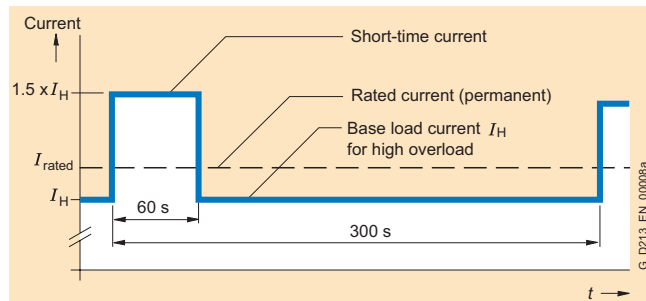
Load cycle data for Single Motor Modules in chassis format

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



Low overload

The base load current  $I_H$  is based on a load cycle of 150% for 60 s or 160% for 10 s with a load cycle period of 300 s.



High overload

##### Derating factors

When the pulse frequency is increased, the derating factor of the output current must be taken into account.

This derating factor must be applied to the currents specified in the technical data.

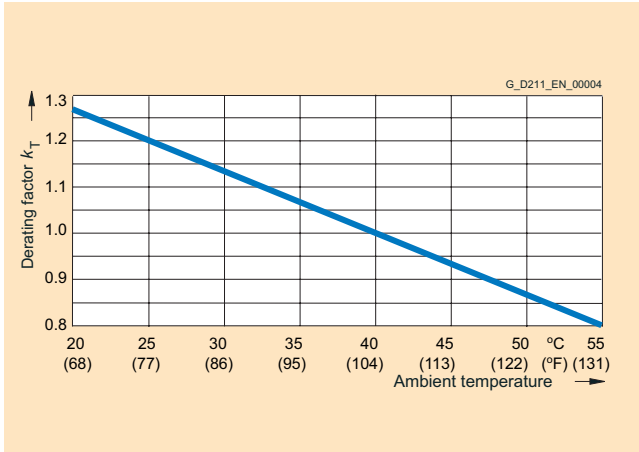
##### Derating factor of the output current as a function of the pulse frequency for devices with a rated pulse frequency of 2-kHz

Single Motor Module in chassis format	Output	Output current	Derating factor	
Type		for a pulse frequency of 2 kHz	for a pulse frequency of 2.5 kHz	for a pulse frequency of 4 kHz
6SL3320- ...	kW (HP)	A		
<b>DC link voltage 510 V to 720 V DC</b>				
1TE32-1AA0	110 (150)	210	0.95	0.82
1TE32-6AA0	132 (200)	260	0.95	0.83
1TE33-1AA0	160 (250)	310	0.97	0.88
1TE33-8AA0	200 (300)	380	0.96	0.87
1TE33-0AA0	250 (400)	490	0.94	0.78

##### Derating factor of the output current as a function of the pulse frequency for devices with a rated pulse frequency of 1.25 kHz

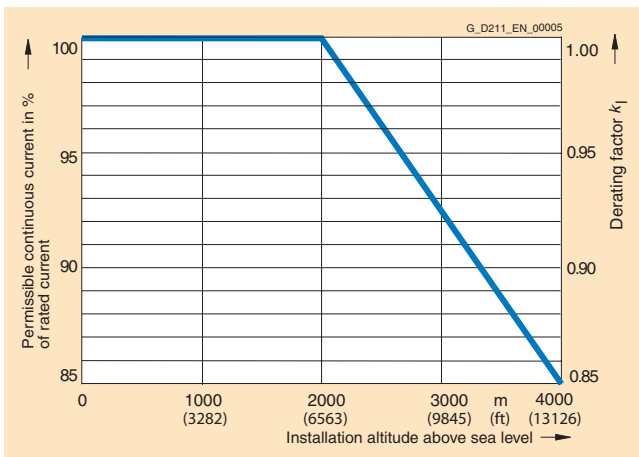
Single Motor Module in chassis format	Output	Output current	Derating factor	
Type		for a pulse frequency of 1.25 kHz	for a pulse frequency of 2.5 kHz	
6SL3320- ...	kW (HP)	A		
<b>DC link voltage 510 V to 720 V DC</b>				
1TE36-1AA0	315 (500)	605	0.72	
1TE37-5AA0	400 (600)	745	0.72	
1TE38-4AA0	450 (700)	840	0.79	
1TE41-0AA0	560 (800)	985	0.87	
1TE41-2AA0	710 (1000)	1260	0.87	
1TE41-4AA0	800 (1150)	1405	0.95	
<b>DC link voltage 890 V to 1035 V DC</b>				
1TH28-5AA0	75	85	0.89	
1TH31-0AA0	90	100	0.88	
1TH31-2AA0	110	120	0.88	
1TH31-5AA0	132	150	0.84	
1TH31-8AA0	160	175	0.87	
1TH32-2AA0	200	215	0.87	
1TH32-6AA0	250	260	0.88	
1TH33-3AA0	315	330	0.82	
1TH34-1AA0	400	410	0.82	
1TH34-7AA0	450	465	0.87	
1TH35-8AA0	560	575	0.85	
1TH37-4AA0	710	735	0.79	
1TH38-1AA0	800	810	0.95	
1TH38-8AA0	900	910	0.87	
1TH41-0AA0	1000	1025	0.86	
1TH41-3AA0	1200	1270	0.79	

### Characteristics (continued)

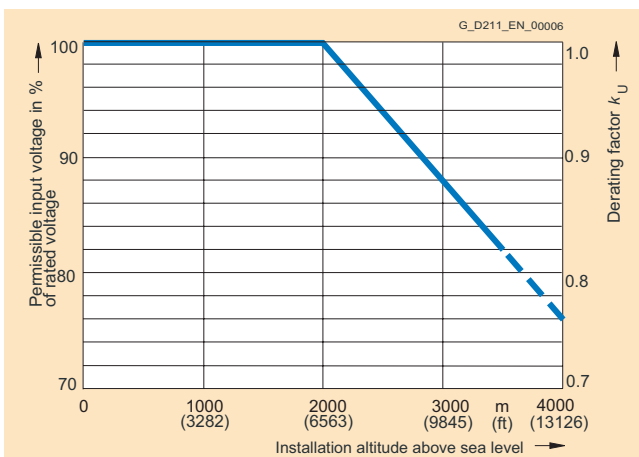


Current derating dependent on ambient temperature

Note: A derating factor  $k_T > 1.0$  is to be taken into account only in conjunction with "current derating dependent on installation altitude". See also System description.



Current derating dependent on installation altitude



Voltage derating dependent on installation altitude

# SINAMICS S120

## Motor Modules

### Double Motor Modules in booksize format

#### Design



Double Motor Modules feature the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 electronics power supply connections via integrated 24 V DC bars
- 4 DRIVE-CLiQ sockets
- 2 plug-in motor connections (not included in scope of supply)
- 2 safe standstill inputs (1 input per axis)
- 2 safe motor brake control
- 2 temperature sensor inputs (KTY84-130 or PTC)
- 3 PE (protective earth) connections

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

On Double Motor Modules, the motor cable shield can be connected in the connector.

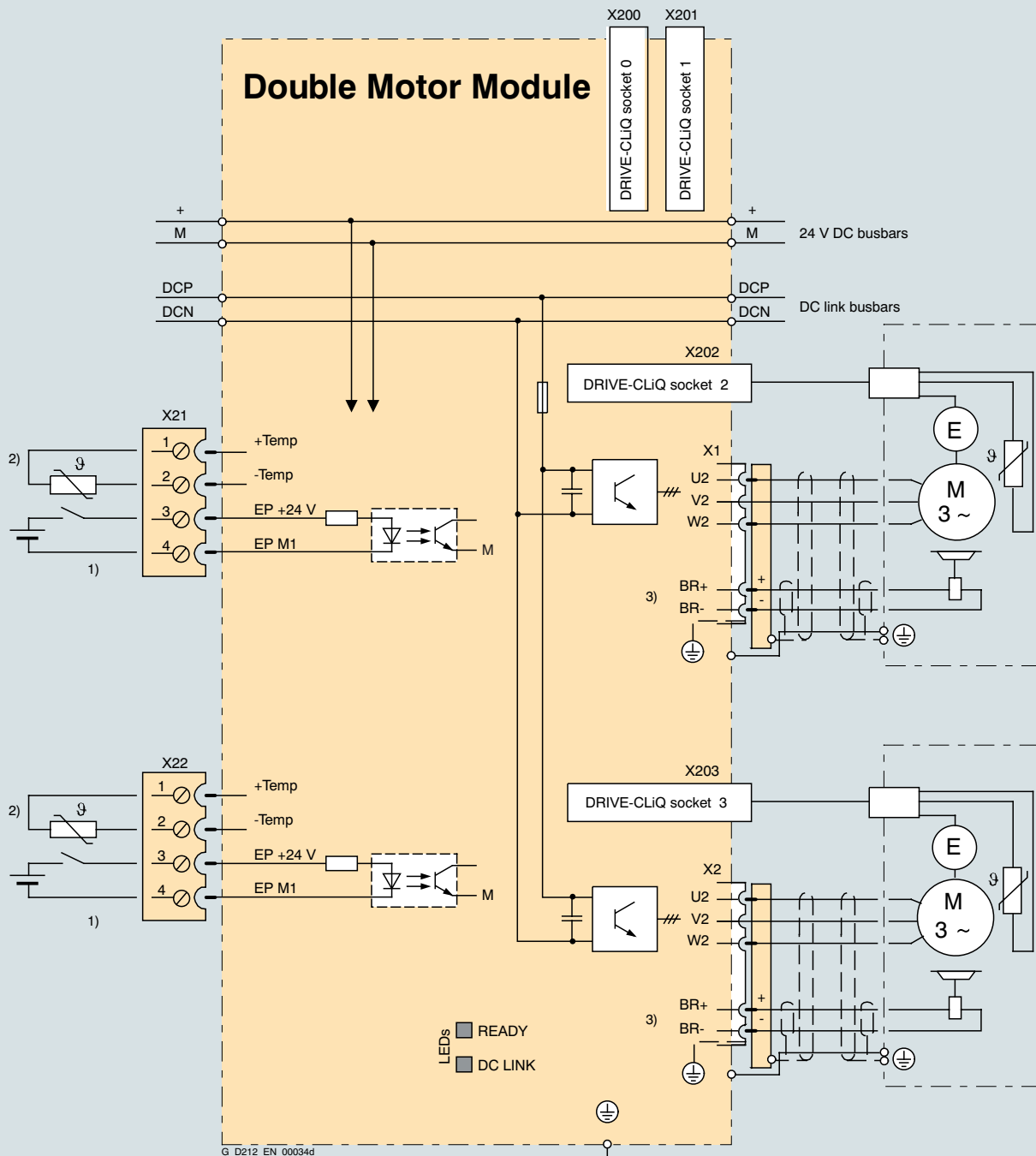
The signal cable shield can be connected to the Motor Module by means of a shield connection terminal, e.g. type KLBÜ 3-8 SC by Weidmüller.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable (length depends on module width) to connect Motor Module to adjacent module
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- Connectors X21 and X22

### Integration

The Double Motor Module communicates with the CU320 or SIMOTION D Control Unit via DRIVE-CLiQ.



- 1) Required for Safety.
- 2) Temperature sensor terminal for motors without DRIVE-CLiQ interface.
- 3) The braking signal has an integrated overvoltage protection.  
An external circuit of the holding brake is not necessary.

Connection example of Double Motor Modules 2 × 3 A to 2 × 18 A

# SINAMICS S120

## Motor Modules

### Double Motor Modules in booksize format

#### Technical data

##### General technical data

Electrical data	
DC link voltage (up to 2000 m (6563 ft) above sea level)	510 V to 720 V DC (line connection voltage 380 V to 480 V 3 AC)
Max. output voltage, line-to-line (fundamental-wave RMS value)	0.67 x DC with voltage
Output frequency	
• Control type Servo	0 Hz to 650 Hz <sup>1)</sup>
• Control type Vector	0 Hz to 300 Hz <sup>1)</sup>
• Control type V/f	0 Hz to 300 Hz <sup>1)</sup>
Electronics power supply	24 V DC – 15%/+ 20%
Radio interference suppression	
• Standard	No radio interference suppression
• in combination with Line Module incl. line filter and line reactor	Class A1 to EN 55011 and Category C2 to EN 61800-3
Ambient conditions	
Type of cooling	- Internal/external air cooling, power units with increased air cooling by means of built-in fan - Cold-plate cooling on request
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 °C to + 40 °C (32 °F to + 104 °F) without derating, > 40 °C to + 55 °C (> 104 °F to +131 °F) see derating characteristics
Site altitude	Up to 1000 m (1328 ft) above sea level without derating, > 1000 m to 4000 m (13126 ft) above sea level see derating characteristics
Certificates	
Conformity	CE (low-voltage and EMC Directives)
Approvals	cULus (File No.: E192450)
Certification	Safety Integrity Level 2 (SIL 2) to IEC 61508, control category 3 to EN 954-1 for Safety Integrated – safe standstill (STO = Safe Torque Off) and safe brake control (SBC = Safe Brake Control)

<sup>1)</sup> Note correlation between max. output frequency, pulse frequency and current derating, see System Description.

### Technical data (continued)

DC link voltage 510 V to 720 V DC		Double Motor Module in booksize format			
Internal air cooling		6SL3120-2TE13-0AA0	6SL3120-2TE15-0AA0	6SL3120-2TE21-0AA0	6SL3120-2TE21-8AA0
Internal air cooling with varnished modules		6SL3120-2TE13-0AB0	6SL3120-2TE15-0AB0	6SL3120-2TE21-0AB0	6SL3120-2TE21-8AB0
External air cooling		6SL3121-2TE13-0AA0	6SL3121-2TE15-0AA0	6SL3121-2TE21-0AA0	6SL3121-2TE21-8AA0
Rated output current $I_{rated}$	A	2 × 3	2 × 5	2 × 9	2 × 18
Output current for S6 duty (40%) $I_{S6}$	A	2 × 3.5	2 × 6	2 × 10	2 × 24
Base load current $I_H$	A	2 × 2.6	2 × 4.3	2 × 7.7	2 × 15.3
Max. output current $I_{max}$	A	2 × 6	2 × 10	2 × 18	2 × 36
Rated power for 600 V DC link voltage	kW (HP)	2 × 1.6 (2 × 1.5)	2 × 2.7 (2 × 3)	2 × 4.8 (2 × 5)	2 × 9.7 (2 × 10)
Rated power based on $I_H$	kW (HP)	2 × 1.4 (2 × 1)	2 × 2.3 (2 × 2.5)	2 × 4.1 (2 × 5)	2 × 8.2 (2 × 10)
DC link current $I_d^{1)}$	A	7.2	12	22	43
DC link busbar current capacity	A	100	100	100	100
DC link capacitance	μF	110	220	220	710
Max. current requirement at 24 V DC	A	1.0	1.0	1.0	1.0
24 V DC busbar current capacity	A	20	20	20	20
If, due to a number of Line and Motor Modules being mounted side-by-side, the current carrying capacity exceeds 20 A, an additional 24-V-DC connection using a 24-V terminal adapter is required (max. cross section 6 mm <sup>2</sup> , max. fuse protection 20 A).					
Efficiency $\eta$		0.97	0.97	0.97	0.97
Power loss with internal air cooling in control cabinet	kW	0.07	0.105	0.16	0.32
Power loss with external air cooling int./ext.	kW	0.025/0.035	0.045/0.06	0.065/0.095	0.08/0.24
Cooling air requirement	m <sup>3</sup> /s (ft <sup>3</sup> /s)	0.008 (0.283)	0.008 (0.283)	0.008 (0.283)	0.016 (0.565)
Sound pressure level	dB(A)	< 60	< 60	< 60	< 60
Motor connection U2, V2, W2		2 x plug-in connectors (X1, X2), max. 30 A (not included in scope of supply, see Accessories)	2 x plug-in connectors (X1, X2), max. 30 A (not included in scope of supply, see Accessories)	2 x plug-in connectors (X1, X2), max. 30 A (not included in scope of supply, see Accessories)	2 x plug-in connectors (X1, X2), max. 30 A (not included in scope of supply, see Accessories)
Shield connection		integrated in connector (X1, X2)	integrated in connector (X1, X2)	integrated in connector (X1, X2)	integrated in connector (X1, X2)
PE connection		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
Motor brake connection		Integrated into the plug-in motor connector (X1, X2), DC 24 V, 2 A	Integrated into the plug-in motor connector (X1, X2), DC 24 V, 2 A	Integrated into the plug-in motor connector (X1, X2), DC 24 V, 2 A	Integrated into the plug-in motor connector (X1, X2), DC 24 V, 2 A
Max. motor cable length	m (ft)	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded	50 (164) shielded 75 (246) unshielded
Degree of protection		IP20	IP20	IP20	IP20
Width	mm (inch)	50 (1.97)	50 (1.97)	50 (1.97)	100 (3.94)
Height	mm (inch)	380 (14.96)	380 (14.96)	380 (14.96)	380 (14.96)
Depth with internal air cooling	mm (inch)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)
Depth with external air cooling on/behind mounting surface	mm (inch)	226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)
Approx. weight with internal air cooling	kg (lb)	5.3 (12)	5.3 (12)	5.3 (12)	6.8 (15)
Approx. weight with external air cooling	kg (lb)	5.8 (13)	5.8 (13)	5.8 (13)	8.6 (19)

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.  
For DC link current calculation for dimensioning the Line Module, see System Description.



# SINAMICS S120

## Motor Modules

### Double Motor Modules in booksize format

#### Selection and ordering data

Rated output current	Rated power	Double Motor Module in booksize format		
		Internal air cooling	Internal air cooling with varnished modules	External air cooling
A	kW (HP) <sup>1)</sup>	Order No.	Order No.	Order No.
<b>DC link voltage 510 V to 720 V DC</b>				
2 x 3 A	2 x 1.6 (2 x 1.5)	<b>6SL3120-2TE13-0AA0</b>	<b>6SL3120-2TE13-0AB0</b>	<b>6SL3121-2TE13-0AA0</b>
2 x 5 A	2 x 2.7 (2 x 3)	<b>6SL3120-2TE15-0AA0</b>	<b>6SL3120-2TE15-0AB0</b>	<b>6SL3121-2TE15-0AA0</b>
2 x 9 A	2 x 4.8 (2 x 5)	<b>6SL3120-2TE21-0AA0</b>	<b>6SL3120-2TE21-0AB0</b>	<b>6SL3121-2TE21-0AA0</b>
2 x 18 A	2 x 9.7 (2 x 10)	<b>6SL3120-2TE21-8AA0</b>	<b>6SL3120-2TE21-8AB0</b>	<b>6SL3121-2TE21-8AA0</b>

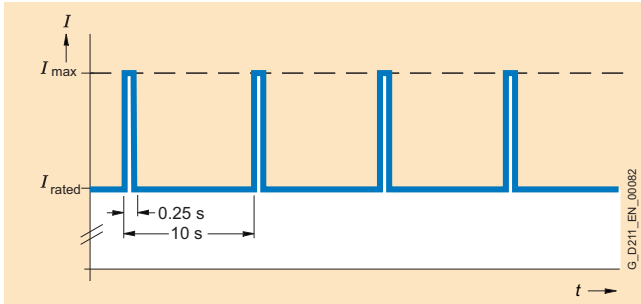
#### Accessories

Description	Order No.
<b>Power connector (X1/X2)</b> at Motor Module end, with screw-type terminals 1.5 mm <sup>2</sup> to 10 mm <sup>2</sup> , for Motor Modules with a rated output current of 3 to 30 A	<b>6SL3162-2MA00-0AA0</b>
<b>DC link supply adapter</b> for direct infeed of DC link voltage Screw-type terminals 0.5 mm <sup>2</sup> to 10 mm <sup>2</sup> for booksize format Line/Motor Modules with a width of 50 mm (1.97 in) or 100 mm (3.94 in)	<b>6SL3162-2BD00-0AA0</b>
<b>DC link adapters (2x)</b> for multi-tier configuration Screw-type terminals 35 mm <sup>2</sup> to 95 mm <sup>2</sup> for all Line Modules/Motor Modules in booksize format	<b>6SL3162-2BM01-0AA0</b>
<b>24 V terminal adapter</b> for all Line Modules/Motor Modules in booksize format	<b>6SL3162-2AA00-0AA0</b>
<b>24 V jumper</b> for connection of the 24 V busbars (for booksize format)	<b>6SL3162-2AA01-0AA0</b>
<b>Warning signs in foreign languages</b> This set of foreign language warning signs can be placed on top of the standard German or English signs. One sign in each of the following languages is provided in each set: Chinese, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Portuguese, Spanish and Swedish.	<b>6SL3166-3AB00-0AA0</b>

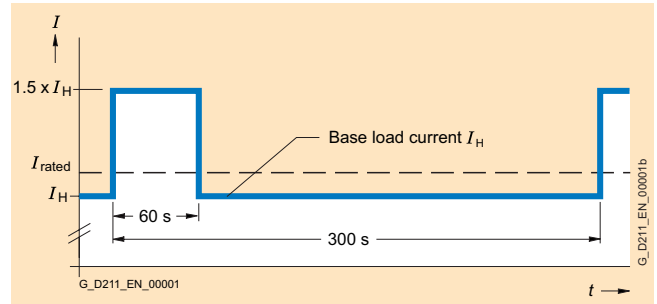
<sup>1)</sup> Nominal HP based on Asynchronous motors (induction motors).  
Match the motor nameplate current for specific sizing.

### Characteristics

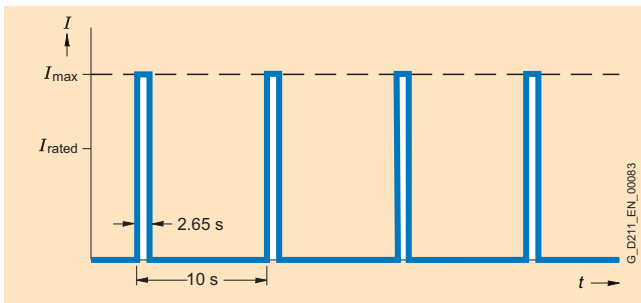
#### Overload capability



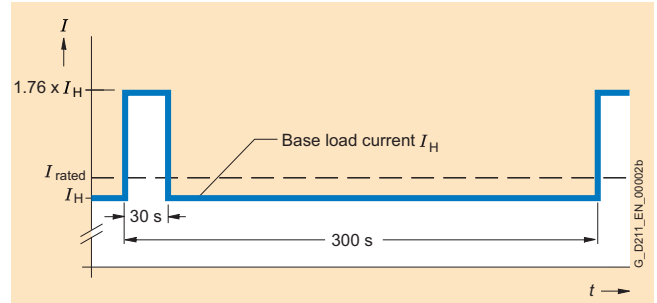
Load cycle with previous load



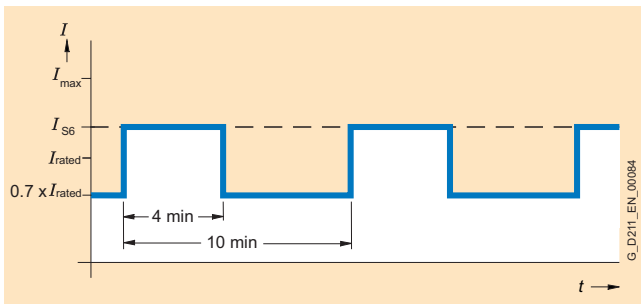
Load cycle with 60 s overload with a load cycle period of 300 s



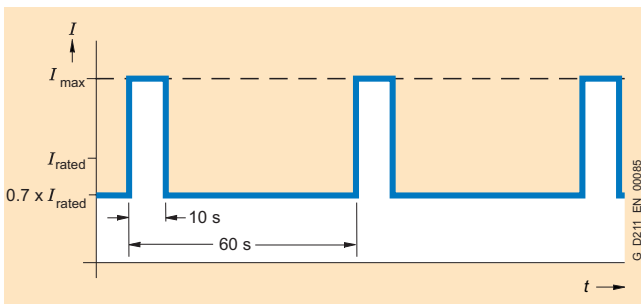
Load cycle without previous load



Load cycle with 30 s overload with a load cycle period of 300 s



S6 load cycle with previous load with a load cycle period of 600 s



S6 load cycle with previous load with a load cycle period of 60 s

# SINAMICS S120

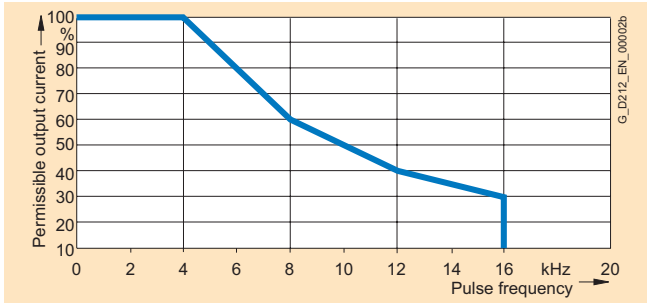
## Motor Modules

### Double Motor Modules in booksize format

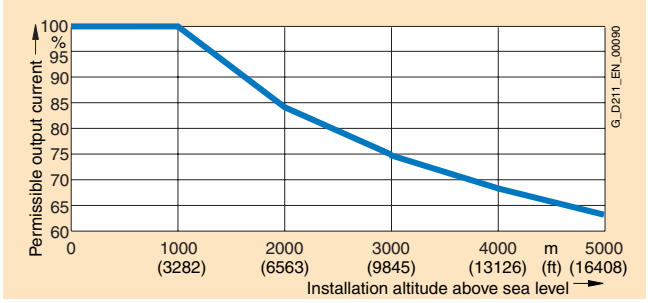
#### Characteristics (continued)

##### Derating characteristics

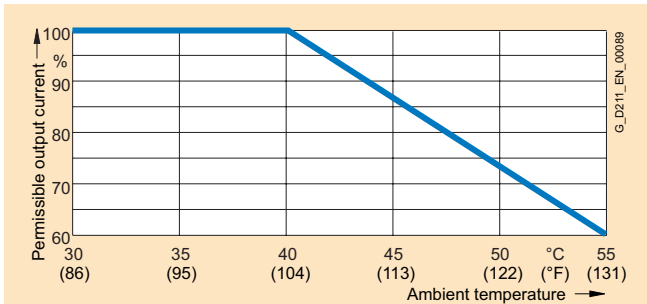
2



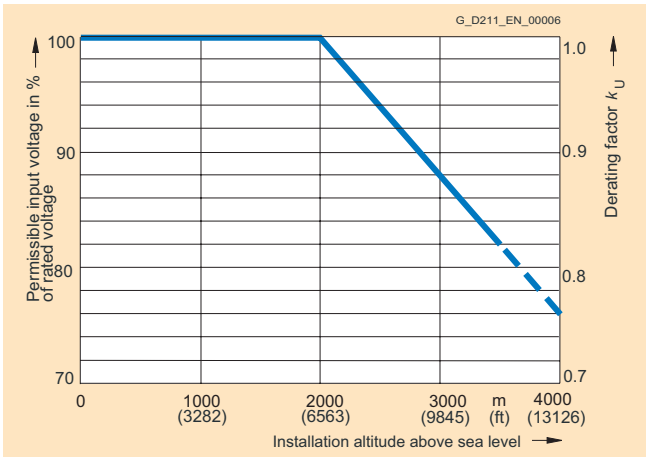
Output current dependent on pulse frequency



Output current dependent on installation altitude



Output current dependent on ambient temperature



Voltage derating dependent on installation altitude

#### Overview



A Braking Module and the matching external braking resistor are required to bring drives to a controlled standstill in the event of a power failure (e.g. emergency retraction or EMERGENCY OFF category 1) or limit the DC link voltage for brief periods of generator operation, e.g. when the regenerative feedback capability of the Line Module is deactivated. The Braking Module houses the power electronics and the associated control circuit. During operation, the DC link energy is converted to heat loss in an external braking resistor. Braking Modules function autonomously. A number of braking modules can be operated in parallel. In this case, each Braking Module must have its own braking resistor.

Braking Modules in booksize format can also be used for rapid discharge of the DC link.

#### Design

The Braking Module in booksize format features the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 electronics power supply connections via integrated 24 V DC bars
- Terminals for connecting the braking resistor
- 2 digital inputs (disable Braking Module/acknowledge faults and rapid discharge of DC link)
- 2 digital outputs (Braking Module disabled and prewarning –  $t$  monitoring)
- 2 PE (protective earth) connections

The status of the Braking Module is indicated via two 2-color LEDs.

#### Selection and ordering data

Description	Order No.
<b>DC link voltage 510 V to 720 V DC</b>	
<b>Braking Module in booksize format (varnished)</b> 1.5 kW/100 kW	<b>6SL3100-1AE31-0AB0</b>

#### Accessories

Description	Order No.
<b>Warning signs in foreign languages</b>	<b>6SL3166-3AB00-0AA0</b>
This set of foreign language warning signs can be placed on top of the standard German or English signs. One sign in each of the following languages is provided in each set: Chinese, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Portuguese, Spanish and Swedish.	

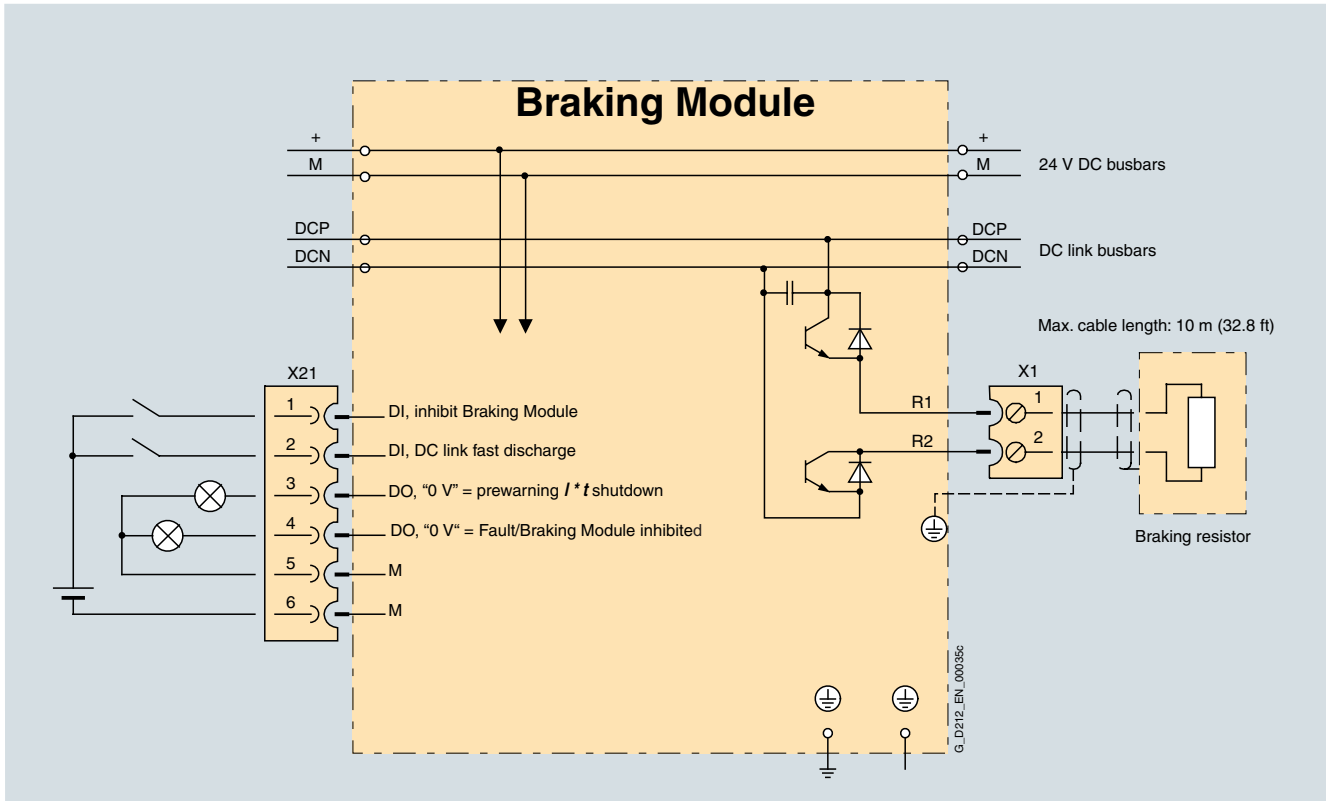
# SINAMICS S120

## DC link components

### Braking Modules in booksize format

#### Integration

2

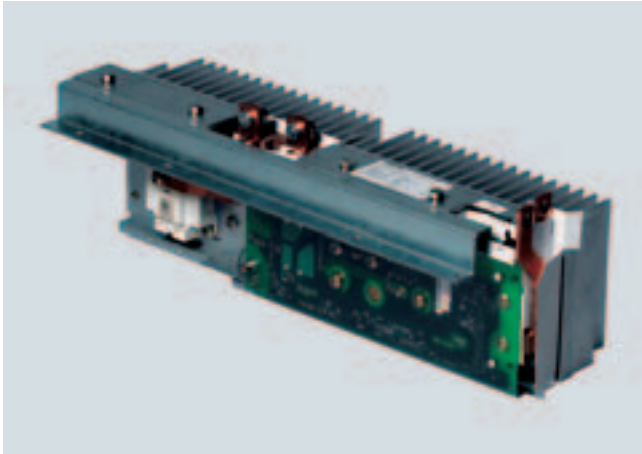


Connection example of Braking Module in booksize format

#### Technical data

DC link voltage 510 V to 720 V DC	Braking Module in booksize format (varnished)
Rated power $P_{DB}$	1.5 kW
Peak power $P_{max}$	100 kW
Activation threshold	770 V
Max. permissible cable length to braking resistor	10 m (32.8 ft)
DC link capacitance	110 $\mu$ F
Max. current requirements at 24 V DC	0.5 A
Digital inputs	
• Voltage	- 3 V to + 30 V
• Low level (an open digital input is interpreted as "low")	- 3 V to + 5 V
• High level	15 V to 30 V
• Current consumption (typ. at 24 V DC)	10 mA
• Max. connectable cross section	1.5 mm <sup>2</sup>
Digital outputs (continued-short-circuit-proof)	
• Voltage	24 V DC
• Max. load current per digital output	100 mA
• Max. connectable cross section	1.5 mm <sup>2</sup>
24 V DC busbar current capacity	20 A
DC link busbar current capacity	100 A
PE connection	On housing with M5 screw
Width	50 mm (1.97 in)
Height	380 mm (14.96 in)
Depth, with spacer (included in scope of supply)	270 mm (10.63 in)
Weight, approx.	4.1 kg (9 lb)

#### Overview



A Braking Module and the matching external braking resistor are required to bring drives to a controlled standstill in the event of a power failure (e.g. emergency retraction or EMERGENCY OFF category 1) or limit the DC link voltage for brief periods of generator operation, e.g. when the regenerative feedback capability of the Line Module is deactivated. 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. Braking Modules function autonomously. A number of braking modules can be operated in parallel. In this case, each Braking Module must have its own braking resistor.

The Braking Module in chassis format is inserted in a mounting location inside the Motor Module, Line Module or Power Module and is force cooled by the fan. The supply voltage for the electronics is drawn from the DC link. The Braking Module is connected to the DC link by means of the busbar sets and flexible cables, which are supplied as standard.

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 in chassis format feature 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 application threshold

#### Selection and ordering data

Description	Order No.
<b>DC link voltage 510 V to 720 V DC</b>	
<b>Braking Module in chassis format</b>	
• Frame size FX, 25 kW/125 kW	<b>6SL3300-1AE31-3AA0</b>
• Frame size GX, 50 kW/250 kW	<b>6SL3300-1AE32-5AA0</b>
• Frame sizes HX and JX, 50 kW/250 kW	<b>6SL3300-1AE32-5BA0</b>
<b>DC link voltage 890 V to 1035 V DC</b>	
<b>Braking Module in chassis format</b>	
• Frame size FX, 25 kW/125 kW	<b>6SL3300-1AH31-3AA0</b>
• Frame size GX, 50 kW/250 kW	<b>6SL3300-1AH32-5AA0</b>
• Frame sizes HX and JX, 50 kW/250 kW	<b>6SL3300-1AH32-5BA0</b>

#### Warning signs in foreign languages

Warning signs in other languages can be placed on top of the standard warning signs in German or English.

The following signs are supplied with chassis format units: Chinese, Danish, Finnish, French, Greek, Italian, Japanese, Korean, Dutch, Polish, Portuguese, Russian, Swedish, Spanish, Czech and Turkish.

#### Accessories

Description	Order No.
<b>Cable harness set</b> for mounting of Braking Modules frame size GX into a Basic Line Module frame size GB	<b>6SL3366-2NG00-0AA0</b>

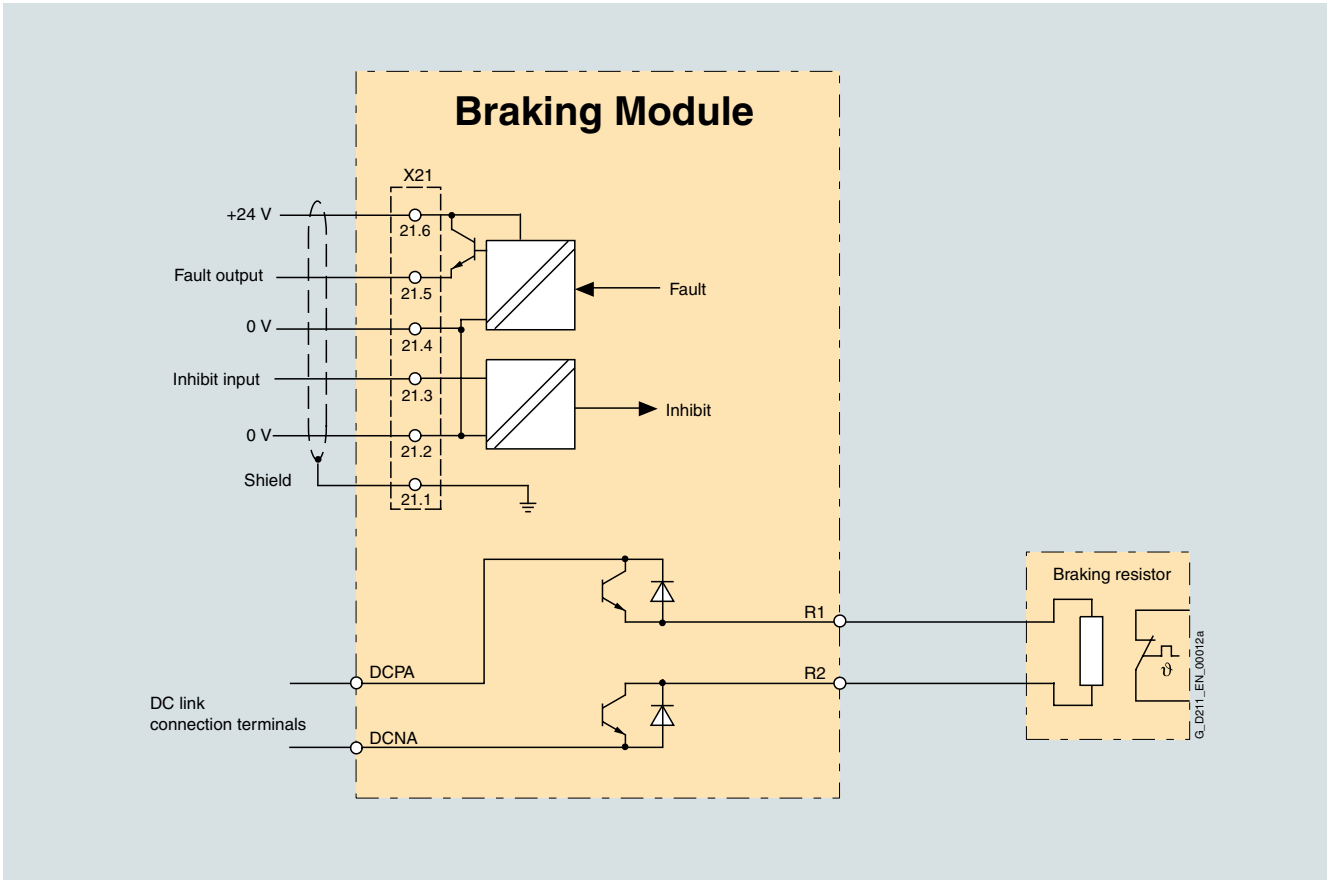
# SINAMICS S120

## DC link components

### Braking Modules in chassis format

#### Integration

2



Connection example of Braking Module in chassis format

#### Technical data

DC link voltage 510 V to 720 V DC	Braking Module in chassis format			
		6SL3300-1AE31-3AA0	6SL3300-1AE32-5AA0	6SL3300-1AE32-5BA0
$P_{DB}$ rated power	kW	25	50	50
$P_{15}$ peak power	kW	125	250	250
$P_{20}$ power	kW	100	200	200
$P_{40}$ power	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
Max. permissible cable length to braking resistor	m (ft)	50 (164)	50 (164)	50 (164)
Digital inputs				
• Voltage	V	-3 to +30	-3 to +30	-3 to +30
• Low level (an open digital input is interpreted as "low")	V	-3 to +5	-3 to +5	-3 to +5
• High level	V	15 to 30	15 to 30	15 to 30
• Current consumption (typ. at 24 V DC)	mA	10	10	10
• Max. connectable cross section	mm <sup>2</sup>	1.5	1.5	1.5
Digital outputs (continued-short-circuit-proof)				
• Voltage	V	DC 24	DC 24	DC 24
• Max. load current per digital output	mA	500	500	500
• Max. connectable cross section	mm <sup>2</sup>	1.5	1.5	1.5
Terminal/screw R1/R2		M8	M8	M8
Max. connectable cross section R1/R2	mm <sup>2</sup>	35	50	50
Weight, approx.	kg (lb)	3.6 (8)	7.3 (16)	7,5 (17)
Suitable for installation in a Moto Module/Active Line Module/Basic Line Module frame size	Frame size	FX/FB	GX/GB <sup>1)</sup>	HX/JX

DC link voltage 890 V to 1035 V DC	Braking Module in chassis format			
		6SL3300-1AH31-3AA0	6SL3300-1AH32-5AA0	6SL3300-1AH32-5BA0
$P_{DB}$ rated power	kW	25	50	50
$P_{15}$ peak power	kW	125	250	250
$P_{20}$ power	kW	100	200	200
$P_{40}$ power	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
Max. permissible cable length to braking resistor	m (ft)	50 (164)	50 (164)	50 (164)
Digital inputs				
• Voltage	V	-3 to +30	-3 to +30	-3 to +30
• Low level (an open digital input is interpreted as "low")	V	-3 to +5	-3 to +5	-3 to +5
• High level	V	15 to 30	15 to 30	15 to 30
• Current consumption (typ. at 24 V DC)	mA	10	10	10
• Max. connectable cross section	mm <sup>2</sup>	1.5	1.5	1.5
Digital outputs (continued-short-circuit-proof)				
• Voltage	V	DC 24	DC 24	DC 24
• Max. load current per digital output	mA	500	500	500
• Max. connectable cross section	mm <sup>2</sup>	1.5	1.5	1.5
Terminal/screw R1/R2		M8	M8	M8
Max. connectable cross section R1/R2	mm <sup>2</sup>	35	50	50
Weight, approx.	kg (lb)	3.6 (8)	7.3 (16)	7.5 (17)
Suitable for installation in a Motor Module/Active Line Module/Basic Line Module frame size	Frame size	FX/FB	GX/GB <sup>1)</sup>	HX/JX

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



# SINAMICS S120

## DC link components

### Braking resistors for blocksize format

#### Overview



Braking resistor for blocksize format, frame sizes FSA and FSC

The PM340 Power Modules cannot regenerate into the line supply. For regenerative operation, e.g. the braking of a rotating mass, a braking resistor must be connected to convert the resulting energy into heat.

The braking resistor is connected at terminals DCP/R1 and R2.

The braking resistors can be installed at the side next to the PM340 Power Modules. The braking resistors for the FSA and FSB frame sizes are designed as base components. If the PM340 Power Modules of the FSA or FSB frame size are operated without line reactor, the braking resistors can also be installed under the Power Modules.

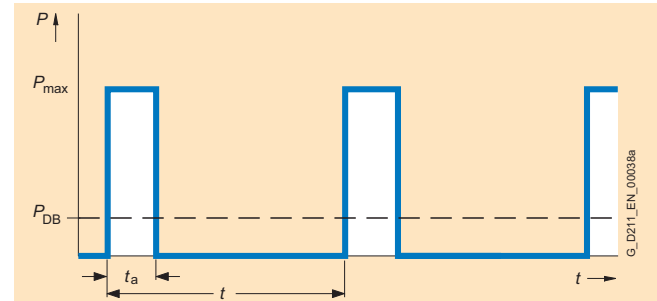
The braking resistors for the Power Modules of the FSC to FSF frame sizes should be placed outside the control cabinet or the switchgear room in order to direct the resulting heat loss away from the Power Modules, thereby allowing a corresponding reduction in the level of air conditioning required.

The braking resistors are designed with a temperature switch. The temperature switch must be evaluated to prevent consequential damage if the braking resistor overheats.

#### Selection and ordering data

Description	Suitable for Power Module, blocksize format	Order No.
<b>DC link voltage 240 V to 360 V DC (line voltage 200 V to 240 V 1 AC)</b>		
<b>Braking resistor</b>		
• 180 ohm	Frame size FSA	<b>6SE6400-4BC05-0AA0</b>
<b>DC link voltage 510 V to 720 V DC (line voltage 380 V to 480 V 3 AC)</b>		
<b>Braking resistor</b>		
• 390 ohm	Frame size FSA	<b>6SE6400-4BD11-0AA0</b>
• 160 ohm	Frame size FSB	<b>6SL3201-0BE12-0AA0</b>
• 56 ohm	Frame size FSC	<b>6SE6400-4BD16-5CA0</b>
• 27 ohm	Frame size FSD	<b>6SE6400-4BD21-2DA0</b>
• 15 ohm	Frame size FSE	<b>6SE6400-4BD22-2EA0</b>
• 8.2 ohm	Frame size FSF	<b>6SE6400-4BD24-0FA0</b>

#### Characteristics



Load diagram for braking resistors in blocksize format

$$t_a = 12 \text{ s}$$

$$t = 240 \text{ s}$$

#### Technical data

DC link voltage 240 V to 360 V DC		Braking resistor for Power Modules in blocksize format 6SE6400-4BC05-0AA0	
Resistor		180 ohm	
Rated power $P_{DB}$		0.05 kW	
Peak power $P_{max}$		1 kW	
Degree of protection <sup>1)</sup>		IP20	
Power connections		3 × 1.5 mm <sup>2</sup> (shielded) length 0.5 m (1.64 ft)	
Thermostatic switch (NC contact)			
• Switching capacity		250 V AC/max. 2.5 A	
• Connectable cable cross section		0.5 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	
Width		72 mm (2.83 in)	
Height		230 mm (9.05 in)	
Depth		43.5 mm (1.71 in)	
Weight, approx.		1.0 kg (2)	

DC link voltage 510 V to 720 V DC		Braking resistors for Power Modules in blocksize format						
		6SE6400-4BD11-0AA0	6SL3201-0BE12-0AA0	6SE6400-4BD16-5CA0	6SE6400-4BD21-2DA0	6SE6400-4BD22-2EA0	6SE6400-4BD24-0FA0	
Resistor	Ohm	390	160	56	27	15	8.2	
Rated power $P_{DB}$	kW	0.1	0.2	0.65	1.2	2.2	4.0	
Peak power $P_{max}$	kW	1.7	4.1	12	24	44	80	
Degree of protection <sup>1)</sup>		IP20	IP20	IP20	IP20	IP20	IP20	
Power connections		3 × 1.5 mm <sup>2</sup> (shielded) length 0.5 m (1.64 ft)	3 × 1.5 mm <sup>2</sup> (shielded) length 0.5 m (1.64 ft)	3 × 1.5 mm <sup>2</sup> (shielded) length 0.9 m (2.95 ft)	M6 screw studs	M6 screw studs	M6 screw studs	
Thermostatic switch (NC contact)								
• Switching capacity		250 V AC/ max. 2.5 A	250 V AC/ max. 2.5 A	250 V AC/ max. 2.5 A	250 V AC/ max. 2.5 A	250 V AC/ max. 2.5 A	250 V AC/ max. 0.2 A	
• Connectable cable cross section		0.5 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	0.5 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	0.5 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	0.5 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	0.5 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	0.5 mm <sup>2</sup> to 2.5 mm <sup>2</sup>	
Width	mm (inch)	72 (2.83)	153 (6.02)	185 (7.28)	270 (10.63)	270 (10.63)	400 (15.75)	
Height	mm (inch)	230 (9.05)	329 (12.95)	285 (11.22)	515 (20.28)	645 (25.39)	650 (25.59)	
Depth	mm (inch)	43.5 (1.71)	43.5 (1.71)	150 (5.9)	175 (6.89)	175 (6.89)	315 (12.4)	
Weight, approx.	kg (lb)	1.0 (2)	1.6 (3)	3.8 (8)	7.4 (16)	10.6 (23)	16.7 (37)	

<sup>1)</sup> With correctly connected load connection cable.

# SINAMICS S120

## DC link components

### Braking resistors for booksize format

#### Overview



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

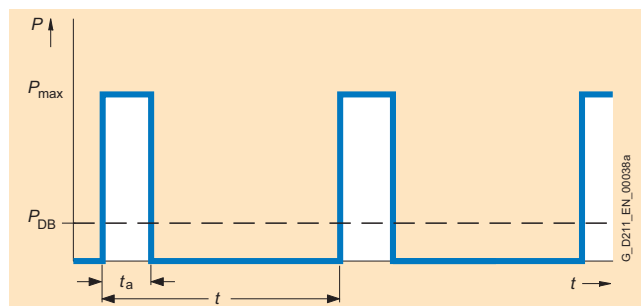
The braking resistor is connected to a Braking Module. The braking resistor is positioned outside the cabinet or switchgear room. This arrangement enables the resulting heat loss around the Line Modules / Motor Modules to be dissipated, thereby allowing a corresponding reduction in the level of air conditioning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

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

#### Selection and ordering data

Description	Order No.
<b>DC link voltage 510 V to 720 V DC</b>	
<b>Braking resistor</b>	
• 0.3 kW/25 kW	<b>6SN1113-1AA00-0DA0</b>
• 1.5 kW/100 kW	<b>6SL3100-1BE31-0AA0</b>

#### Characteristics



Load diagram for Braking Module and braking resistor in booksize format

The braking resistor is monitored on the basis of the mark-space ratio.

#### Technical data

DC link voltage 510 V to 720 V DC	Braking resistors for Braking Modules in booksize format					
		6SN1113-1AA00-0DA0		6SL3100-1BE31-0AA0		
Resistor	Ohm	17		5.7		
Rated power $P_{DB}$	kW	0.3		1.5		
Peak power $P_{max}$	kW	25		100		
In-service period for peak power $t_a$	s	0.1	0.4	1	2	
Period duration of braking duty cycle	s	11.5	210	68	460	
Degree of protection		IP54 Braking resistor with connected 1.5 mm <sup>2</sup> cable (shielded), 3 m (9.84 ft) long		IP20		
Width	mm (inch)	80 (3.15)		193 (7.6)		
Height	mm (inch)	210 (8.27)		410 (16.14)		
Depth	mm (inch)	53 (2.09)		240 (9.45)		
Weight, approx.	kg (lb)	3.4 (8)		5.6 (12)		

#### Overview



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

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

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

The braking resistor is monitored on the basis of the mark-space ratio. A temperature switch (NC contact) is also fitted. This responds when the maximum permissible temperature is exceeded and can be evaluated by a controller.

#### Technical data

DC link voltage 510 V to 720 V DC		Braking resistors for Braking Modules in chassis format	
		6SL3000-1BE31-3AA0	6SL3000-1BE32-5AA0
Resistor	Ohm	4.4	2.2
Rated power $P_{DB}$	kW	25	50
Peak power $P_{max}$	kW	125	250
In-service period for peak power	s	15	15
Period duration of braking duty cycle	s	90	90
Max. current	A	189	378
Cable entry		via M50 cable gland	via M50 cable gland
Power connection		via M10 stud terminal	via M10 stud terminal
Max. connectable cross section	mm <sup>2</sup>	50	70
Degree of protection		IP20	IP20
Width	mm (inch)	740 (29.13)	810 (31.89)
Height	mm (inch)	605 (23.82)	1325 (52.17)
Depth	mm (inch)	485 (19.09)	485 (19.09)
Weight, approx.	kg (lb)	50 (110)	120 (265)

DC link voltage 890 V to 1035 V DC		Braking resistors for Braking Modules in chassis format	
		6SL3000-1BH31-3AA0	6SL3000-1BH32-5AA0
Resistor	Ohm	9.8	4.9
Rated power $P_{DB}$	kW	25	50
Peak power $P_{max}$	kW	125	250
In-service period for peak power	s	15	15
Period duration of braking duty cycle	s	90	90
Max. current	A	125	255
Cable entry		via M50 cable gland	via M50 cable gland
Power connection		via M10 stud terminal	via M10 stud terminal
Max. connectable cross section	mm <sup>2</sup>	50	70
Degree of protection		IP20	IP20
Width	mm (inch)	740 (29.13)	810 (31.89)
Height	mm (inch)	605 (23.82)	1325 (52.17)
Depth	mm (inch)	485 (19.09)	485 (19.09)
Weight, approx.	kg (lb)	50 (110)	120 (265)

# SINAMICS S120

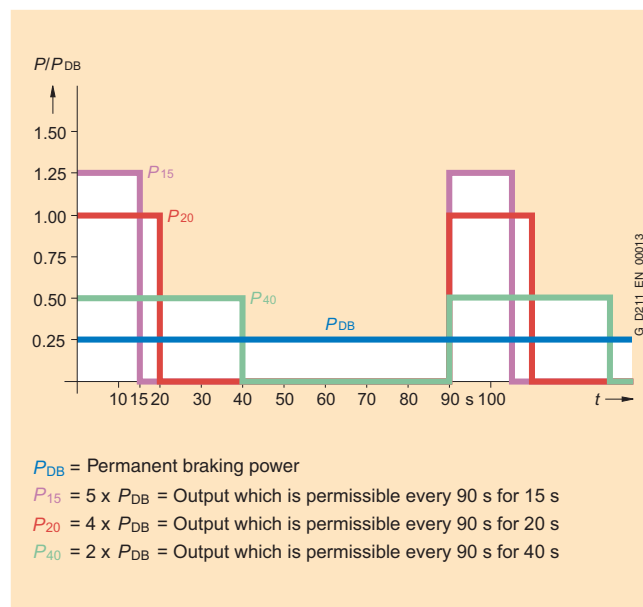
## DC link components

### Braking resistors for chassis format

#### Selection and ordering data

Description	Suitable for Braking Module in chassis format	Order No.
<b>DC link voltage 510 V to 720 V DC</b>		
<b>Braking resistor</b>		
• 25 kW/125 kW	6SL3300-1AE31-3AA0	<b>6SL3000-1BE31-3AA0</b>
• 50 kW/250 kW	6SL3300-1AE32-5 . A0	<b>6SL3000-1BE32-5AA0</b>
<b>DC link voltage 890 V to 1035 V DC</b>		
<b>Braking resistor</b>		
• 25 kW/125 kW	6SL3300-1AH31-3AA0	<b>6SL3000-1BH31-3AA0</b>
• 50 kW/250 kW	6SL3300-1AH32-5 . A0	<b>6SL3000-1BH32-5AA0</b>

#### Characteristics



Load diagram for Braking Module and braking resistor in chassis format

#### Overview



Capacitor Modules are used to increase the DC link capacitance to bridge momentary power losses.

Capacitor Modules are connected to the DC link voltage via the integrated DC link busbars. Capacitor Modules function autonomously.

Several Capacitor Modules can be operated in parallel.

#### Design

Capacitor Modules feature the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 PE (protective earth) connections

#### Selection and ordering data

Description	Order No.
<b>Capacitor Module in booksize format</b>	<b>6SL3100-1CE14-0AA0</b>

#### Accessories

Description	Order No.
<b>Warning signs in foreign languages</b>	<b>6SL3166-3AB00-0AA0</b>
<p>This set of foreign language warning signs can be placed on top of the standard German or English signs. One sign in each of the following languages is provided in each set: Chinese, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Portuguese, Spanish and Swedish.</p>	

#### Technical data

DC link voltage 510 V to 720 V DC	Capacitor Module
Capacitance	4000 $\mu$ F
24 V DC busbar current capacity	20 A
DC link busbar current capacity	100 A
PE connection	On housing with M5 screw
Width	100 mm (3.94 in)
Height	380 mm (14.96 in)
Depth, with spacer (included in scope of supply)	270 mm (10.63 in)
Weight, approx.	7.2 kg (16 lb)

# SINAMICS S120

## DC link components

### Control Supply Modules in booksize format

#### Overview



The Control Supply Module in booksize format provides a 24 V DC power supply via the line or DC link. This makes it possible, for example, to make emergency retraction movements in the event of a supply failure, provided that the DC link voltage is available.

#### Design

Control Supply Modules feature the following interfaces as standard:

- 1 power connection
- 2 DC link connections via integrated DC link busbars
- 2 electronics power supply connections via integrated 24 V DC bars
- 1 connection for the electronics power supply for Control Units, Terminal Modules, Sensor Modules, etc., via the 24 V terminal adapter provided in the scope of supply (max. cross section 6 mm<sup>2</sup>, max. fuse protection 20 A)
- 2 PE (protective earth) connections

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

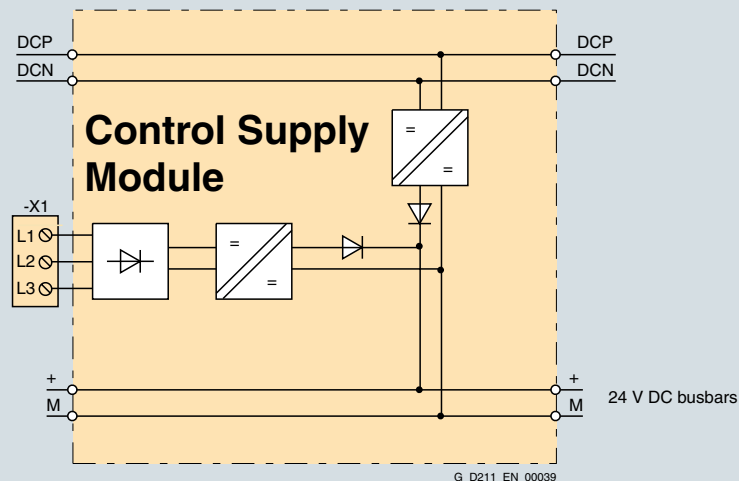
#### Selection and ordering data

Description	Order No.
<b>Control Supply Module in booksize format</b>	<b>6SL3100-1DE22-0AA0</b>

#### Accessories

Description	Order No.
<b>Warning signs in foreign languages</b> This set of foreign language warning signs can be placed on top of the standard German or English signs. One sign in each of the following languages is provided in each set: Chinese, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Portuguese, Spanish and Swedish.	<b>6SL3166-3AB00-0AA0</b>

#### Integration



Connection example of Control Supply Module

**Technical data**

DC link voltage 510 V to 720 V DC Line voltage 380 V to 480 V 3 AC	Control Supply Module in booksize format
Rated input current	
• at 400 V 3 AC	2.2 A
• at 600 V DC	1.1 A
Radio interference suppression (standard)	Class A1 to EN 55011 and Category C2 to EN 61800-3
Rated output voltage	26 V DC
Rated output current	20 A
24 V DC busbar current capacity	20 A
DC link busbar current capacity	100 A
Power connection L1, L2, L3 (X1)	Screw-type terminals 0.2 mm <sup>2</sup> to 4.0 mm <sup>2</sup>
PE connection	On housing with M5 screw
Width	50 mm (1.97 in)
Height	380 mm (14.96 in)
Depth, with spacer (included in scope of supply)	270 mm (10.63 in)
Weight, approx.	4.8 kg (11 lb)

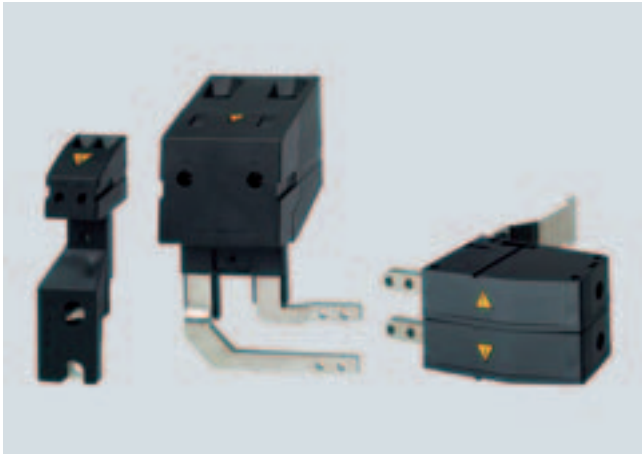


# SINAMICS S120

## DC link components

### DC link supply adapter for booksize format

#### Overview



If the internal Motor Module DC link busbars are not to be used, the DC link voltage can be provided externally via a DC link power supply adapter. Two versions are available depending on cable cross section. The DC link power supply adapter is mounted on the DC link busbars of the Motor Module. The DC link cables are routed from above.

If a multi-tier Motor Module configuration is used, a DC link power supply adapter set can be provided for linking the DC links of two drive groups. The DC link power supply adapters are mounted on the DC link busbars of the Motor Modules to the far right of each group. The DC link cables are routed from behind.

#### Technical data

		DC link supply adapter for booksize format		
		6SL3162-2BD00-0AA0	6SL3162-2BM00-0AA0	6SL3162-2BM01-0AA0
Connectable cross section (screw-type terminals)	mm <sup>2</sup>	0.5 to 10	35 to 95	35 to 95
Current carrying capacity	A	36	240	240
Weight, approx.	kg (lb)	0.06 (0.1)	0.48 (1.1)	0.76 (1.7)

#### Selection and ordering data

Description	Order No.
<b>DC link supply adapter</b> for direct infeed of DC link voltage for Line Modules and Motor Modules in booksize format	
• 50 mm (1.97 in) and 100 mm (3.94 in) wide	<b>6SL3162-2BD00-0AA0</b>
• 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in) wide	<b>6SL3162-2BM00-0AA0</b>
<b>DC link adapters (2x)</b> for multi-tier configuration for all Line Modules and Motor Modules in booksize format	<b>6SL3162-2BM01-0AA0</b>

#### Overview



Undesirable oscillations to ground potential can occur in drive groupings with total cable lengths (sum of all motor and DC link cables) of > 350 m (1148 ft) (shielded) or 560 m (1837 ft) (unshielded). The Voltage Clamping Module damps these oscillations, thereby allowing the total permissible cables lengths in a booksize format drive grouping to increase to 630 m (2067 ft) (shielded) or 850 m (2789 ft) (unshielded), taking derating into account (see characteristics of corresponding Line Modules).

With total cable lengths of > 350 m (1148 ft), the limit values of Category C2 defined in EN 61800-3 can be exceeded.

VCM Voltage Clamping Modules may be operated only in networks with grounded neutral (TN system).

Where possible, the Voltage Clamping Module should be mounted next to the Line Module and connected to the voltage-source DC link via the integrated DC busbar.

#### Design

The Voltage Clamping Module features the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 1 connection for HSB
- 2 PE (protective earth) connections

#### Technical data

DC link voltage 510 V to 720 V DC	Voltage Clamping Module in booksize format
24 V DC busbar current capacity	20 A
DC link busbar current capacity	100 A
PE connection	On housing with M5 screw
Grounding	Screw terminal Connectable cross section: 4 mm <sup>2</sup> to 16 mm <sup>2</sup>
Power loss, approx.	50 W
Width	50 mm (1.97 in)
Height	380 mm (14.96 in)
Depth, with spacer (included in scope of supply)	270 mm (10.63 in)
Weight, approx.	3.1 kg (7 lb)

#### Selection and ordering data

Description	Order No.
<b>Voltage Clamping Module in booksize format</b>	<b>6SL3100-1VE00-0AA0</b>

#### Accessories

Description	Order No.
<b>Warning signs in foreign languages</b> This set of foreign language warning signs can be placed on top of the standard German or English signs. One sign in each of the following languages is provided in each set: Chinese, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Portuguese, Spanish and Swedish.	<b>6SL3166-3AB00-0AA0</b>

# SINAMICS S120

## Load-side power components

### Motor reactors for blocksize format

#### Overview



Motor reactors for blocksize format, frame sizes FSA and FSB

Motor reactors reduce the voltage loading on the motor windings. At the same time, the capacitive charge/discharge currents that place an additional load on the power unit when long motor cables are used are reduced. The maximum permissible output frequency when a motor reactor is used is 150 Hz.

The motor reactors are designed for a pulse frequency of 4 kHz. Higher pulse frequencies are not permissible.

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

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

#### Technical data

DC link voltage 510 V to 720 V DC or line voltage 380 V to 480 V 3 AC		Motor reactor (for a 4 kHz pulse frequency)					
		6SE6400-3TC00-4AD2					
Rated current	A	4.5	4.5	4.5	4.5	4.5	
Power loss	kW	0.005	0.005	0.005	0.005	0.005	
Connection to the Power Module		Cable 4 x AWG16 (1.5 mm <sup>2</sup> ) length approx. 0.3 m (0.98 ft)	Cable 4 x AWG16 (1.5 mm <sup>2</sup> ) length approx. 0.3 m (0.98 ft)	Cable 4 x AWG16 (1.5 mm <sup>2</sup> ) length approx. 0.3 m (0.98 ft)	Cable 4 x AWG16 (1.5 mm <sup>2</sup> ) length approx. 0.3 m (0.98 ft)	Cable 4 x AWG16 (1.5 mm <sup>2</sup> ) length approx. 0.3 m (0.98 ft)	
Motor connection		Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	
PE connection		M5 bolt	M5 bolt	M5 bolt	M5 bolt	M5 bolt	
Max. permissible cable length between motor reactor and motor	m (ft)	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	
Width	mm (inch)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)	75.5 (2.97)	
Height	mm (inch)	201 (7.91)	201 (7.91)	201 (7.91)	201 (7.91)	201 (7.91)	
Depth	mm (inch)	110 (4.33)	110 (4.33)	110 (4.33)	110 (4.33)	110 (4.33)	
Degree of protection <sup>1)</sup>		IP20	IP20	IP20	IP20	IP20	
Weight, approx.	kg (lb)	2 (4)	2 (4)	2 (4)	2 (4)	2 (4)	
Suitable for Power Module, blocksize format	Type	6SL3210-1SE11-3UA0	6SL3210-1SE11-7UA0	6SL3210-1SE12-2UA0	6SL3210-1SE13-1UA0	6SL3210-1SE14-1UA0	
Rated current of the Power Module	A	1.3	1.7	2.2	3.1	4.1	
Size		FSA	FSA	FSA	FSA	FSA	

<sup>1)</sup> With correctly connected connection cable to the Power Module.

**Technical data** (continued)

DC link voltage 510 V to 720 V DC or line voltage 380 V to 480 V 3 AC		Motor reactor (for a 4 kHz pulse frequency)					
		6SL3202-0AE21-0CA0			6SL3202-0AJ23-2CA0		
Rated current	A	10	10	10	32	32	32
Power loss	kW	0.02	0.02	0.02	0.06	0.06	0.06
Connection to the Power Module		Cable 4 x AWG14 (1.5 mm <sup>2</sup> ) length approx. 0.4 m (1.31 ft)	Cable 4 x AWG14 (1.5 mm <sup>2</sup> ) length approx. 0.4 m (1.31 ft)	Cable 4 x AWG14 (1.5 mm <sup>2</sup> ) length approx. 0.4 m (1.31 ft)	Cable 4 x 6 mm <sup>2</sup> length approx. 0.35 m (1.15 ft)	Cable 4 x 6 mm <sup>2</sup> length approx. 0.35 m (1.15 ft)	Cable 4 x 6 mm <sup>2</sup> length approx. 0.35 m (1.15 ft)
Motor connection		Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>	Screw-type terminals for conductor cross section 6 mm <sup>2</sup>
PE connection		M5 bolt	M5 bolt	M5 bolt	M5 bolt	M5 bolt	M5 bolt
Max. permissible cable length between motor reactor and motor	m (ft)	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded
Width	mm (inch)	153 (6.02)	153 (6.02)	153 (6.02)	189 (7.44)	189 (7.44)	189 (7.44)
Height	mm (inch)	285 (11.22)	285 (11.22)	285 (11.22)	351 (13.82)	351 (13.82)	351 (13.82)
Depth	mm (inch)	70 (2.76)	70 (2.76)	70 (2.76)	80 (3.15)	80 (3.15)	80 (3.15)
Degree of protection <sup>1)</sup>		IP20	IP20	IP20	IP20	IP20	IP20
Weight, approx.	kg (lb)	4.5 (10)	4.5 (10)	4.5 (10)	9 (20)	9 (20)	9 (20)
Suitable for Power Module, blocksize format	Type	6SL3210-1SE16-0 . A0	6SL3210-1SE17-7 . A0	6SL3210-1SE21-0 . A0	6SL3210-1SE21-8 . A0	6SL3210-1SE22-5 . A0	6SL3210-1SE23-2 . A0
Rated current of the Power Module	A	5.9	7.7	10	18	25	32
Size		FSB	FSB	FSB	FSC	FSC	FSC

DC link voltage 510 V to 720 V DC or line voltage 380 V to 480 V 3 AC		Motor reactor (for a 4 kHz pulse frequency)				
		6SE6400-3TC05-4DD0	6SE6400-3TC03-8DD0	6SE6400-3TC05-4DD0	6SE6400-3TC08-0ED0	6SE6400-3TC07-5ED0
Rated current	A	68	45	68	104	90
Power loss	kW	0.2	0.2	0.2	0.17	0.27
Connection to the Power Module		Flat terminator for M6 cable lug	Flat terminator for M6 cable lug	Flat terminator for M6 cable lug	Flat terminator for M6 cable lug	Flat terminator for M6 cable lug
Motor connection		Flat terminator for M6 cable lug	Flat terminator for M6 cable lug	Flat terminator for M6 cable lug	Flat terminator for M6 cable lug	Flat terminator for M6 cable lug
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Max. permissible cable length between motor reactor and motor	m (ft)	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded
Width	mm (inch)	225 (8.86)	225 (8.86)	225 (8.86)	225 (8.86)	270 (10.63)
Height	mm (inch)	210 (8.27)	210 (8.27)	210 (8.27)	210 (8.27)	248 (9.76)
Depth	mm (inch)	140 (5.51)	140 (5.51)	140 (5.51)	140 (5.51)	189 (7.44)
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	11.5 (25)	19 (42)	11.5 (25)	12 (26)	27 (59)
Suitable for Power Module, blocksize format	Type	6SL3210-1SE23-8 . A0	6SL3210-1SE24-5 . A0	6SL3210-1SE26-0 . A0	6SL3210-1SE27-5 . A0	6SL3210-1SE31-0 . A0
Rated current of the Power Module	A	38	45	60	75	90
Size		FSD	FSD	FSD	FSE	FSE

<sup>1)</sup> With correctly connected connection cable to the Power Module.

# SINAMICS S120

## Load-side power components

### Motor reactors for blocksize format

#### Technical data (continued)

DC link voltage 510 V to 720 V DC or line voltage 380 V to 480 V 3 AC		Motor reactor (for a 4 kHz pulse frequency)		
		6SE6400-3TC14-5FD0	6SE6400-3TC14-5FD0	6SE6400-3TC14-5FD0
Rated current	A	178	178	178
Power loss	kW	0.47	0.25	0.47
Connection to the Power Module		Flat terminator for M8 cable lug	Flat terminator for M8 cable lug	Flat terminator for M8 cable lug
Motor connection		Flat terminator for M8 cable lug	Flat terminator for M8 cable lug	Flat terminator for M8 cable lug
PE connection		M8 screw	M8 screw	M8 screw
Max. permissible cable length between motor reactor and motor	m (ft)	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded
Width	mm (inch)	357 (14.05)	270 (10.63)	357 (14.05)
Height	mm (inch)	321 (12.64)	248 (9.76)	321 (12.64)
Depth	mm (inch)	221 (8.7)	189 (7.44)	221 (8.7)
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg (lb)	57 (126)	24 (53)	57 (126)
Suitable for Power Module, blocksize format	Type	6SL3210-1SE31-1 . A0	6SL3210-1SE31-5 . A0	6SL3210-1SE31-8 . A0
Rated current of the Power Module	A	110	145	178
Size		FSF	FSF	FSF

#### Selection and ordering data

Rated output current A	Rated power kW (HP)	Suitable for PM340 Power Module		Motor reactor
		Type	Size	Order No.
<b>Line voltage 380 V to 480 V 3 AC</b>				
1.3	0.37 (0.5)	6SL3210-1SE11-3UA0	FSA	6SE6400-3TC00-4AD2
1.7	0.55 (1)	6SL3210-1SE11-7UA0	FSA	6SE6400-3TC00-4AD2
2.2	0.75 (1)	6SL3210-1SE12-2UA0	FSA	6SE6400-3TC00-4AD2
3.1	1.1 (1.5)	6SL3210-1SE13-1UA0	FSA	6SE6400-3TC00-4AD2
4.1	1.5 (2)	6SL3210-1SE14-1UA0	FSA	6SE6400-3TC00-4AD2
5.9	2.2 (3)	6SL3210-1SE16-0...	FSB	6SL3202-0AE21-0CA0
7.7	3 (4)	6SL3210-1SE17-7...	FSB	6SL3202-0AE21-0CA0
10	4 (5)	6SL3210-1SE21-0...	FSB	6SL3202-0AE21-0CA0
18	7.5 (10)	6SL3210-1SE21-8...	FSC	6SL3202-0AJ23-2CA0
25	11 (15)	6SL3210-1SE22-5...	FSC	6SL3202-0AJ23-2CA0
32	15 (20)	6SL3210-1SE23-2...	FSC	6SL3202-0AJ23-2CA0
38	18.5 (25)	6SL3210-1SE23-8...	FCD	6SE6400-3TC05-4DD0
45	22 (30)	6SL3210-1SE24-5...	FCD	6SE6400-3TC03-8DD0
60	30 (40)	6SL3210-1SE26-0...	FCD	6SE6400-3TC05-4DD0
75	37 (50)	6SL3210-1SE27-5...	FSE	6SE6400-3TC08-0ED0
90	45 (60)	6SL3210-1SE31-0...	FSE	6SE6400-3TC07-5ED0
110	55 (70)	6SL3210-1SE31-1...	FSF	6SE6400-3TC14-5FD0
145	75 (100)	6SL3210-1SE31-5...	FSF	6SE6400-3TC15-4FD0
178	90 (120)	6SL3210-1SE31-8...	FSF	6SE6400-3TC14-5FD0

#### Overview



Motor reactors reduce the voltage loading on the motor windings. At the same time, the capacitive charge/discharge currents that place an additional load on the power unit when long motor cables are used are reduced. The maximum permissible output frequency when a motor reactor is used is 120 Hz.

The motor reactors are designed for a pulse frequency of 4 kHz. Higher pulse frequencies are not permissible.

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

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

#### Selection and ordering data

Rated output current of Motor Module	Suitable for Motor Module	Motor reactor
		Order No.
3 A and 2 × 3 A	6SL3120-1TE13-0AA0	<b>6SE7021-0ES87-1FE0</b>
	6SL3120-1TE13-0AB0	
	6SL3121-1TE13-0AA0	
	6SL3120-2TE13-0AA0	
	6SL3120-2TE13-0AB0	
	6SL3121-2TE13-0AA0	
5 A and 2 × 5 A	6SL3120-1TE15-0AA0	<b>6SE7021-0ES87-1FE0</b>
	6SL3120-1TE15-0AB0	
	6SL3121-1TE15-0AA0	
	6SL3120-2TE15-0AA0	
	6SL3120-2TE15-0AB0	
	6SL3121-2TE15-0AA0	
9 A and 2 × 9 A	6SL3120-1TE21-0AA1	<b>6SL3000-2BE21-0AA0</b>
	6SL3120-1TE21-0AB0	
	6SL3121-1TE21-0AA0	
	6SL3120-2TE21-0AA0	
	6SL3120-2TE21-0AB0	
	6SL3121-2TE21-0AA0	
18 A and 2 × 18 A	6SL3120-1TE21-8AA1	<b>6SE7022-6ES87-1FE0</b>
	6SL3120-1TE21-8AB0	
	6SL3121-1TE21-8AA0	
	6SL3120-2TE21-8AA0	
	6SL3120-2TE21-8AB0	
	6SL3121-2TE21-8AA0	
30 A	6SL3120-1TE23-0AA1	<b>6SE7024-7ES87-1FE0</b>
	6SL3120-1TE23-0AB0	
	6SL3121-1TE23-0AA0	
45 A	6SL3120-1TE24-5AA1	<b>6SE7027-2ES87-1FE0</b>
	6SL3120-1TE24-5AB0	
	6SL3121-1TE24-5AA0	
60 A	6SL3120-1TE26-0AA1	<b>6SL3000-2BE26-0AA0</b>
	6SL3120-1TE26-0AB0	
	6SL3121-1TE26-0AA0	
85 A	6SL3120-1TE28-5AA1	<b>6SE7031-5ES87-1FE0</b>
	6SL3120-1TE28-5AB0	
	6SL3121-1TE28-5AA0	
132 A	6SL3120-1TE31-3AA0	<b>6SE7031-8ES87-1FE0</b>
	6SL3120-1TE31-3AB0	
	6SL3121-1TE31-3AA0	
200 A	6SL3120-1TE32-0AA0	<b>6SE7032-6ES87-1FE0</b>
	6SL3120-1TE32-0AB0	
	6SL3121-1TE32-0AA0	

# SINAMICS S120

## Load-side power components

### Motor reactors for booksize format

#### Technical data

DC link voltage 510 V to 720 V DC or line voltage 380 V to 480 V 3 AC		Motor reactor (for a 4 kHz pulse frequency)				
		6SE7021-0ES87-1FE0	6SL3000-2BE21-0AA0	6SE7022-6ES87-1FE0	6SE7024-7ES87-1FE0	
Rated current	A	9.2	9.2	9	23	42
Power loss	kW	0.08	0.08	0.07	0.11	0.19
Connection Motor Module/Motor		4 mm <sup>2</sup> screw-type terminals	4 mm <sup>2</sup> screw-type terminals	4 mm <sup>2</sup> screw-type terminals	10 mm <sup>2</sup> screw-type terminals	Flat terminator for M8 cable lug
PE connection		M6 bolt	M6 bolt	M6 bolt	M6 bolt	M6 grounding stud
Max. permissible cable length between motor reactor and motor	m (ft)	100 (328) shielded 150 (492) unshielded	100 (328) shielded 150 (492) unshielded	135 (443) shielded 200 (656) unshielded	160 (525) shielded 240 (787) unshielded	190 (623) shielded 280 (917) unshielded
Width	mm (inch)	178 (7)	178 (7)	178 (7)	219 (8.62)	197 (7.76)
Height	mm (inch)	153 (6.02)	153 (6.02)	159 (6.26)	180 (7.09)	220 (8.66)
Depth	mm (inch)	97 (3.82)	97 (3.82)	111 (4.37)	132 (5.2)	121 (4.76)
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	6 (13)	6 (13)	5 (11)	9.5 (21)	20 (44)
Suitable for Motor Module in booksize format	Type	6SL3120-1TE13-0AA0 6SL3120-1TE13-0AB0 6SL3121-1TE13-0AA0 6SL3120-2TE13-0AA0 6SL3120-2TE13-0AB0 6SL3121-2TE13-0AA0	6SL3120-1TE15-0AA0 6SL3120-1TE15-0AB0 6SL3121-1TE15-0AA0 6SL3120-2TE15-0AA0 6SL3120-2TE15-0AB0 6SL3121-2TE15-0AA0	6SL3120-1TE21-0AA1 6SL3120-1TE21-0AB0 6SL3121-1TE21-0AA0 6SL3120-2TE21-0AA0 6SL3120-2TE21-0AB0 6SL3121-2TE21-0AA0	6SL3120-1TE21-8AA1 6SL3120-1TE21-8AB0 6SL3121-1TE21-8AA0 6SL3120-2TE21-8AA0 6SL3120-2TE21-8AB0 6SL3121-2TE21-8AA0	6SL3120-1TE23-0AA1 6SL3120-1TE23-0AB0 6SL3121-1TE23-0AA0
Rated current of the Motor Module	A	3	5	9	18	30

DC link voltage 510 V to 720 V DC or line voltage 380 V to 480 V 3 AC		Motor reactor (for a 4 kHz pulse frequency)				
		6SE7027-2ES87-1FE0	6SL3000-2BE26-0AA0	6SE7031-5ES87-1FE0	6SE7031-8ES87-1FE0	6SE7032-6ES87-1FE0
Rated current	A	65	60	131	167	234
Power loss	kW	0.2	0.1	0.22	0.29	0.29
Connection Motor Module/Motor		Flat terminator for M8 cable lug	Flat terminator for M8 cable lug	Flat terminator for M8 cable lug	Flat terminator for M8 cable lug	Flat terminator for M8 cable lug
PE connection		M6 bolt	M6 bolt	M6 grounding stud	M6 grounding stud	M6 grounding stud
Max. permissible cable length between motor reactor and motor	m (ft)	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded
Width	mm (inch)	267 (10.51)	267 (10.51)	219 (8.62)	281 (11.06)	281 (11.06)
Height	mm (inch)	221 (8.7)	220 (8.66)	220 (8.66)	250 (9.84)	250 (9.84)
Depth	mm (inch)	131 (5.16)	126 (4.96)	145 (5.7)	171 (6.73)	184 (7.24)
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	11 (24)	10.5 (23)	25 (55)	30 (66)	30 (66)
Suitable for Motor Module in booksize format	Type	6SL3120-1TE24-5AA1 6SL3120-1TE24-5AB0 6SL3121-1TE24-5AA0	6SL3120-1TE26-0AA1 6SL3120-1TE26-0AB0 6SL3121-1TE26-0AA0	6SL3120-1TE28-5AA1 6SL3120-1TE28-5AB0 6SL3121-1TE28-5AA0	6SL3120-1TE31-3AA0 6SL3120-1TE31-3AB0 6SL3121-1TE31-3AA0	6SL3120-1TE32-0AA0 6SL3120-1TE32-0AB0 6SL3121-1TE32-0AA0
Rated current of the Motor Module	A	45	60	85	132	200



#### Overview



Motor reactors reduce the voltage loading on the motor windings. At the same time, the capacitive charge/discharge currents that place an additional load on the power unit 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.

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

#### Technical data

DC link voltage 510 V to 720 V DC or line voltage 380 V to 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	kW	0.486	0.5	0.47	0.5	0.5
Line/load connection		M10	M10	M10	M10	M12
PE connection		M8	M8	M8	M8	M8
Max. permissible cable length between motor reactor and motor	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Width	mm (inch)	300 (11.81)	300 (11.81)	300 (11.81)	300 (11.81)	300 (11.81)
Height	mm (inch)	285 (11.22)	315 (12.4)	285 (11.22)	285 (11.22)	365 (14.37)
Depth	mm (inch)	257 (10.12)	277 (10.9)	257 (10.12)	277 (10.9)	277 (10.9)
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	66 (146)	66 (146)	66 (146)	73 (161)	100 (221)
Suitable for Single Motor Module in chassis format	Type	6SL3320-1TE32-1AA0	6SL3320-1TE32-6AA0	6SL3320-1TE33-1AA0	6SL3320-1TE33-8AA0	6SL3320-1TE35-0AA0
Suitable for Power Module in chassis format	Type	6SL3310-1TE32-1AA0	6SL3310-1TE32-6AA0	6SL3310-1TE33-1AA0	6SL3310-1TE33-8AA0	6SL3310-1TE35-0AA0
Rated current of Motor Module or Power Module	A	210	260	310	380	490
Rated output of the Motor Module or Power Module	kW (HP)	110 (150)	132 (200)	160 (250)	200 (300)	250 (400)



# SINAMICS S120

## Load-side power components

### Motor reactors for chassis format

#### Technical data

DC link voltage 510 V to 720 V DC or line voltage 380 V to 480 V 3 AC		Motor reactor (for pulse frequencies of 1.25 kHz to 2.5 kHz)					
		6SL3000- 2AE36-1AA0	6SL3000- 2AE38-4AA0	6SL3000- 2AE38-4AA0	6SL3000- 2AE41-0AA0	6SL3000-2AE41-4AA0	
Rated current	A	605	840	840	985	1405	1405
Power loss	kW	0.9	0.83	0.943	1.062	0.962	1.054
Line/load connection		M12	M12	M12	M12	2 x M12	2 x M12
PE connection		M8	M10	M10	M10	M10	M10
Max. permissible cable length between motor reactor and motor	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Width	mm (inch)	410 (16.14)	410 (16.14)	410 (16.14)	410 (16.14)	460 (18.11)	460 (18.11)
Height	mm (inch)	392 (15.43)	392 (15.43)	392 (15.43)	392 (15.43)	392 (15.43)	392 (15.43)
Depth	mm (inch)	292 (11.5)	292 (11.5)	292 (11.5)	302 (11.89)	326 (12.83)	326 (12.83)
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	130 (287)	140 (309)	140 (309)	146 (322)	179 (395)	179 (395)
Suitable for Single Motor Module in chassis format	Type	6SL3320-1TE36-1AA0	6SL3320-1TE37-5AA0	6SL3320-1TE38-4AA0	6SL3320-1TE41-0AA0	6SL3320-1TE41-2AA0	6SL3320-1TE41-4AA0
Rated current of the Motor Module	A	605	745	840	985	1260	1405
Rated output of the Motor Module	kW (HP)	315 (500)	400 (600)	450 (700)	560 (800)	710 (1000)	800 (1150)

DC link voltage 890 V to 1035 V DC or line voltage 660 V to 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	kW	0.257	0.3	0.318	0.335	0.4	0.425
Line/load connection		M10	M10	M10	M10	M10	M10
PE connection		M6	M6	M6	M6	M6	M6
Max. permissible cable length between motor reactor and motor	m (ft)	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded
Width	mm (inch)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)	300 (11.81)	300 (11.81)
Height	mm (inch)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)	285 (11.22)	285 (11.22)
Depth	mm (inch)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	212 (8.35)	212 (8.35)
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	25 (55)	25 (55)	25.8 (57)	25.8 (57)	34 (75)	34 (75)
Suitable for Single Motor Module in chassis format	Type	6SL3320-1TH28-5AA0	6SL3320-1TH31-0AA0	6SL3320-1TH31-2AA0	6SL3320-1TH31-5AA0	6SL3320-1TH31-8AA0	6SL3320-1TH32-2AA0
Rated current of the Motor Module	A	85	100	120	150	175	215
Rated output of the Motor Module	kW	75	90	110	132	160	200

#### Technical data

DC link voltage 890 V to 1035 V DC or line voltage 660 V to 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	kW	0.44	0.45	0.545	0.72	0.8	0.96
Line/load connection		M10	M10	M12	M12	M12	M12
PE connection		M6	M6	M8	M8	M8	M8
Max. permissible cable length between motor reactor and motor	m (ft)	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded
Width	mm (inch)	300 (11.81)	300 (11.81)	350 (13.78)	410 (16.14)	410 (16.14)	410 (16.14)
Height	mm (inch)	285 (11.22)	285 (11.22)	330 (12.99)	392 (15.43)	392 (15.43)	392 (15.43)
Depth	mm (inch)	212 (8.35)	212 (8.35)	215 (8.46)	292 (11.5)	292 (11.5)	279 (10.98)
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	40 (88)	46 (101)	68 (150)	80 (176)	80 (176)	146 (322)
Suitable for Single Motor Module in chassis format	Type	6SL3320-1TH32-6AA0	6SL3320-1TH33-3AA0	6SL3320-1TH34-1AA0	6SL3320-1TH34-7AA0	6SL3320-1TH35-8AA0	6SL3320-1TH37-4AA0
Rated current of the Motor Module	A	260	330	410	465	575	735
Rated output of the Motor Module	kW	250	315	400	450	560	710

DC link voltage 890 V to 1035 V DC or line voltage 660 V to 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	kW	1.0	0.97	1.05	0.95
Line/load connection		M12	M12	M12	M12
PE connection		M8	M8	M8	M8
Max. permissible cable length between motor reactor and motor	m (ft)	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded	200 (656) shielded 300 (984) unshielded
Width	mm (inch)	410 (16.14)	410 (16.14)	410 (16.14)	460 (18.11)
Height	mm (inch)	392 (15.43)	392 (15.43)	392 (15.43)	392 (15.43)
Depth	mm (inch)	279 (10.98)	279 (10.98)	317 (12.48)	296 (11.65)
Degree of protection		IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	146 (322)	150 (331)	163 (360)	153 (337)
Suitable for Single Motor Module in chassis format	Type	6SL3320-1TH38-1AA0	6SL3320-1TH38-8AA0	6SL3320-1TH41-0AA0	6SL3320-1TH41-3AA0
Rated current of the Motor Module	A	810	910	1025	1270
Rated output of the Motor Module	kW	800	900	1000	1200

# SINAMICS S120

## Load-side power components

### Motor reactors for chassis format

#### Selection and ordering data

Rated current of the Motor Module or Power Module A	Rated output of the Motor Module or Power Module kW (HP)	Suitable for Motor Module/Power Module Type	Motor reactor Order No.
<b>DC link voltage 510 V to 720 V DC (line voltage 380 V to 480 V 3 AC)</b>			
210	110 (150)	6SL33 . 0-1TE32-1AA0	<b>6SL3000-2BE32-1AA0</b>
260	132 (200)	6SL33 . 0-1TE32-6AA0	<b>6SL3000-2BE32-6AA0</b>
310	160 (250)	6SL33 . 0-1TE33-1AA0	<b>6SL3000-2BE33-2AA0</b>
380	200 (300)	6SL33 . 0-1TE33-8AA0	<b>6SL3000-2BE33-8AA0</b>
490	250 (400)	6SL33 . 0-1TE35-0AA0	<b>6SL3000-2BE35-0AA0</b>
605	315 (500)	6SL3320-1TE36-1AA0	<b>6SL3000-2AE36-1AA0</b>
745	400 (600)	6SL3320-1TE37-5AA0	<b>6SL3000-2AE38-4AA0</b>
840	450 (700)	6SL3320-1TE38-4AA0	<b>6SL3000-2AE38-4AA0</b>
985	560 (800)	6SL3320-1TE41-0AA0	<b>6SL3000-2AE41-0AA0</b>
1260	710 (1000)	6SL3320-1TE41-2AA0	<b>6SL3000-2AE41-4AA0</b>
1405	800 (1150)	6SL3320-1TE41-4AA0	<b>6SL3000-2AE41-4AA0</b>
<b>DC link voltage 890 V to 1035 V DC (line voltage 660 V to 690 V 3 AC)</b>			
85	75	6SL3320-1TH28-5AA0	<b>6SL3000-2AH31-0AA0</b>
100	90	6SL3320-1TH31-0AA0	<b>6SL3000-2AH31-0AA0</b>
120	110	6SL3320-1TH31-2AA0	<b>6SL3000-2AH31-5AA0</b>
150	132	6SL3320-1TH31-5AA0	<b>6SL3000-2AH31-5AA0</b>
175	160	6SL3320-1TH31-8AA0	<b>6SL3000-2AH31-8AA0</b>
215	200	6SL3320-1TH32-2AA0	<b>6SL3000-2AH32-4AA0</b>
260	250	6SL3320-1TH32-6AA0	<b>6SL3000-2AH32-6AA0</b>
330	315	6SL3320-1TH33-3AA0	<b>6SL3000-2AH33-6AA0</b>
410	400	6SL3320-1TH34-1AA0	<b>6SL3000-2AH34-5AA0</b>
465	450	6SL3320-1TH34-7AA0	<b>6SL3000-2AH34-7AA0</b>
575	560	6SL3320-1TH35-8AA0	<b>6SL3000-2AH35-8AA0</b>
735	710	6SL3320-1TH37-4AA0	<b>6SL3000-2AH38-1AA0</b>
810	800	6SL3320-1TH38-1AA0	<b>6SL3000-2AH38-1AA0</b>
910	900	6SL3320-1TH38-8AA0	<b>6SL3000-2AH41-0AA0</b>
1025	1000	6SL3320-1TH41-0AA0	<b>6SL3000-2AH41-1AA0</b>
1270	1200	6SL3320-1TH41-3AA0	<b>6SL3000-2AH41-3AA0</b>

#### Overview



If a sinusoidal filter is connected at the Motor Module output, 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 Motor Modules must be set to 4 kHz for the sinusoidal filters.

With chassis format units, this reduces the maximum possible output current and the maximum achievable output voltage (see characteristics for Single Motor Modules in chassis format and System Description). The voltage drops across the sinusoidal filter, a factor which must also be taken into account in the drive design (see System Description)

The sinusoidal filter must be installed as close as possible to the Motor Module.

#### Technical data

DC link voltage 510 V to 720 V DC		Sinusoidal filter for chassis format 6SL3000-2CE32-3AA0				
		6SL3000-2CE32-8AA0	6SL3000-2CE33-3AA0	6SL3000-2CE34-1AA0		
Rated current	A	225	225	276	333	408
Power loss 50 Hz/60 Hz	kW	0.35/0.6	0.35/0.6	0.4/0.69	0.245/0.53	0.38/0.7
Line/load connection		M10 connecting lugs	M10 connecting lugs	M10 connecting lugs	M10 connecting lugs	M10 connecting lugs
PE connection		M10 connecting lugs	M10 connecting lugs	M10 connecting lugs	M10 connecting lugs	M10 connecting lugs
Max. permissible cable length between sinusoidal filter and motor	m (ft)	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded	300 (984) shielded 450 (1477) unshielded
Degree of protection		IP00	IP00	IP00	IP00	IP00
Width	mm (inch)	620 (24.4)	620 (24.4)	620 (24.4)	620 (24.4)	620 (24.4)
Height	mm (inch)	300 (11.81)	300 (11.81)	300 (11.81)	370 (14.57)	370 (14.57)
Depth	mm (inch)	320 (12.6)	320 (12.6)	320 (12.6)	360 (14.17)	360 (14.17)
Weight, approx.	kg (lb)	124 (273)	124 (273)	127 (280)	136 (300)	198 (437)
Suitable for Single Motor Module in chassis format	Type	6SL3320-1TE32-1AA0	6SL3320-1TE32-6AA0	6SL3320-1TE33-1AA0	6SL3320-1TE33-8AA0	6SL3320-1TE35-0AA0
Suitable for Power Module in chassis format	Type	6SL3310-1TE32-1AA0	6SL3310-1TE32-6AA0	6SL3310-1TE33-1AA0	6SL3310-1TE33-8AA0	6SL3310-1TE35-0AA0
Rated current of the Motor Module or Power Module at pulse frequency of 4 kHz	A	170	215	270	330	380
Rated output of the Motor Module or Power Module at pulse frequency of 4 kHz	kW (HP)	90 (120)	110 (150)	132 (200)	160 (250)	200 (400)

# SINAMICS S120

## Load-side power components

### Sinusoidal filter for chassis format

#### Selection and ordering data

Rated output current of the Motor Module or Power Module	Rated output of the Motor Module or Power Module	Suitable for Motor Module/Power Module	Sinusoidal filter
A	kW (HP)	Type	Order No.
<b>DC link voltage 510 V to 720 V DC (line voltage 380 V to 480 V 3 AC)</b>			
210	110 (150)	6SL33 . 0-1TE32-1AA0	<b>6SL3000-2CE32-3AA0</b>
260	132 (200)	6SL33 . 0-1TE32-6AA0	<b>6SL3000-2CE32-3AA0</b>
310	160 (250)	6SL33 . 0-1TE33-1AA0	<b>6SL3000-2CE32-8AA0</b>
380	200 (300)	6SL33 . 0-1TE33-8AA0	<b>6SL3000-2CE33-3AA0</b>
490	250 (400)	6SL33 . 0-1TE35-0AA0	<b>6SL3000-2CE34-1AA0</b>

#### Overview



BOP20 Basic Operator Panel

The BOP20 Basic Operator Panel can be inserted on any CU310 or CU320 Control Unit and may be used to acknowledge faults, set parameters and read diagnostic information (e.g. warnings 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 back of the BOP20 Basic Operator Panel is used for the power supply of the BOP20 Basic Operator Panel and communication with the CU310 or CU320 Control Unit.

#### Integration



CU310 DP Control Unit with mounted BOP20 Basic Operator Panel



CU320 Control Unit with mounted BOP20 Basic Operator Panel

#### Selection and ordering data

Description	Order No.
<b>BOP20 Basic Operator Panel</b>	<b>6SL3055-0AA00-4BA0</b>

# SINAMICS S120

## Supplementary system components

### CBC10 Communication Board

#### Overview



The CBC10 Communication Board is used to interface the CU320 Control Unit and therefore the drives 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 in each case of input and output.

#### Technical data

CBC10 Communication Board	
Max. current requirement (at 24 V DC) via CU320 Control Unit	0.05 A
Power loss	< 10 W
Weight, approx.	0.1 kg (0.2 lb)

#### Selection and ordering data

Description	Order No.
<b>CBC10 Communication Board</b>	<b>6SL3055-0AA00-2CA0</b>

#### Accessories

Description	Order No.
<b>SUB-D connector</b> , 9-pin, female (3x)	<b>6FC9341-2AE</b>
<b>SUB-D connector</b> , 9-pin, male (3x)	<b>6FC9341-2AF</b>

#### Overview



The CBE20 Communication Board can be used to connect the SINAMICS S120 drive system to a PROFINET IO network via a CU320 Control Unit. The SINAMICS S120 then assumes the function of a PROFINET IO device and can perform the following:

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

#### Integration

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

#### Technical data

##### CBE20 Communication Board

Max. current requirement (at 24 V DC)	0.16 A
Permissible ambient temperature	
• Storage and transport	- 40 °C to + 70 °C (- 40 °F to + 158 °F)
• Operation	0 °C to + 55 °C (32 °F to + 131 °F)
Dimensions	130 mm × 78 mm (5.11 in × 3.07 in)
Weight, approx.	76 g (0.17 lb)

#### Selection and ordering data

Description	Order No.
<b>CBE20 Communication Board</b>	<b>6SL3055-0AA00-2EB0</b>

#### Accessories

The PROFINET cables and connectors listed below are recommended:

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

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



# SINAMICS S120

## Supplementary system components

### CBE30 Communication Board

#### Overview



The CBE30 Communication Board for SIMOTION D425, D435 and D445 allows the SIMOTION to be connected to a PROFINET IO network. The SIMOTION D then assumes the function of a PROFINET IO Controller and can perform the following functions:

- PROFINET IO Controller
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
  - RT (RealTime)
  - IRT (Isochronous RealTime)
- Connects distributed IOs as PROFINET IO devices
- Connects drives as PROFINET IO devices using PROFIdrive compliant with specification V4
- Supports standard Ethernet communication (TCP/IP), e.g. for interfacing SIMOTION SCOUT, HMI or standard TCP, UDP communication, to devices of any other type
- Integrated 4-port switch with four RJ45 sockets based on the PROFINET ASIC ERTEC400. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

#### Integration

The CBE30 Communication Board plugs into the option slot on the SIMOTION D Control Unit.

#### Technical data

CBE30 Communication Board	
Max. current requirement (at 24 V DC)	0.25 A
Permissible ambient temperature	
• Storage and transport	- 40 °C to + 70 °C (- 40 °F to + 158 °F)
• Operation	0 °C to + 55 °C (32 °F to + 131 °F)
Dimensions	113 mm × 77 mm (4.45 in × 3.03 in)
Weight, approx.	100 g (0.22 lb)

#### Selection and ordering data

Description	Order No.
<b>CBE30 Communication Board</b>	<b>6FC5312-0FA00-0AA0</b>

#### Accessories

The PROFINET cables and connectors listed below are recommended:

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

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

#### Overview



The CUA31 Control Unit Adapter converts the PM-IF interface to a DRIVE-CLiQ interface. This adapter allows Power Modules in blocksize format to operate on a CU320 or SIMOTION D Control Unit.

#### Design

The CUA31 Control Unit Adapter features the following interfaces:

- 1 temperature sensor input (KTY84-130 or PTC)
- 3 DRIVE-CLiQ sockets
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 safe standstill input (enable pulses)

The status of the CUA31 Control Unit Adapter is indicated via multi-color LEDs.

#### Technical data

##### CUA31 Control Unit Adapter

Max. current requirement (at 24 V DC) without DRIVE-CLiQ supply	0.15 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Width	73 mm (2.87 in)
Height	165.8 mm (6.53 in)
Depth	37.3 mm (1.47 in)
Weight, approx.	0.31 kg (0.68 lb)

#### Selection and ordering data

Description	Order No.
<b>CUA31 Control Unit Adapter</b> (without DRIVE-CLiQ cable)	<b>6SL3040-0PA00-0AA0</b>

# SINAMICS S120

## Supplementary system components

### CUA31 Control Unit Adapter

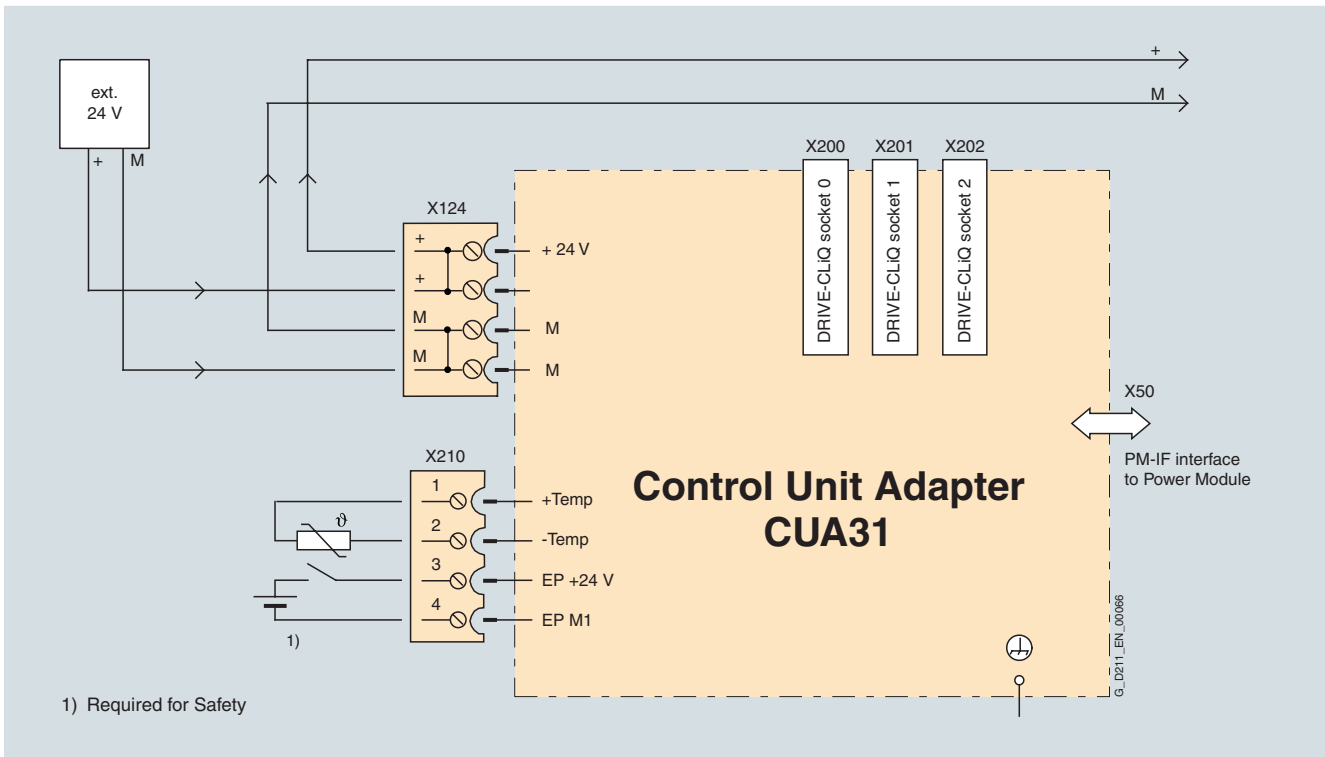
#### Integration

The CUA31 Control Unit Adapter is snapped onto the Power Module in blocksize format and communicates with the CU320 or SIMOTION D Control Unit by means of a DRIVE-CLiQ link.

The CUA31 Control Unit Adapter's power is supplied by the Power Module via the PM-IF interface. If the CUA31 Control Unit Adapter needs to communicate when the Power Module is switched off, it must be supplied with 24 V DC from an external source.

Other DRIVE-CLiQ devices such as Sensor Modules or Terminal Modules can be connected to the CUA31 Control Unit Adapter.

2



#### Overview



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

#### Design

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

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

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

#### Technical data

##### DMC20 DRIVE-CLiQ Hub Module

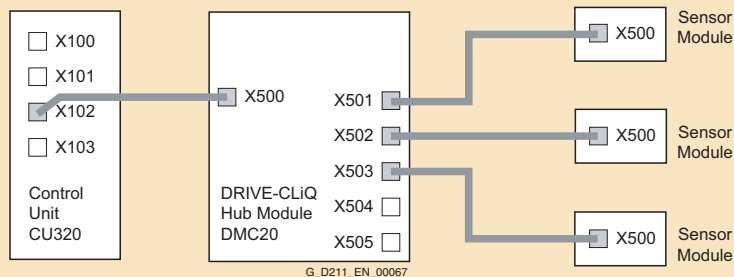
Max. current requirement (at 24 V DC) without DRIVE-CLiQ supply	0.15 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Width	50 mm (1.97 in)
Height	150 mm (5.91 in)
Depth	111 mm (4.37 in)
Weight, approx.	0.8 kg (2 lb)

#### Selection and ordering data

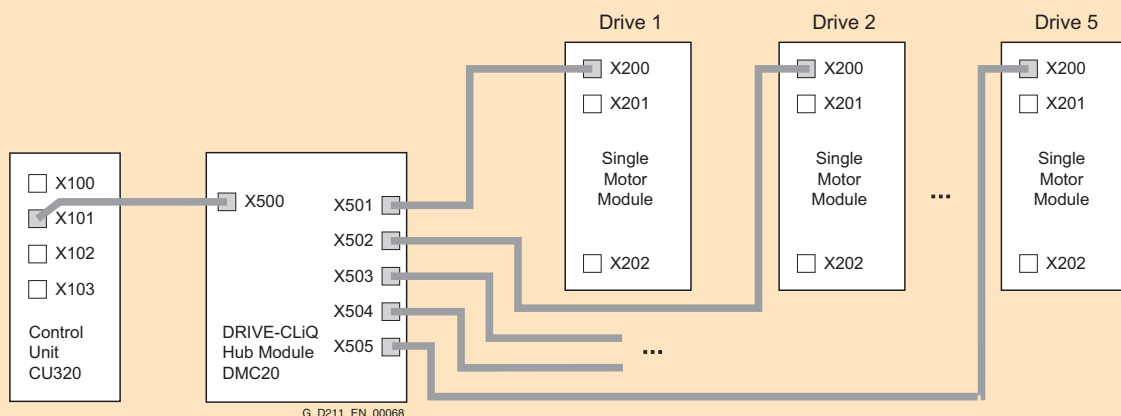
Description	Order No.
<b>DRIVE-CLiQ DMC20 Hub Module</b> (without DRIVE-CLiQ cable)	<b>6SL3055-0AA00-6AA0</b>

#### Integration

Signals from more than one encoder can be collected by the DRIVE-CLiQ DMC20 Hub Module and forwarded to the Control Unit on 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.



# SINAMICS S120

## Supplementary system components

### TB30 Terminal Board

#### Overview



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

#### 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.

#### Technical specifications

##### TB30 Terminal Board

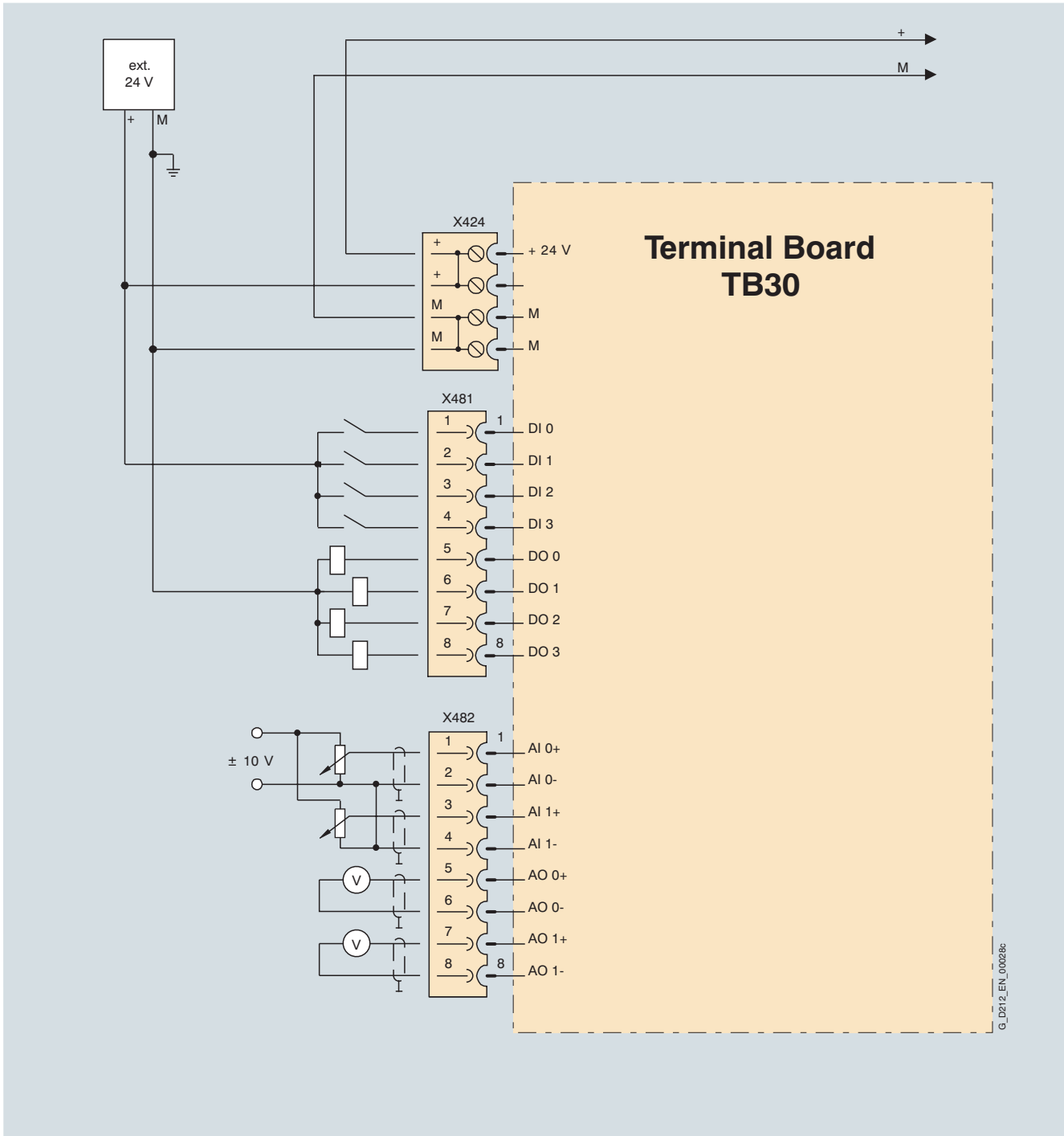
Max. current requirement (at 24 V DC) via CU320 Control Unit without taking account of digital outputs	0.05 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Digital inputs	
• Voltage	– 3 V to + 30 V
• Low level (an open digital input is interpreted as "low")	– 3 V to + 5 V
• High level	15 V to 30 V
• Current consumption (at 24 V DC)	Type 10 mA
• Signal propagation delays for digital inputs <sup>1)</sup>	L → H: approx. 50 μs H → L: approx. 100 μs
• Max. connectable cross section	0.5 mm <sup>2</sup>
Digital outputs (continued-short-circuit-proof)	
• Voltage	24 V DC
• Max. load current per digital output	500 mA
• Max. connectable cross section	0.5 mm <sup>2</sup>
Analog inputs (difference)	
• Voltage range (an open analog input is interpreted as 0 V)	– 10 V to + 10 V
• Internal resistance $R_i$	65 kOhm
• Resolution	13 bit, + sign
• Max. connectable cross section	0.5 mm <sup>2</sup>
Analog outputs (continued-short-circuit-proof)	
• Voltage range	– 10 V to + 10 V
• Max. load current	– 3 mA to + 3 mA
• Resolution	11 bit, + sign
• Max. connectable cross section	0.5 mm <sup>2</sup>
Power loss	< 3 W
Weight, approx.	0.1 kg (0.2 lb)
Approvals	cULus (File No.: E164110)

#### Selection and ordering data

Description	Order No.
<b>TB30 Terminal Board</b>	<b>6SL3055-0AA00-2TA0</b>

<sup>1)</sup> The specified signal propagation delays refer to the hardware. The actual reaction time depends on the time slot in which the digital input is processed.

Integration



Connection example of TB30 Terminal Board

# SINAMICS S120

## Supplementary system components

### TM15 Terminal Module

#### 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 x DRIVE-CLiQ sockets
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 PE (protective earth) 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.

#### Technical data

TM15 Terminal Module	
Max. current requirement (at 24 V DC) without load	0.15 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Number of DRIVE-CLiQ sockets	2
I/O	
• Digital inputs/outputs	Channelwise parameterizable as DI or DO
• Number of digital inputs/outputs	24
• Isolation	Yes, in groups of 8
• Cables and connections	Plug-in screw-type terminals
• Max. connectable cross section	1.5 mm <sup>2</sup>
Digital inputs	
• Voltage	- 30 V to + 30 V
• Low level (an open digital input is interpreted as "low")	- 30 V to + 5 V
• High level	15 V to 30 V
• Current consumption (at 24 V DC)	5 mA to 11 mA
• Signal propagation delays for digital inputs, typical <sup>1)</sup>	L → H: 50 μs H → L: 100 μs
Digital outputs (continued-short-circuit-proof)	
• Voltage	24 V DC
• Max. load current per digital output	0.5 A
• Output delay (ohmic load) <sup>1)</sup>	
- Typical	L → H: 50 μs H → L: 150 μs
- Maximum	L → H: 100 μs H → L: 225 μs
• Max. total current of outputs (per group)	
- Up to 60 °C (140° F)	2 A
- Up to 50 °C (122° F)	3 A
- Up to 40 °C (104° F)	4 A
Power loss	< 3 W
PE connection	On housing with M4 screw
Width	50 mm (1.97 in)
Height	150 mm (5.91 in)
Depth	111 mm (4.37 in)
Weight, approx.	0.86 kg (2 lb)
Approvals	cULus (File No.: E164110)

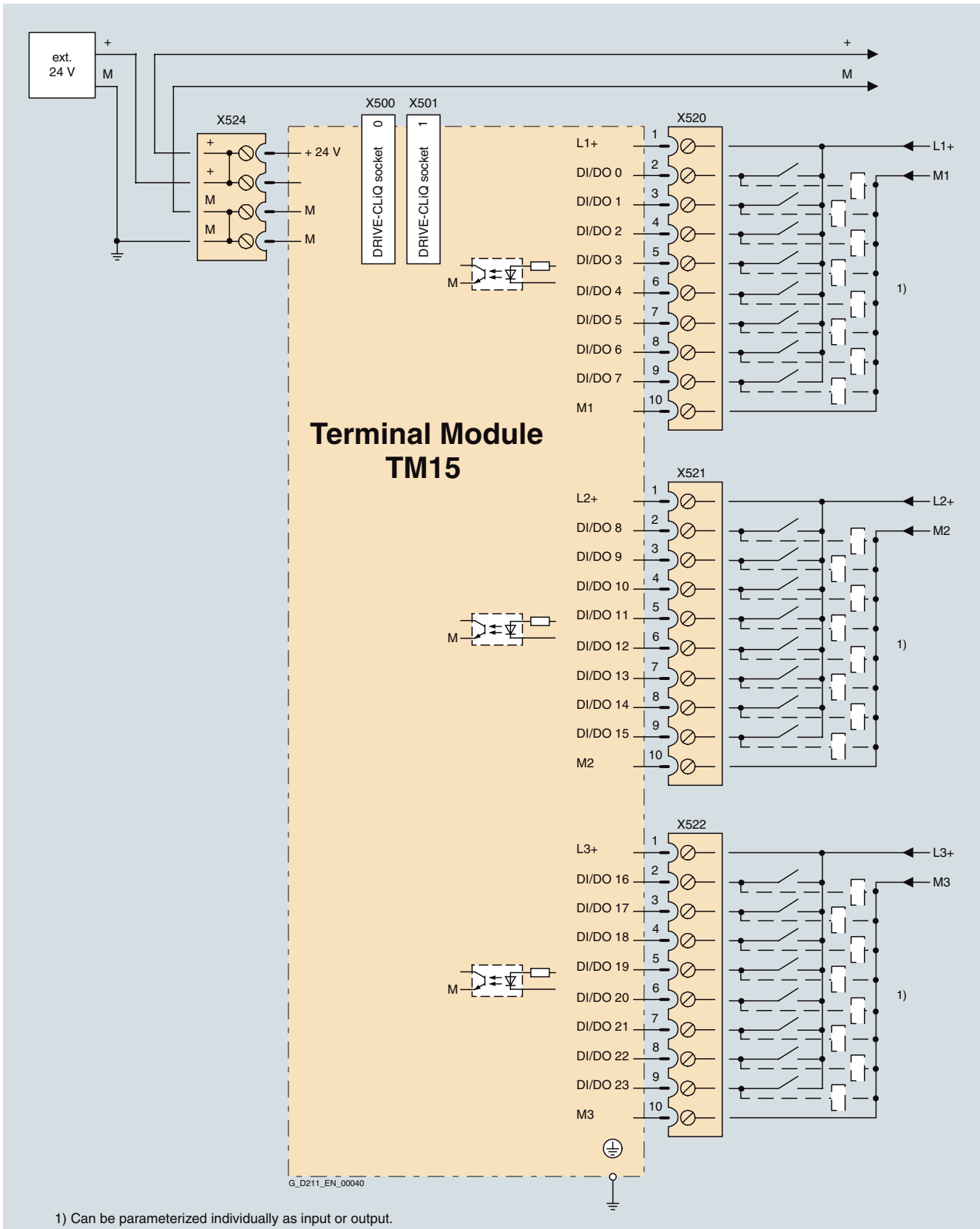
#### Selection and ordering data

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

<sup>1)</sup> The specified signal propagation delays refer to the hardware. The actual reaction time depends on the time slot in which the digital input/output is processed.

#### Integration

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



1) Can be parameterized individually as input or output.



# SINAMICS S120

## Supplementary system components

### TM31 Terminal Module

#### Overview



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

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

#### Design

The following 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 power supply connector
- 1 PE (protective earth) 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.
<b>TM31 Terminal Module</b> (without DRIVE-CLiQ cable)	<b>6SL3055-0AA00-3AA0</b>

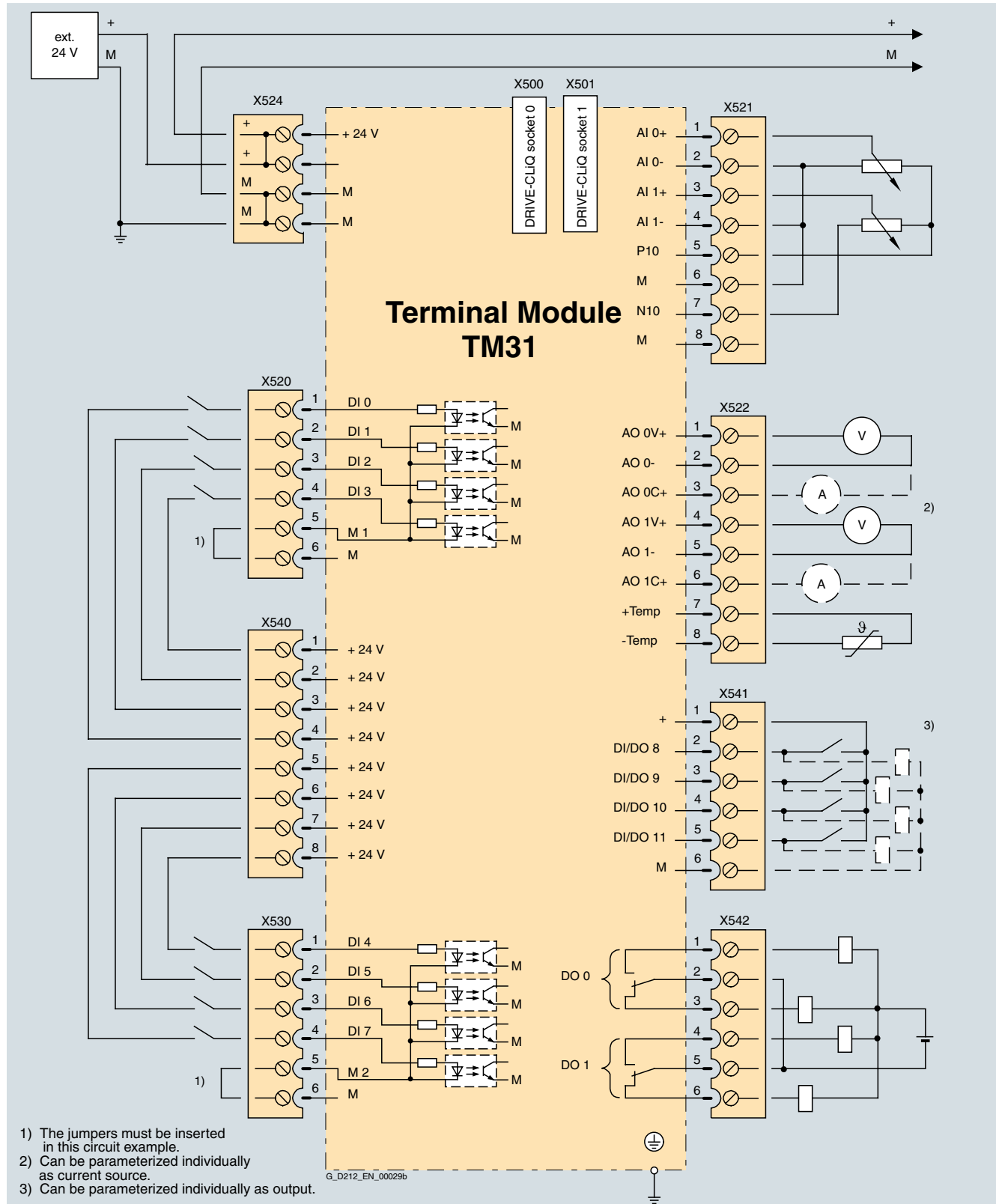
#### Technical data

TM31 Terminal Module	
Max. current requirement (at 24 V DC), not taking into account digital outputs	0.2 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Digital inputs	
• Voltage	- 3 V to + 30 V
• Low level (an open digital input is interpreted as "low")	- 3 V to + 5 V
• High level	15 V to 30 V
• Current consumption (at 24 V DC)	Type 10 mA
• Signal propagation delays for digital inputs <sup>1)</sup>	L → H: approx. 50 μs H → L: approx. 100 μs
• Max. connectable cross section	1.5 mm <sup>2</sup>
Digital outputs (continued-short-circuit-proof)	
• Voltage	24 V DC
• Max. load current per digital output	100 mA
• Max. total current of digital outputs	400 mA
• Max. connectable cross section	1.5 mm <sup>2</sup>
Analog inputs (a switch is used to toggle between voltage and current input)	
• As voltage input	
- Voltage range	- 10 V to + 10 V
- Internal resistance $R_i$	100 kOhm
• As current input	
- Current range	4 mA to 20 mA, - 20 mA to + 20 mA, 0 mA to 20 mA
- Internal resistance $R_i$	250 ohm
- Resolution	11 bit, + sign
• Max. connectable cross section	1.5 mm <sup>2</sup>
Analog outputs (continued-short-circuit-proof)	
• Voltage range	- 10 V to + 10 V
• Max. load current	- 3 mA to + 3 mA
• Current range	4 mA to 20 mA, - 20 mA to + 20 mA, 0 mA to 20 mA
• Max. load resistance	500 ohms for outputs in the range - 20 mA to + 20 mA
• Resolution	11 bit, + sign
• Max. connectable cross section	1.5 mm <sup>2</sup>
Relay outputs (changeover contacts)	
• Max. load current	8 A
• Max. switching voltage	250 V AC, 30 V DC
• Max. switching power (at 250 V AC)	2000 VA (cos φ = 1) 750 VA (cos φ = 0.4)
• Max. switching power (at 30 V DC)	240 W (ohmic load)
• Required minimum current	100 mA
• Max. connectable cross section	2.5 mm <sup>2</sup>
Power loss	< 10 W
PE connection	On housing with M4 screw
Width	50 mm (1.97 in)
Height	150 mm (5.91 in)
Depth	111 mm (4.37 in)
Weight, approx.	0.87 kg (2 lb)
Approvals	cULus (File No.: 164110)

<sup>1)</sup> The specified signal propagation delays refer to the hardware. The actual reaction time depends on the time slot in which the digital input is processed.

#### Integration

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



Connection example of TM31 Terminal Module

# SINAMICS S120

## Supplementary system components

### TM41 Terminal Module

#### Overview



The TM41 Terminal Module supplies TTL signals which simulate an incremental encoder, e.g. to a higher-level control. The encoder interface (incremental encoder simulation) 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 simulation 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 to digital outputs
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 PE (protective earth) 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 simulation is illuminated as soon as a zero mark is detected.

#### Selection and ordering data

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

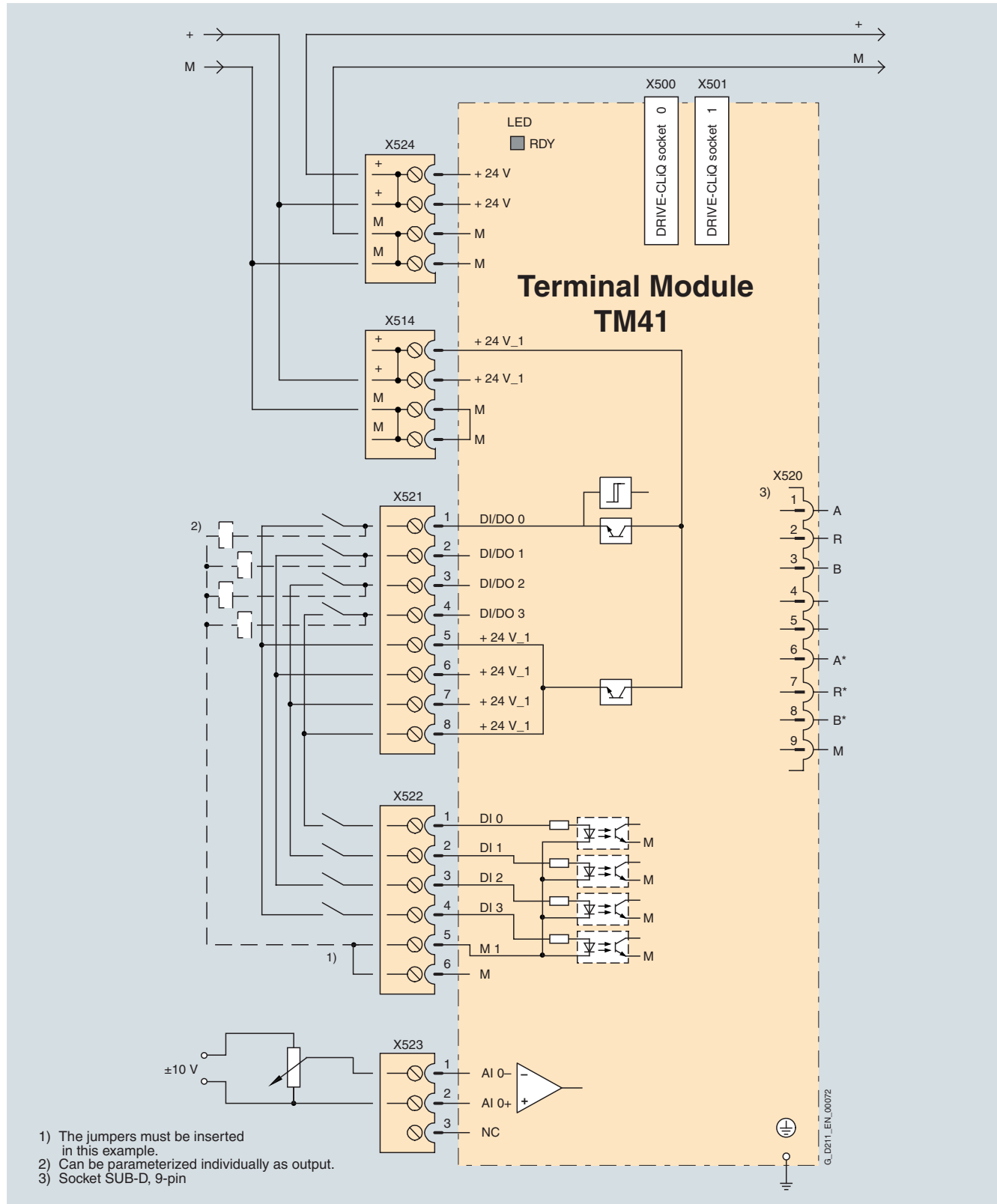
<sup>1)</sup> The specified signal propagation delays refer to the hardware. The actual reaction time depends on the time slot in which the digital input/output is processed.

#### Technical data

TM41 Terminal Module	
Current requirement (X524 at 24 V DC) without DRIVE-CLiQ supply or digital outputs (X514)	0.2 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
I/O	
• Digital inputs/outputs	Individually parameterizable as DI or DO
• Number of digital inputs/outputs	4
• Number of digital input/outputs (with electrical isolation)	4
• Cables and connections	Plug-in screw-type terminals
• Max. connectable cross section	1.5 mm <sup>2</sup>
Digital inputs	
• Voltage	– 3 V to + 30 V (digital inputs without electrical isolation) – 30 V to + 30 V (digital inputs with electrical isolation)
• Low level (an open digital input is interpreted as "low")	– 3 V to + 5 V (digital inputs without electrical isolation) – 30 V to + 5 V (digital inputs with electrical isolation)
• High level	15 V to 30 V
• Current consumption (at 24 V DC), typ.	< 9 mA
• Signal propagation delays for digital inputs, max. <sup>1)</sup>	L → H: 3 ms H → L: 3 ms
Digital outputs (continued-short-circuit-proof)	
• Voltage	24 V DC
• Max. load current per digital output	0.5 A
• Output delay (ohmic load) <sup>1)</sup>	
- Typical	L → H: 50 μs H → L: 75 μs
- Maximum	L → H: 100 μs H → L: 150 μs
Analog input (difference)	
• Voltage range	– 10 V to + 10 V
• Internal resistance	≥ 40 kOhm
• Resolution	13 bit, + sign
Pulse encoder emulation	
• Level	TTL (RS422), A+, A-, B+, B-, zero track N+, N-
• Limit frequency $f_{max}$ .	256 kHz
• Ratio Encoder pulses : encoder emulation	1 : 1 with incremental encoder sin/cos and TTL/HTL
	(resolver evaluation in preparation)
PE connection	On housing with M4 screw
Width	50 mm (1.97 in)
Height	150 mm (5.91 in)
Depth	111 mm (4.37 in)
Weight, approx.	0.85 kg (2 lb)
Approvals	cULus (File No.: E164110)

#### Integration

The TM41 Terminal Module communicates with a CU310, CU320 or SIMOTION D Control Unit via DRIVE-CLiQ.



Connection example of TM41 Terminal Module

# SINAMICS S120

## Supplementary system components

### VSM10 Voltage Sensing Module

#### Overview



The VSM10 Voltage Sensing Module can detect the exact line voltage characteristic and supports fault-free operation of Line Modules when power supply conditions are unfavorable, e.g. with severe voltage fluctuations or short-time interruptions.

The VSM10 Voltage Sensing Module is integrated in chassis format Active Interface Modules. It can be used optionally with all booksize format Active Line Modules and 16 kW or 36 kW Smart Line Modules.

#### Design

The VSM10 Voltage Sensing Module has the following interfaces:

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

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

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

#### Technical data

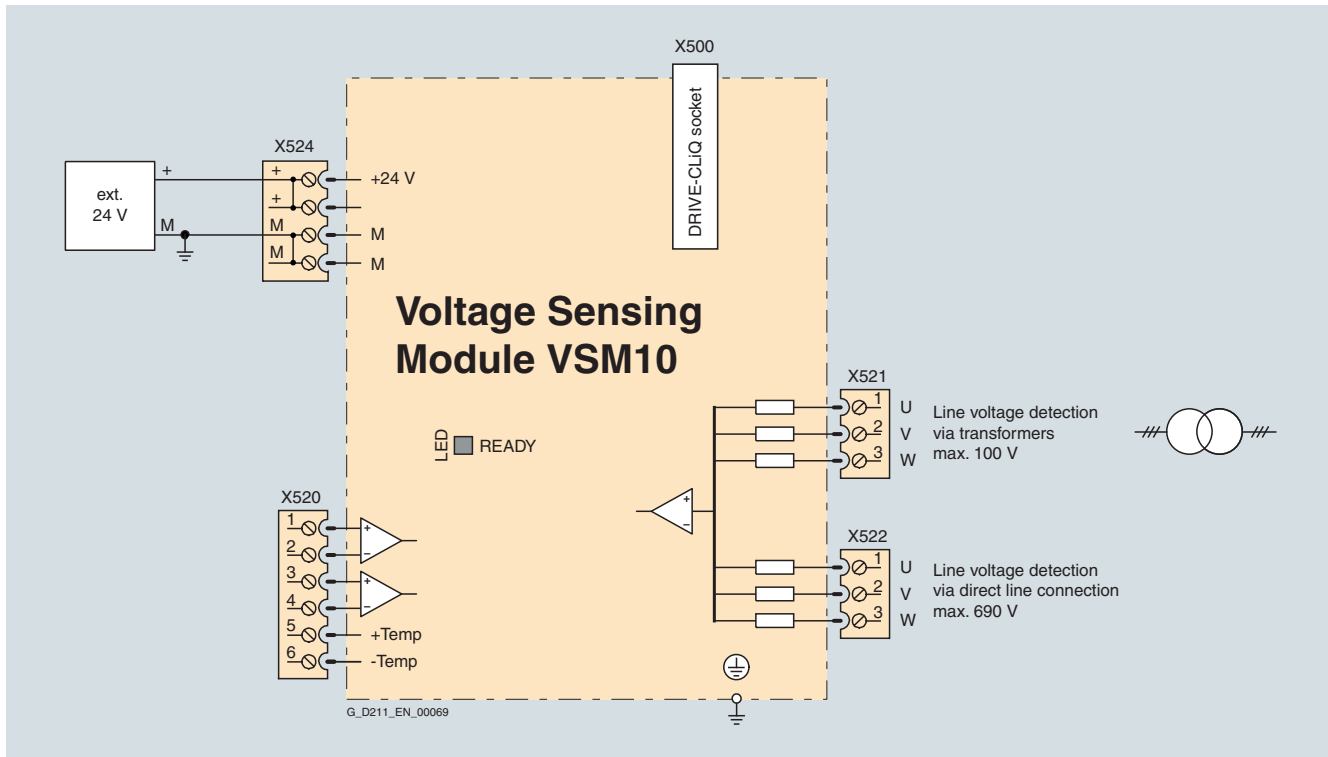
VSM10 Voltage Sensing Module	
Max. current requirement (at 24 V DC)	0.15 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Power loss, approx.	7.2 W
PE connection	On housing with M4 screw
Width	50 mm (1.97 in)
Height	150 mm (5.91 in)
Depth	111 mm (4.37 in)
Weight, approx.	1.0 kg (2 lb)
Approvals	cULus (File No.: E164110)

#### Selection and ordering data

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

#### Integration

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



Connection example of VSM10 Voltage Sensing Module

# SINAMICS S120

## Supplementary system components

### Brake Relay/Safe Brake Relay

#### Overview



Brake Relay and Safe Brake Relay

The Brake Relay in conjunction with Power Modules in blocksize format can be used to control a motor brake.

In the case of the Safe Brake Relay, the brake is controlled in accordance with EN 954-1 safety class 3 and IEC 61508 SIL2 (available soon).

#### Design

The Brake Relay has the following interfaces:

- 1 switch contact (NO contact) to control the motor brake solenoid
- 1 connection for the cable harness (CTRL) to the Power Module in blocksize format

The Safe Brake Relay has the following interfaces:

- 1 two-channel transistor output stage to control the motor brake solenoid
- 1 connection for the cable harness (CTRL) to the Power Module in blocksize format
- 1 connection for the 24 V DC power supply

The connection between the 24 V DC supply and the Safe Brake Relay must be kept as short as possible.

The Brake Relay or Safe Brake Relay can be installed below the Power Module on the shield connection plate.

The supplied Brake Relay and Safe Brake Relay includes the cable harness (CTRL) for connection with the Power Module.

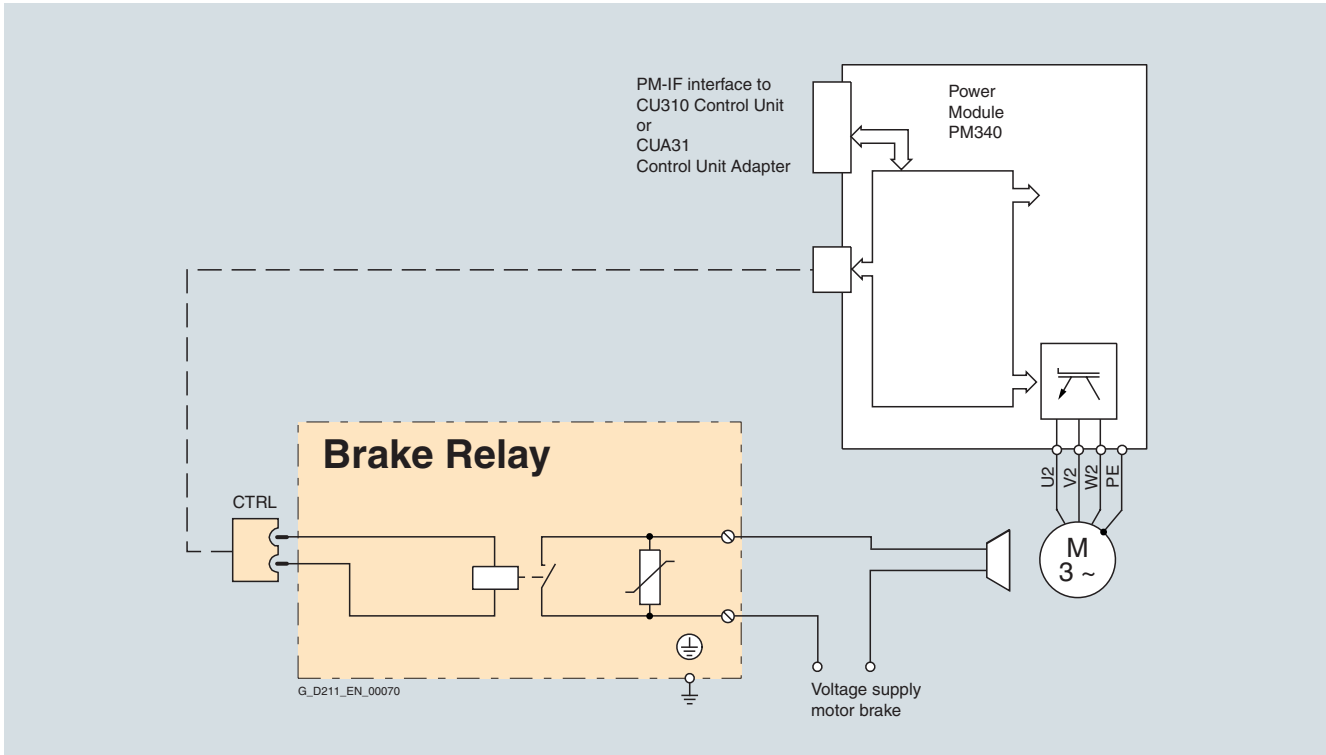
#### Technical data

	Brake Relay	Safe Brake Relay
Switching capability of the NO contact	Max. 240 V AC/12 A 30 V DC/2 A	–
Power supply	–	20.4 V to 28.8 V DC Recommended rated supply voltage 26 V DC (to compensate for voltage drop in feeder cable to 24 V DC motor brake solenoid)
Max. permissible current requirement of the motor brake	–	2 A
Max. current requirement (at 24 V DC)	–	0.05 A + the current requirement of motor brake
Max. connectable cross section	2.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>
Width	69 mm (2.72)	69 mm (2.72)
Height	67.5 mm (2.66)	63 mm (2.66)
Depth	33 mm (1.3)	33 mm (1.3)
Weight, approx.	0.17 kg (0.4 lb)	0.17 kg (0.4 lb)

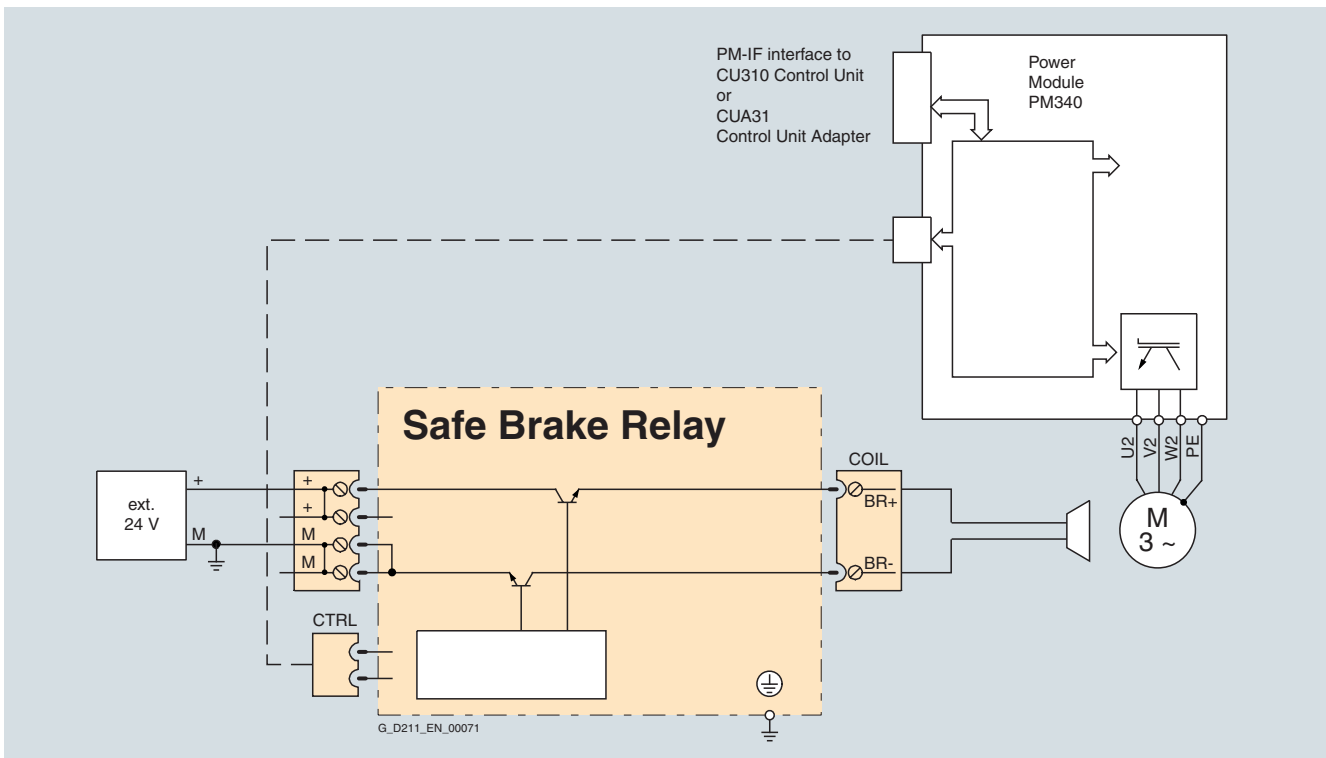
#### Selection and ordering data

Description	Order No.
<b>Brake Relay</b> (including cable harness for connection to PM340 Power Module)	<b>6SL3252-0BB00-0AA0</b>
<b>Safe Brake Relay</b> (including cable harness for connection to PM340 Power Module)	<b>6SL3252-0BB01-0AA0</b>

#### Integration



Connection example of Brake Relay



Connection example of Safe Brake Relay

The 24 V DC solenoid of the motor brake is directly connected to the Safe Brake Relay. External overvoltage limiters are not required.



# SINAMICS S120

## Encoder system connection

### Encoder system connection

#### Overview

##### Motors with DRIVE-CLiQ interface



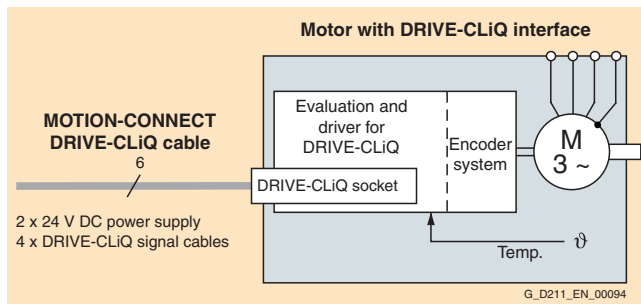
DRIVE-CLiQ is the preferred method for connecting the encoder systems to SINAMICS S120.

Motors with DRIVE-CLiQ interface can be ordered for this purpose, for example, 1FK7/1FT6 synchronous motors, 1FW3 torque motors and 1PH7, 1PL6 and 1PH4 asynchronous motors.

Motors with DRIVE-CLiQ interface can be directly connected to the associated Motor Module via the available MOTION-CONNECT DRIVE-CLiQ cables. The connection of the MOTION-CONNECT DRIVE-CLiQ cable at the motor has degree of protection IP67.

The DRIVE-CLiQ interface supplies the motor encoder via the integrated 24 V DC supply and transfers the motor encoder and temperature signals and the electronic rating plate data, e.g. a unique identification number, rated data (voltage, current, torque) to the Control Unit. This means that for the various encoder types – e.g. resolver or absolute encoder – different encoder cables with varying permissible lengths are now no longer required; just one cable type, MOTION-CONNECT DRIVE-CLiQ, can be used for all encoders.

These motors simplify commissioning and diagnostics, as the motor and encoder type are identified automatically.



##### Motors without DRIVE-CLiQ interface

The encoder and temperature signals of motors without DRIVE-CLiQ interface, as well as those of external encoders, must be connected via Sensor Modules. Sensor Modules Cabinet-Mounted are available in degree of protection IP20 for control cabinet installation, as well as Sensor Modules External-Mounted (degree of protection IP67).

Only one encoder system can be connected to each Sensor Module.

#### Technical data for motors with DRIVE-CLiQ interface

Motors with DRIVE-CLiQ interface and resolver (2-pole/multi-pole), incremental encoder sin/cos 1 V <sub>pp</sub> , absolute encoder EnDat (512 pulses/revolution, 2048 pulses/revolution) or single absolute encoder	
Max. current requirement at 24 V DC (via Motor Module and MOTION-CONNECT DRIVE-CLiQ cable)	190 mA
Max. DRIVE-CLiQ cable length	<ul style="list-style-type: none"> <li>• 100 m (328 ft) when using MOTION-CONNECT 500 DRIVE-CLiQ cables</li> <li>• 50 m (164 ft) when using MOTION-CONNECT 800 DRIVE-CLiQ cables</li> </ul>

#### Further information

Motor encoder and temperature signals must be connected to the corresponding Motor Module or Power Module and external encoders to the Control Unit.

#### Overview



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

The following encoder signals can be evaluated:

- 2-pole resolver
- Multi-pole 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 power supply connector
- 1 PE (protective earth) 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 to EN 60715 (IEC 60715).

The maximum encoder cable length between SMC10 modules and encoders is 130 m (427 ft).

#### Integration

The SMC10 Sensor Module Cabinet-Mounted communicates with the CU320 Control Unit via DRIVE-CLiQ.

#### Technical data

##### SMC10 Sensor Module Cabinet-Mounted

Max. current requirement (at 24 V DC) not taking encoder into account	0.2 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Power loss	< 10 W
PE connection	On housing with M4 screw
Width	50 mm (1.97 in)
Height	150 mm (5.91 in)
Depth	111 mm (4.37 in)
Weight, approx.	0.8 kg (2 lb)

#### Selection and ordering data

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

# SINAMICS S120

## Encoder system connection

### SMC20 Sensor Module Cabinet-Mounted

#### Overview



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

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1 V<sub>pp</sub>
- Absolute encoder EnDat
- SSI encoder with incremental signals sin/cos 1 V<sub>pp</sub> (firmware version 2.4 and later)

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

#### 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 power supply connector
- 1 PE (protective earth) 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 to EN 60715 (IEC 60715).

The maximum encoder cable length between SMC20 modules and encoders is 100 m (328 ft).

#### Integration

The SMC20 Sensor Module Cabinet-Mounted communicates with the CU320 Control Unit via DRIVE-CLiQ.

#### Technical data

##### SMC20 Sensor Module Cabinet-Mounted

Power supply for encoder	5 V DC
Max. current requirement (at 24 V DC) not taking encoder into account	0.2 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Power loss	< 10 W
PE connection	On housing with M4 screw
Width	50 mm (1.97 in)
Height	150 mm (5.91 in)
Depth	111 mm (4.37 in)
Weight, approx.	0.8 kg (2 lb)

#### Selection and ordering data

Description	Order No.
<b>SMC20 Sensor Module Cabinet-Mounted</b> (without DRIVE-CLiQ cable)	<b>6SL3055-0AA00-5BA1</b>

#### Overview



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

The following encoder signals can be evaluated:

- Incremental encoders TTL/HTL with/without open-circuit detection
- SSI encoders with incremental signals TTL/HTL (firmware version V2.4 and later)
- SSI encoders without incremental signals (firmware version V2.4 and later)

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

#### Design

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

- 1 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 power supply connector
- 1 PE (protective earth) 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 to EN 60715 (IEC 60715).

The maximum encoder cable length between SMC30 modules and encoders is 100 m (328 ft). For HTL encoders, this length can be increased to 300 m (984 ft) if signals A+/A- and B+/B- are evaluated and the power supply cable has a minimum cross section of 0.5 mm<sup>2</sup>.

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.

#### Integration

The SMC30 Sensor Module Cabinet-Mounted communicates with the CU320 Control Unit via DRIVE-CLiQ.

#### Technical data

SMC30 Sensor Module Cabinet-Mounted	
Power supply for encoder	5 V DC and 24 V DC
Max. current requirement (at 24 V DC) not taking encoder into account	0.2 A
Max. connectable cross section	2.5 mm <sup>2</sup>
Max. fuse protection	20 A
Power loss	< 10 W
Cut-off frequency	500 kHz
Resolution absolute position SSI	30 bit
Max. cable length	
• TTL encoders	Max. 100 m (328 ft) (only bipolar signals permitted)
• HTL encoders	Max. 100 m (328 ft) for unipolar signals Max. 300 m (984 ft) for bipolar signals
PE connection	On housing with M4 screw
Width	50 mm (1.97 in)
Height	150 mm (5.91 in)
Depth	111 mm (4.37 in)
Weight, approx.	0.8 kg (2 lb)

#### Selection and ordering data

Description	Order No.
<b>SMC30 Sensor Module Cabinet-Mounted</b> (without DRIVE-CLiQ cable)	<b>6SL3055-0AA00-5CA1</b>

# SINAMICS S120

## Encoder system connection

### SME20/SME25 Sensor Modules External

#### Overview



SME20/SME25 Sensor Modules External are encoder evaluation units for machine encoders (direct measuring systems). The devices are designed with IP67 degree of protection. This means that the units can be installed outside the control cabinet near the machine encoder.

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1 V<sub>pp</sub> without rotor position track (C/D track)
- Absolute encoder EnDat
- Absolute encoder SSI with incremental signals sin/cos 1 V<sub>pp</sub> (firmware version 2.4 and later)

SME20/SME25 Sensor Modules External evaluate the encoder signals and convert the information obtained to DRIVE-CLiQ.

#### Design

SME20/SME25 Sensor Modules External feature the following interfaces as standard:

- 1 DRIVE-CLiQ interface
- 1 encoder connector (circular plug)
- 24 V DC electronics power supply via DRIVE-CLiQ link from the Control Unit/Motor Module
- 1 PE (protective earth) connection

The maximum cable length between the measuring system and SME20/SME25 modules is 3 m (9.84 ft).

The maximum cable length between SME20/SME25 modules and the drive control is 100 m (328 ft).

#### Integration

SME20/SME25 Sensor Modules External communicate with a Control Unit via DRIVE-CLiQ.

#### Selection and ordering data

Description	Order No.
<b>SME20 Sensor Module External</b> for incremental measuring systems (without DRIVE-CLiQ cable)	<b>6SL3055-0AA00-5EA0</b>
<b>SME25 Sensor Module External</b> for absolute systems (without DRIVE-CLiQ cable)	<b>6SL3055-0AA00-5HA0</b>

#### Technical data

	SME20 Sensor Module External	SME25 Sensor Module External
Encoder	• Incremental encoder sin/cos 1 V <sub>pp</sub> with 5 V voltage supply	• Absolute encoder EnDat with 5 V voltage supply • Absolute encoder SSI with incremental signals sin/cos 1 V <sub>pp</sub> with 5 V voltage supply
Multiplication factor	2048	2048
Measuring system interface	12-pin circular connector	17-pin circular connector
Outlet	IP67 DRIVE-CLiQ connector	IP67 DRIVE-CLiQ connector
Max. current requirement (at 24 V DC) not taking encoder into account	0.11 A	0.11
Max. cross section that can be connected	Acc. to connector contacts	Acc. to connector contacts
Max. fuse protection	via DRIVE-CLiQ power supply source	via DRIVE-CLiQ power supply source
Power loss	W < 10	< 10
PE connection	On housing with M4/1.8 Nm screw	On housing with M4/1.8 Nm screw
Degree of protection	IP67	IP67
Width	mm (inch) 58 (2.28)	58 (2.28)
Height	mm (inch) 44 (1.73)	44 (1.73)
Depth	mm (inch) 112 (4.41)	112 (4.41)
Weight, approx.	kg (lb) 0.18 (0.4)	0.18 (0.4)



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