Equipment Manual 06/2005 Edition

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SINAMICS S120
Control Units and
Additional System Components

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SINAMICS S120
Equipment Manual for Control Units and Additional System Components

Manual

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Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.

Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.

Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Automation and Drives
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GERMANY

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Preface

Information on the SINAMICS S Documentation

The SINAMICS S documentation is divided into the following areas:

- General documentation/catalogs
- Manufacturer/service documentation
- Electronic documentation

This documentation is an integral part of the manufacturer/service documentation developed for SINAMICS. All documents can be obtained separately.

You can obtain detailed information about the documents named in the documentation overview and other documents available for SINAMICS from your local Siemens office.

For the sake of simplicity, this documentation does not contain all detailed information about all types of the product and cannot cover every conceivable case of installation, operation, or maintenance.

The contents of this documentation are not part of an earlier or existing agreement, a promise, or a legal agreement, nor do they change this. All obligations entered into by Siemens result from the respective contract of sale that contains the complete and sole valid warranty arrangements. These contractual warranty provisions are neither extended nor curbed as a result of the statements made in this documentation.

Audience

This documentation is aimed at machine and plant builders, commissioning engineers, and service personnel who use SINAMICS.

Objective

This manual describes the hardware components of the SINAMICS S system. It provides information about installation, electrical connection, and cabinet design.

Technical Information

Hotline

If you have any further questions, please call our hotline:

A&D Technical Support

Tel.: +49 (0) 180 5050 - 222

Fax: +49 (0) 180 5050 - 223

E-mail: adsupport@siemens.com

Internet: http://www.siemens.de/automation/support-request

Please send any questions about the documentation (suggestions for improvement, corrections, and so on) to the following fax number or e-mail address:

Fax: +49 (0) 9131 98 - 63315

E-mail: motioncontrol@siemens.de

Fax form: See feedback page at the end of this publication

Internet Address

Up-to-date information about our products can be found on the Internet at the following address:

http://www.siemens.com/motioncontrol

You can find information on SINAMICS S120 at:

http://www.siemens.com/sinamics.

ESD Notices

Caution

Electrostatic sensitive devices (ESDs) are individual components, integrated circuits, or boards that may be damaged by either electrostatic fields or electrostatic discharge.

Regulations for handling ESD components:

When handling components, make sure that personnel, workplaces, and packaging are well earthed.

Personnel in ESD areas with conductive flooring may only handle electronic components if:

They are grounded with an ESD wrist band

They are wearing ESD shoes or ESD shoe grounding straps

Electronic boards should only be touched if absolutely necessary. They must only be handled on the front panel or, in the case of printed circuit boards, at the edge.

Electronic boards must not come into contact with plastics or items of clothing containing synthetic fibers.

Boards must only be placed on conductive surfaces (work surfaces with ESD surface, conductive ESD foam, ESD packing bag, ESD transport container).

Do not place boards near display units, monitors, or television sets (minimum distance from screen: 10 cm).

Measurements must only be taken on boards when the measuring instrument is grounded (via protective conductors, for example) or the measuring probe is briefly discharged before measurements are taken with an isolated measuring device (for example, touching a bare metal housing).

Safety Guidelines

Danger

Commissioning shall not start until you have ensured that the machine in which the components described here are to be installed complies with Directive 98/37/EC.

SINAMICS S equipment must only be commissioned by suitably qualified personnel.

The personnel must take into account the information provided in the technical customer documentation for the product, and be familiar with and observe the specified danger and warning notices.

When electrical equipment and motors are operated, the electrical circuits automatically conduct a dangerous voltage.

Dangerous mechanical movements may occur in the system during operation.

All work on the electrical system must be performed after the system has been switched off and disconnected from the power supply.

SINAMICS S equipment with three-phase motors may only be connected to the line system via residual current devices (RCDs) if compatibility of the SINAMICS equipment with the RCD has been ensured as specified in EN 50178, Subsection 5.2.11.2.

Warning

Correct and safe operation of SINAMICS S equipment assumes correct transportation, storage, setup, and installation, as well as careful operation and maintenance.

The details in the catalogs and proposals also apply to the design of special equipment versions.

In addition to the danger and warning information provided in the technical customer documentation, the applicable national, local, and system-specific regulations and requirements must be taken into account.

Only protective extra-low voltages (PELVs) that comply with EN60204-1 must be connected to all connections and terminals between 0 and 48 V.

Caution

As part of routine tests, SINAMICS equipment with three-phase motors will undergo a voltage test in accordance with EN 50178. Before the voltage test is performed on the electrical equipment of industrial machines to EN 60204-1, Section 19.4, all connectors of SINAMICS equipment must be disconnected/unplugged to prevent the equipment from being damaged.

Motors must be connected in accordance with the circuit diagram provided. They must not be connected directly to the three-phase supply because this will damage them.

Note

When operated in dry operating areas, SINAMICS equipment with three-phase motors conforms to low-voltage Directive 73/23/EEC.

SINAMICS equipment with three-phase motors conforms to EMC Directive 89/336/EEC in the configurations specified in the associated EC Certificate of Conformity.

Caution

Operating the equipment in the immediate vicinity (< 1.5 m) of mobile telephones with a transmitter power of > 1 W may lead to incorrect operation.

Notes

Table of contents

System overview

1

1.1 Field of application

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

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

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

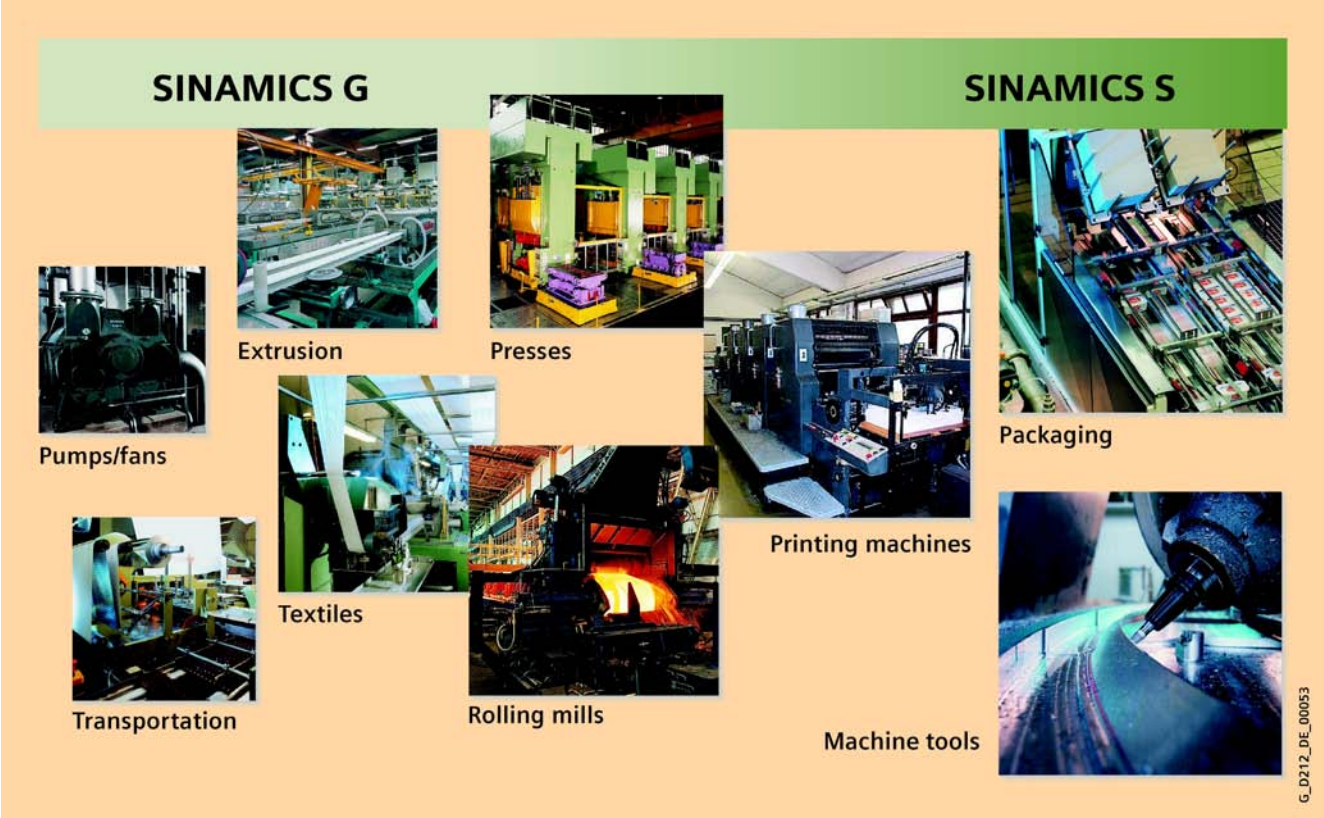


Figure 1-1 SINAMICS applications

1.2 Product variants

SINAMICS offers different versions designed to meet a range of requirements:

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

1.3 Platform Concept and Totally Integrated Automation

All SINAMICS versions are based on a platform concept. Joint hardware and software components, as well as standardized tools for design, configuration, and commissioning tasks ensure high-level integration across all components. SINAMICS handles a wide variety of drive tasks with no system gaps. The different SINAMICS versions can be easily combined with each other.

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

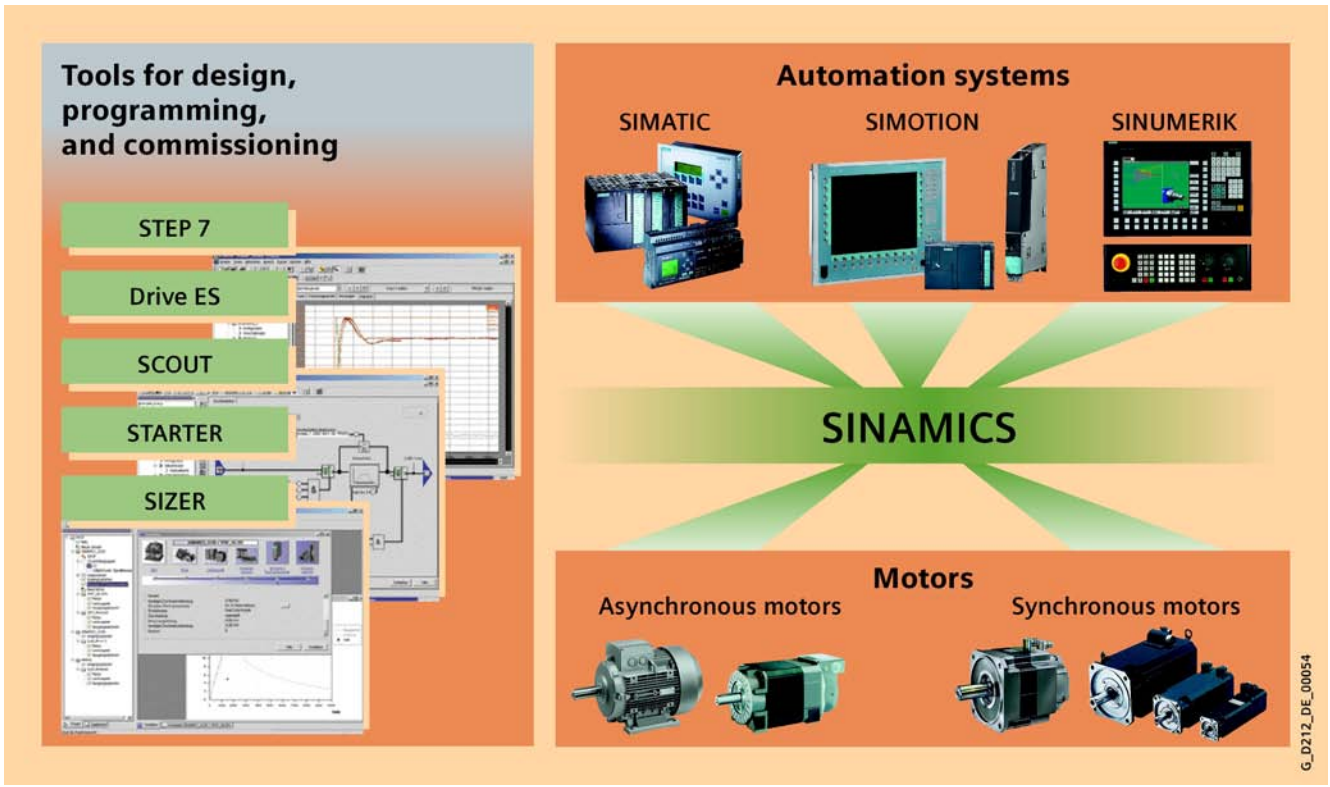


Figure 1-2 SINAMICS as part of the Siemens modular automation system

1.4 Introduction

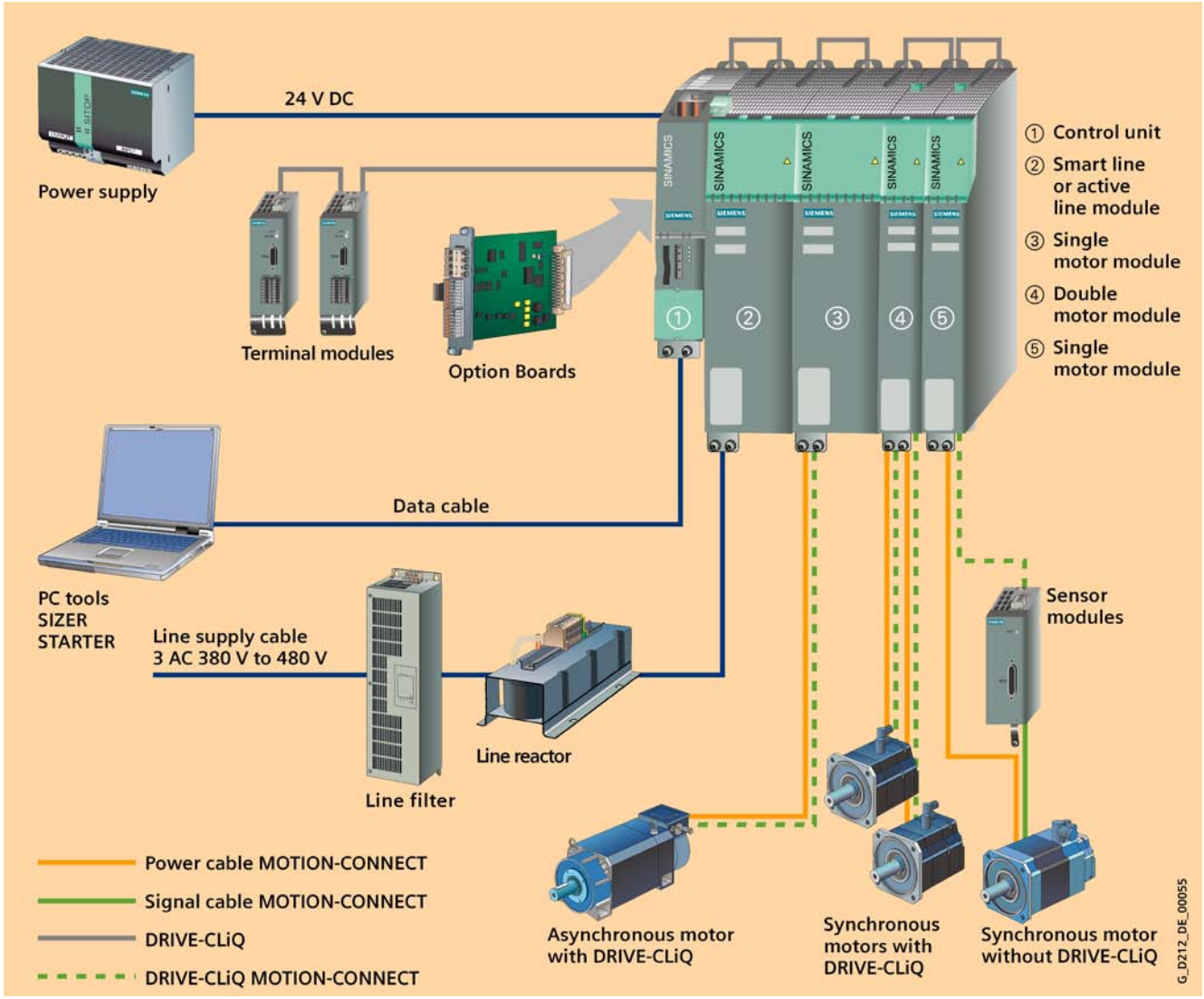


Figure 1-3 SINAMICS S120 System Overview

Modular system for complex drive tasks

SINAMICS S120 solves complex drive tasks for a wide range of industrial applications and is, therefore, designed as a modular system. Users can choose from many different harmonized components and functions to create a solution that best meets their requirements. SIZER, a high-performance configuration tool, makes it easier to choose and determine the optimum drive configuration.

SINAMICS S120 is enhanced by a wide range of motors. Whether synchronous or asynchronous, all motor types are supported by SINAMICS S120.

Drive for multi-axis applications

The trend towards separate axes in mechanical engineering is growing all the time. Where possible, central drives are being replaced by electronically coordinated servo drives. These require drives with a connected DC link, which allows cost-saving energy balancing between braking and driving axes.

SINAMICS S120 features infeeds and inverters that cover a large power range, are designed for seamless integration, and enable space-saving, multi-axis drive configurations.

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 all the drives. This exchange always had to take 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 drive for all connected axes and also establishes the technological links between the axes. Since all the required data is stored in the central control unit, it does not need to be transferred. Cross-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. For complex numerical or motion-control tasks, high-performance SINUMERIK or SIMOTION D modules are used instead.

DRIVE-CLiQ – a digital interface between all components

All SINAMICS S120 components, including the motors and encoders, are interconnected via a joint serial interface called DRIVE-CLiQ. The standardized cables and connectors reduce the variety of different parts and cut storage costs.

Converter boards for converting standard encoder signals to DRIVE-CLiQ are available for third-party motors or retrofit applications.

Electronic type plates in all components

All SINAMICS S120 components have an electronic type plate that contains all the relevant data about that particular component. In the motors, for example, this data includes the parameters of the electric equivalent circuit diagram and characteristic values for the in-built motor encoder. The control unit records this data automatically via DRIVE-CLiQ so that it does not need to be entered during commissioning or if the equipment is replaced.

In addition to the technical data, the type plate includes logistical data (manufacturer ID, order number, and globally unique ID). Since this data can be called up electronically on site or remotely, all the components used in a machine can always be individually identified, which helps simplify servicing.

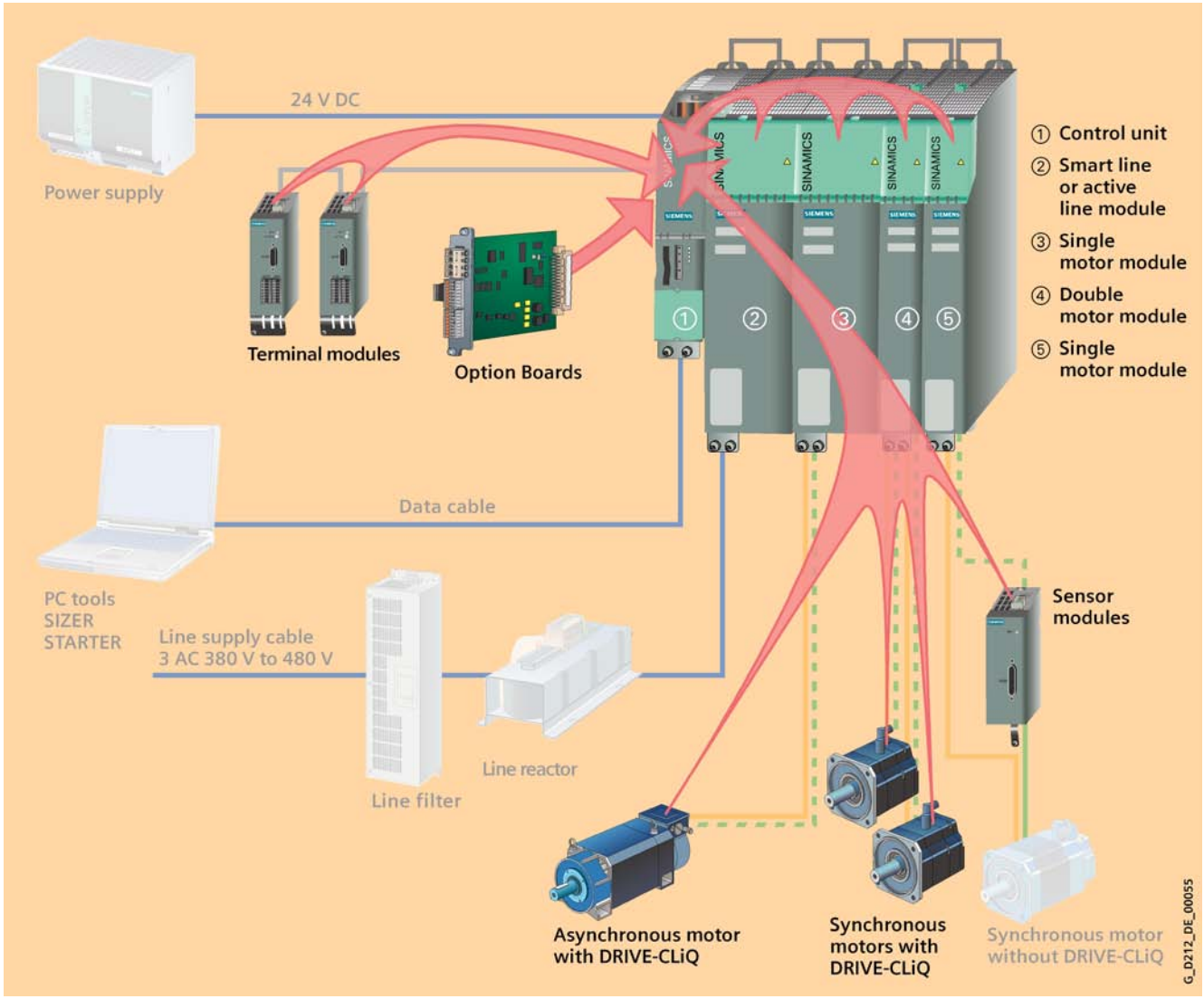


Figure 1-4 The electronic type plate for SINAMICS S120

1.5 SINAMICS S120 Components

This overview features the SINAMICS S120 components that are primarily used for multi-axis drive tasks.

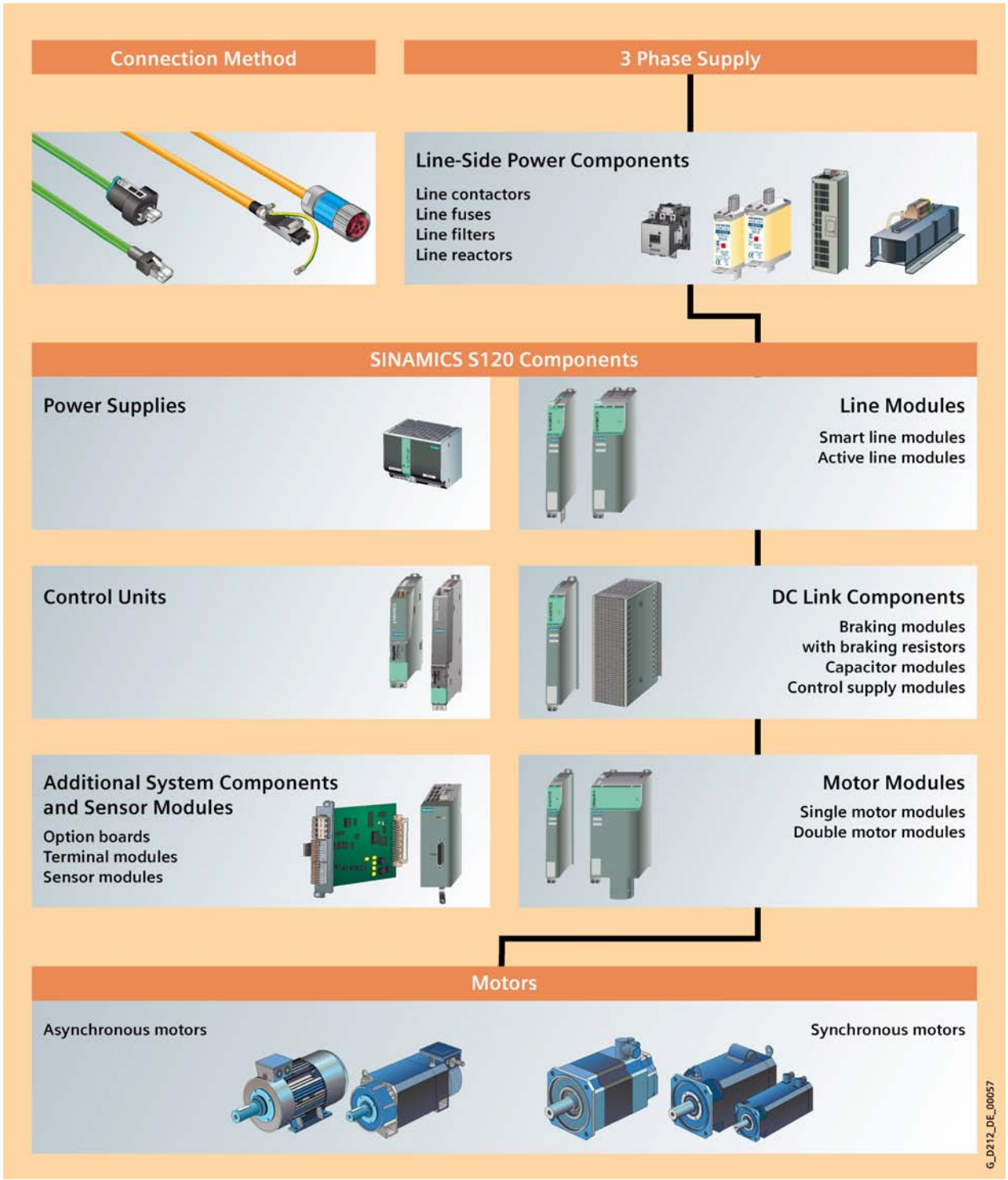


Figure 1-5 SINAMICS S120 component overview

The following power components are available:

- Line-side power components, such as fuses, contactors, reactors, and filters for switching the power supply and meeting EMC requirements.
- Line modules, which supply power centrally to the DC link.
- DC link components (optional), which stabilize the DC link voltage.
- Motor modules, which act as inverters, receive power from the DC link, and supply the connected motors.

To carry out the required functions, SINAMICS S120 is equipped with:

- A control unit that carries out all drive and technological functions across all axes.
- Additional system components that enhance functionality and offer different interfaces for encoders and process signals.

The SINAMICS S120 components were developed for installation in cabinets. They have the following features and characteristics:

- Easy to handle, simple installation and wiring
- Practical connection system, cable routing in accordance with EMC requirements
- Standardized design, seamless integration
- Internal ventilators (other cooling methods available on request).

1.6 Power Sections

Line modules

Convert the three-phase supply into a DC voltage for the DC link.

- Smart line modules

  The smart line modules generate a non-stabilized DC link voltage and are capable of regenerative feedback.
- Active line modules

  The active line modules generate a stabilized DC link voltage and are capable of regenerative feedback.

Motor modules

- Convert energy from the DC link for the connected motors with variable voltage and variable frequency.

1.7 System Data

Technical Specifications

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

Electrical specifications	
Electronics power supply	24 V DC, -15/+20 %
Conducted radio interference Standard	 No conducted radio interference
Overvoltage category	Class I to EN 60 664-1

Ambient conditions	
The Safety-Integrated safety function: The components must be protected against conducted contamination (e.g. by installing them in a cabinet with degree of protection IP54). Provided that conducted interference can be prevented at the installation site, the degree of protection for the cabinet can be decreased accordingly.	
Degree of protection	IP20 to EN 60 529
Class of protection	Class I (with protective conductor system) and Class III (PELV) to EN 61 800-5-1
Permissible ambient and coolant temperature (air) during operation for Control Units, additional system components and Sensor Modules	0 °C to +55 °C

Information on storage, transportation and operation:	
Environmental class • Storage • Transportation • Warning	 Class 1C2 to EN 60 721-3-1 Class 2C2 to EN 60 721-3-2 Class 3C2 to EN 60 721-3-3
Organic/biological influences • Storage • Transportation • Warning	 Class 1B1 to EN 60 721-3-1 Class 2B1 to EN 60 721-3-2 Class 3B1 to EN 60 721-3-3
Vibratory load • Transportation • Warning	 EN 60 721-3-2, class 2M3 EN 60 721-3-3, class 3M4
Shock stressing • Transportation • Warning	 EN 60 721-3-2, class 2M3 EN 60 721-3-3, class 3M3

Information on storage, transportation and operation:	
Ambient climatic conditions • Storage • Transportation • Warning	 Class 1K3 to EN 60 721-3-1 Temperature: -40 °C to +70 °C Class 2K4 to EN 60 721-3-2 Temperature: -40 °C to +70 °C Max. humidity: 95 % at 40 °C Class 3K3 to EN 60 721-3-3 Relative air humidity 5 to 65 % (annual average, ≦ 80 % above the maximum for 2 months a year. Avoid splashing water and do not allow condensation or ice to form (EN 60 204, Part 1)
Degree of contamination	2 to EN 60 664-1
Installation altitude	Up to 5000 m above sea level

Approbation	
Certification	CE (low-voltage and EMC Directives), cULus (file pos.: E192450, E164110, E70122, and E214113)

Control Units

2

2.1 Introduction

Description

The Control Unit 320 (CU320) of the SINAMICS S system is designed for use with several drives.

The number of variable-speed drives depends on:

- The required performance
- The required special functions
- The required operating mode (servo, vector, or V/f).

The software and the parameters are stored on a plug-in CompactFlash card.

The option slot is used to expand the number of terminals or adapt to other communication interfaces (to the higher-level control).

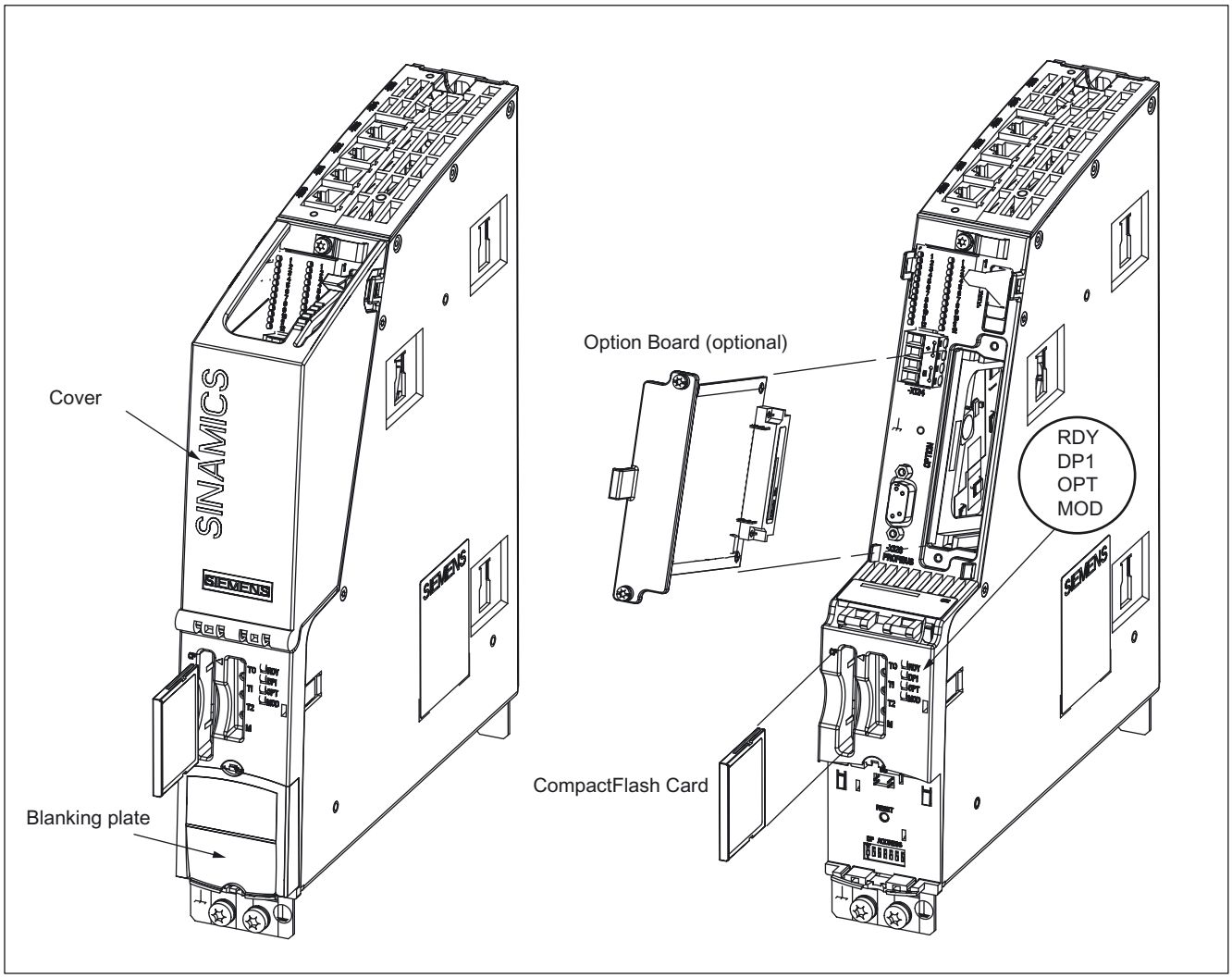


Figure 2-1 Overview of the CU320

Note

The Control Unit, the Option Board, and the CompactFlash card must be ordered separately.

If your application requires more than one Control Unit, the number can be increased accordingly. The Control Units are then interconnected via PROFIBUS, for example.

A Control Unit communicates with the associated components (Motor Modules, Line Modules, Sensor Modules, Terminal Modules, and so on) via the system-internal DRIVE-CLiQ interface.

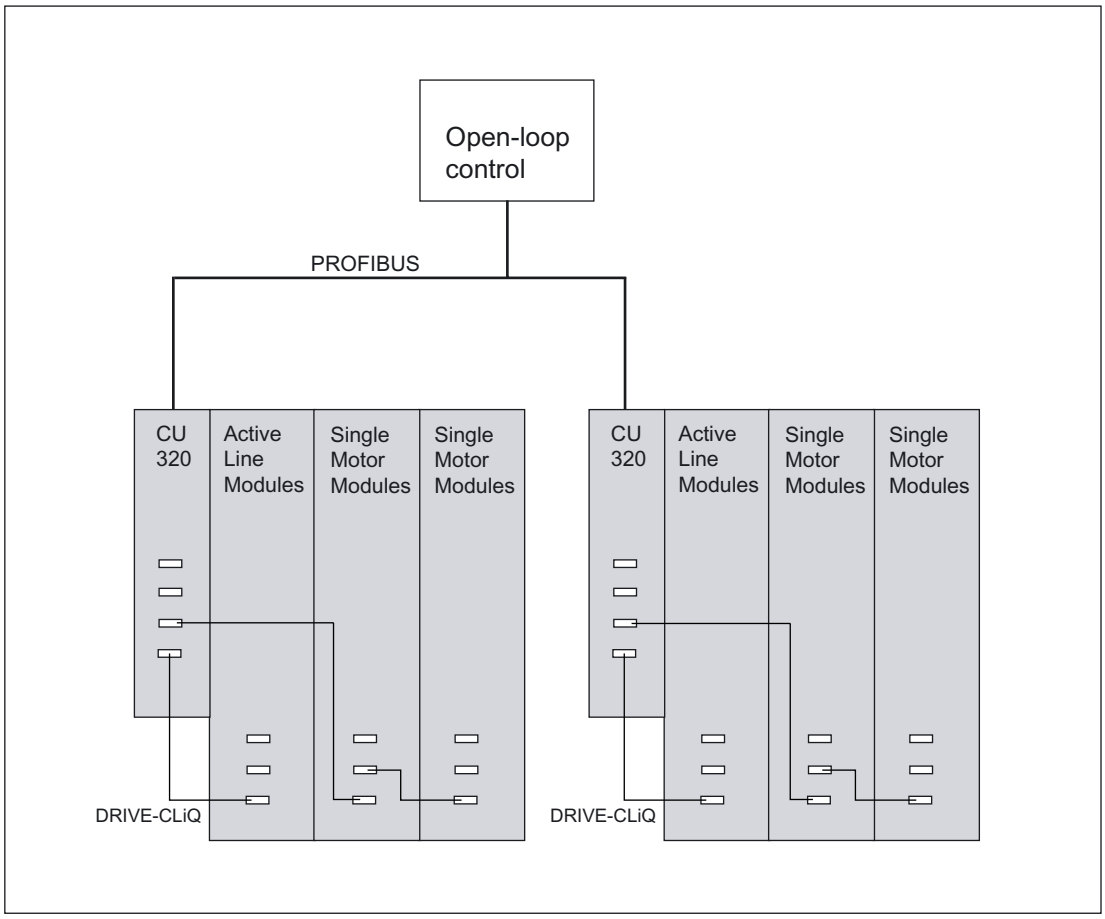


Figure 2-2 Sample configuration

2.2 Control Unit 320 (CU320)

2.2.1 Description

The Control Unit 320 (CU320) is a central control module in which the closed-loop and open-loop functions are implemented for one or more Active Line and/or Motor Modules.

The CU320 contains the following interfaces:

Table 2-1 Overview of the CU320 interfaces

Type	Number
Digital inputs	8
Digital inputs/outputs	8
DRIVE-CLiQ interfaces	4
PROFIBUS interface	1
Serial interface (RS232)	1
Option slot	1

2.2.2 Safety information

Caution

The Option Board may only be inserted and removed when the Control Unit and Option Board are disconnected from the power supply.

Notice

The 80 mm clearances above and below the components must be observed.

Note

The CompactFlash card may only be inserted and removed when the Control Unit is disconnected from the power supply.

2.2.3 Interface description

2.2.3.1 Overview

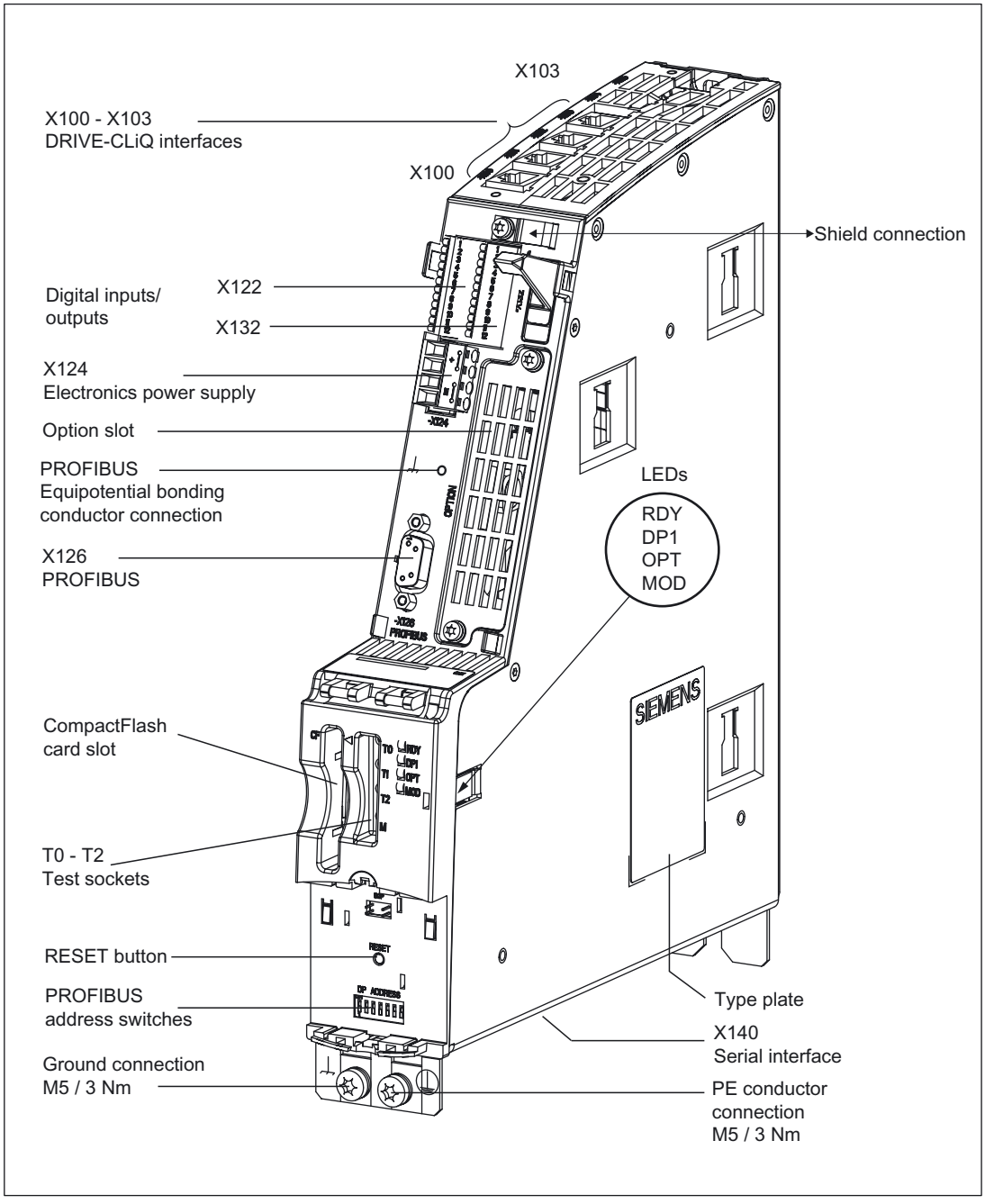


Figure 2-3 Interface description of the CU320 (covers removed)

2.2.3.2 Connection example

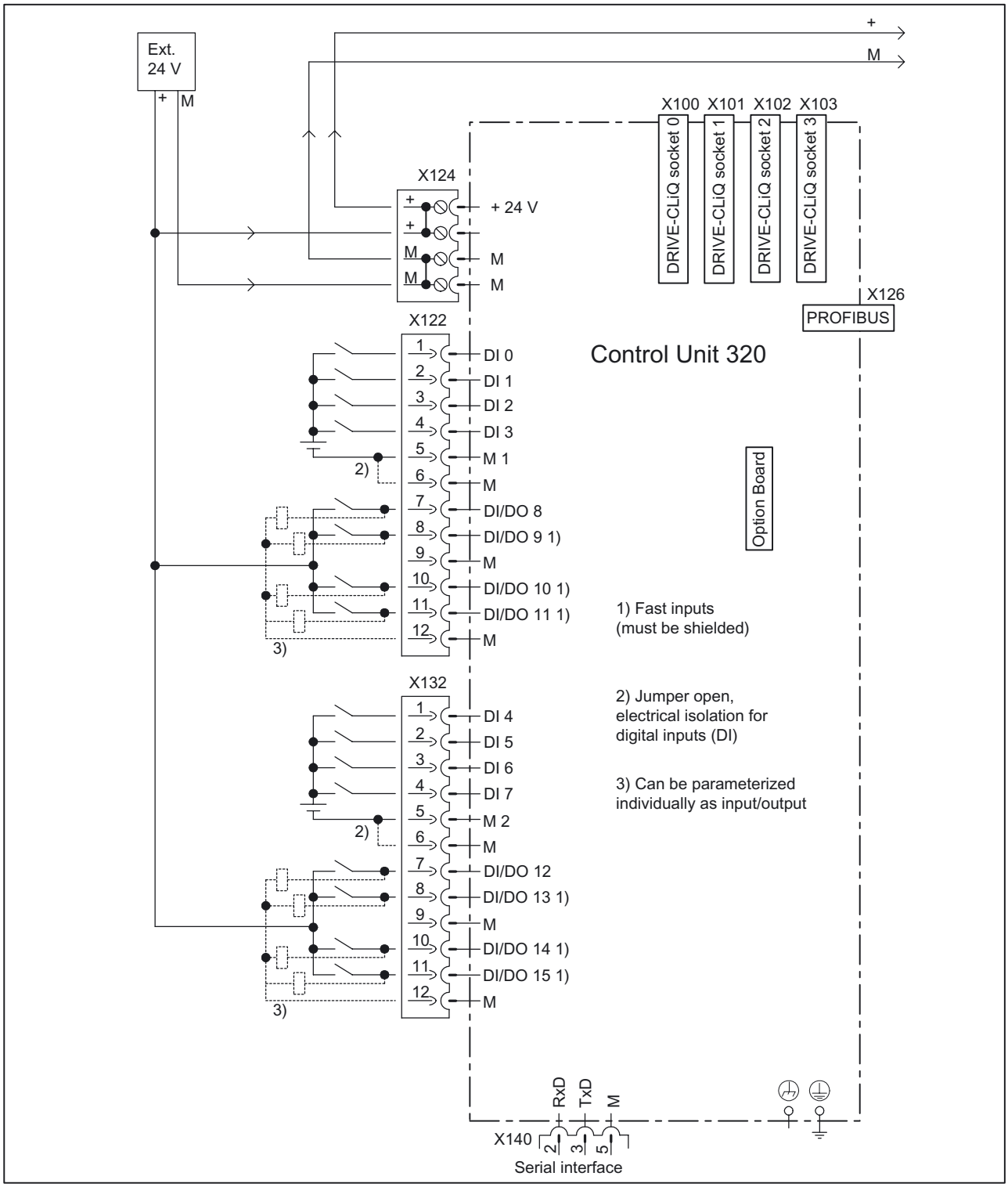
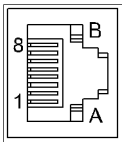


Figure 2-4 Connection example of CU320

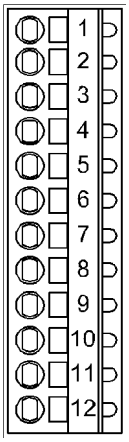
2.2.3.3 DRIVE-CLiQ interface X100 - X103

Table 2-2 DRIVE-CLiQ interface

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	+ (24 V)	Power supply
	B	GND (0 V)	Electronic ground
Blanking plate for DRIVE-CLiQ interface: Molex, order number: 85999-3255			

2.2.3.4 X122: Digital Inputs/Outputs

Table 2-3 Terminal block X122

	Terminal	Name[1)]	Technical specifications
	1	DI 0	Voltage: -3 V to 30 V Typical current consumption: 10 mA at 24 V DC Isolation: The reference potential is terminal M1 Level (incl. ripple) High level: 15 V to 30 V Low level: -3 V to 5 V Signal propagation times: L → H approx. 50 µs H → L: approx. 100 µs
	2	DI 1	
	3	DI 2	
	4	DI 3	
	5	M1	
	6	M	
	7	DI/DO 8	As input: Voltage: -3 V to 30 V Typical current consumption: 10 mA at 24 V DC Level (incl. ripple) High level: 15 V to 30 V Low level: -3 V to 5 V Terminal numbers 8, 10, and 11 are "fast inputs" Signal propagation times for inputs/"fast inputs": L → H: approx. 50 µs/5 µs H → L: approx. 100 µs/50 µs As output: Voltage: 24 V DC Max. load current per output: 500 mA Continued-short-circuit-proof
	8	DI/DO 9	
	9	M	
	10	DI/DO 10	
	11	DI/DO 11	
	12	M	
Max. connectable cross-section: 0.5 mm^2 Type: Spring-loaded terminal 1 (see Appendix A)			

1) DI: digital input; DI/DO: bidirectional digital input/output; M: electronic ground M1: ground reference

Note

An open input is interpreted as "low".

The "fast inputs" can be used in conjunction with a measuring system for position sensing.

To enable digital inputs (DI) 0 to 3 to function, terminal M1 must be connected. This can be done as follows:

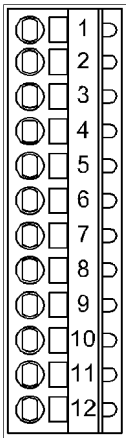
Connect the reference mass of the digital inputs, or a jumper to terminal M **(Notice this removes isolation for these digital inputs).**

Note

If a momentary interruption in the voltage occurs in the 24 V supply, the digital outputs will be deactivated until the interruption has been rectified.

2.2.3.5 X132: Digital Inputs/Outputs

Table 2-4 Terminal block X132

	Terminal	Name[1)]	Technical specifications
	1	DI 4	Voltage: -3 V to 30 V Typical current consumption: 10 mA at 24 V DC Isolation: The reference potential is terminal M2 Level (incl. ripple) High level: 15 V to 30 V Low level: -3 V to 5 V Signal propagation times for digital inputs: L → H approx. 50 µs H → L: approx. 100 µs
	2	DI 5	
	3	DI 6	
	4	DI 7	
	5	M2	
	6	M	
	7	DI/DO 12	As input: Voltage: -3 V to 30 V Typical current consumption: 10 mA at 24 V DC Level (incl. ripple) High level: 15 V to 30 V Low level: -3 V to 5 V Terminal numbers 8, 10, and 11 are "fast inputs" Signal propagation times "fast inputs": L → H: approx. 5 µs H → L: approx. 50 µs As output: Voltage: 24 V DC Max. load current per output: 500 mA Continued-short-circuit-proof
	8	DI/DO 13	
	9	M	
	10	DI/DO 14	
	11	DI/DO 15	
	12	M	
Max. connectable cross-section: 0.5 mm^2 Type: Spring-loaded terminal 1 (see Appendix A)			

1) DI: digital input; DI/DO: digital input/output; M: electronic ground; M2: ground reference

Note

An open input is interpreted as "low".

The "fast inputs" can be used for position sensing.

To enable digital inputs (DI) 4 to 7 to function, terminal M2 must be connected. This can be done as follows:

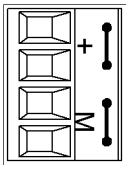
Connect the reference mass of the digital inputs, or a jumper to terminal M **(Notice this removes isolation for these digital inputs).**

Note

If a momentary interruption in the voltage occurs in the 24 V supply, the digital outputs will be deactivated until the interruption has been rectified.

2.2.3.6 Electronics power supply X124

Table 2-5 Terminal block X124

	Terminal	Function	Technical specifications
	+	Electronics power supply	Voltage: 24 V DC (20.4 V - 28.8 V) Current consumption: max. 0.8 A (without DRIVE-CLiQ or digital outputs) Max. current via jumper in connector: 20 A at 55 °C
	+	Electronics power supply	
	M	Electronic ground	
	M	Electronic ground	
Max. connectable cross-section: 2.5 mm^2 Type: Screw terminal 2 (see Appendix A)			

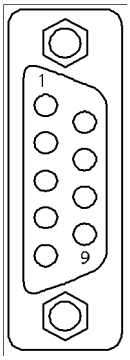
Note

The two "+" and "M" terminals are jumpered in the connector and not in the unit. This ensures the supply voltage is looped through.
The current consumption of the components increases by the value required for the DRIVE-CLiQ nodes, the digital outputs and PROFIBUS teleservice.

2.2.3.7 PROFIBUS X126

The PROFIBUS interface is a standard interface on every Control Unit.

Table 2-6 PROFIBUS interface X126

	Pin	Signal name	Meaning	Range
	1	-	Do not use	
	2	M24_SERV	Power supply for teleservice, ground	0 V
	3	RxD/TxD–P	Receive/transmit data P (B)	RS485
	4	CNTR–P	Control signal	TTL
	5	DGND	PROFIBUS data reference potential	
	6	VP	Supply voltage plus	5 V + -10 %
	7	P24_SERV	Power supply for teleservice, + (24 V)	24 V (20.4 V – 28.8 V)
	8	RxD/TxD–N	Receive/transmit data N (A)	RS485
	9	-	Do not use	
Type: 9-pin SUB-D female				

Note

A teleservice adapter can be connected to the PROFIBUS interface (X126) for remote diagnosis purposes.
The power supply for the teleservice terminals 2 and 7 withstands a max. load and continued short-circuit current of 150 mA.

Caution

No CAN cables must be connected to interface X126. If CAN cables are connected, the CU320 and other CAN bus nodes may be destroyed.

PROFIBUS connectors

The first and last nodes in a bus must contain terminating resistors. Otherwise data transmission will not function correctly.

The terminating resistors are activated in the connector.

The cable shield must be connected at both ends over large-surface area contacts.

2.2.3.8 PROFIBUS address switches

Table 2-7 PROFIBUS address switches

Technical specifications	Switch	Significance
Significance: 2^0 2^1 2^2 2^3 2^4 2^5 2^6 = 1 2 4 8 16 32 64  ON OFF S1 S2 S3 S4 S5 S6 S7 Example: 1 + 4 + 32 = 37 PROFIBUS address = 37	S1	$2^0 = 1$
	S2	$2^1 = 2$
	S3	$2^2 = 4$
	S4	$2^3 = 8$
	S5	$2^4 = 16$
	S6	$2^5 = 32$
	S7	$2^6 = 64$

Note

The PROFIBUS address switches are defaulted to 0 or 127. In these two settings, addresses are assigned via parameters.

The address switch is behind the blanking plate. The blanking plate is part of the scope of supply.

Setting the PROFIBUS address

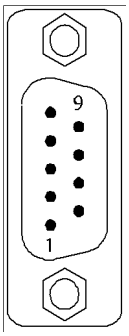
The following reference contains further information about setting the PROFIBUS address:

Reference: /IH1/ SINAMICS S120 Commissioning Manual

2.2.3.9 Serial interface (RS232) X140

For operation and parameterization you can connect either a PG/PC with STARTER (start-up tool) or an external display and operator panel via the serial interface. The interface is located on the underside of the CU.

Table 2-8 Serial interface (RS-232-C) X140

	Pin	Name	Technical Specifications
	2	RxD	Receive data
	3	TxD	Transmit data
	5	Ground	Ground reference

2.2.3.10 Measurement sockets T0, T1, and T2

Table 2-9 Measurement sockets T0, T1, and T2

Socket	Function	Technical specifications
T0	Measurement socket 0	Voltage: 0 V to 5 V Resolution: 8 bits Load current: max. 3 mA Continued-short-circuit-proof The reference potential is terminal M
T1	Measurement socket 1	
T2	Measurement socket 2	
M	Ground	
The measurement sockets are only suitable for bunch pin plugs with a diameter of 2 mm.		

2.2.3.11 Slot for the CompactFlash card

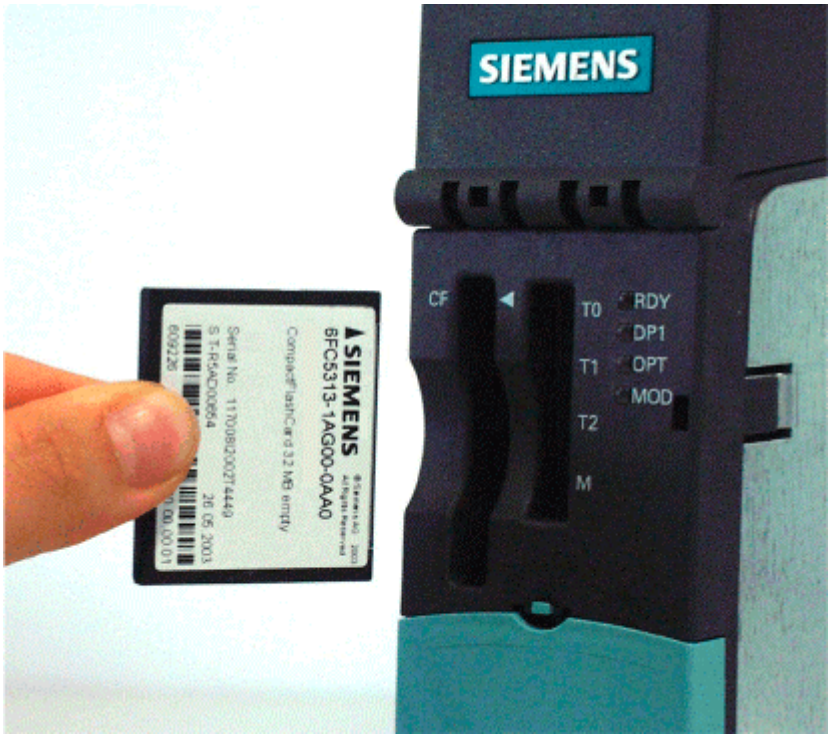


Figure 2-5 CompactFlash card slot

Caution

The CompactFlash card may only be inserted as shown in the figure (arrow top right).

The CompactFlash card may only be inserted or removed when the Control Unit is disconnected from the power supply.

When returning a defective Control Unit, remove the CompactFlash card and keep it for insertion in the replacement unit. This is important otherwise the data on the CompactFlash card (parameters, firmware, licenses, and so on) may be lost.

2.2.3.12 Description of the LEDs on the control unit

Table 2-10 Description of the LEDs on the Control Unit

LED	Color	State	Description
RDY (READY)	-	OFF	Electronics power supply outside permissible tolerance range
	Green	Continuous	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
		Flashing 2 Hz	Writing to CompactFlash card
	Red	Continuous	At least one fault is present in this component.
		Flashing 0.5 Hz	CompactFlash card has not been inserted. Boot error (e.g. firmware cannot be loaded to the RAM).
	Green Red	Flashing 0.5 Hz	Control Unit 320 is ready for operation. No software licenses for device.
	Orange	Continuous	DRIVE-CLiQ communication is being established.
		Flashing 0.5 Hz	Unable to load firmware to RAM
		Flashing 2 Hz	Firmware CRC error
DP1 (PROFIBUS cyclic operation)	-	OFF	Cyclic communication is not (yet) running. Note: The PROFIBUS is ready for communication when the Control Unit is ready for operation (see RDY LED).
	Green	Continuous	Cyclic communication is running.
		Flashing 0.5 Hz	Cyclic communication is not yet running fully. Possible reasons: • The master is not transmitting setpoints. • No global control (GC) or master sign-of-life is transmitted during isochronous operation.
	Red	Continuous	Cyclic communication has been interrupted.
OPT (OPTION)	-	OFF	Electronics power supply outside permissible tolerance range. The component is not ready for operation. The Option Board is missing or an associated drive object has not been created.
	Green	Continuous	Option Board ready for operation
		Flashing 0.5 Hz	Depends on the Option Board used
	Red	Continuous	At least one fault is pending in this component. The Option Board is not ready (e.g. after power ON).
MOD	-	OFF	Reserved
	Green	Continuous	Reserved

Cause and rectification of faults

The following reference contains further information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S120 Commissioning Manual

RESET button

The RESET button is located behind the blanking plate.

Function of the RESET button

The following reference contains further information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S, Commissioning Manual

2.2.4 Dimension Drawing

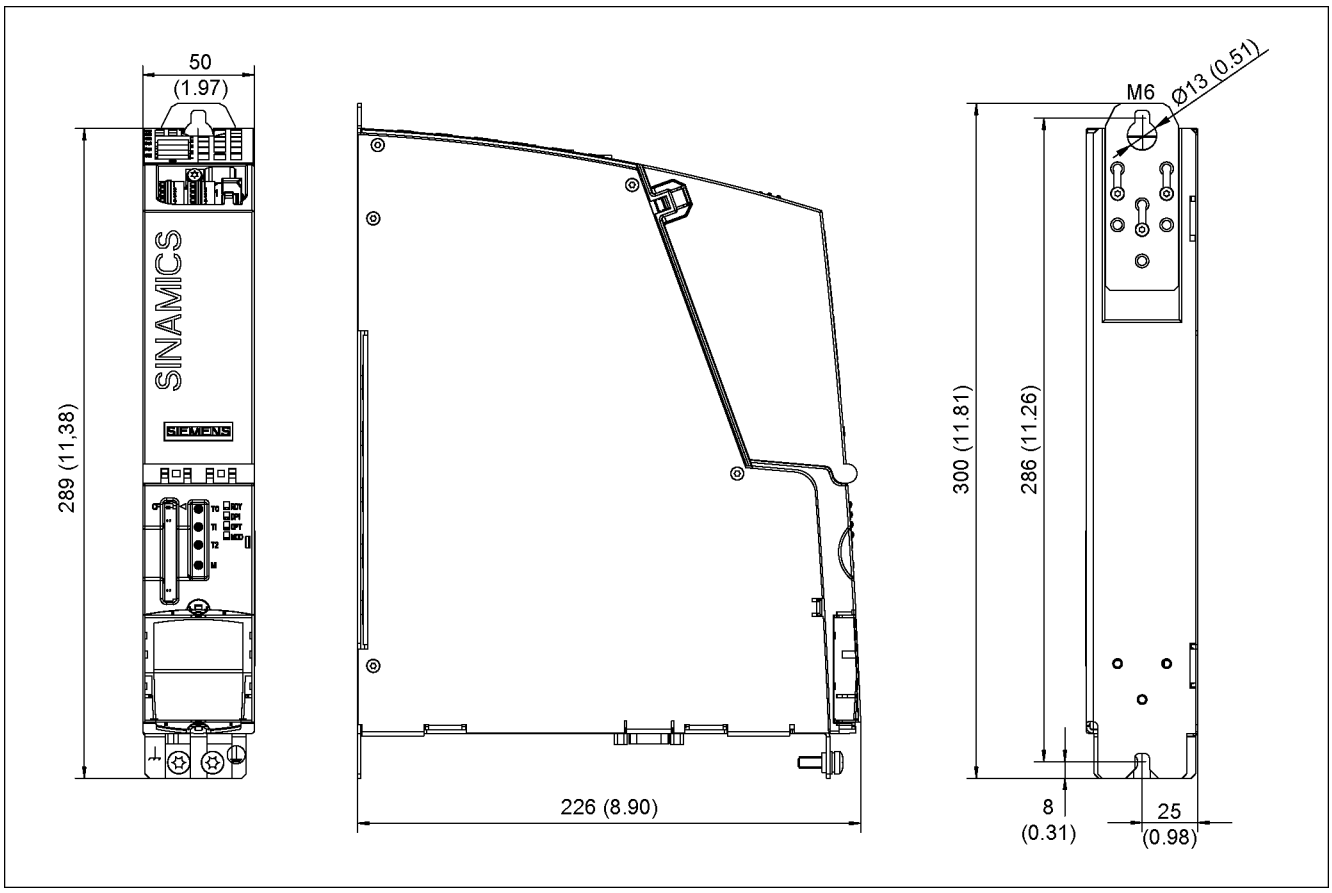


Figure 2-6 Dimension drawing: CU320

2.2.5 Installation

Mounting the CU320 directly on a line module booksize

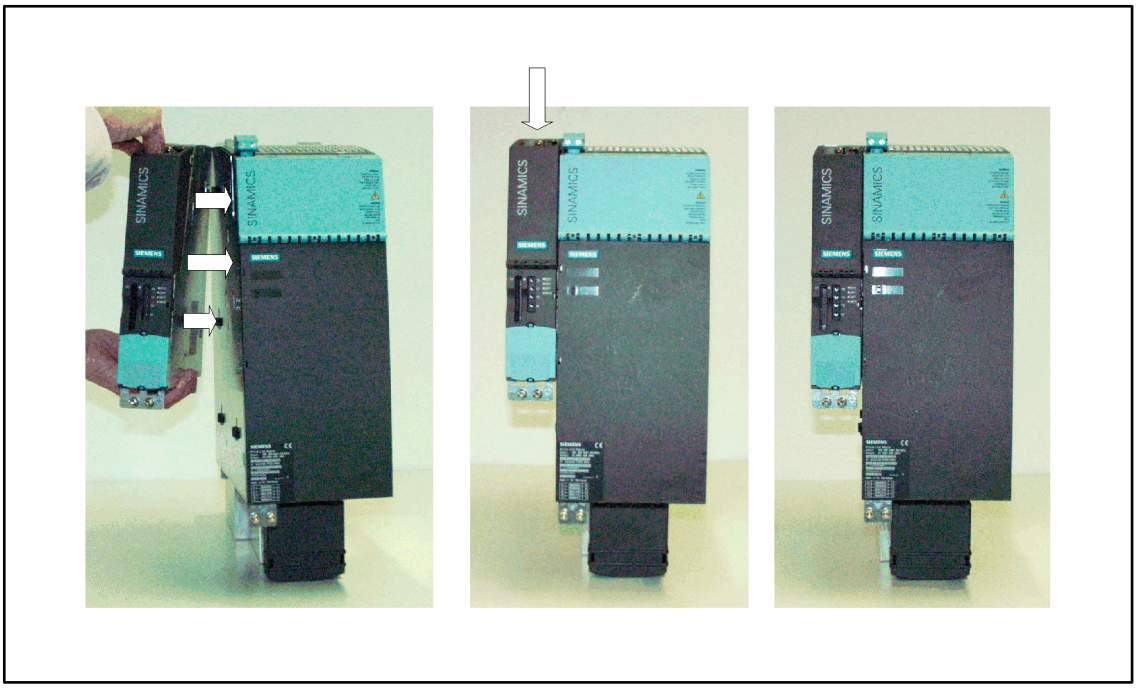


Figure 2-7 Mounting the CU320 directly on a line module booksize

Installing the CU320 directly on a mounting surface

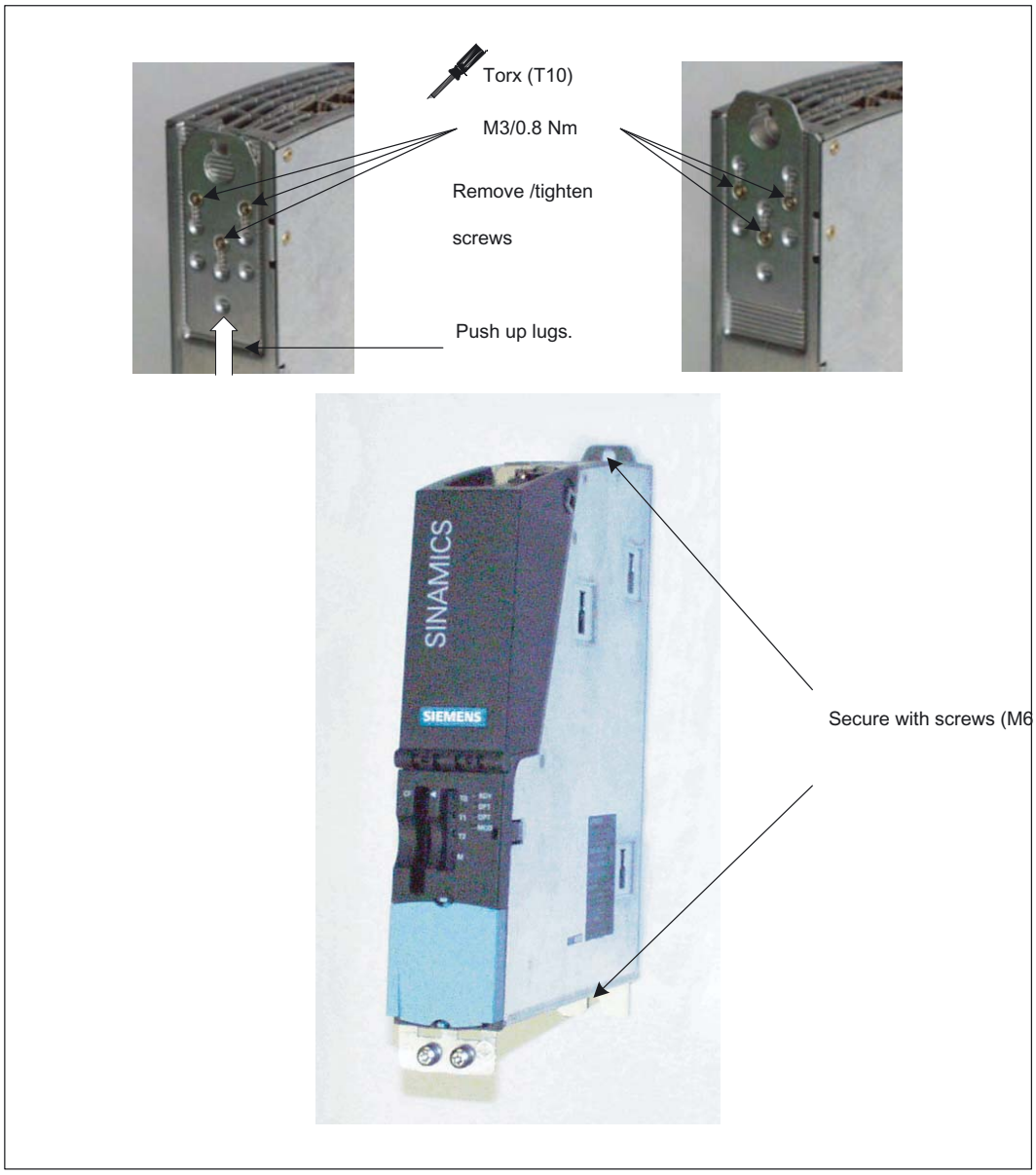


Figure 2-8 Installing the CU320 directly on a mounting surface

Installing the CU320 on a mounting surface using spacer elements

To provide the correct mounting depth for a booksize line-up with internal air cooling, you can use spacer elements.

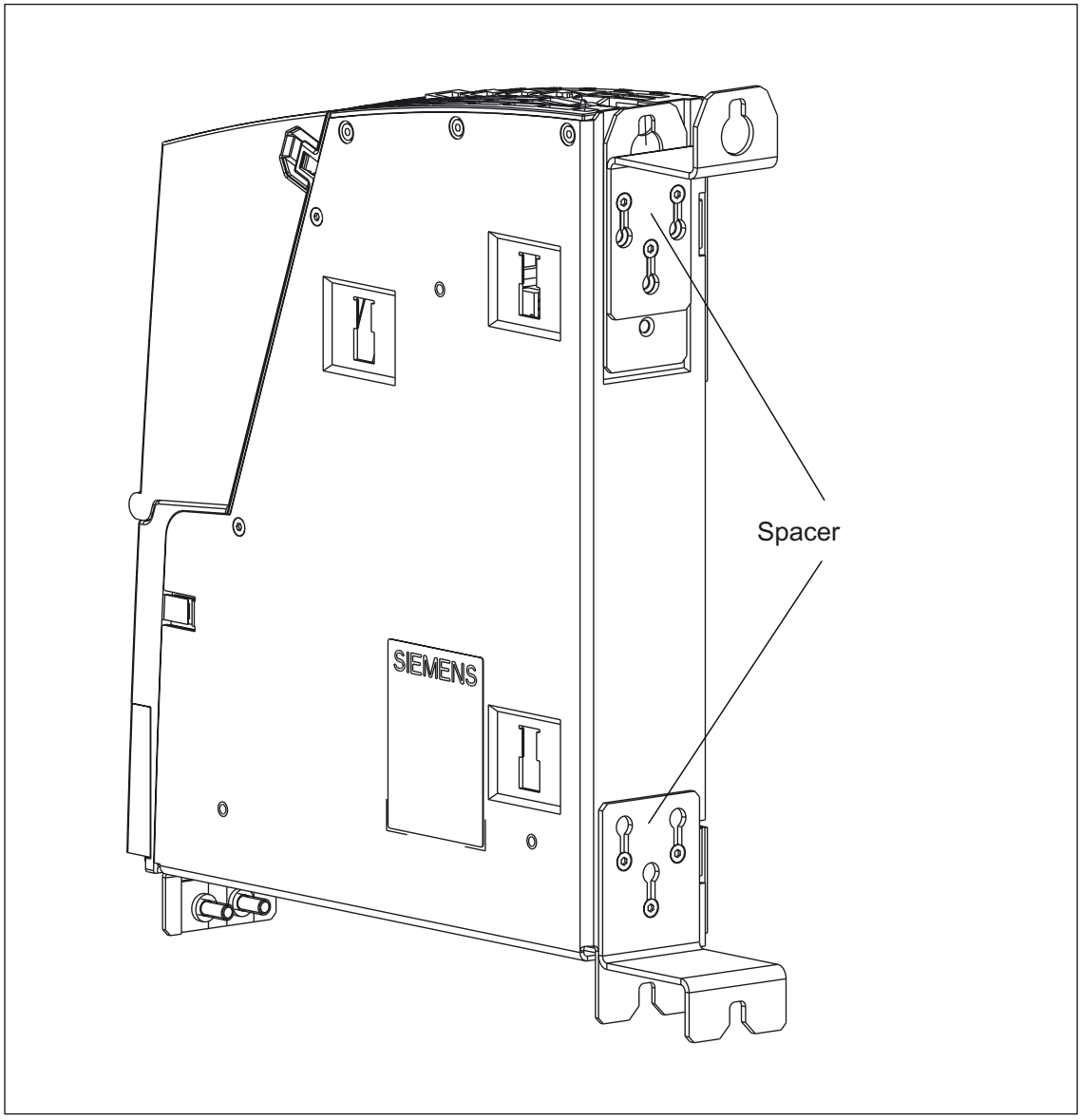


Figure 2-9 Installing the CU320 on a mounting surface using spacer elements

Removing/opening the cover of the CU320

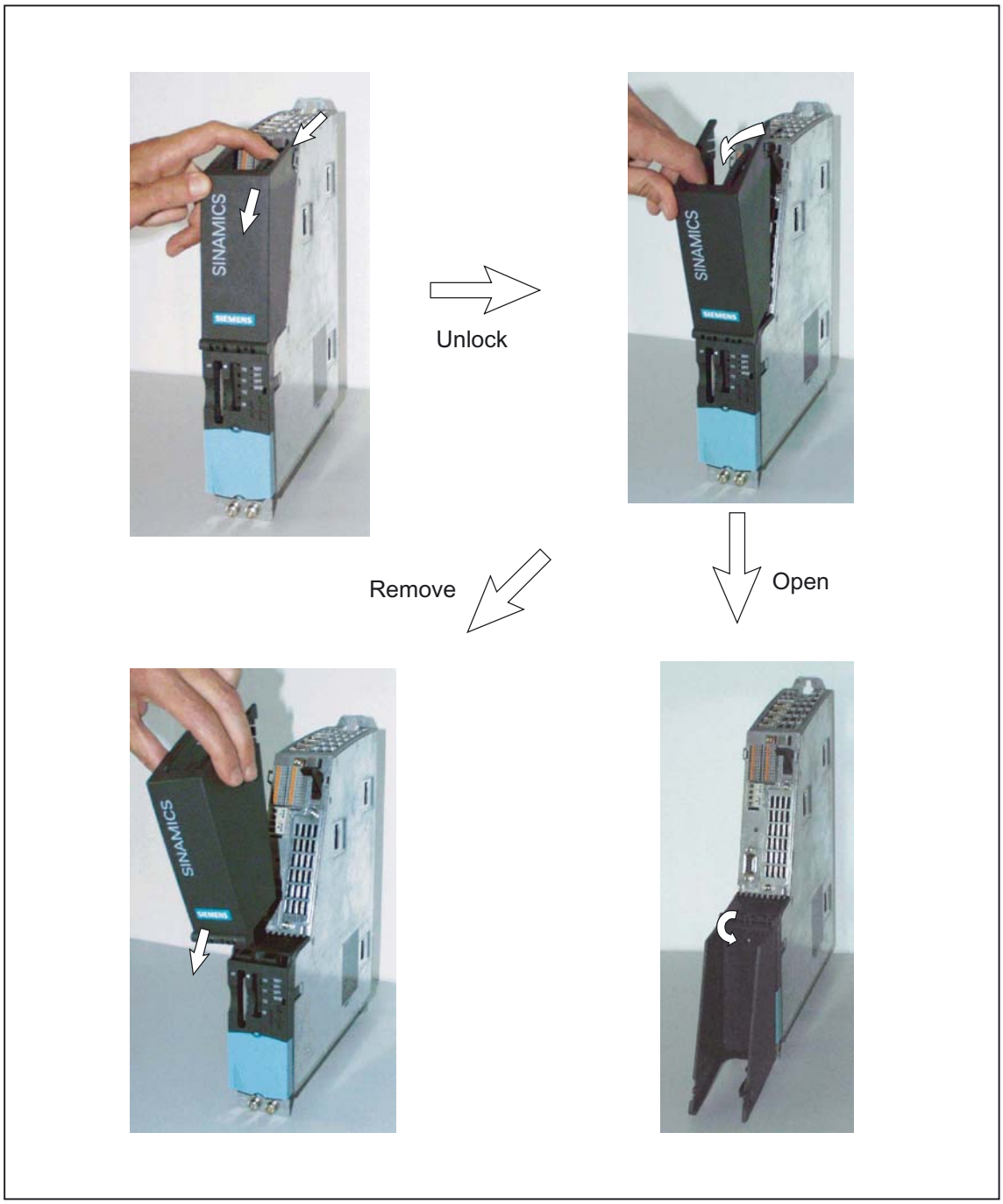


Figure 2-10 Removing/opening the cover of the CU320

2.2.6 Technical Specifications

Table 2-11 Technical specifications

	Unit	Value
Electronics power supply		
Voltage	V_{DC}	24 DC (20.4 – 28.8)
Current (without DRIVE-CLiQ or digital outputs)	A_{DC}	0.8
Power loss	W	20
Max. ambient temperature up to an altitude of 2000 m	°C	55
Note: As of an altitude of 2000 m, the max. ambient temperature decreases by 7 °C every 1000 m.		
PE/ground connection	On housing with M5/3 Nm screw	
Weight	kg	1.5

Additional system components

3

3.1 Option Board: Communication Board CAN (CBC10)

3.1.1 Description

The Communication Board CAN 10 (CBC10) is a communication board for linking to CAN.

3.1.2 Safety information

Caution

The Option Board may only be inserted and removed when the Control Unit and Option Board are disconnected from the power supply.

Caution

The CBC10 must only be operated by qualified personnel. The ESC notices must be observed.

3.1.3 Interface description

3.1.3.1 Overview

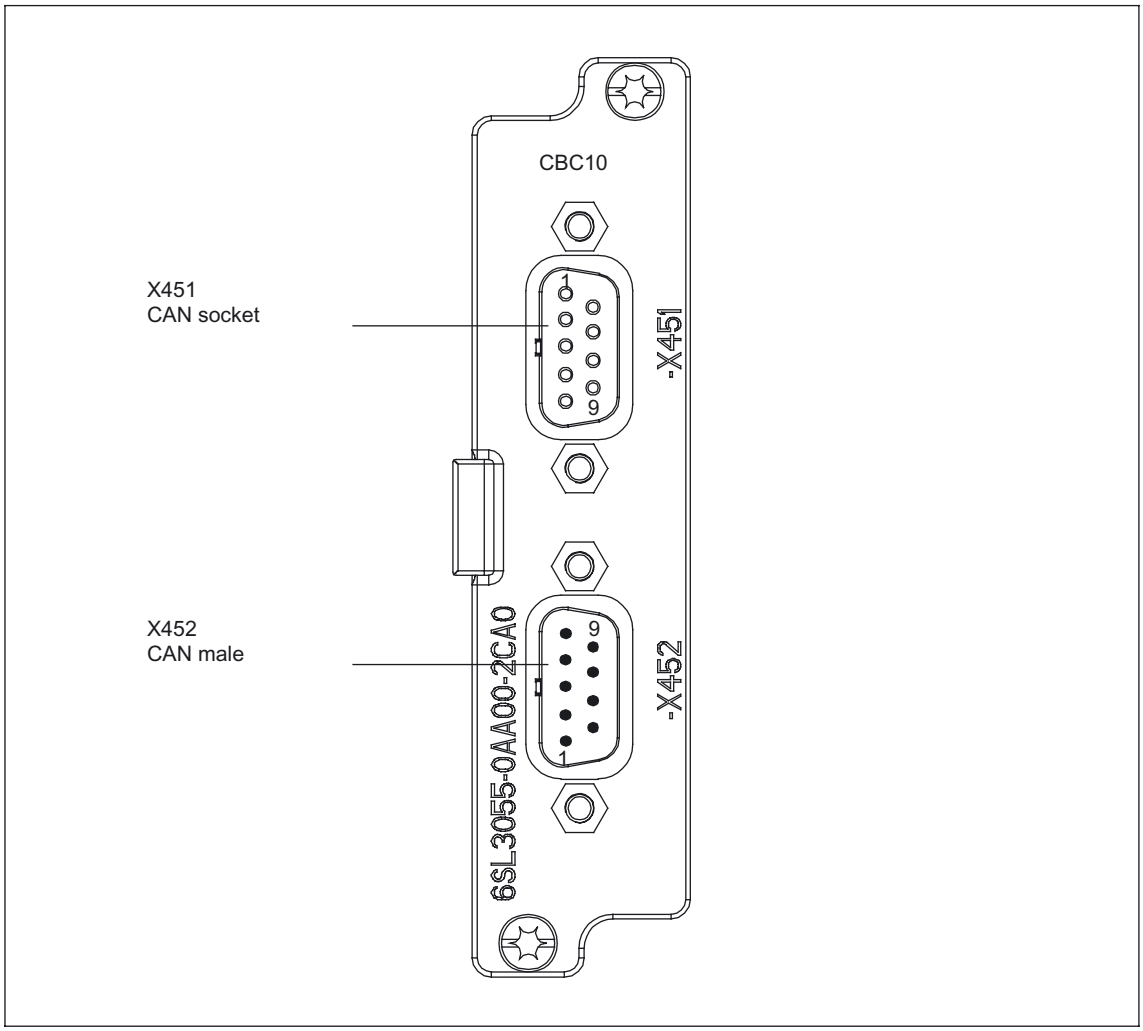
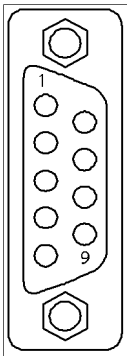


Figure 3-1 Interface description of the CBC10

3.1.3.2 CAN bus interface X451

Table 3-1 CAN bus interface X451

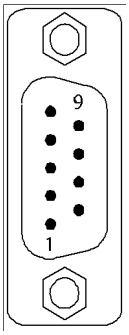
	Pin	Name	Technical specifications
	1	Reserved, do not use	
	2	CAN_L	CAN signal (dominant low)
	3	CAN_GND	CAN ground
	4	Reserved, do not use	
	5	CAN_SHLD	Optional shield
	6	GND	CAN ground
	7	CAN_H	CAN signal
	8	Reserved, do not use	
	9	Reserved, do not use	
Type: 9-pin SUB-D female			

Caution

If the CAN connector is mistakenly plugged into the PROFIBUS connector, this can destroy the CAN master.

3.1.3.3 CAN bus interface X452

Table 3-2 CAN bus interface X452

	Pin	Name	Technical specifications
	1	Reserved, do not use	
	2	CAN_L	CAN signal (dominant low)
	3	CAN_GND	CAN ground
	4	Reserved, do not use	
	5	CAN_SHLD	Optional shield
	6	GND	CAN ground
	7	CAN_H	CAN signal
	8	Reserved, do not use	
	9	Reserved, do not use	
Type: 9-pin SUB-D male			

3.1.3.4 2-pin SMD DIL switch

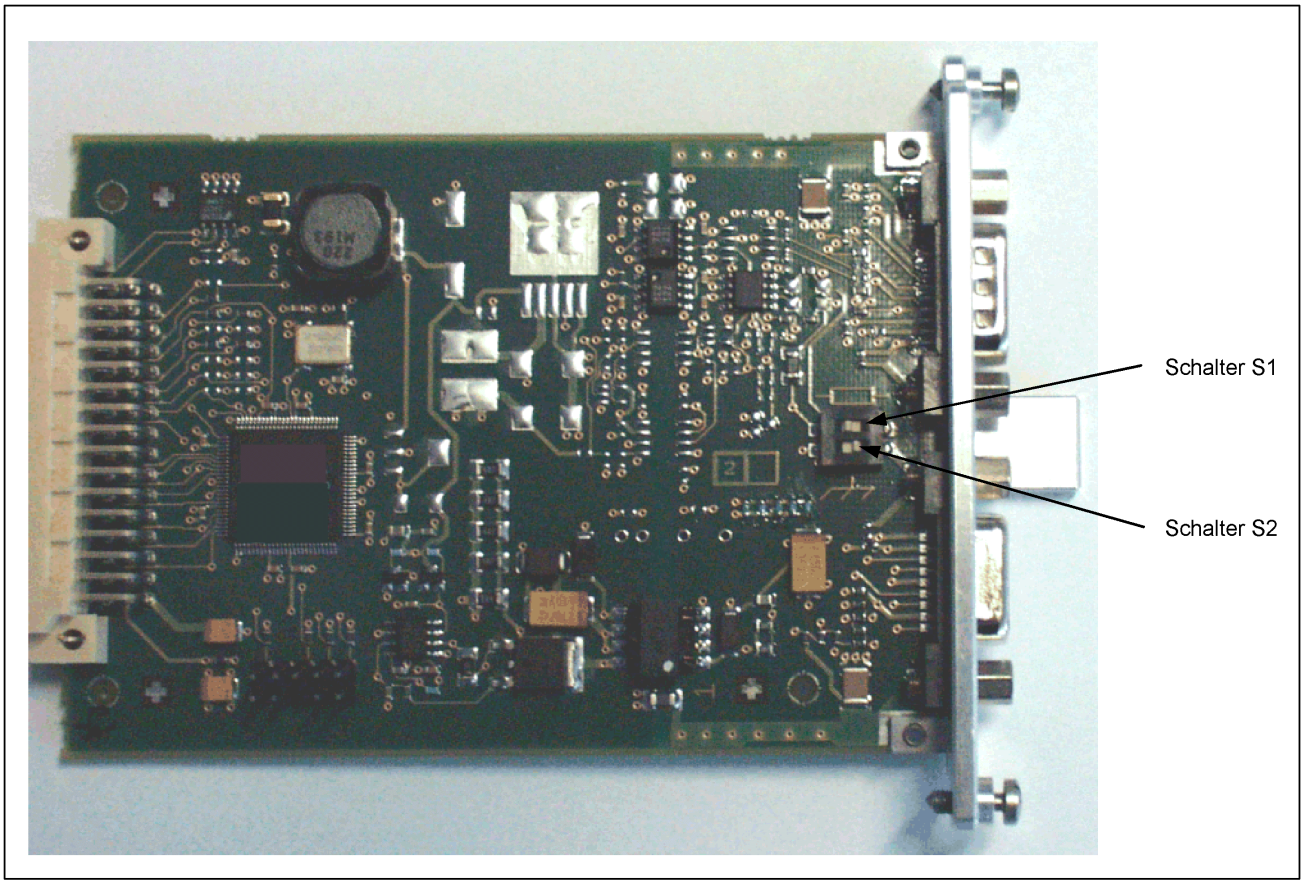
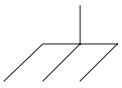


Figure 3-2 Switch S1/S2

Table 3-3 2-pin SMD DIL switch

ID on the board	Switch	Function	Switch position		Default
	S1	Terminating resistor	OFF	Inactive	OFF
			ON	Active	
	S2	Operation with/without ground	OFF	Ground-free operation	OFF
			ON	Operation with ground	

PROFIBUS connectors

The first and last nodes in a bus must contain terminating resistors. Otherwise data transmission will not function correctly.

The terminating resistors are activated in the connector.

The cable shield must be connected at both ends over large-surface area contacts.

3.1.4 Installation

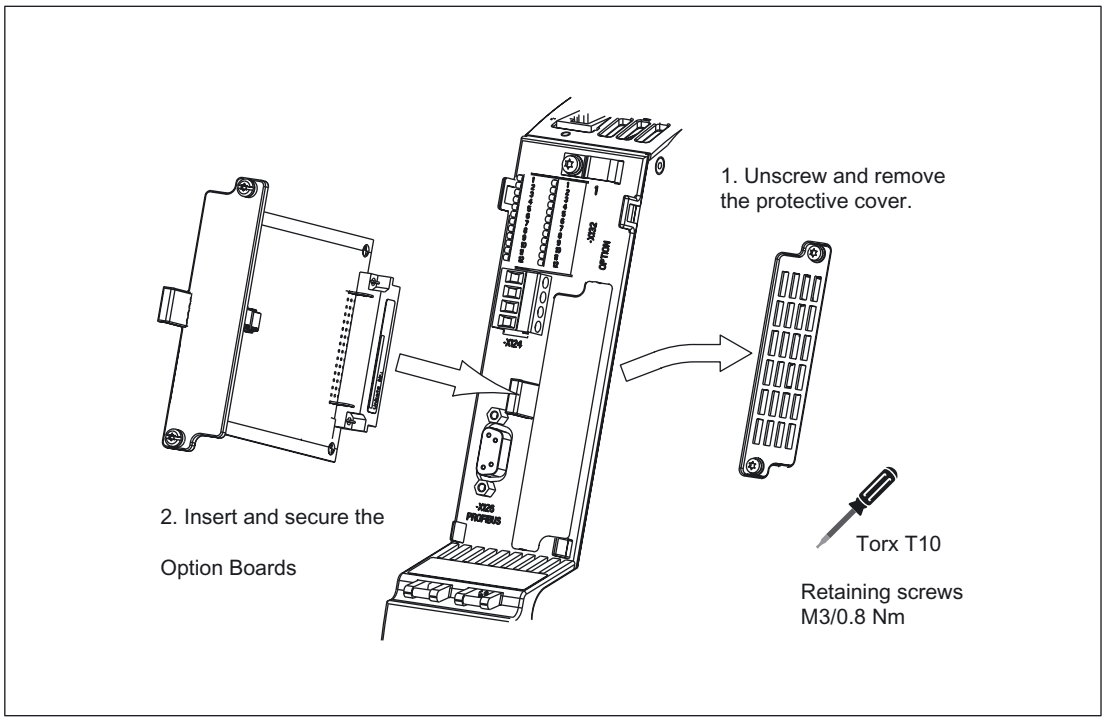


Figure 3-3 Installing the Option Board

3.1.5 Technical Specifications

Table 3-4 Technical Specifications

Communication Board CAN (CBC10)		
Max. current requirements (at 24 V DC) Power loss	A_{DC} W	0.1 <10
Weight, approx.	kg	0.1

3.2 Option Board: Terminal Board 30 (TB30)

3.2.1 Description

The Terminal Board 30 (TB30) is a terminal expansion board for plugging in to the control unit.

The TB30 contains the following terminals:

Table 3-5 Interface overview of the TB30

Type	Number
Digital inputs	4
Digital outputs	4
Analog inputs	2
Analog outputs	2

3.2.2 Safety information

Caution

The option board may only be inserted and removed when the control unit and option board are disconnected from the power supply.

Caution

The TB30 must only be operated by qualified personnel. The ESC notices must be observed.

3.2.3 Interface description

3.2.3.1 Overview

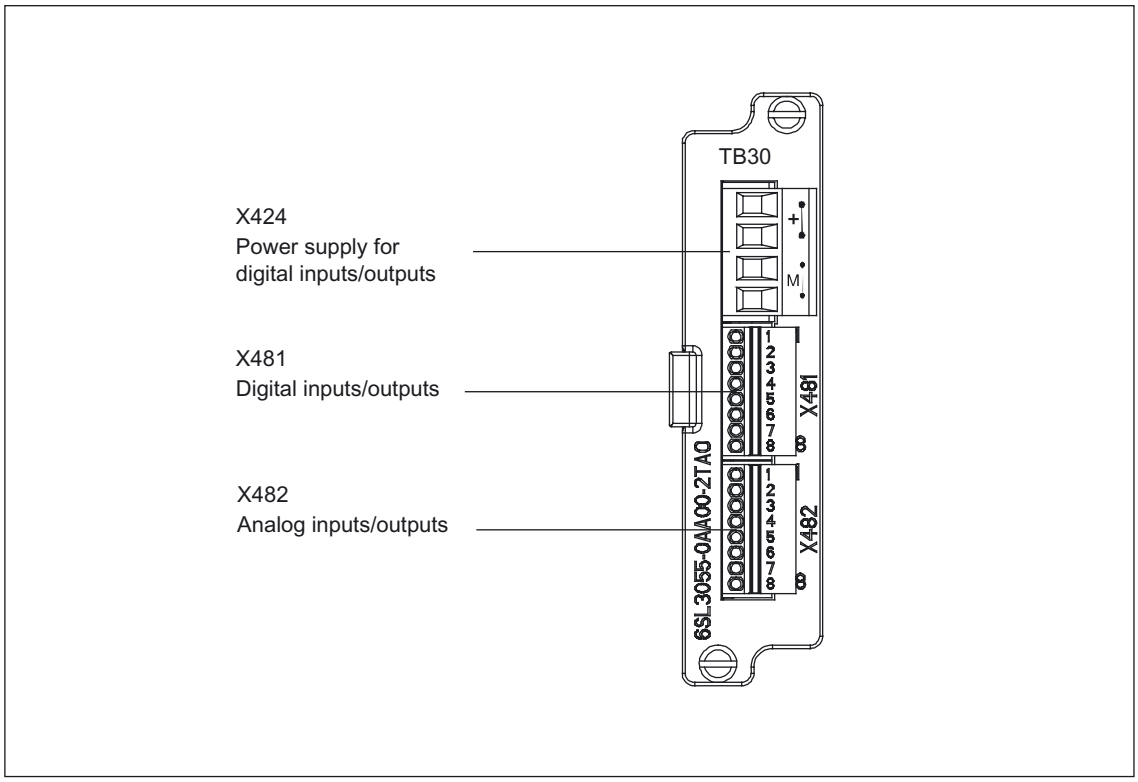


Figure 3-4 Interface description of the TB30

3.2.3.2 Connection example

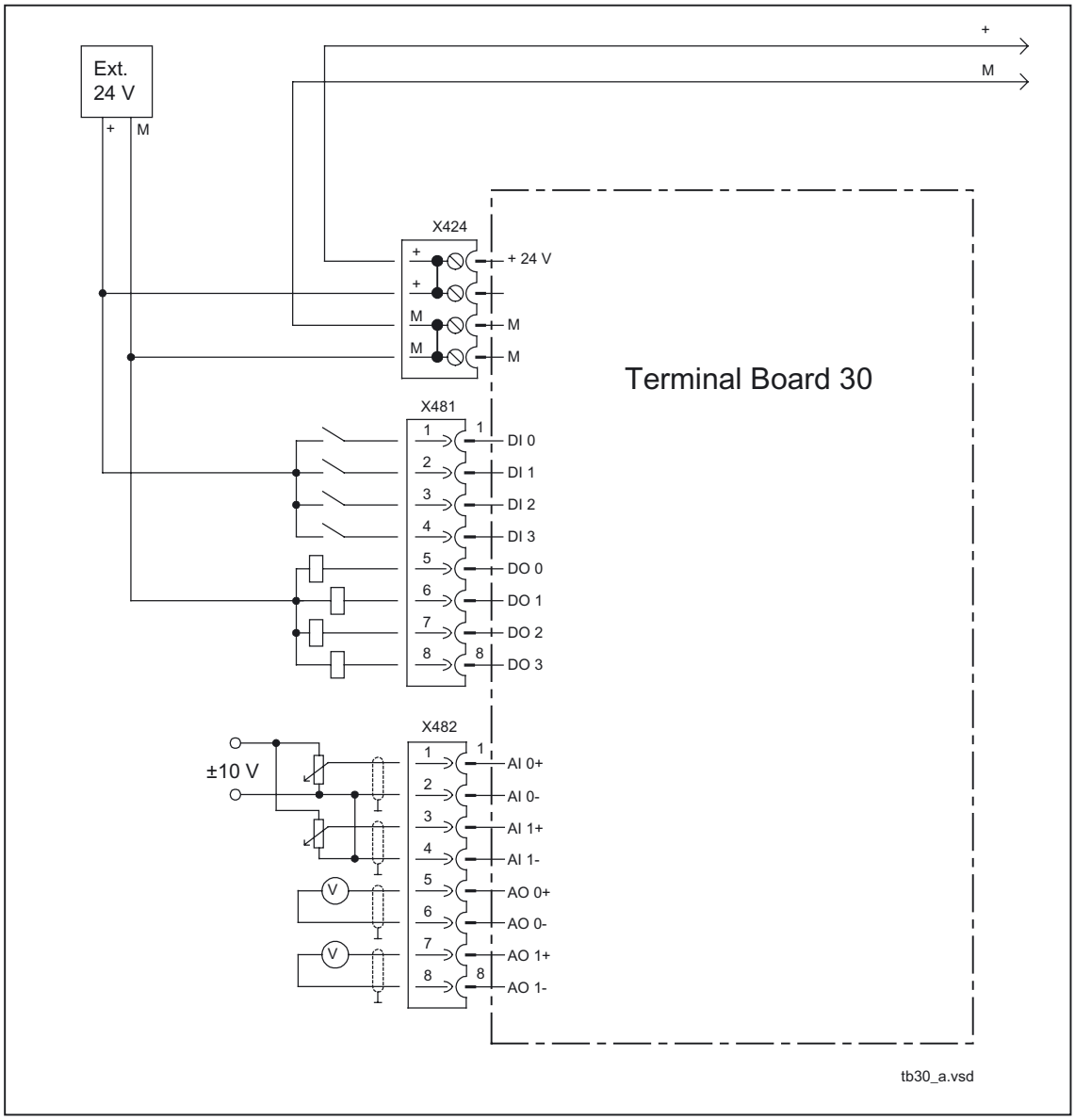
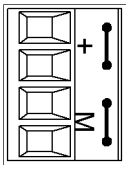


Figure 3-5 Connection example of TB30

3.2.3.3 Power supply for digital inputs/outputs X424

Table 3-6 Terminal block X424

	Terminal	Function	Technical specifications
	+	Power supply	Voltage: 24 V DC (20.4 V – 28.8 V) Current consumption: max. 4 A (per digital output max. 0.5 A) Max. current via jumper in connector: 20 A at 55 °C
	+	Power supply	
	M	Ground	
	M	Ground	
Max. connectable cross-section: 2.5 mm^2 Type: Screw terminal 2 (see Appendix A)			

Note

The two "+" and "M" terminals are jumpered in the connector and not in the unit. This ensures the supply voltage is looped through.

This power supply is required for the digital inputs/outputs only. The electronics power supply and the power supply for the analog inputs/outputs are drawn via the option slot of the Control Unit.

Note

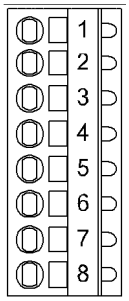
The power supply of the digital inputs/outputs and the electronics power supply of the Control Unit are isolated.

Note

If a momentary interruption in the voltage occurs in the 24 V supply, the digital outputs will be deactivated until the interruption has been rectified.

3.2.3.4 Digital inputs/outputs X481

Table 3-7 Terminal block X481

	Terminal	Name[1)]	Technical specifications
	1	DI 0	Voltage: -3 V to 30 V Typical current consumption: 10 mA at 24 V DC Ground reference: X424. M Signal propagation times: L → H approx. 50 µs H → L: approx. 100 µs Level (incl. ripple) High level: 15 V to 30 V Low level: -3 V to 5 V
	2	DI 1	
	3	DI 2	
	4	DI 3	
	5	DO 0	Voltage: 24 V DC Max. load current per output: 500 mA Ground reference: X424.M Continued-short-circuit-proof
	6	DO 1	
	7	DO 2	
	8	DO 3	
Max. connectable cross-section: 0.5 mm^2 Type: Spring-loaded terminal 1 (see Appendix A)			

1) DI: digital input, DO: Digital output

Note

An open input is interpreted as "low".

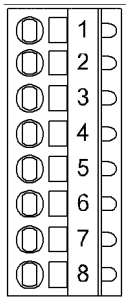
The power supply and the digital inputs/outputs are isolated from the Control Unit.

Note

If a momentary interruption in the voltage occurs in the 24 V supply, the digital outputs will be deactivated until the interruption has been rectified.

3.2.3.5 Analog inputs/outputs X482

Table 3-8 Terminal block X482

	Terminal	Name[1)]	Technical specifications
	1	AI 0+	Voltage: -10 V to +10 V Internal resistance: 65 kΩ Resolution: 13 bits + sign
	2	AI 0-	
	3	AI 1+	
	4	AI 1-	
	5	AO 0+	Voltage range: -10 V to +10 V Load current: max. -3 mA to +3 mA Resolution: 11 bits + sign Continued-short-circuit-proof
	6	AO 0-	
	7	AO 1+	
	8	AO 1-	
Max. connectable cross-section: 0.5 mm^2 Type: Spring-loaded terminal 1 (see Appendix A)			

1) AI: analog input, AO: Analog output

Note

An open input is interpreted as approximately "0V".

The power supply of the analog inputs/outputs is drawn via the option slot of the Control Unit and not via X424.

The shield is connected to the Control Unit (see Electrical Connection).

Caution

The common-mode range must not be infringed.
The analog differential voltage signals can have a maximum offset voltage of +/-30 V with respect to the ground potential. If the range is infringed, incorrect results may occur during analog/digital conversion.

Handling analog inputs

The following reference contains more information about analog inputs:

Reference: /IH1/ SINAMICS S120 Commissioning Manual

3.2.4 Installation

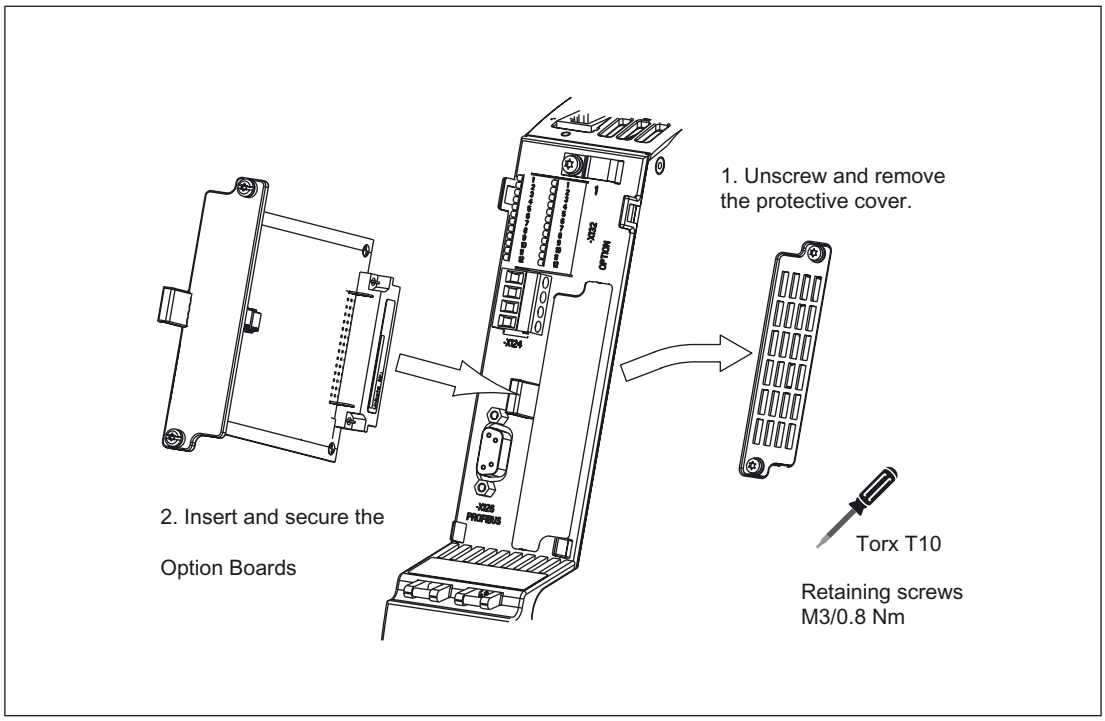


Figure 3-6 Installing the Option Board

3.2.5 Electrical Connection

Shield connection of the TB30 on the Control Unit

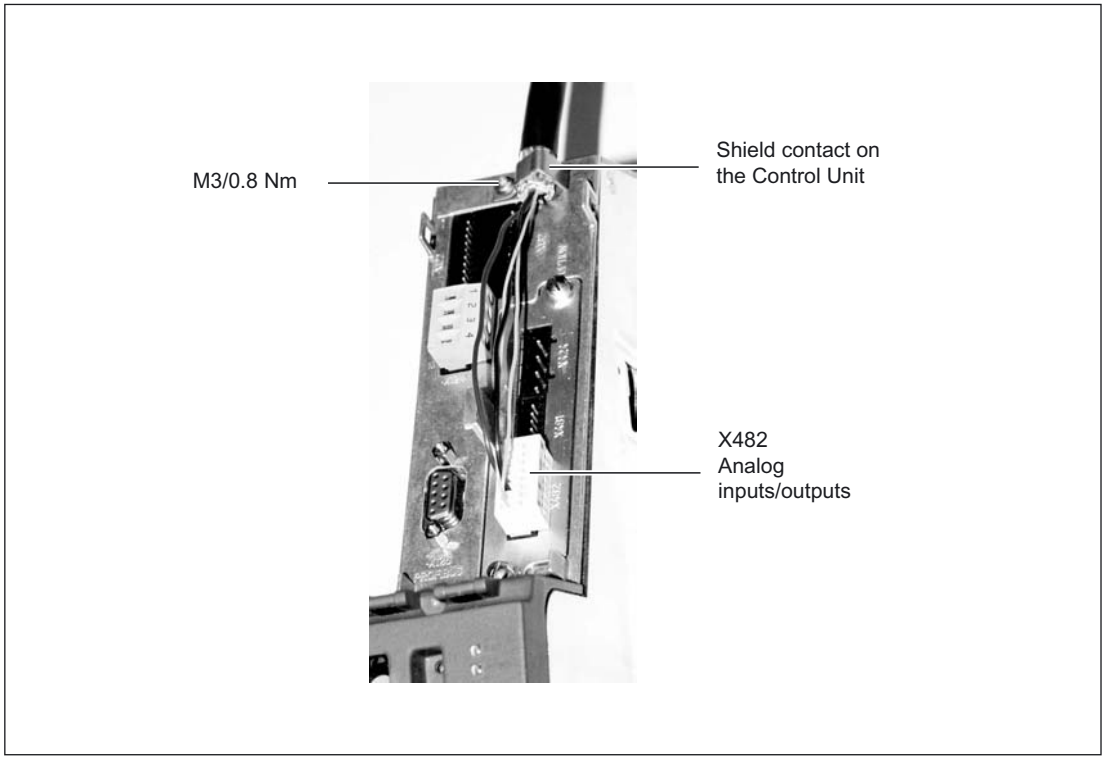


Figure 3-7 Shield contact for the TB30

The permissible bending radii for the cables must not be exceeded when the cables are being installed.

3.2.6 Technical Specifications

Table 3-9 Technical Specifications

	Unit	Value
Electronics power supply		
Voltage	V_{DC}	24 DC (20.4 – 28.8)
Current via the option slot of the CU (without digital outputs)	A_{DC}	0.05
Power loss	W	<3
PE/ground connection	On housing with M5/3Nm screw	
Weight	kg	0.1

3.3 Terminal Module 15 (TM15)

3.3.1 Description

The Terminal Module 15 (TM15) is a terminal expansion module for snapping on to a DIN 50022 mounting rail. It can be used to increase the number of available digital inputs/outputs within a drive system.

Table 3-10 Interface overview of the TM15

Type	Number
Digital inputs/outputs	24 (isolation in 3 groups each with 8 channels)

3.3.2 Safety Information

Danger

The 50 mm clearances above and below the components must be observed.

3.3.3 Interface description

3.3.3.1 Overview

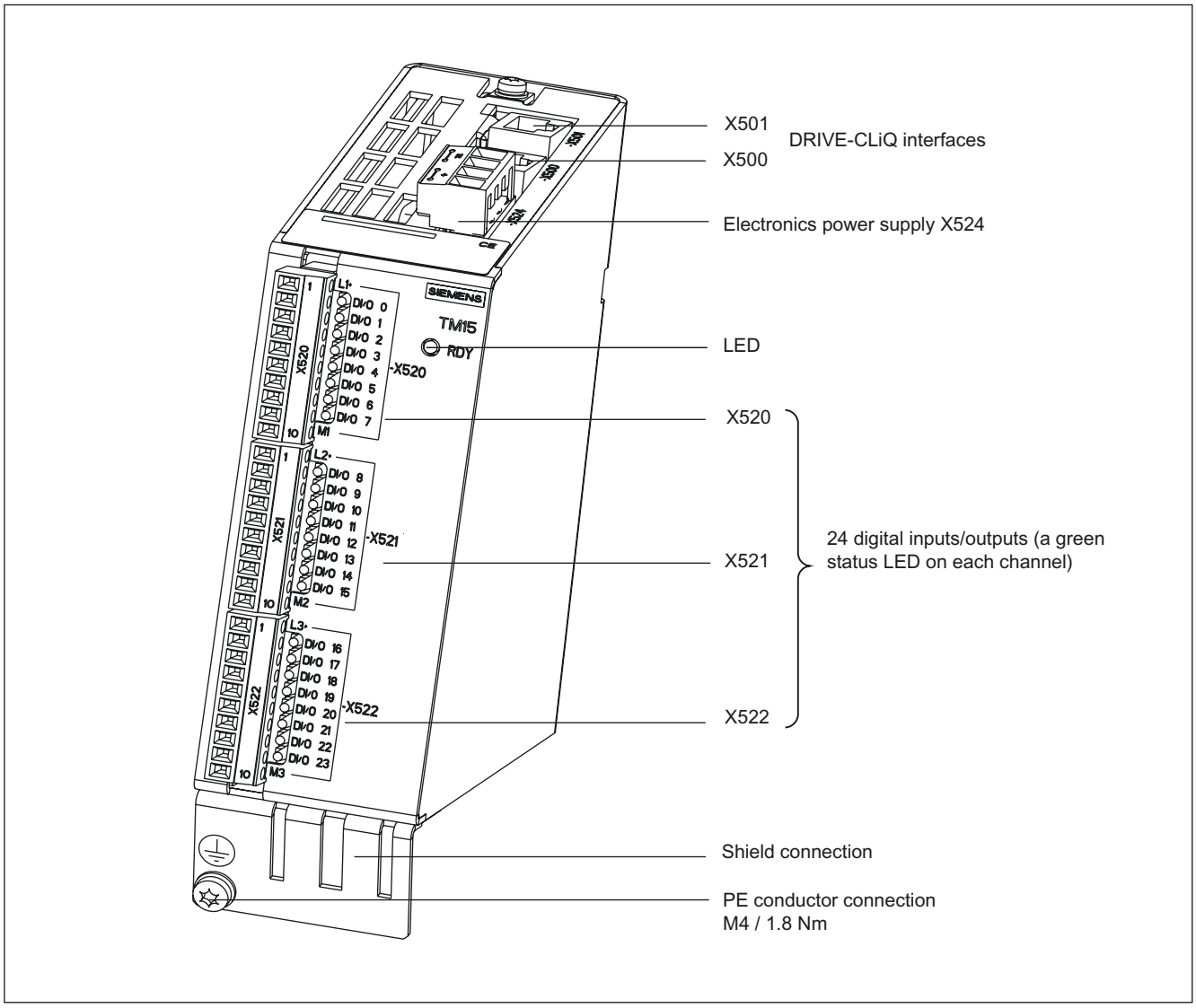


Figure 3-8 Interface description TM15

3.3.3.2 Connection example

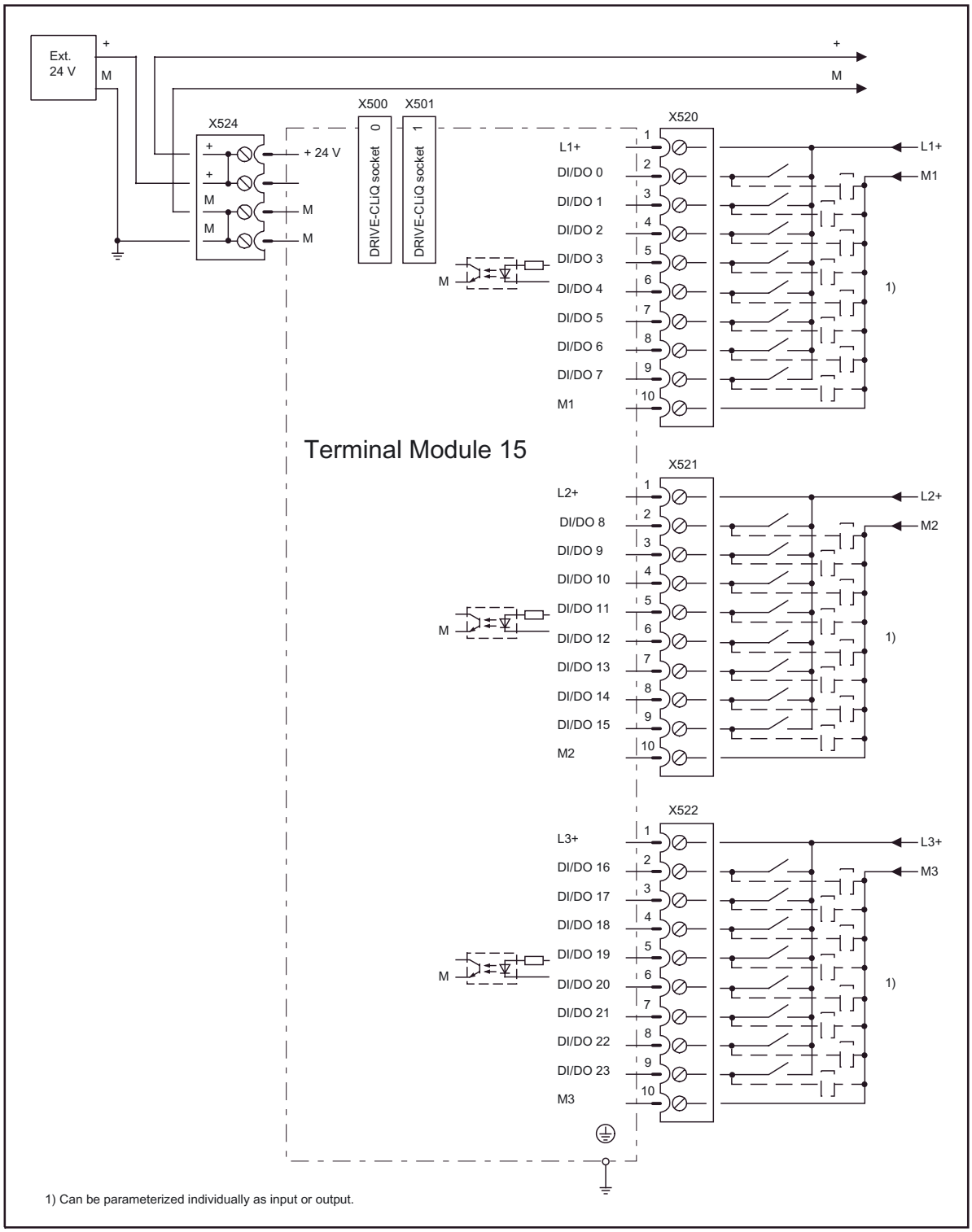
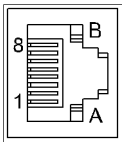


Figure 3-9 Connection example of TM15

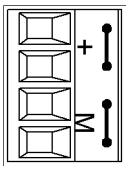
3.3.3.3 X500 and X501 DRIVE-CLiQ interface

Table 3-11 DRIVE-CLiQ interface X500

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	+ (24 V)	Power supply
	B	GND (0 V)	Electronic ground
Blanking plate for DRIVE-CLiQ interface: Molex, order number: 85999-3255			

3.3.3.4 Electronics power supply X524

Table 3-12 Terminals for the electronics power supply

	Terminal	Name	Technical specifications
	+	Electronics power supply	Voltage: 24 V DC (20.4 V – 28.8 V) Current consumption: max. 0.15 A Max. current via jumper in connector: 20 A at 60 °C
	+	Electronics power supply	
	M	Electronic ground	
	M	Electronic ground	
Max. connectable cross-section: 2.5 mm² Type: Screw terminal 2 (see Appendix A)			

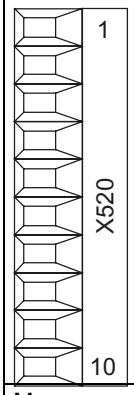
Note

The two "+" and "M" terminals are jumpered in the connector and not in the unit. This ensures the supply voltage is looped through.

The current consumption increases by the value for the DRIVE-CLiQ node. The digital outputs are supplied via terminals X520, X521 and X522.

3.3.3.5 X520 digital inputs/outputs

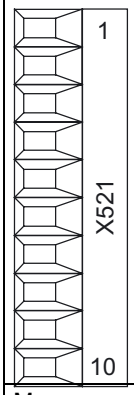
Table 3-13 Digital I/O port X520

	Terminal	Designation[1]	Technical specifications
	1	L1+	See "Technical specifications"
	2	DI/O 0	
	3	DI/O 1	
	4	DI/O 2	
	5	DI/O 3	
	6	DI/O 4	
	7	DI/O 5	
	8	DI/O 6	
	9	DI/O 7	
	10	M1 (GND)	
Max. connectable cross-section: 1.5 mm^2 Type: Screw terminal 1 (see Appendix A)			

[1] L1+: A 24 V DC power supply for channels 0 to 7 (first I/O group) must always be connected when at least one channel in the group is used as an output.
M1: A ground reference for channels 0 to 7 (first I/O group) must always be connected when at least one channel in the group is used as an input or an output.
DI/O: Digital inputs/outputs

3.3.3.6 X521 digital inputs/outputs

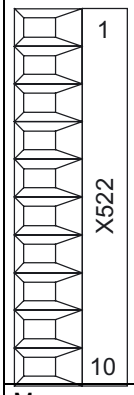
Table 3-14 Digital I/O port X521

	Terminal	Designation[1]	Technical specifications
	1	L2+	See "Technical specifications"
	2	DI/O 8	
	3	DI/O 9	
	4	DI/O 10	
	5	DI/O 11	
	6	DI/O 12	
	7	DI/O 13	
	8	DI/O 14	
	9	DI/O 15	
	10	M2 (GND)	
Max. connectable cross-section: 1.5 mm^2 Type: Screw terminal 1 (see Appendix A)			

[1] L2+: A 24 V DC power supply for channels 8 to 15 (second I/O group) must always be connected when at least one channel in the group is used as an output.
M2: A ground reference for channels 8 to 15 (second I/O group) must always be connected when at least one channel in the group is used as an input or an output.
DI/O: Digital inputs/outputs

3.3.3.7 X522 digital inputs/outputs

Table 3-15 Digital I/O port X522

	Terminal	Designation[1]	Technical specifications
	1	L3+	See "Technical specifications"
	2	DI/O 16	
	3	DI/O 17	
	4	DI/O 18	
	5	DI/O 19	
	6	DI/O 20	
	7	DI/O 21	
	8	DI/O 22	
	9	DI/O 23	
	10	M3 (GND)	
Max. connectable cross-section: 1.5 mm^2 Type: Screw terminal 1 (see Appendix A)			

[1] L3+: A 24 V DC power supply for channels 16 to 23 (third I/O group) must always be connected when at least one channel in the group is used as an output.
M3: A ground reference for channels 16 to 23 (third I/O group) must always be connected when at least one channel in the group is used as an input or an output.
DI/O: Digital inputs/outputs

3.3.3.8 Description of the LEDs on the Terminal Module 15 (TM15)

Table 3-16 Description of the LEDs on the TM15

LED	Color	State	Description
READY	-	OFF	Electronics power supply outside permissible tolerance range.
	Green	Continuous	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
	Orange	Continuous	DRIVE-CLiQ communication is being established.
	Red	Continuous	At least one fault is present in this component.
	Green/red	Flashing 2 Hz	Firmware is being downloaded.
	Green/Orange	Flashing 2 Hz	Component detected: no fault present
	Red/Orange	Flashing 2 Hz	Component detected: Fault(s) present

Cause and rectification of faults

The following reference contains further information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S, Commissioning Manual

3.3.4 Dimension drawing

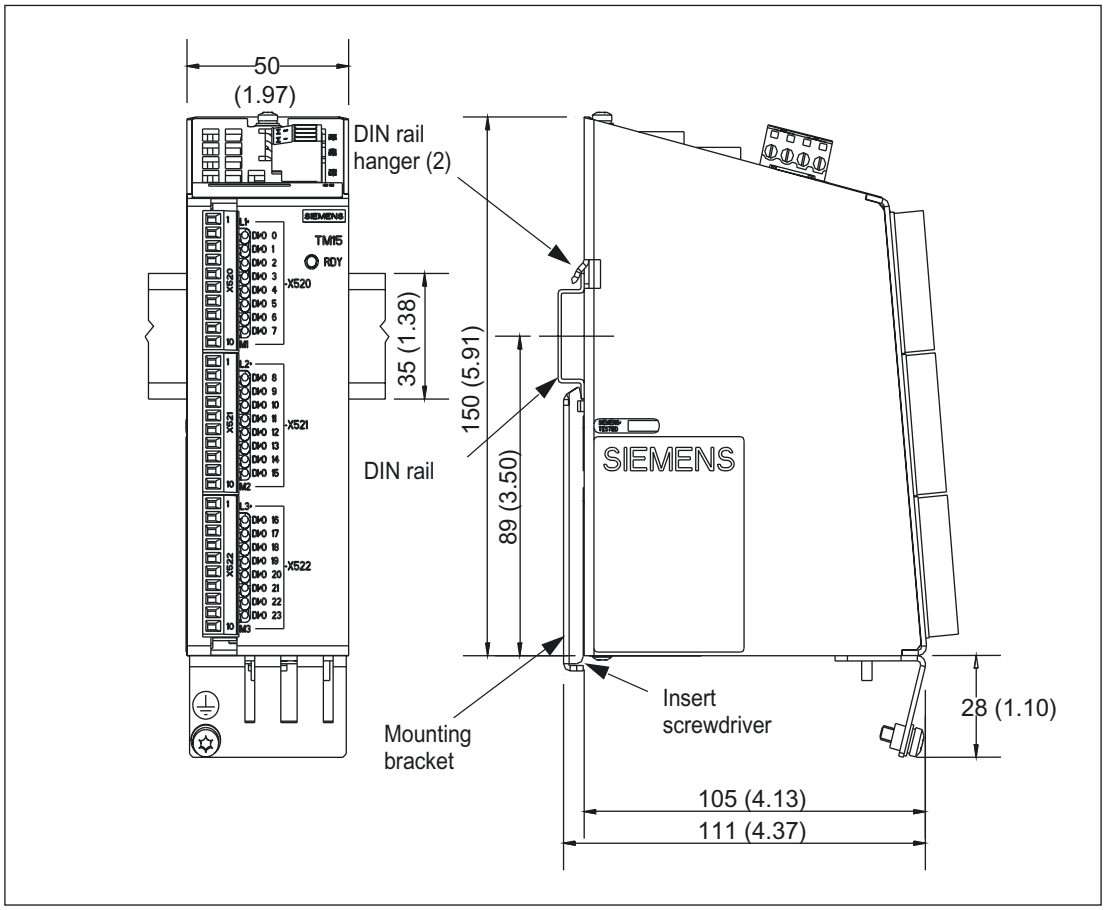


Figure 3-10 Dimension drawing of the TM15

3.3.5 Installation

Installation

1. Place the component on the DIN rail.
2. Snap the component on to the DIN rail. Make sure that the mounting slides at the rear latch into place.
3. You can now move the component on the DIN rail to the left or to the right to its final position.

Removal

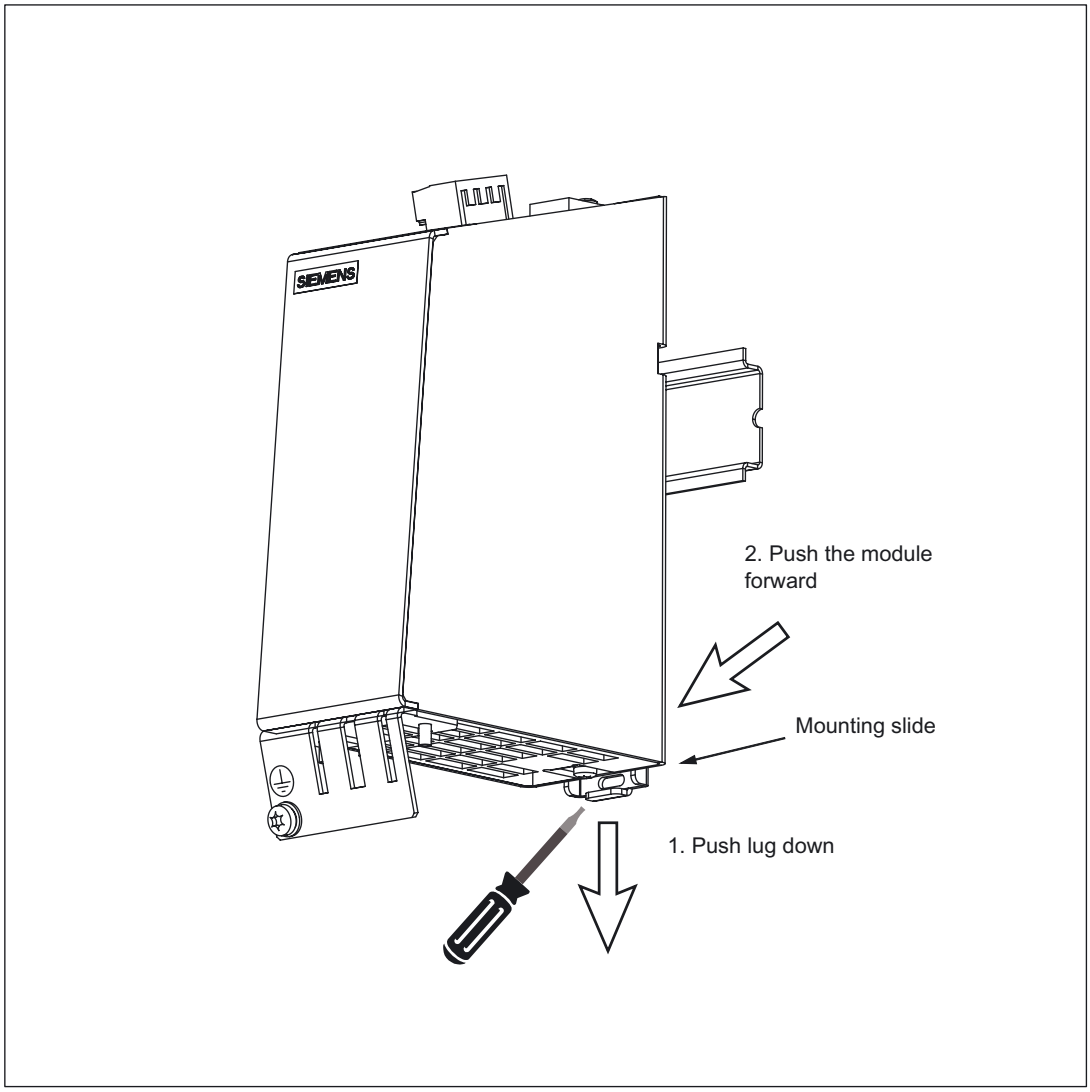


Figure 3-11 Releasing the component from a DIN rail

3.3.6 Electrical Connection

It is always advisable to shield the I/O wiring.

The following pictures show two typical shield contacts from Weidmüller.

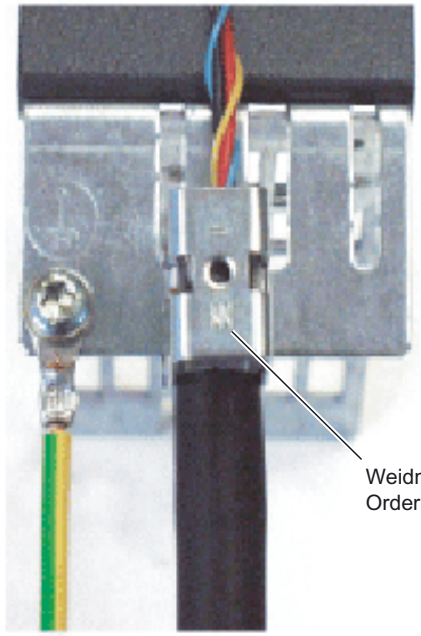


Figure 3-12 Shield contacts

Company internet addresses:

Weidmüller: http://www.weidmueller.com

Danger

If the shielding procedures described and the specified cable lengths are not observed, the machine may not operate properly.

Connector codes

Siemens supplies a series of profiled coding keys (coding sliders) with each Terminal Module 15. To encode a connector, you must insert at least one coding slider and cut off a coding lug on the connector:

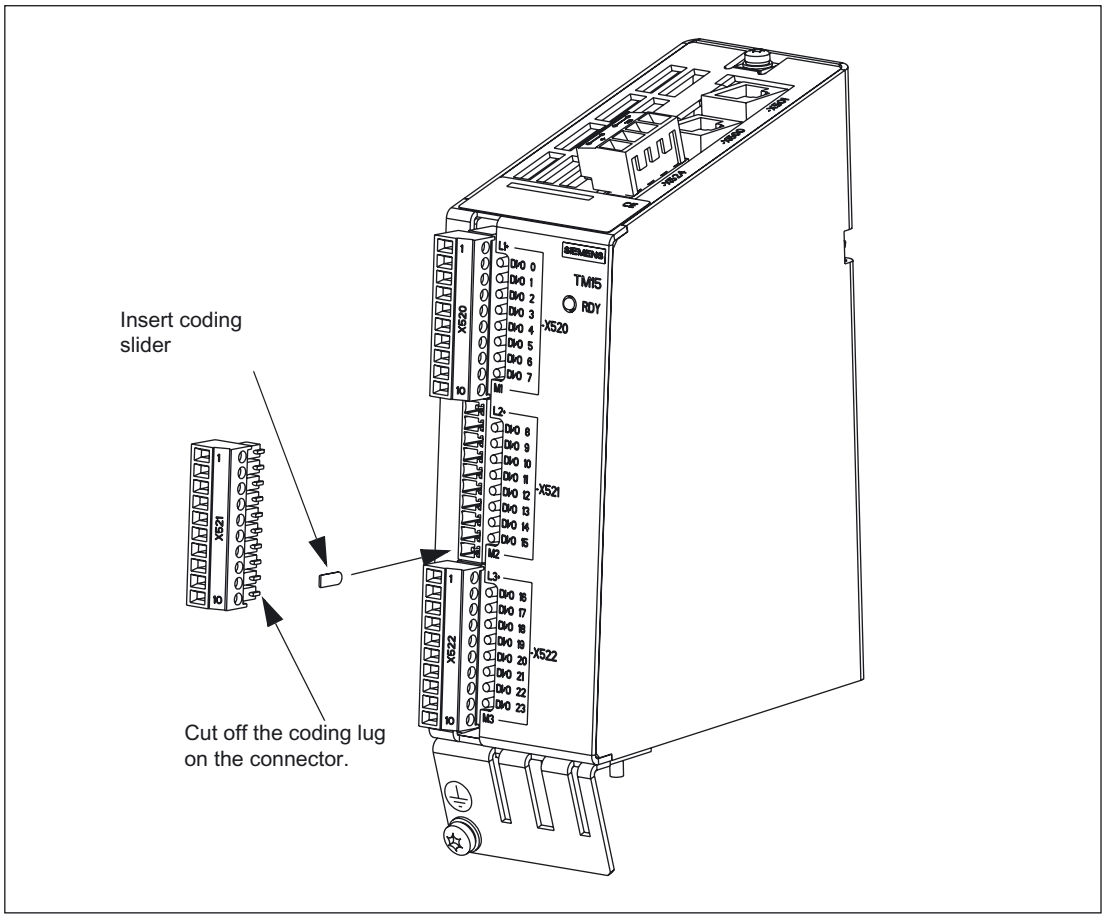


Figure 3-13 Procedure for encoding a connector

To avoid wiring errors, unique coding patterns can be defined for the I/O connectors X520, X521 and X522. Examples of possible patterns:

- 3 connectors on one module are encoded differently (i.e. X520, X521 and X522).
- Different module types are encoded differently.
- Identical modules on the same machine are encoded differently (e.g. several TM15-type modules).

3.3.7 Technical specifications

Table 3-17 Technical Specifications

Terminal Module 15 **6SL3055-0AA00-3FAx**	**Unit**	**Value**
Electronics power supply Voltage Current (without DRIVE-CLiQ or digital outputs) Power loss	 V_{DC} A_{DC} W	 24 DC (20.4 – 28.8) 0.15 <3
Max. ambient temperature up to an altitude of 2000 m	°C	60
Note: As of an altitude of 2,000 m, the max. ambient temperature decreases by 7 °C every 1,000 m.		
I/O		
• Digital inputs/outputs	Each channel can be parameterized separately as DI or DO	
• Number of digital inputs/outputs	24	
• Isolation	Yes, in groups of 8	
Digital inputs		
• Voltage	V_{DC}	-30 to +30
• Low level (an open digital input is interpreted as "low")	V_{DC}	-30 to +5
• High level	V_{DC}	15 to 30
• Current consumption (at 24 V DC)	mA	5 to 11
• Typical signal propagation times for digital inputs	µs	L → H: 50 H → L: 100
Digital outputs (continued-short-circuit-proof)		
• Voltage	V_{DC}	24
• Max. load current per digital output	A_{DC}	0,5
• Output delay (ohmic load)		
• typical	µs	L → H: 50 H → L: 150
• maximum	µs	L → H: 100 H → L: 225
• Max. total current of outputs (per group) up to 60 °C up to 50 °C up to 40 °C	 A_{DC} A_{DC} A_{DC}	 2 3 4
Note: As of an altitude of 2,000 m, the max. ambient temperature decreases by 7 °C every 1,000 m.		
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	0.86
Approbation	UL and cULus	

3.4 Terminal Module 31 (TM31)

3.4.1 Description

The Terminal Module 31 (TM31) is a terminal expansion board that can be attached to a DIN 50022 mounting rail. It can be used to increase the number of available digital inputs/outputs and analog inputs/outputs within a drive system.

The TM31 contains the following terminals:

Table 3-18 Interface overview of the TM31

Type	Number
Digital inputs	8
Digital inputs/outputs	4
Analog inputs	2
Analog outputs	2
Relay outputs	2
Temperature sensor input	1

3.4.2 Safety information

Danger

The 50 mm clearances above and below the components must be observed.

3.4.3 Interface description

3.4.3.1 Overview

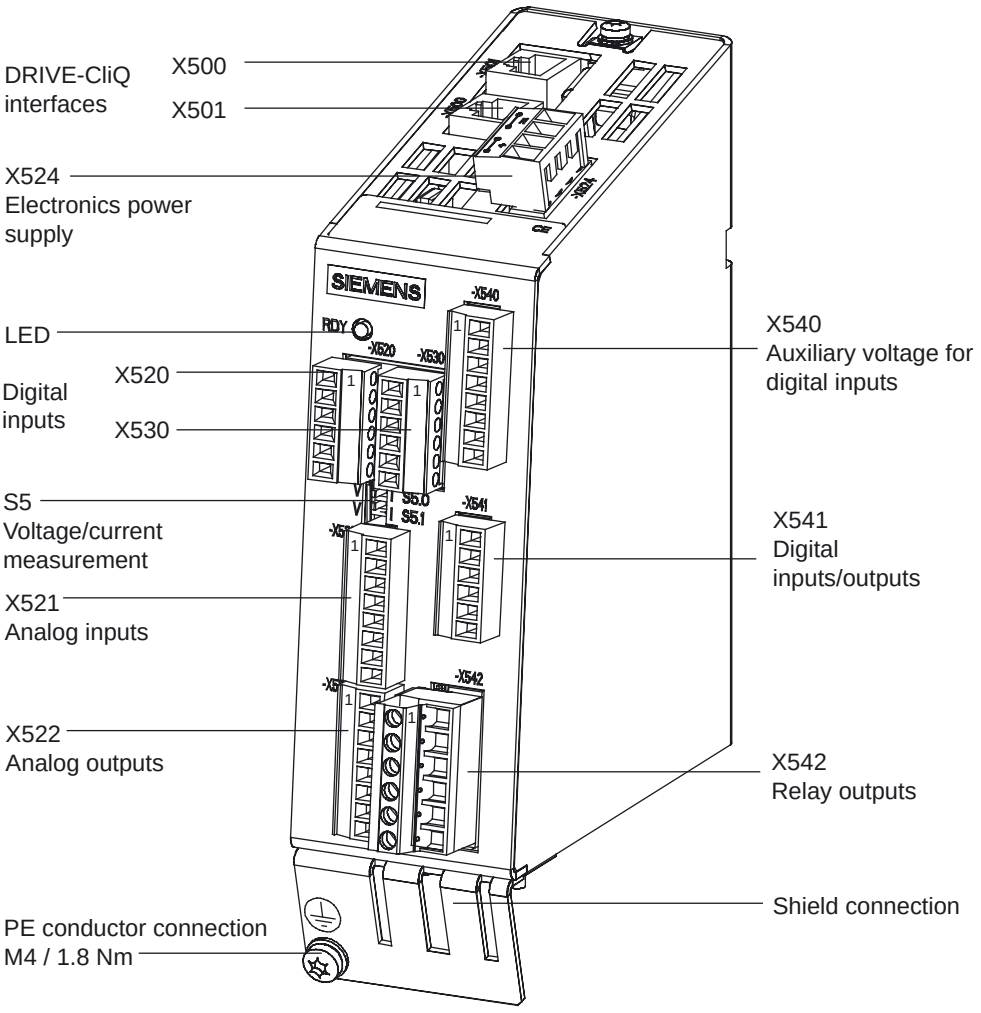


Figure 3-14 Interface description TM31

3.4.3.2 Connection example

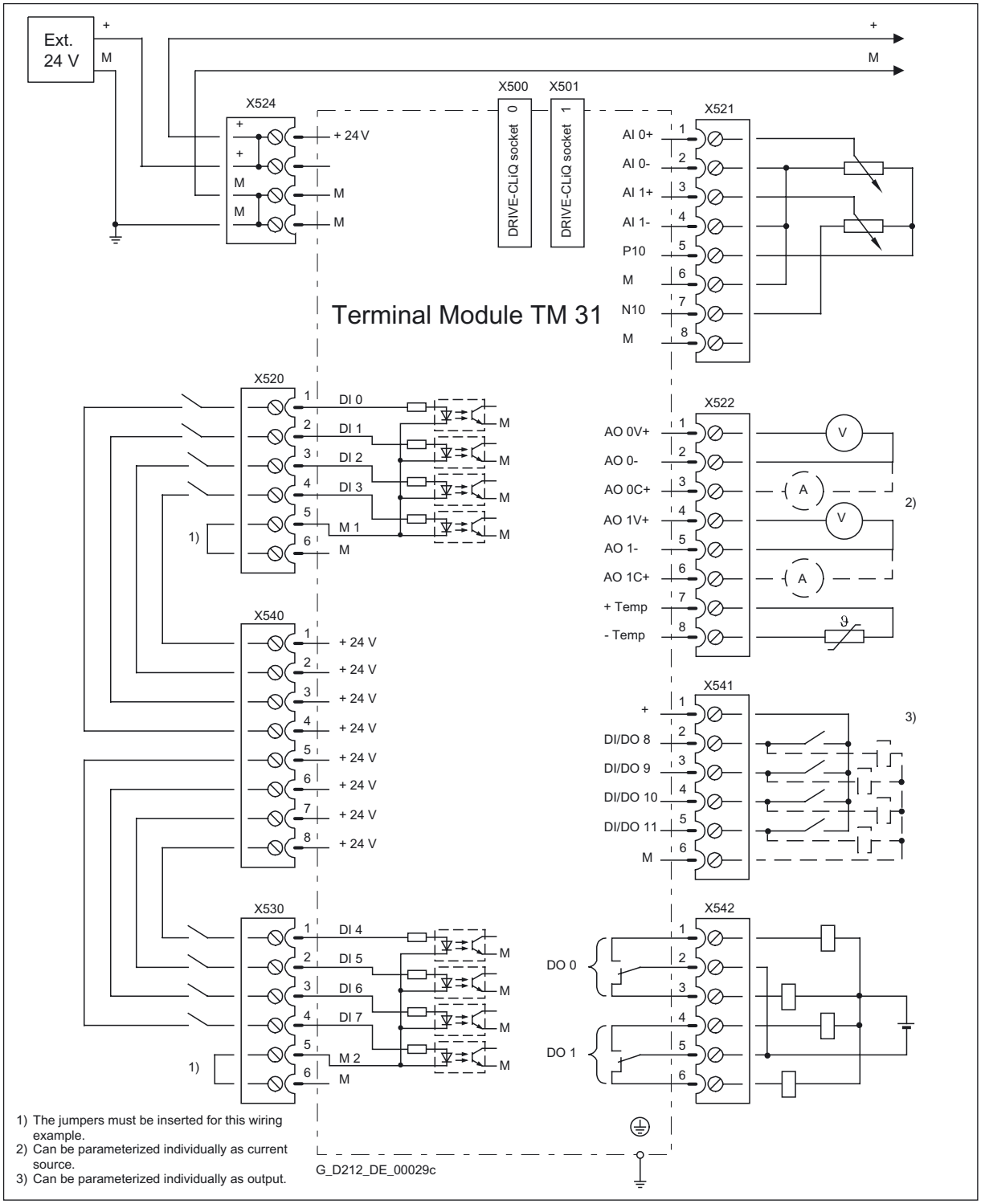
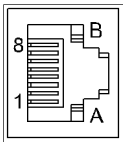


Figure 3-15 Connection example of TM31

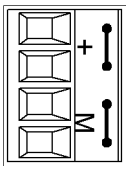
3.4.3.3 X500 and X501 DRIVE-CLiQ interface

Table 3-19 DRIVE-CLiQ interface X500

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	+ (24 V)	Power supply
	B	GND (0 V)	Electronic ground
Blanking plate for DRIVE-CLiQ interface: Molex, order number: 85999-3255			

3.4.3.4 Electronics power supply X524

Table 3-20 Terminals for the electronics power supply

	Terminal	Name	Technical specifications
	+	Electronics power supply	Voltage: 24 V DC (20.4 V – 28.8 V) Current consumption: max. 0.5 A Max. current via jumper in connector: 20 A at 55 °C
	+	Electronics power supply	
	M	Electronic ground	
	M	Electronic ground	
Max. connectable cross-section: 2.5 mm² Type: Screw terminal 2 (see Appendix A)			

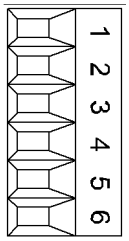
Note

The two "+" and "M" terminals are jumpered in the connector and not in the unit. This ensures the supply voltage is looped through.

The current consumption increases by the value for the DRIVE-CLiQ node and digital outputs.

3.4.3.5 Digital inputs X520

Table 3-21 Screw terminal X520

	Terminal	Name[1)]	Technical specifications
	1	DI 0	Voltage: - 3 V to 30 V Typical current consumption: 10 mA at 24 V DC Isolation: The reference potential is terminal M1 Signal propagation times: L → H approx. 50 µs H → L: approx. 100 µs Level (incl. ripple) High level: 15 V to 30 V Low level: -3 V to 5 V
	2	DI 1	
	3	DI 2	
	4	DI 3	
	5	M1	
	6	M	
Max. connectable cross-section: 1.5 mm² Type: Screw terminal 1 (see Appendix A)			

1) DI: digital input; M: electronic ground M1: ground reference

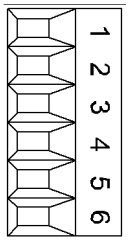
Note

To enable the digital inputs to function, terminal M1 must be connected. This can be done as follows:

1) Connect the reference mass of the digital inputs, or
2) a jumper to terminal M **(Notice: this removes isolation for these digital inputs).**

3.4.3.6 Digital inputs X530

Table 3-22 Screw terminal X530

	Terminal	Name[1)]	Technical specifications
	1	DI 4	Voltage: -3 V to 30 V Typical current consumption: 10 mA at 24 V DC Isolation: The reference potential is terminal M2 Signal propagation times: L → H approx. 50 µs H → L: approx. 100 µs Level (incl. ripple) High level: 15 V to 30 V Low level: -3 V to 5 V
	2	DI 5	
	3	DI 6	
	4	DI 7	
	5	M2	
	6	M	
Max. connectable cross-section: 1.5mm² Type: Screw terminal 1 (see Appendix A)			

1) DI: digital input; M: electronic ground; M2: ground reference

Note

An open input is interpreted as "low".

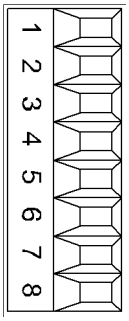
To enable the digital inputs to work, terminal M2 must be connected. This can be done as follows:

1) Route the reference ground of the digital inputs (with the other cable) and connect it to M2.

2) Jumper terminal M and M2 directly **(Important: this removes isolation for these digital inputs).**

3.4.3.7 Auxiliary voltage for the digital inputs X540

Table 3-23 Screw terminal X540

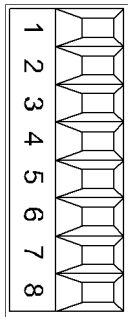
	Terminal	Name	Technical specifications
	1	+24 V	Voltage: +24 V DC Max. total load current: 150 mA
	2	+24 V	
	3	+24 V	
	4	+24 V	
	5	+24 V	
	6	+24 V	
	7	+24 V	
	8	+24 V	
Max. connectable cross-section: 1.5 mm² Type: Screw terminal 1 (see Appendix A)			

Note

This voltage supply is only for powering the digital inputs.

3.4.3.8 Analog inputs X521

Table 3-24 Terminal block X521

	Terminal	Name[1)]	Technical specifications
	1	AI 0+	You can set the following input signals using the appropriate parameters: Voltage: -10 V to 10 V; R_i = 100 kΩ Current 1: 4 mA to 20 mA; R_i = 250 Ω Current 2: -20 mA to 20 mA; R_i = 250 Ω Current 3: 0 mA to 20 mA; R_i = 250 Ω Resolution: 12 bits
	2	AI 0-	
	3	AI 1+	
	4	AI 1-	
	5	P10	Auxiliary voltage: P10 = 10 V N10 = -10 V Continued-short-circuit-proof
	6	M	
	7	N10	
	8	M	
Max. connectable cross-section: 1.5 mm² Type: Screw terminal 1 (see Appendix A)			

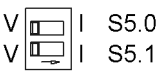
1) AI: analog inputs; P10/N10: auxiliary voltage; M or GND: ground reference

Caution

A current of 40 mA must not be exceed when the current is being measured.
The common-mode range must not be infringed. This means that the analog differential voltage signals can have a maximum offset voltage of +/-30 V with respect to the ground potential. If the range is infringed, incorrect results may occur during analog/digital conversion.

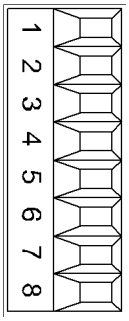
3.4.3.9 S5 current/voltage changeover switch for analog inputs

Table 3-25 Current/voltage selector S5

	Switch	Function
	S5.0	Selector voltage (V)/current (I) AI0
	S5.1	Selector voltage (V)/current (I) AI1

3.4.3.10 Analog outputs/temperature sensor connection X522

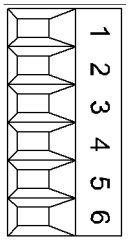
Table 3-26 Terminal block X522

	Terminal	Name[1)]	Technical specifications
	1	AO 0V+	You can set the following output signals using parameters: Voltage: -10 V to 10 V (max. 3 mA) Current 1: 4 mA to 20 mA (max. load resistance ≤ 500 Ω) Current 2: -20 mA to 20 mA (max. load resistance ≤ 500 Ω) Current 3: 0 mA to 20 mA (max. load resistance ≤ 500 Ω) Resolution: 11 bits + sign Continued-short-circuit-proof
	2	AO 0-	
	3	AO 0C+	
	4	AO 1V+	
	5	AO 1-	
	6	AO 1C+	
	7	+Temp	Temperature sensor connection KTY84-1C130/PTC
	8	-Temp	
Max. connectable cross-section: 1.5 mm² Type: Screw terminal 1 (see Appendix A)			

1) AO xV: analog output voltage; AO xC: Analog output current

3.4.3.11 X541 bidirectional digital inputs/outputs

Table 3-27 Terminals for bidirectional digital inputs/outputs

	Terminal	Name[1)]	Technical specifications
	1	+	As input: Voltage: -3 V to 30 V Typical current consumption: 10 mA at 24 V DC Signal propagation times: L → H: approx. 50 µs H → L: approx. 100 µs As output: Voltage: 24 V DC Max. load current per output: 100 mA Max. total current of outputs: 400 mA Continued-short-circuit-proof
	2	DI/DO 8	
	3	DI/DO 9	
	4	DI/DO 10	
	5	DI/DO 11	
	6	M	
Max. connectable cross-section: 1.5 mm² Type: Screw terminal 1 (see Appendix A)			

1) DI/DO: bidirectional digital input/output; M or GND: Electronic ground

Note

An open input is interpreted as "low".

Note

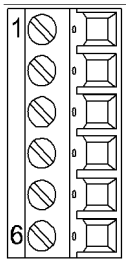
If a momentary interruption in the voltage occurs in the 24 V supply, the digital outputs will be deactivated until the interruption has been rectified.

Notice

Terminals "+" and "M" must be used to power the bidirectional digital inputs/outputs on this connector.

3.4.3.12 Relay outputs X542

Table 3-28 Terminal block X542

	Terminal	Name[1)]	Technical specifications
	1	DO 0.NC	Contact type: Two-way contact max. load current: 8 A Max. switching voltage: 250 V_{AC}, 30 V_{DC} Max. switching power at 250 V_{AC}: 2000 VA (cosφ = 1) Max. switching power at 250 $V_{AC:}$ 750 VA (cosφ = 0.4) Max. switching power at 30 V_{DC}: 240 W (ohmic load) Required minimum current: 100 mA Overvoltage category: Class III to EN 60 664-1
	2	DO 0.COM	
	3	DO 0.NO	
	4	DO 1.NC	
	5	DO 1.COM	
	6	DO 1.NO	
Max. connectable cross-section. 2.5 mm^2 Type: Screw terminal 3 (see Appendix A)			

1) DO: digital output, NO: normally-open contact, NC: normally-closed contact, COM: Mid-position contact

3.4.3.13 Description of the LEDs on the Terminal Module 31 (TM31)

Table 3-29 Description of the LEDs on the TM31

LED	Color	State	Description
READY	-	OFF	Electronics power supply outside permissible tolerance range.
	Green	Continuous	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
	Orange	Continuous	DRIVE-CLiQ communication is being established.
	Red	Continuous	At least one fault is present in this component.
	Green Red	Flashing 2 Hz	Firmware is being downloaded.
	Green/Orange or Red/Orange	Flashing 2 Hz	Component recognition via LED is activated (p0154). Note: both options depend on the LED status when module recognition is activated via p0154 = 1.

Cause and rectification of faults

The following reference contains further information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S, Commissioning Manual

3.4.4 Dimension Drawing

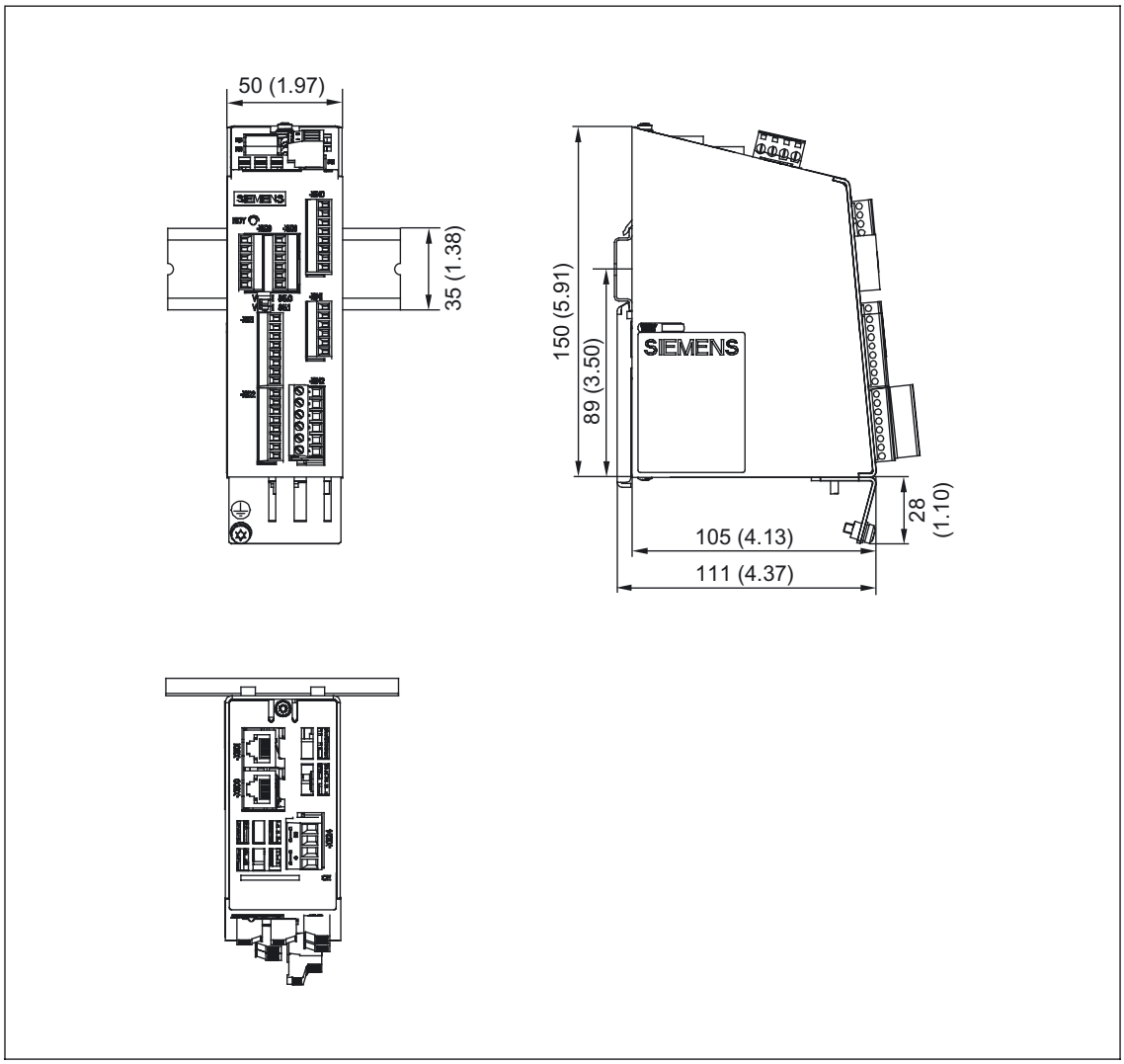


Figure 3-16 Dimension drawing of the TM31

3.4.5 Installation

Installation

1. Place the component on the DIN rail.
2. Snap the component on to the DIN rail. Make sure that the mounting slides at the rear latch into place.
3. You can now move the component on the DIN rail to the left or to the right to its final position.

Removal

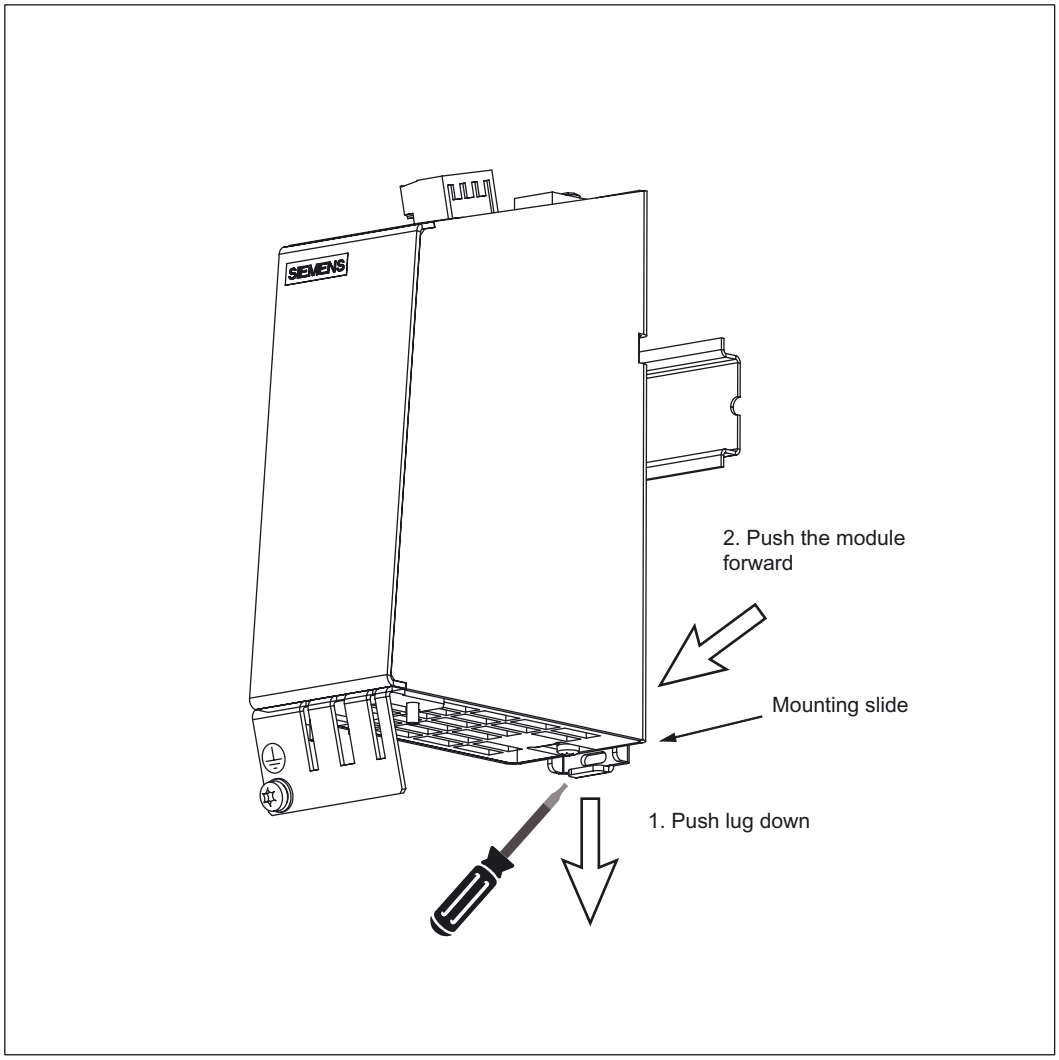


Figure 3-17 Releasing the component from a DIN rail

3.4.6 Electrical Connection

Shield contact for components from Weidmüller

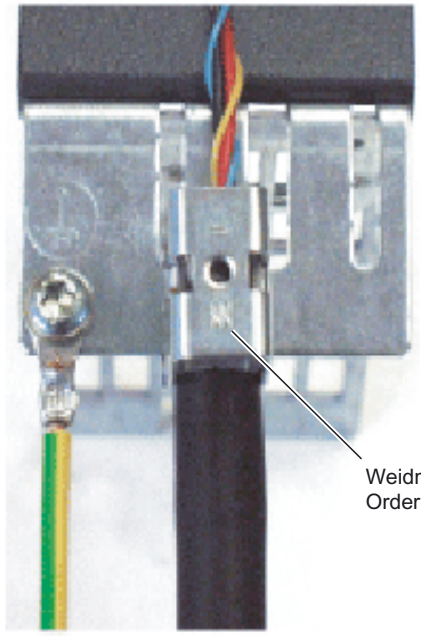


Figure 3-18 Shield contacts

Company internet addresses:

Weidmüller: http://www.weidmueller.com

Connector codes

To ensure that identical connectors are assigned correctly on the TM31, the connecters are encoded as shown in the following diagram.

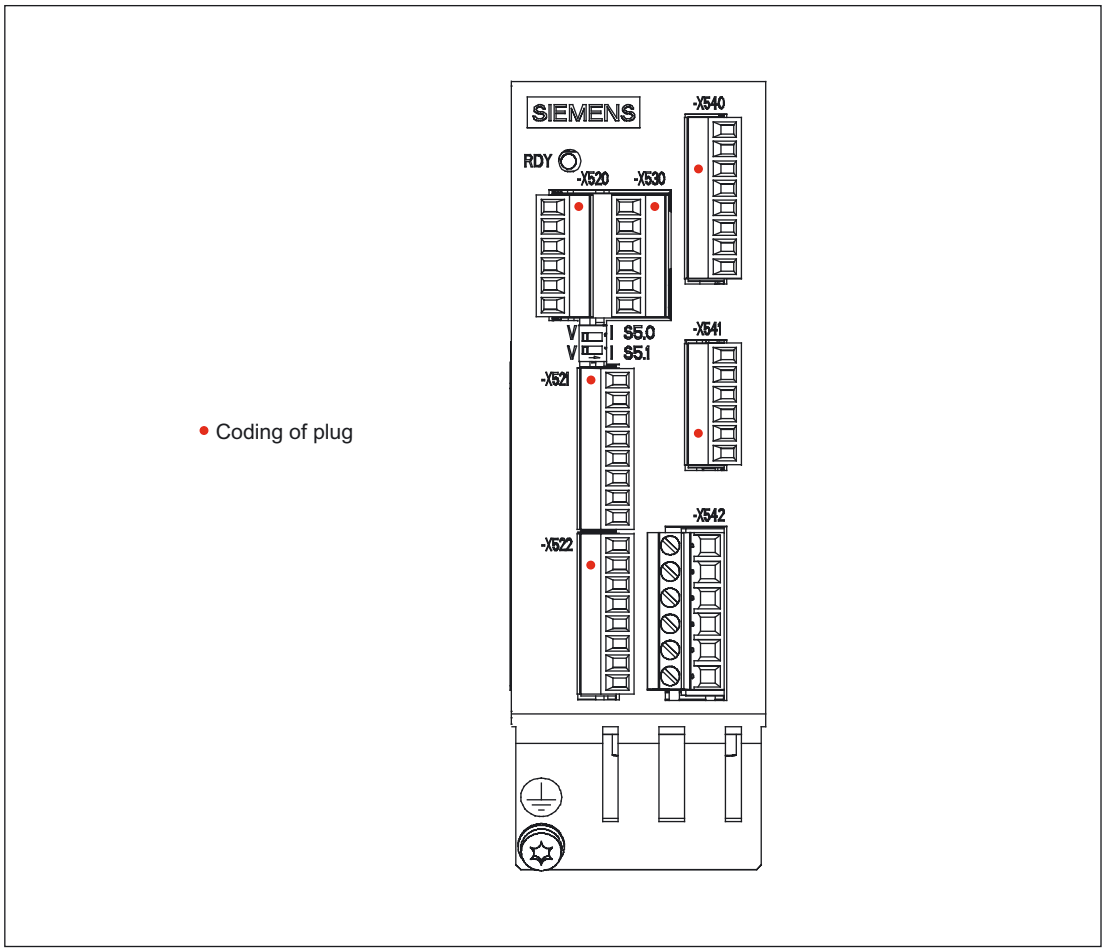


Figure 3-19 Connector codes of the TM31

The bending radii of the cables must be taken into account (see description of MOTION-CONNECT).

3.4.7 Technical Specifications

Table 3-30 Technical Specifications

	Unit	Value
Electronics power supply		
Voltage	V_{DC}	24 DC (20.4 – 28.8)
Current (without DRIVE-CLiQ or digital outputs)	A_{DC}	0.5
Power loss	W	<10
Max. ambient temperature up to an altitude of 2,000 m	°C	55
Note: As of an altitude of 2,000 m, the max. ambient temperature decreases by 7 °C every 1,000 m.		
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	1

Encoder system connection

4

4.1 Introduction

The sensor system should be connected to SINAMICS S120 via DRIVE-CLiQ.

Motors with DRIVE-CLiQ interfaces (e.g. synchronous motors 1FK7 and 1FT6, and induction motors 1PH7) are designed for this purpose.

These motors with DRIVE-CLiQ interfaces can be connected to the associated Motor Module via the available MOTION-CONNECT DRIVE-CLiQ cables. In this way, the motor sensor and temperature signals as well as the electronic type plate data, such as the unique identification number, rated data (voltage, current and torque) are transferred directly to the Control Unit. These motors simplify commissioning and diagnosis because the motor and sensor type are identified automatically.

Motors without DRIVE-CLiQ interfaces:

The sensor and temperature signals from motors without DRIVE-CLiQ interfaces, as well as external sensors must be connected via Sensor Modules. Cabinet-mounted Sensor Modules with degree of protection IP20 are currently available for direct installation in cabinets.

Only one sensor system can be connected to each cabinet-mounted Sensor Module.

Further information

Motor sensors and temperature signals should preferably be connected to the associated Motor Module, while external sensors should be connected to the Control Unit.

4.2 Overview of Sensor Modules

4.2.1 Description

Sensor Modules Cabinet-Mounted (SMC)

Cabinet-mounted Sensor Modules (SMC) can be ordered and configured separately. They are used when a motor with a DRIVE-CLiQ interface is not available and when external sensors in addition to the motor sensor are required. Only one sensor system can be connected to each cabinet-mounted Sensor Module (SMC). Only sensor systems in which the power supply for the sensor system is not grounded may be connected.

Sensor Module External (SME)

Measuring systems outside the cabinet can be connected directly to the Sensor Module External (SME). The SME evaluates these measuring systems and converts the calculated values to DRIVE-CLiQ. No motor or sensor data is stored in the SME.

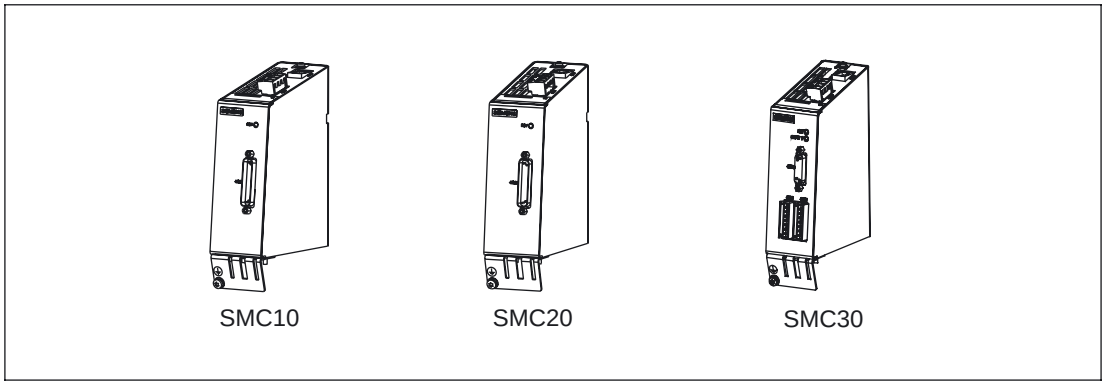


Figure 4-1 Sensor Modules

Connectable sensor systems

Table 4-1 Connectable sensor systems

	SMC			SME	
Measuring systems	**SMC10**	**SMC20**	**SMC30**	**SME20**	**SME25**
Resolver	Yes	-	-	-	-
Incremental encoder sin/cos (1 Vpp) with zero pulse	-	Yes	-	Yes	-
Incremental encoder sin/cos (1 Vpp) without zero pulse	-	Yes	-	Yes	Yes
Absolute encoder EnDat	-	Yes	-	-	Yes
Incremental encoder TTL/HTL	-	-	Yes	-	-
Temperature evaluation	Yes	Yes	Yes	-	-

4.2.2 Sensor Connections

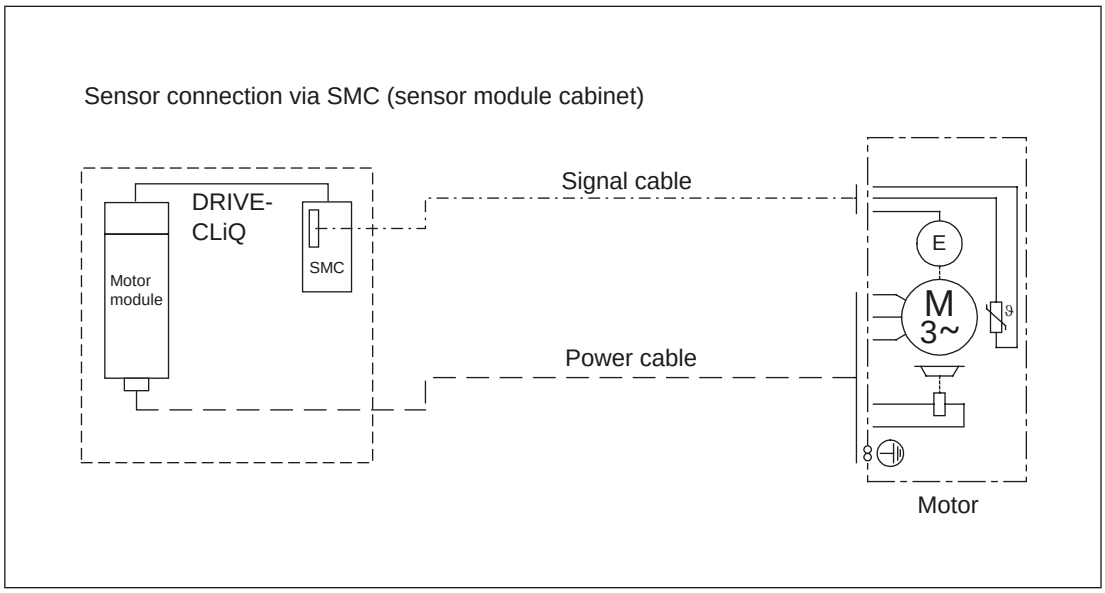


Figure 4-2 Sensor connection via an SMC (Sensor Module Cabinet)

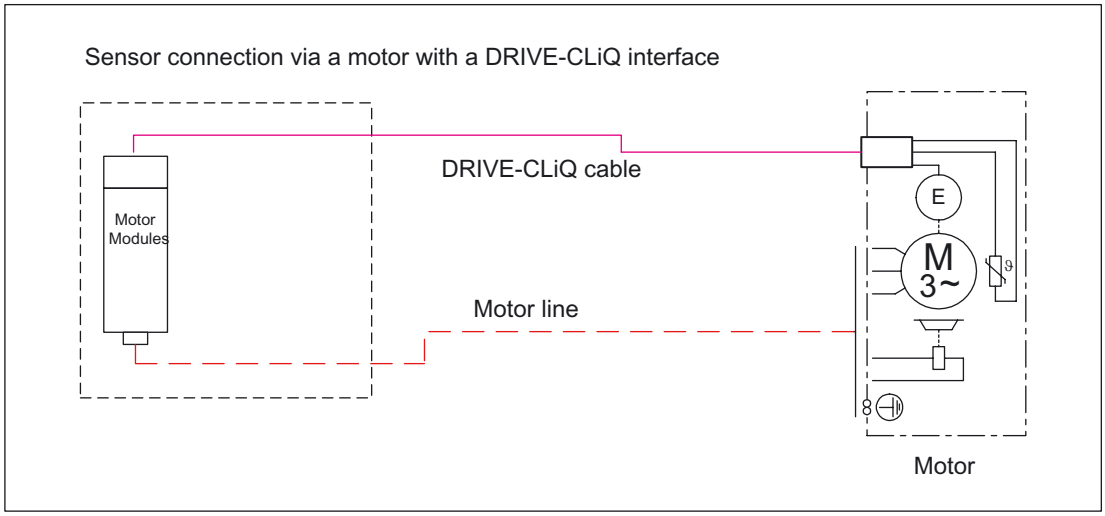


Figure 4-3 Sensor connection via a motor with a DRIVE-CLiQ interface

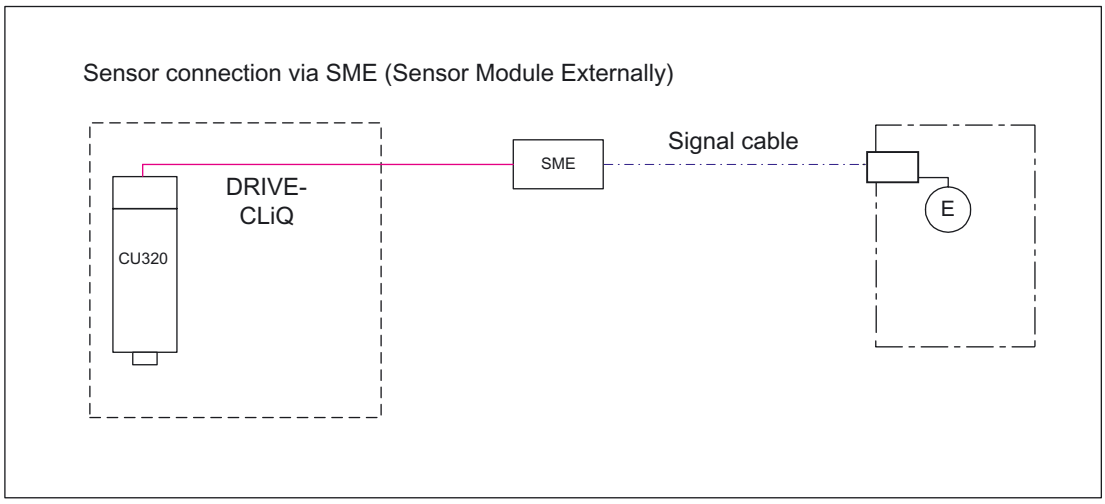


Figure 4-4 Sensor connection via an SME (Sensor Module Externally)

4.3 Sensor Module Cabinet 10 (SMC10)

4.3.1 Description

The SMC10 evaluates encoder signals and transmits the speed, actual position value, rotor position and, if necessary, the motor temperature via DRIVE-CLiQ to the Control Unit.

The SMC10 is used to evaluate sensor signals from resolvers.

Table 4-2 Specification

	Value
Transmission ratio of the resolver	ü = 0.5
Exciting voltage on the SMC10 when ü=0.5	4.1 Vrms
Amplitude monitoring threshold (secondary tracks) of the SMC10	1 Vrms

The ratio between ohmic resistance R and inductance L determines whether the resolver can be evaluated with the SMC10. See the following diagram:

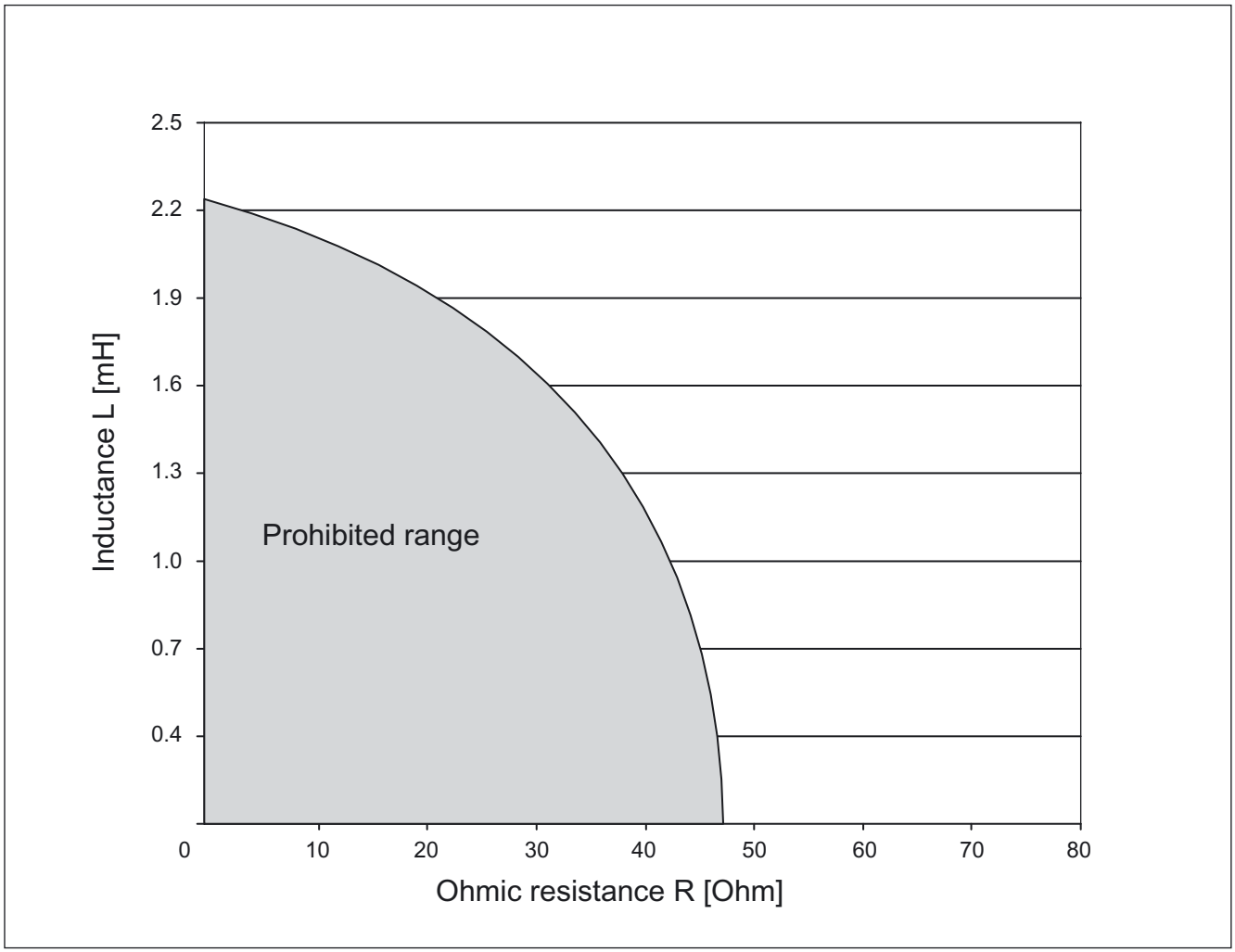


Figure 4-5 Connectable impedances with an exciting frequency f = 5000 Hz

The maximum signal cable lengths are as follows:

- For 2-pin resolver: 130 m
- For multi-pin resolver: 50 m

The module is snapped on to a DIN50022 mounting rail.

4.3.2 Safety Information

Caution

The 50 mm clearances above and below the components must be observed.

Notice

Only measuring systems in which the measuring system power supply is not grounded may be connected.

4.3.3 Interface description

4.3.3.1 Overview

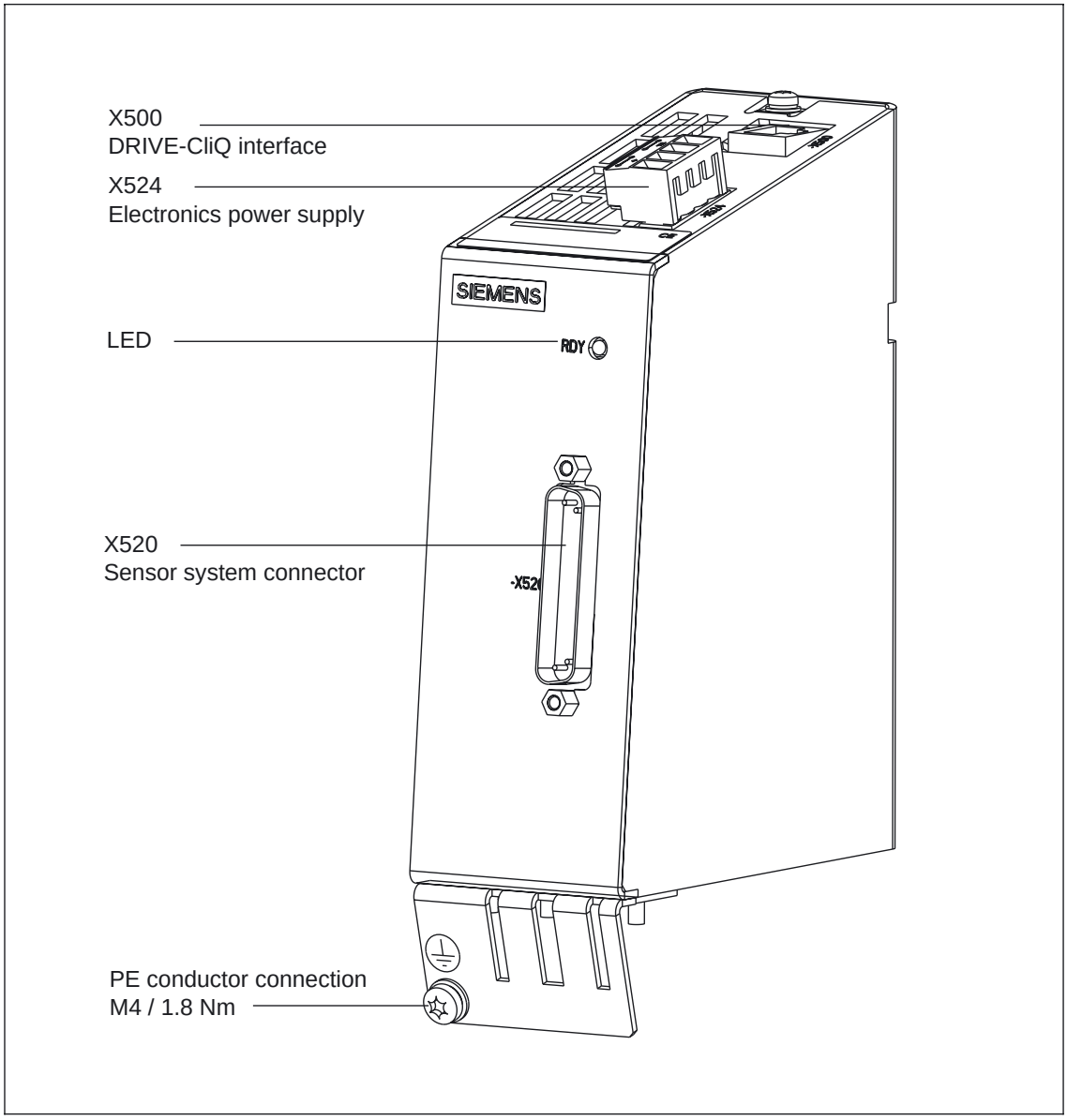
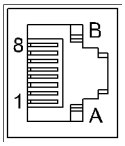


Figure 4-6 Interface description of the SMC10

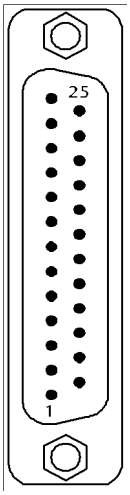
4.3.3.2 DRIVE-CLiQ interface X500

Table 4-3 DRIVE-CLiQ interface X500

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	Reserved, do not use	
	B	GND (0 V)	Electronic ground
Blanking plate for DRIVE-CLiQ interface: Molex, order number: 85999-3255			

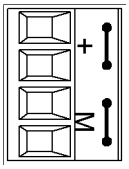
4.3.3.3 X520 sensor system

Table 4-4 Sensor interface X520

	Pin	Signal name	Technical specifications
	1	Reserved, do not use	
	2	Reserved, do not use	
	3	A (sin+)	Incremental signal A
	4	A* (sin-)	Inverted incremental signal A
	5	Ground	Ground (for internal shield)
	6	B (cos+)	Incremental signal B
	7	B* (cos-)	Inverted incremental signal B
	8	Ground	Ground (for internal shield)
	9	RESP	Resolver excitation positive
	10	Reserved, do not use	
	11	RESN	Resolver excitation negative
	12	Reserved, do not use	
	13	+Temp	Motor temperature measurement KTY+
	14	Reserved, do not use	
	15	Reserved, do not use	
	16	Reserved, do not use	
	17	Reserved, do not use	
	18	Reserved, do not use	
	19	Reserved, do not use	
	20	Reserved, do not use	
	21	Reserved, do not use	
	22	Reserved, do not use	
	23	Reserved, do not use	
	24	Ground	Ground (for internal shield)
	25	-Temp	Motor temperature measurement KTY-
	Shell	Ground	Outer shield

4.3.3.4 Electronics power supply X524

Table 4-5 Terminal block X524

	Terminal	Function	Technical specifications
	+	Electronics power supply	Voltage: 24 V (20.4 V – 28.8 V) Current consumption: max. 0.3 A Maximum current via jumper in connector: 20 A at 55 °C
	+	Electronics power supply	
	M	Electronic ground	
	M	Electronic ground	
Max. connectable cross-section: 2.5 mm² Type: Screw terminal 2 (see Appendix)			

Note

The two "+" and "M" terminals are jumpered in the connector and not in the unit. This ensures the supply voltage is looped through.

4.3.3.5 Description of the LEDs on the SMC10

Table 4-6 Description of the LEDs on the SMC10

LED	Color	State	Technical specifications
RDY	-	OFF	Electronics power supply outside permissible tolerance range.
	Green	Continuous	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
	Orange	Continuous	DRIVE-CLiQ communication is being established.
	Red	Continuous	At least one fault is present in this component.
	Green Red	Flashing 2 Hz	Firmware is being downloaded.
	Green/Orange or Red/Orange	Flashing 2 Hz	Component recognition via LED is activated (p0144) Note: both options depend on the LED status when module recognition is activated via p0144 = 1.

Cause and rectification of faults

The following reference contains further information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S, Commissioning Manual

4.3.4 Dimension Drawing

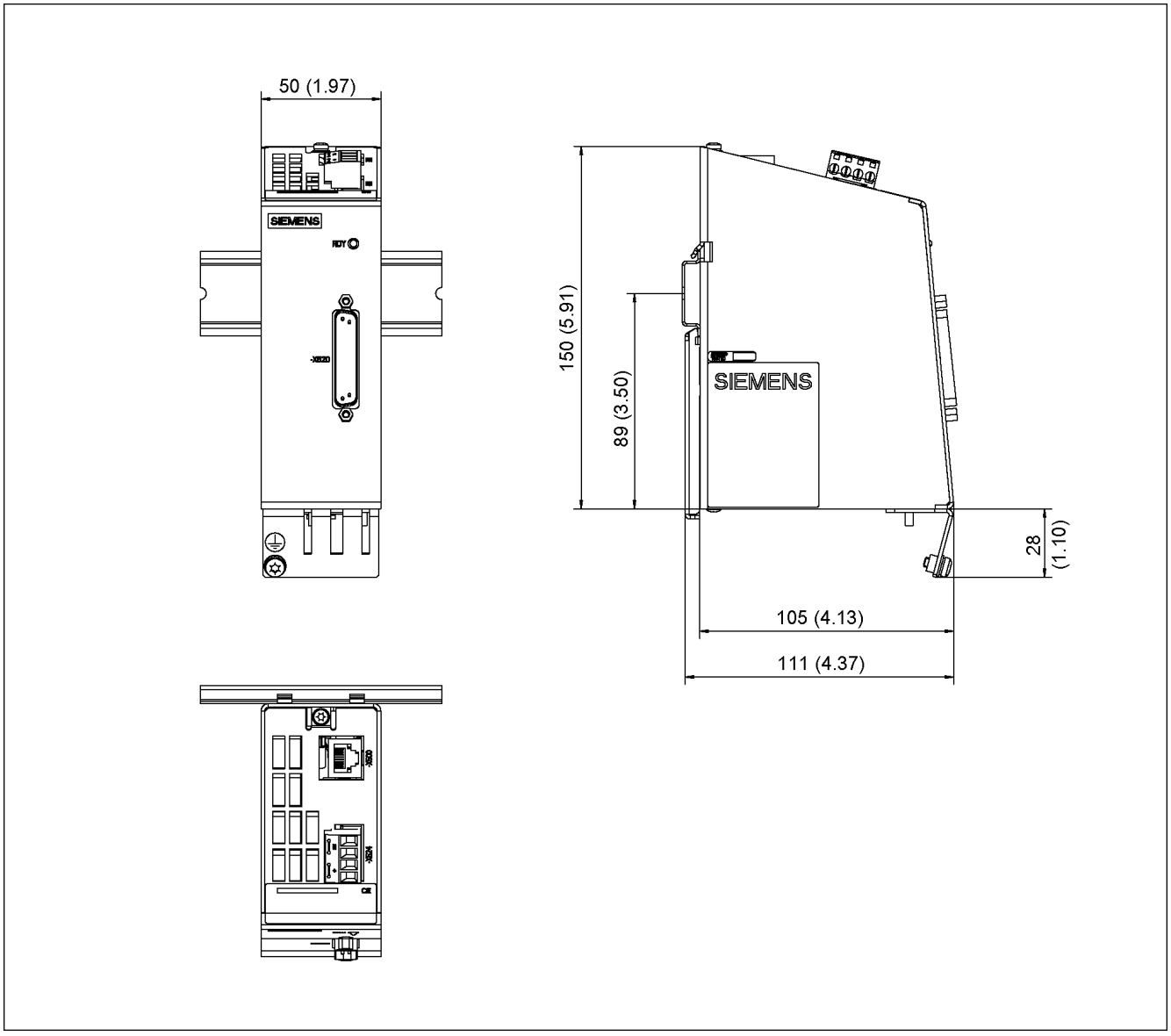


Figure 4-7 Dimension drawing of the SMC10

4.3.5 Installation

Installation

1. Place the component on the DIN rail.
2. Snap the component on to the DIN rail. Make sure that the mounting slides at the rear latch into place.
3. You can now move the component on the DIN rail to the left or to the right to its final position.

Removal

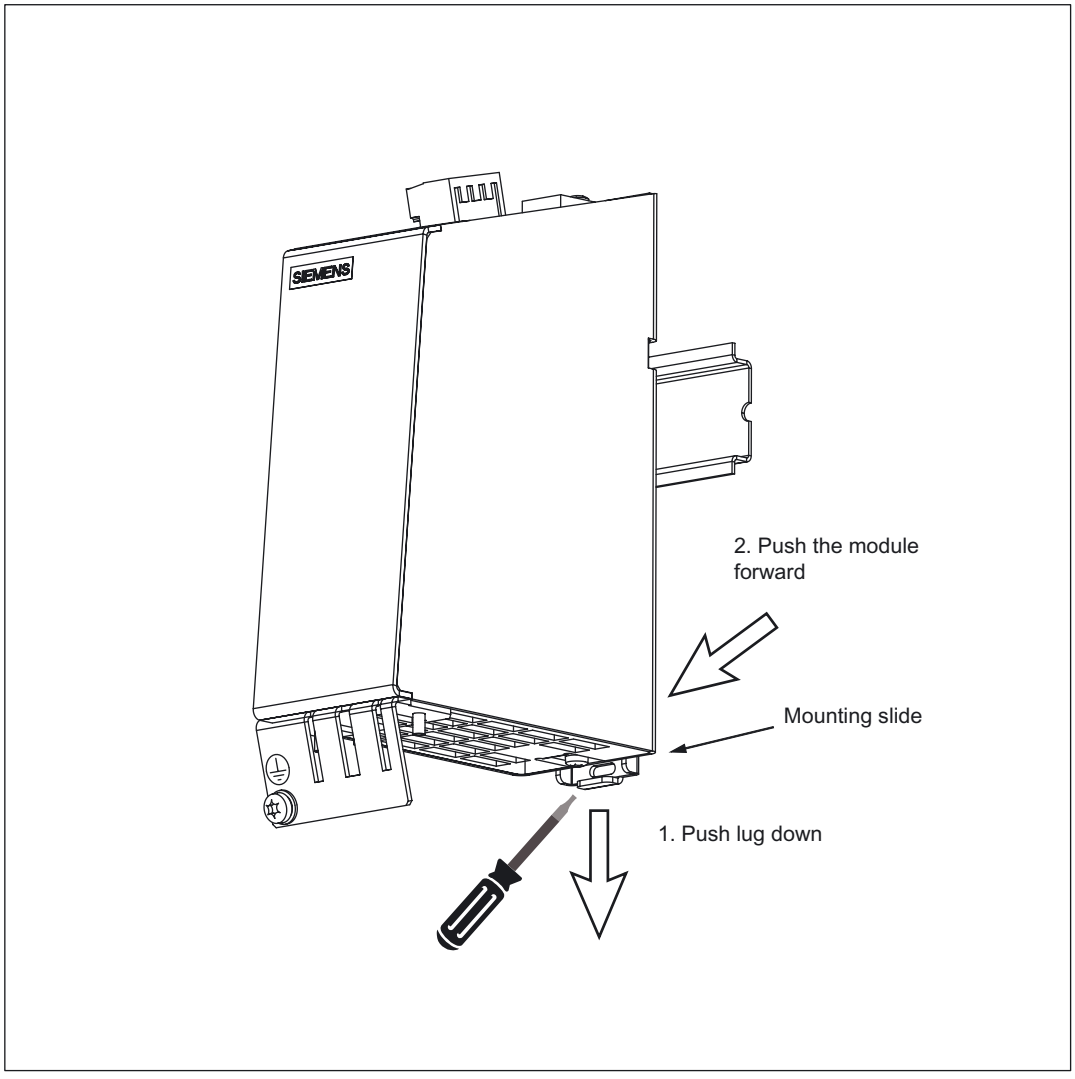


Figure 4-8 Releasing the component from a DIN rail

4.3.6 Technische Daten

Table 4-7 Technical specifications

	Unit	Value
Electronics power supply Voltage Current	 V_{DC} A_{DC}	 24 DC (20.4 – 28.8) max. 0.3
Max. ambient temperature up to an altitude of 2,000 m	°C	55
Note: As of an altitude of 2,000 m, the max. ambient temperature decreases by 7 °C every 1,000 m.		
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	0.8
Degree of protection	IP20	

4.4 Sensor Module Cabinet 20 (SMC20)

4.4.1 Description

The SMC20 evaluates encoder signals and transmits the speed, actual position value, rotor position and, if necessary, the motor temperature and reference point via DRIVE-CLiQ to the control unit.

The connectable encoders are incremental encoders SIN/COS (1 Vpp) and absolute encoders EnDat.

The maximum signal cable length is 100 m.

The module may be snapped on to a DIN50022 mounting rail.

4.4.2 Safety Information

Caution

The 50 mm clearances above and below the components must be observed.

Notice

Only measuring systems in which the measuring system power supply is not grounded may be connected.

4.4.3 Interface description

4.4.3.1 Overview

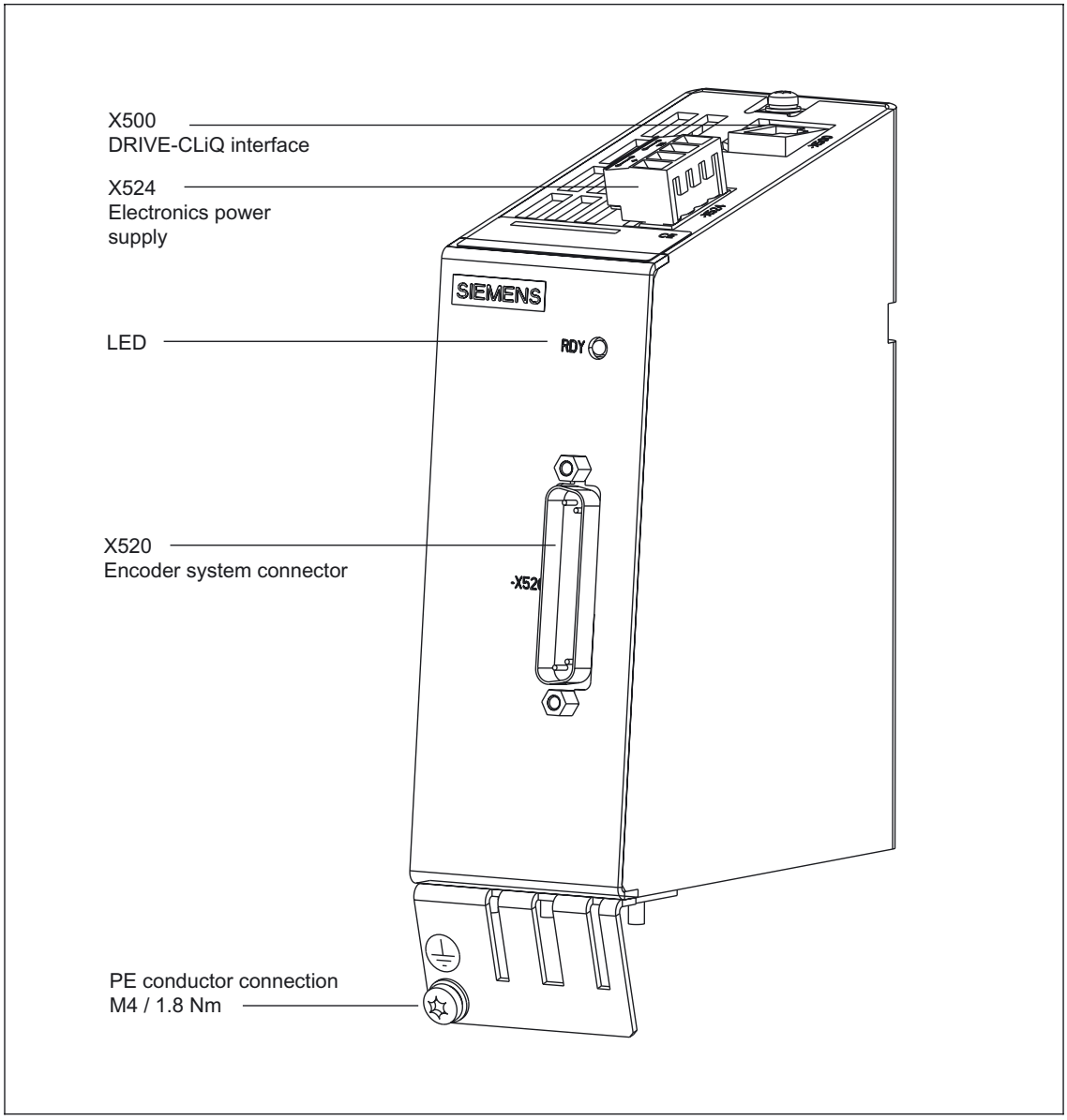
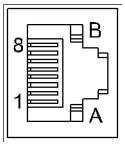


Figure 4-9 Interface description of the SMC20

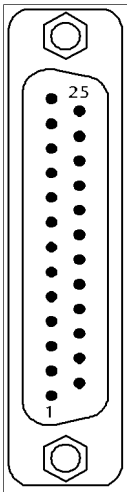
4.4.3.2 DRIVE-CLiQ interface X500

Table 4-8 DRIVE-CLiQ interface X500

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	Reserved, do not use	
	B	GND (0 V)	Electronic ground
Blanking plate for DRIVE-CLiQ interface: Molex, order number: 85999-3255			

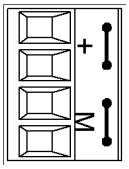
4.4.3.3 X520 sensor system

Table 4-9 Sensor interface X520

	Pin	Signal name	Technical specifications
	1	P encoder	Sensor power supply
	2	M encoder	Ground for sensor power supply
	3	A	Incremental signal A
	4	A*	Inverted incremental signal A
	5	Ground	Ground (for internal shield)
	6	B	Incremental signal B
	7	B*	Inverted incremental signal B
	8	Ground	Ground (for internal shield)
	9	Reserved, do not use	
	10	EnDat_Clock	Clock EnDat interface
	11	Reserved, do not use	
	12	EnDat_Clock*	Inverted clock EnDat interface
	13	+Temp	Motor temperature measurement KTY+/PTC
	14	5 V Sense	Sense input sensor power supply
	15	EnDat_Data	Data EnDat interface
	16	0 V Sense	Ground sense input sensor power supply
	17	R	Reference signal R
	18	R*	Inverted reference signal R
	19	C	Absolute track signal C
	20	C*	Inverted absolute value signal C
	21	D	Absolute track signal D
	22	D*	Inverted absolute track signal D
	23	EnDat_Data*	Inverted data EnDat interface
	24	Ground	Ground (for internal shield)
	25	-Temp	Motor temperature measurement KTY-/PTC
	Shell	Ground	Outer shield

4.4.3.4 Electronics power supply X524

Table 4-10 Terminal block X524

	Terminal	Function	Technical specifications
	+	Electronics power supply	Voltage: 24 V (20.4 V – 28.8 V) Current consumption: max. 0.4 A Maximum current via jumper in connector: 20 A at 55 °C
	+	Electronics power supply	
	M	Electronic ground	
	M	Electronic ground	
Max. connectable cross-section: 2.5 mm² Type: Screw terminal 2 (see Appendix A)			

Note

The two "+" and "M" terminals are jumpered in the connector and not in the unit. This ensures the supply voltage is looped through.

4.4.3.5 Description of the LEDs on the SMC20

Table 4-11 Description of the LEDs on the SMC20

LED	Color	State	Technical specifications
RDY	-	OFF	Electronics power supply outside permissible tolerance range.
	Green	Continuous	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
	Orange	Continuous	DRIVE-CLiQ communication is being established.
	Red	Continuous	At least one fault is present in this component.
	Green Red	Flashing 2 Hz	Firmware is being downloaded.
	Green/Orange or Red/Orange	Flashing 2 Hz	Component recognition via LED is activated (p0144) Note: both options depend on the LED status when module recognition is activated via p0144 = 1.

Cause and rectification of faults:

The following reference contains further information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S, Commissioning Manual

4.4.4 Dimension Drawing

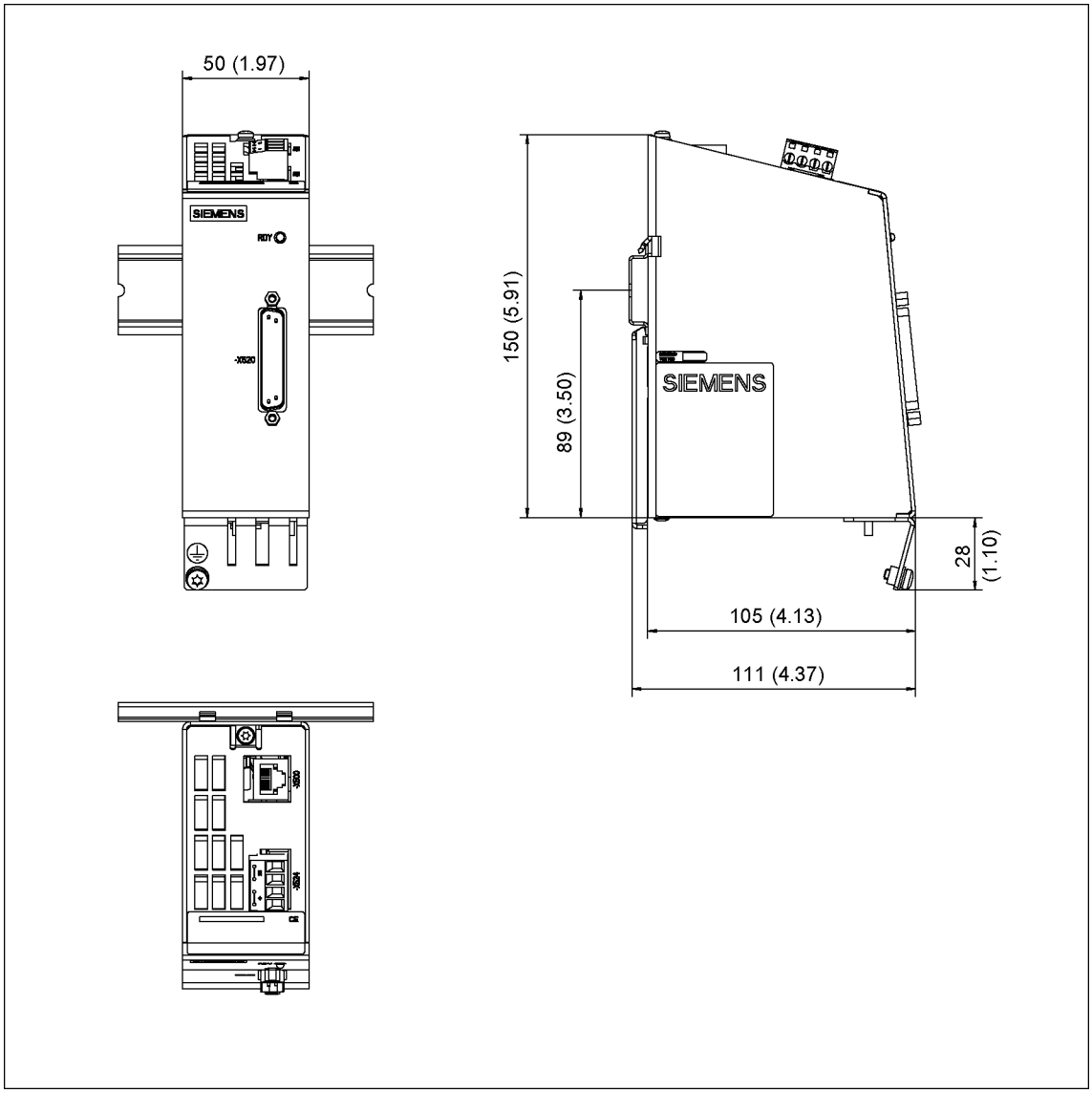


Figure 4-10 Dimension drawing of the SMC20

4.4.5 Installation

Installation

1. Place the component on the DIN rail.
2. Snap the component on to the DIN rail. Make sure that the mounting slides at the rear latch into place.
3. You can now move the component on the DIN rail to the left or to the right to its final position.

Removal

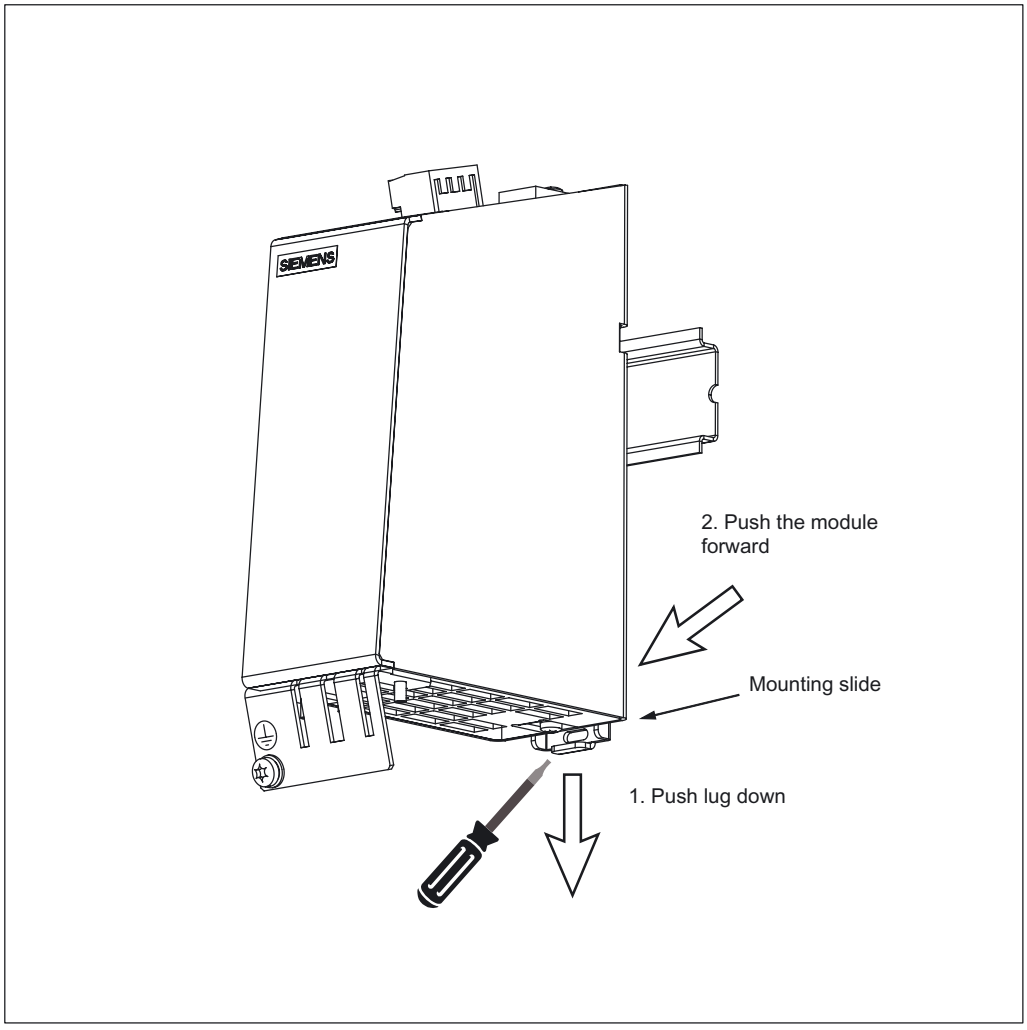


Figure 4-11 Releasing the component from a DIN rail

Table 4-12 Technical specifications

	Unit	Value
Electronics power supply Voltage Current Power loss	 V_{DC} A_{DC} W	 24 DC (20.4 – 28.8) Max. 0.4 <10
Max. ambient temperature up to an altitude of 2,000 m	°C	55
Note: As of an altitude of 2,000 m, the max. ambient temperature decreases by 7 °C every 1,000 m.		
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	0.8
Degree of protection	IP20	

4.5 Sensor Module Cabinet 30 (SMC30)

4.5.1 Description

The SMC30 evaluates encoder signals and transmits the speed, actual position value, rotor position and, if necessary, the motor temperature and reference point via DRIVE-CLiQ to the Control Unit.

TTL (to RS422 standard) and HTL rectangular signal sensors can be connected.

Table 4-13 Connectable sensors with supply voltage

	Remote Sense	X520 (D-Sub)	X521 (terminal)	X531 (terminal)	Open-circuit monitoring
HTL bipolar 24 V	No	Not possible	Yes		Not possible
HTL unipolar 24 V	No	Not possible	Yes		Not possible
TTL bipolar 24 V	No	Yes	Yes		Only at X520
TTL bipolar 5 V	Only at X520	Yes	Yes		Only at X520
TTL unipolar	Not possible				

Table 4-14 Maximum signal cable lengths

Sensor type	Maximum signal cable length in m
TTL	100
HTL unipolar	100
HTL bipolar	300

For sensors with 5 V supply at X521/X531, the cable lengths (for 0.5 mm^2 cable cross-sections) depend on the sensor current:

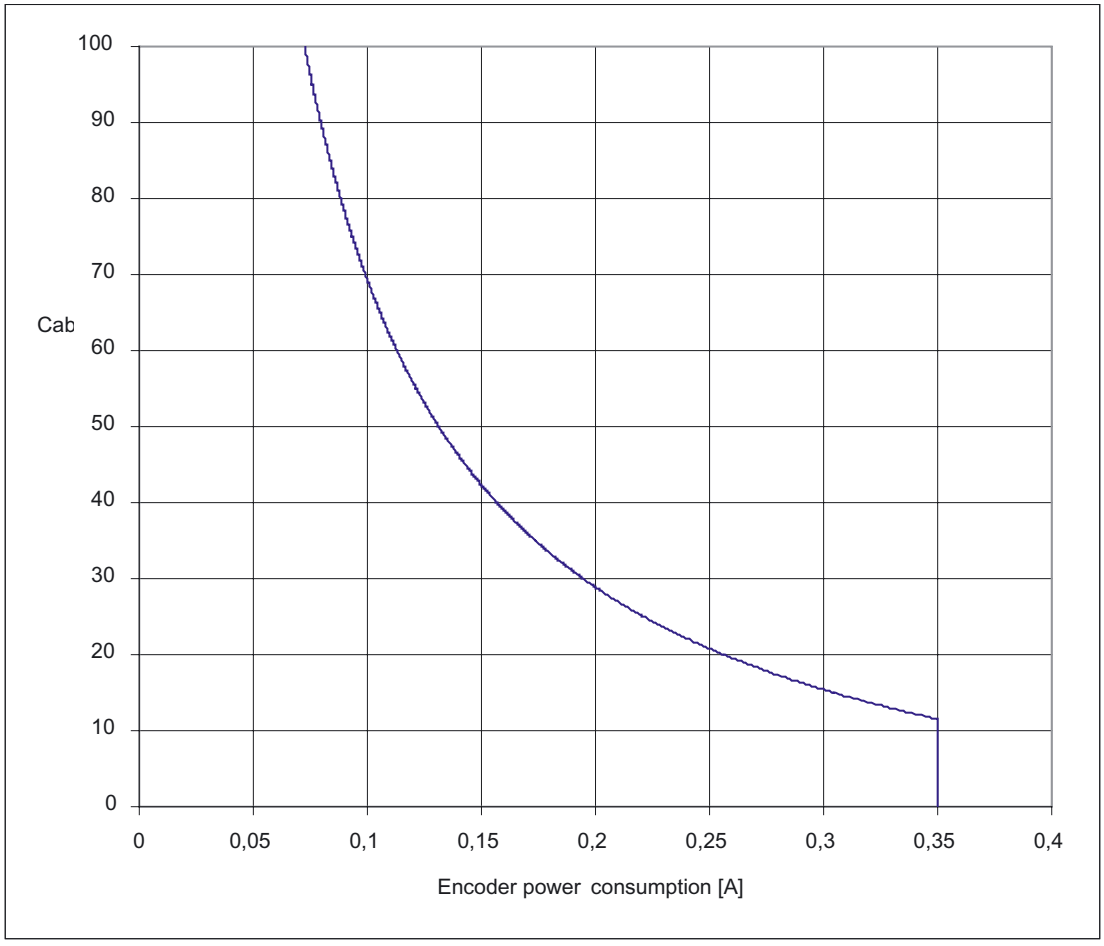


Figure 4-12 Cable length as a function of the sensor current consumption

4.5.2 Safety Information

Danger

The 50 mm clearances above and below the components must be observed.

Notice

Only one measuring system can be connected to each sensor module.

Only measuring systems in which the measuring system power supply is not grounded may be connected.

Caution

When you use screw terminals, the signal cable must be shielded and connected to the shield contact with the greatest possible surface area.

4.5.3 Interface description

4.5.3.1 Overview

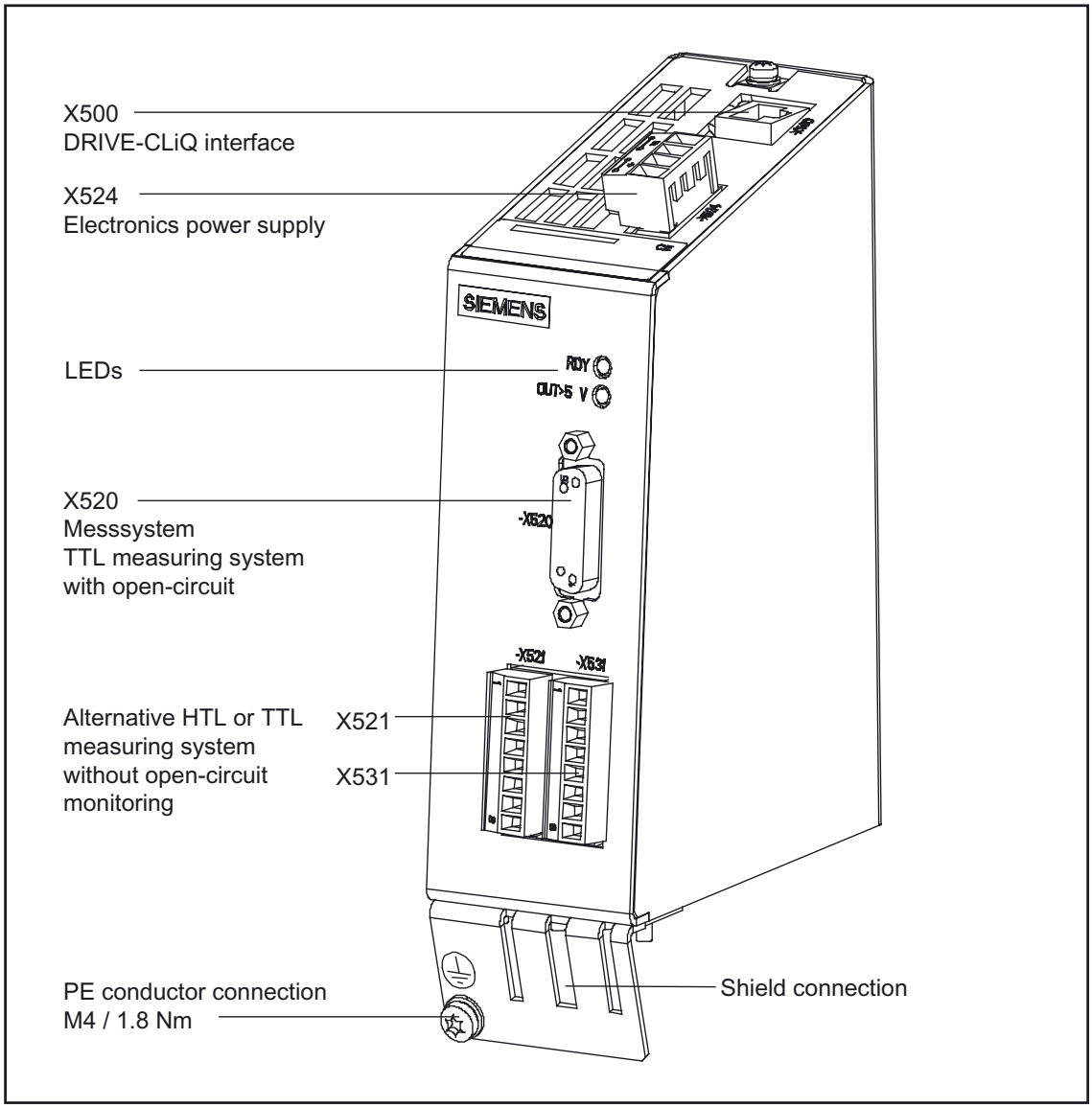


Figure 4-13 Interface description of the SMC30

4.5.3.2 Connection examples

Connection example 1: HTL encoder, bipolar, with zero marker

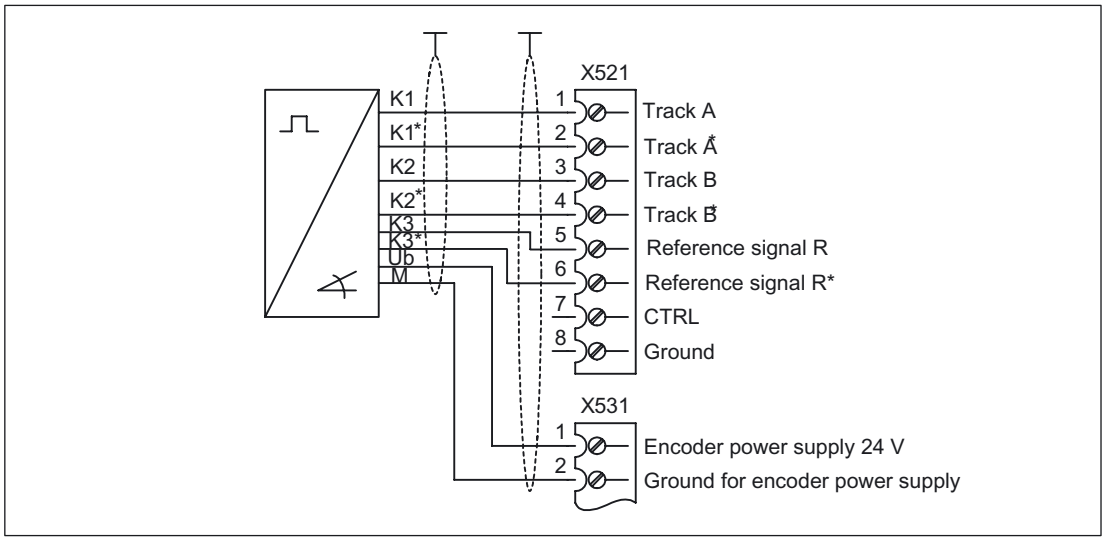


Figure 4-14 Connection example 1: HTL encoder, bipolar, with zero marker

Connection example 2: HTL encoder, unipolar, with zero marker

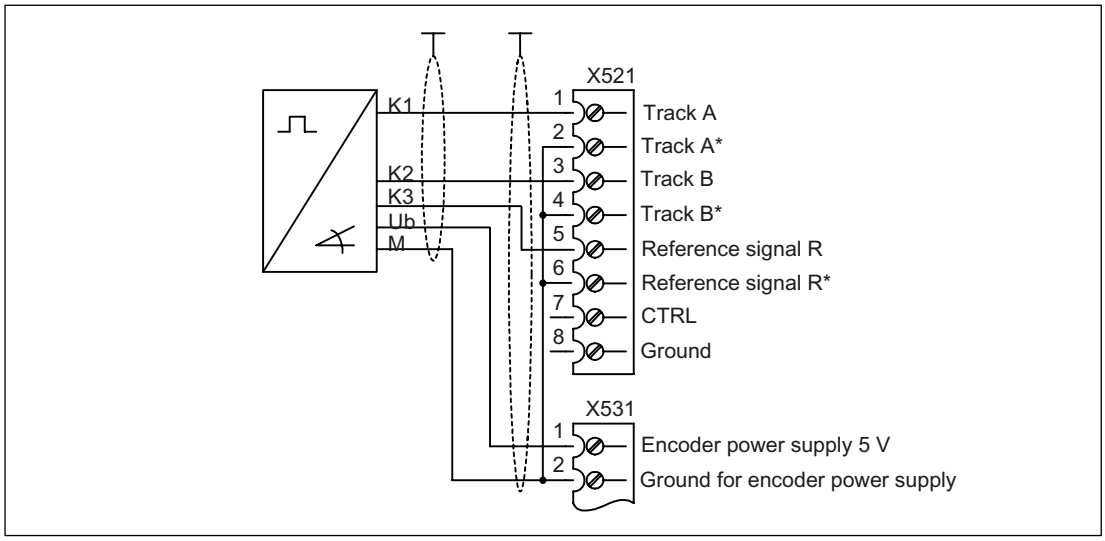
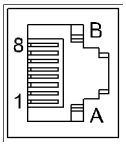


Figure 4-15 Connection example 2: HTL encoder, unipolar, with zero marker

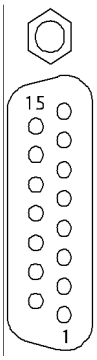
4.5.3.3 DRIVE-CLiQ interface X500

Table 4-15 DRIVE-CLiQ interface X500

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	Reserved, do not use	
	B	GND (0 V)	Electronic ground
Blanking plate for DRIVE-CLiQ interface: Molex, order number: 85999-3255			

4.5.3.4 X520 sensor connection 1 TTL with open-circuit monitoring

Table 4-16 Sensor connection X520

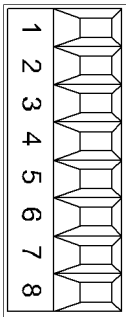
	Pin	Signal name	Technical specifications
	1	Reserved, do not use	
	2	Reserved, do not use	
	3	Reserved, do not use	
	4	P_Encoder 5 V / 24 V	Sensor power supply
	5	P_Encoder 5 V / 24 V	
	6	P_Sense	Sense input sensor power supply
	7	M_Encoder (M)	Ground for sensor power supply
	8	Reserved, do not use	
	9	M_Sense	Ground sense input
	10	R	Reference signal R
	11	R*	Inverted reference signal R
	12	B*	Inverted incremental signal B
	13	B	Incremental signal B
	14	A*	Inverted incremental signal A
	15	A	Incremental signal A

Caution

The sensor power supply can be parameterized to 5 V or 24 V. The sensor may be destroyed if you enter the wrong parameters.

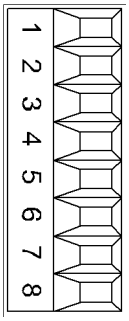
4.5.3.5 X521 sensor connection 2 HTL/TTL without open-circuit monitoring

Table 4-17 Sensor connection X521

	Pin	Name	Technical specifications
	1	A	Incremental signal A
	2	A*	Inverted incremental signal A
	3	B	Incremental signal B
	4	B*	Inverted incremental signal B
	5	R	Reference signal R
	6	R*	Inverted reference signal R
	7	CTRL	Control signal
	8	M	Ground via inductivity
Max. connectable cross-section: 1.5 mm^2 When unipolar HTL encoders are used, A*, B*, and R* on the terminal block must be jumpered with M_Encoder (X531).			

4.5.3.6 X531 sensor connection 2 HTL/TTL without open-circuit monitoring

Table 4-18 Sensor connection X531

	Pin	Name	Technical specifications
	1	P_Encoder 5 V / 24 V	Sensor power supply
	2	M_Encoder	Ground for sensor power supply
	3	-Temp	Motor temperature measurement KTY84-1C130 Temperature sensor connection KTY84-1C130/PTC
	4	+Temp	
	5	Reserved, do not use	
	6	Reserved, do not use	
	7	Reserved, do not use	
	8	Reserved, do not use	
Max. connectable cross-section: 1.5 mm^2			

Note

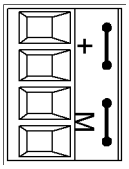
Ensure that when the sensor is connected via terminals, the cable shield must be placed on the module.

Shield brackets for the SMC30 are available from:

Weidmüller: http://www.weidmueller.com

4.5.3.7 Electronics power supply X524

Table 4-19 Terminal block X524

	Terminal	Function	Technical specifications
	+	Electronics power supply	Voltage: 24 V (20.4 V – 28.8 V) Current consumption: max. 0.6 A Max. current across jumper in connector: 20 A at 55 °C
	+	Electronics power supply	
	M	Electronic ground	
	M	Electronic ground	
Max. connectable cross-section: 2.5 mm²			

Note

The two "+" and "M" terminals are jumpered in the connector and not in the unit. This ensures the supply voltage is looped through.

4.5.3.8 Description of the LEDs on the SMC30

Table 4-20 Description of the LEDs on the SMC30

LED	Color	State	Description
RDY	-	OFF	Electronics power supply outside permissible tolerance range.
	Green	Continuous	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
	Orange	Continuous	DRIVE-CLiQ communication is being established.
	Red	Continuous	At least one fault is present in this component.
	Green Red	Flashing 2 Hz	Firmware is being downloaded.
	Green/Orange or Red/Orange	Flashing 2 Hz	Component recognition via LED is activated (p0144) Note: both options depend on the LED status when module recognition is activated via p0144 = 1.
OUT > 5 V	-	OFF	Electronics power supply outside permissible tolerance range. Measuring system supply ≤ 5 V (only when ready for operation).
	Orange	Continuous	Measuring system supply > 5 V.

Cause and rectification of faults

The following reference contains further information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S, Commissioning Manual

4.5.4 Dimension Drawing

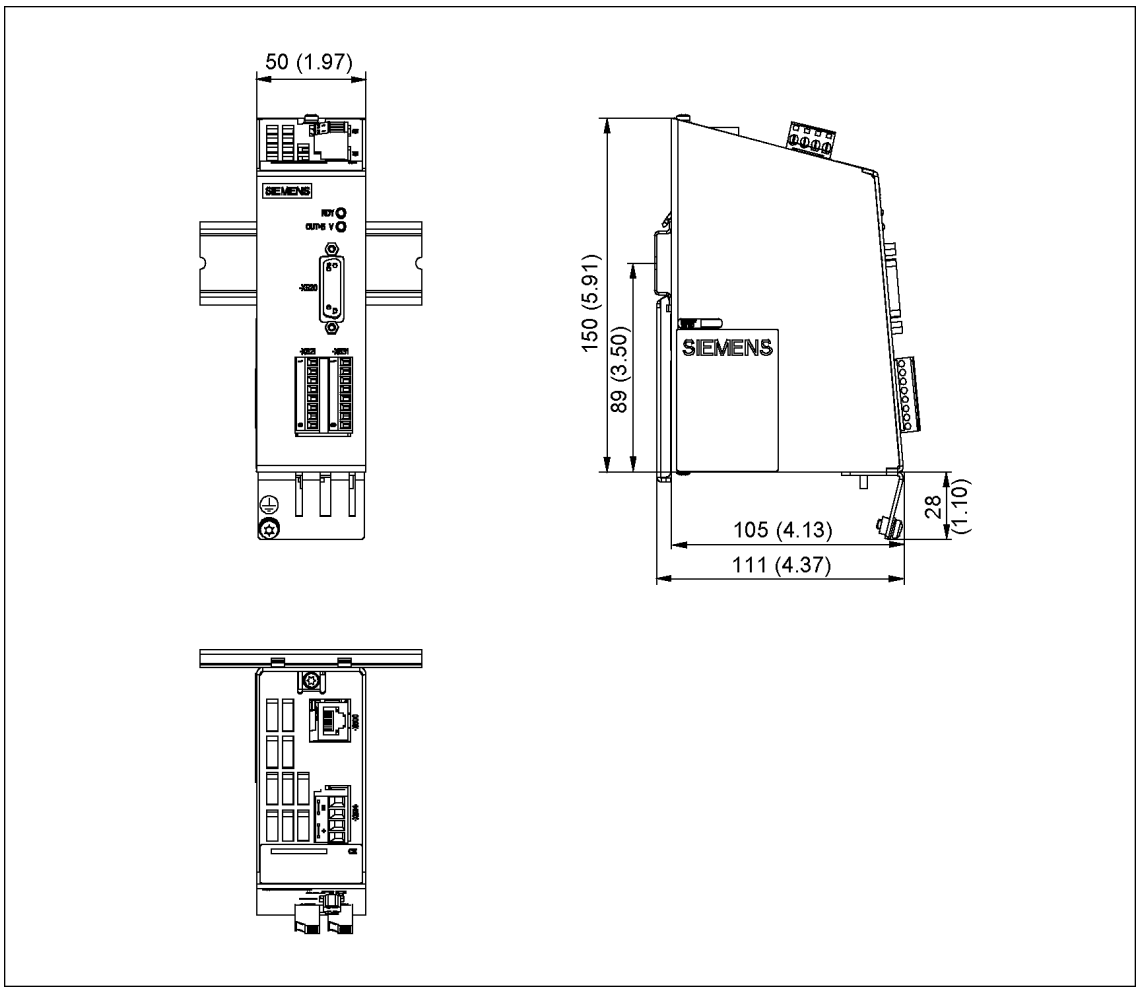


Figure 4-16 Dimension drawing of the SMC30

4.5.5 Installation

Installation

1. Place the component on the DIN rail.
2. Snap the component on to the DIN rail. Make sure that the mounting slides at the rear latch into place.
3. You can now move the component on the DIN rail to the left or to the right to its final position.

Removal

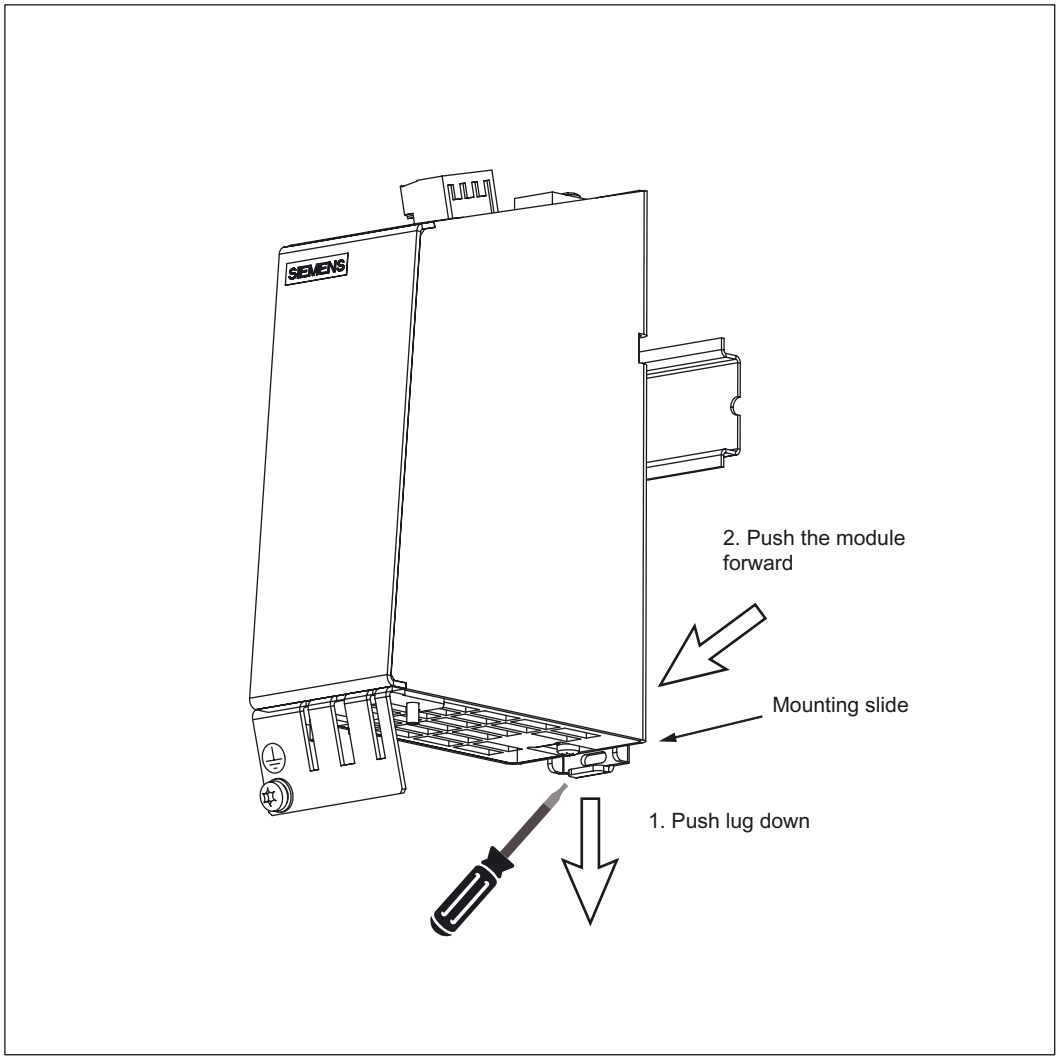


Figure 4-17 Releasing the component from a DIN rail

4.5.6 Electrical Connection

Shield contacts are only required if the system is connected to X521/X531.

Shield contact for the SMC30 from Weidmüller

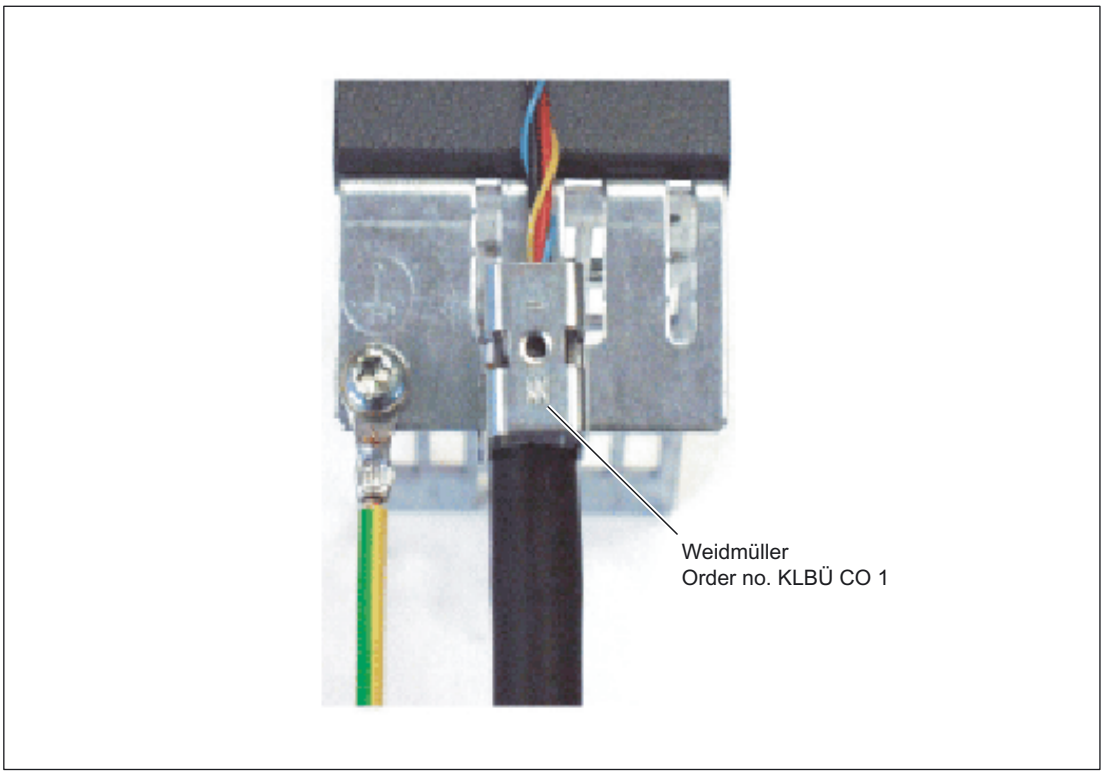


Figure 4-18 Shield contacts for the SMC30

Weidmüller:

The bending radii of the cables must be taken into account (see description of MOTION-CONNECT).

4.5.7 Technical [54]Specifications

	Unit	Value
Electronics power supply Voltage Current	 V_{DC} A_{DC}	 24 DC (20.4 – 28.8) max. 0.6
Max. ambient temperature up to an altitude of 2,000 m	°C	55
Note: As of an altitude of 2,000 m, the max. ambient temperature decreases by 7 °C every 1,000 m.		
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	0.8
Degree of protection	IP20	

Table 4-21 Properties of the connectable pulse encoders

Parameter	Name	Unit	Min.	Max .
Signal level high (TTL bipolar at X520 or X521/X531)	U_H	V	2	
Signal level low (TTL bipolar at X520 or X521/X531)	U_L	V		-2
Signal level high (HTL unipolar)	U_H	V	10	VCC
Signal level low (HTL unipolar)	U_L	V		2
Signal level high (HTL bipolar)	U_H	V	3	VCC
Signal level low (HTL bipolar)	U_L	V		-3
Signal frequency	f_S	kHz		500
Identification range	α1; α2	Degrees	50	270

The VCC supply voltage of encoder is max. 30 V.

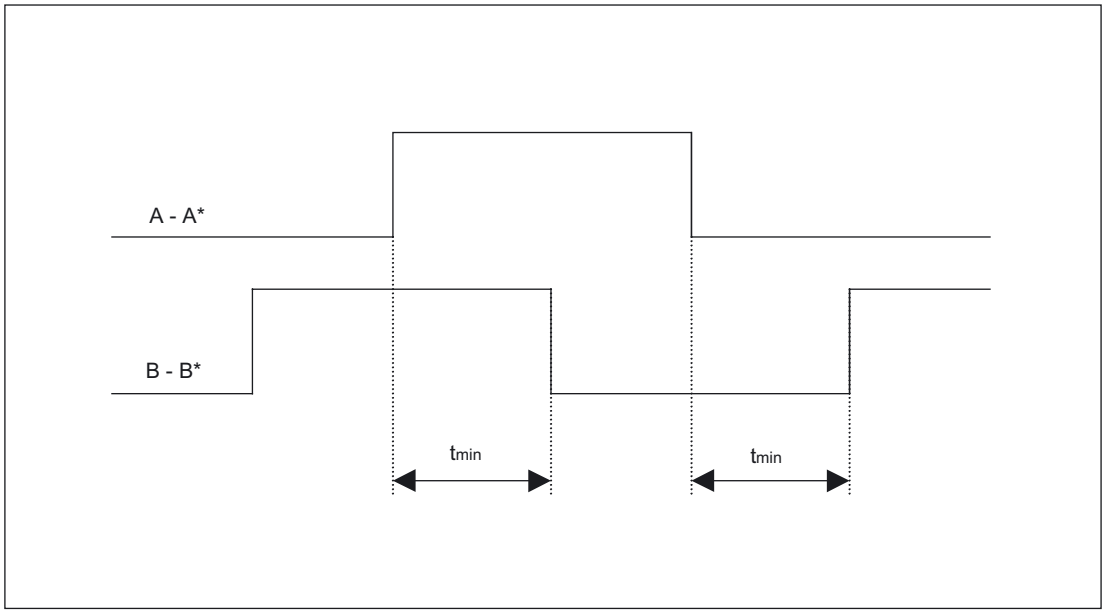


Figure 4-19 Time between two edges with pulse encoders

The minimum interval t_{min} between two edges is 250 ns.

4.6 Sensor Module External 20 (SME20)

4.6.1 Description

Measuring systems outside the cabinet can be connected directly to the Sensor Module External 20 (SME20). The SME20 evaluates these measuring systems and converts the calculated values to DRIVE-CLiQ.
No motor or encoder data is stored in the SME20.
The component must be commissioned in the system.

Incremental direct SIN/COS (1 Vpp) measuring systems can be connected.

The maximum DRIVE-CLiQ cable length is 100 m.

The maximum signal cable length is 3 m.

4.6.2 Safety information

Notice

Only measuring systems in which the power supply for the measuring system is not grounded may be connected.

4.6.3 Interface description

4.6.3.1 Overview

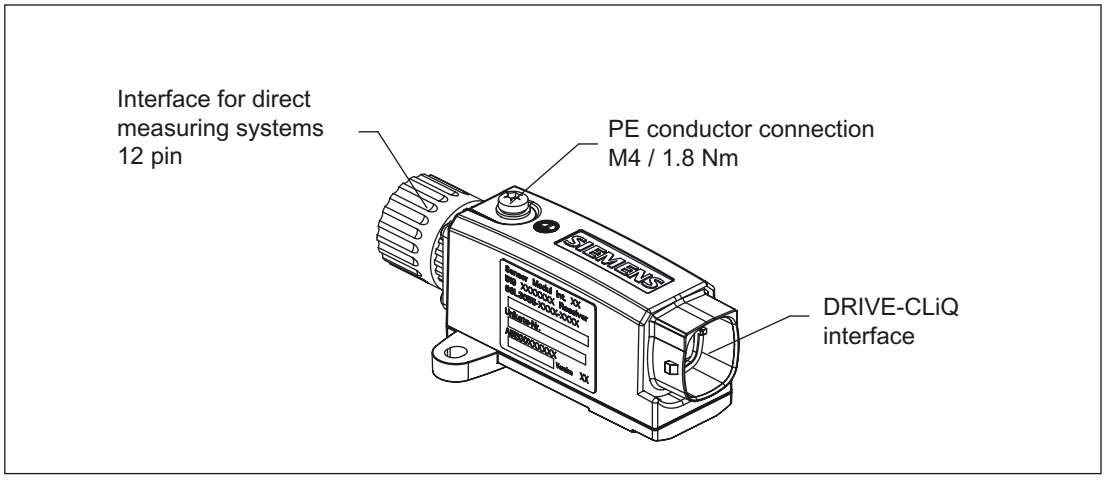
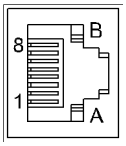


Figure 4-20 Interface description SME20

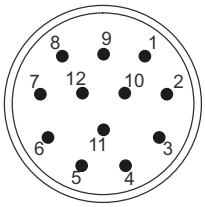
4.6.3.2 DRIVE-CLiQ interface

Table 4-22 DRIVE-CLiQ interface

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	+ (24 V)	Power supply
	B	GND (0 V)	Electronic ground
The blanking plate for the DRIVE-CLiQ interface is included in the scope of supply			

4.6.3.3 Measuring system interface

Table 4-23 Measuring system interface SME20

	Pin	Signal name	Technical specifications
	1	BN	B track negative
	2	P5	Encoder power supply +5 V
	3	RP	Zero pulse positive
	4	RN	Zero pulse negative
	5	AP	A track positive
	6	AN	A track negative
	7	Reserved, do not use	
	8	BP	B track positive
	9	Reserved, do not use	
	10	M	Encoder power supply M
	11	M	Encoder power supply M
	12	P5	Encoder power supply +5 V
	Housing	Ground	Outer shield
Blanking plate for measuring system interface: Pöppelmann GmbH & Co. KG, Lohne, Order No.: GPN 300 F211			

4.6.4 Dimension drawing

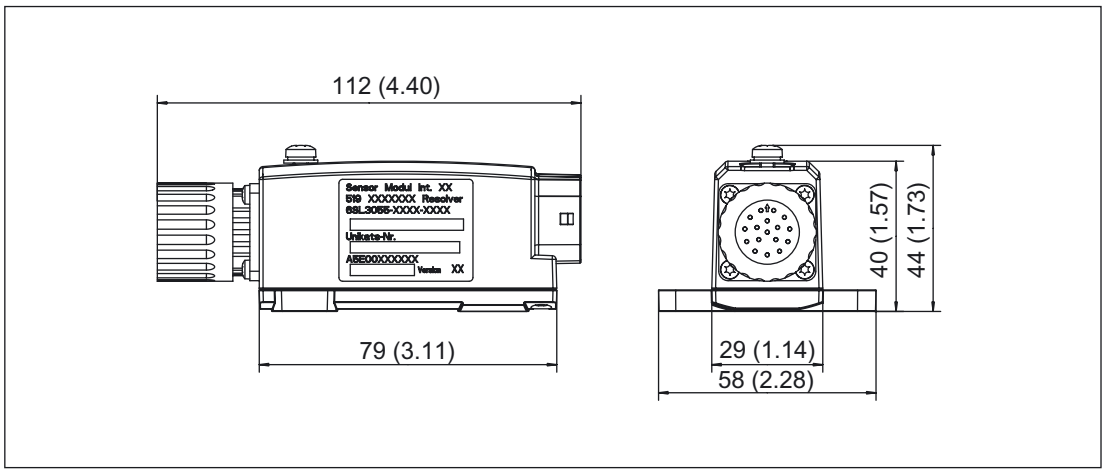


Figure 4-21 Dimension drawing of the SME20

4.6.5 Installation

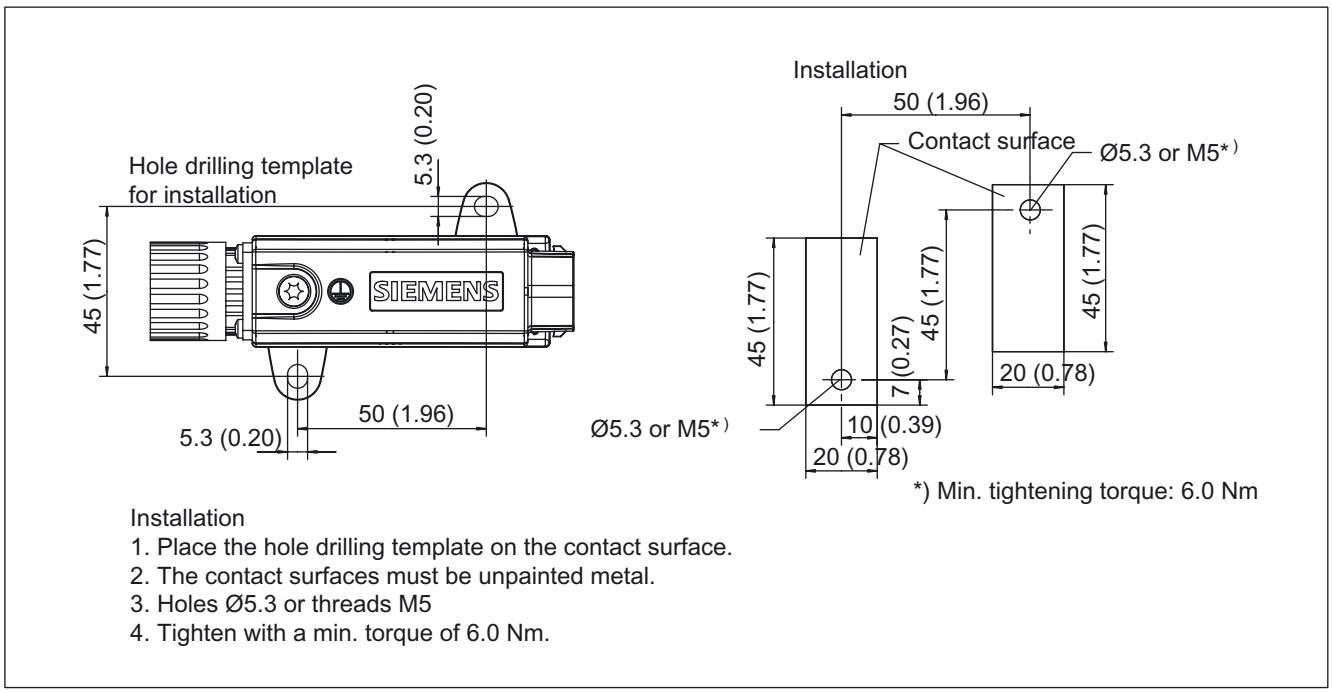


Figure 4-22 Installing the SME20/SME25

4.6.6 Technical specifications

Table 4-24 Technical specifications

Sensor Module External (SME20) 6SL3055-0AA00-5EAx	Unit	Value
Electronics power supply Voltage Power loss	 V_{DC} W	24 DC (20.4 – 28.8)
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	0.18
Degree of protection	IP 67	

4.7 Sensor Module External 25 (SME25)

4.7.1 Description

Measuring systems outside the cabinet can be connected directly to the Sensor Module External 25 (SME25). The SME25 evaluates these measuring systems and converts the calculated values to DRIVE-CLiQ.
No motor or encoder data is stored in the SME25.
The component must be commissioned in the system.

Incremental direct SIN/COS (1 Vpp) measuring systems without zero pulse and EnDat can be connected.

The maximum DRIVE-CLiQ cable length is 100 m.

The maximum signal cable length is 3 m.

4.7.2 Safety information

Notice

Only measuring systems in which the power supply for the measuring system is not grounded may be connected.

4.7.3 Interface description

4.7.3.1 Overview

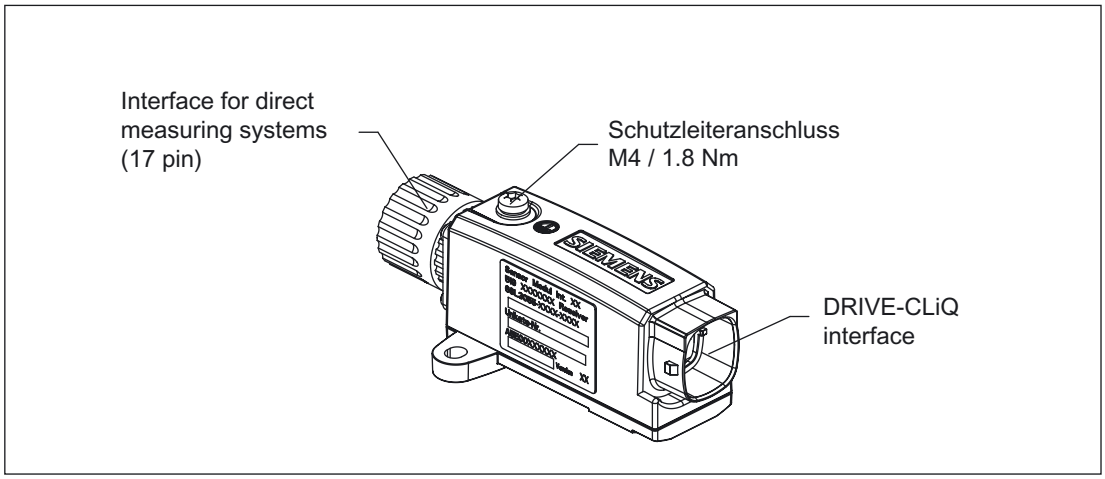
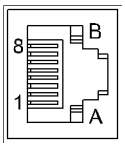


Figure 4-23 Interface description SME25

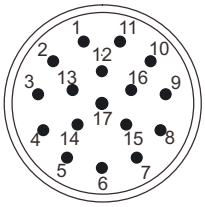
4.7.3.2 DRIVE-CLiQ interface

Table 4-25 DRIVE-CLiQ interface

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	+ (24 V)	Power supply
	B	GND (0 V)	Electronic ground
The blanking plate for the DRIVE-CLiQ interface is included in the scope of supply			

4.7.3.3 Measuring system interface

Table 4-26 Measuring system interface SME25

	Pin	Signal name	Technical specifications
	1	P5	Encoder power supply +5 V
	2	Reserved, do not use	
	3	Reserved, do not use	
	4	M	Encoder power supply M
	5	Reserved, do not use	
	6	Reserved, do not use	
	7	P5	Encoder power supply +5 V
	8	CLK	EnDat V2.1 clock positive
	9	CLK*	EnDat V2.1 clock negative
	10	M	Encoder power supply M
	11	M	Encoder power supply M
	12	BP	B track positive
	13	BN	B track negative
	14	DATA	EnDat V2.1 data positive
	15	AP	A track positive
	16	AN	A track negative
	17	DATA*	EnDat V2.1 data negative
	Housing	Ground	Outer shield
Blanking plate for measuring system interface: Pöppelmann GmbH & Co. KG, Lohne, Order No.: GPN 300 F211			

4.7.4 Dimension drawing

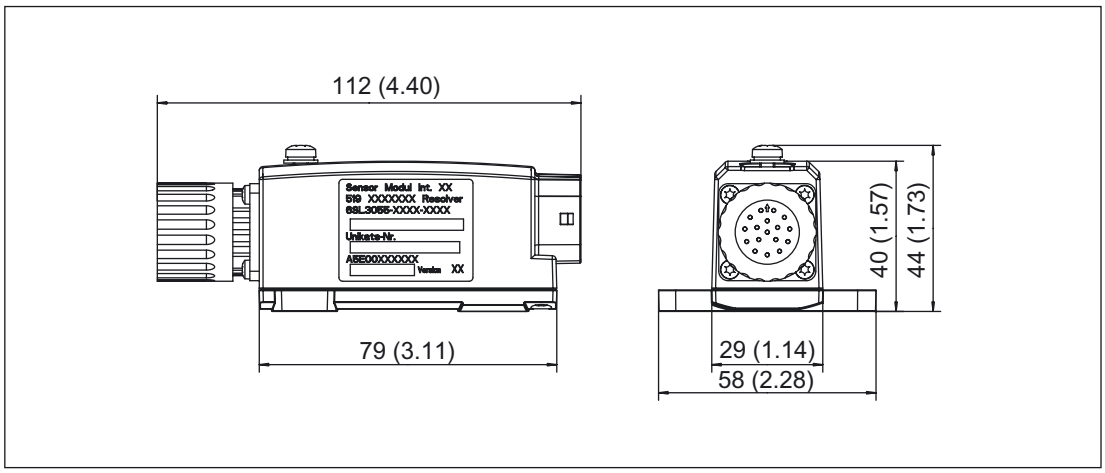
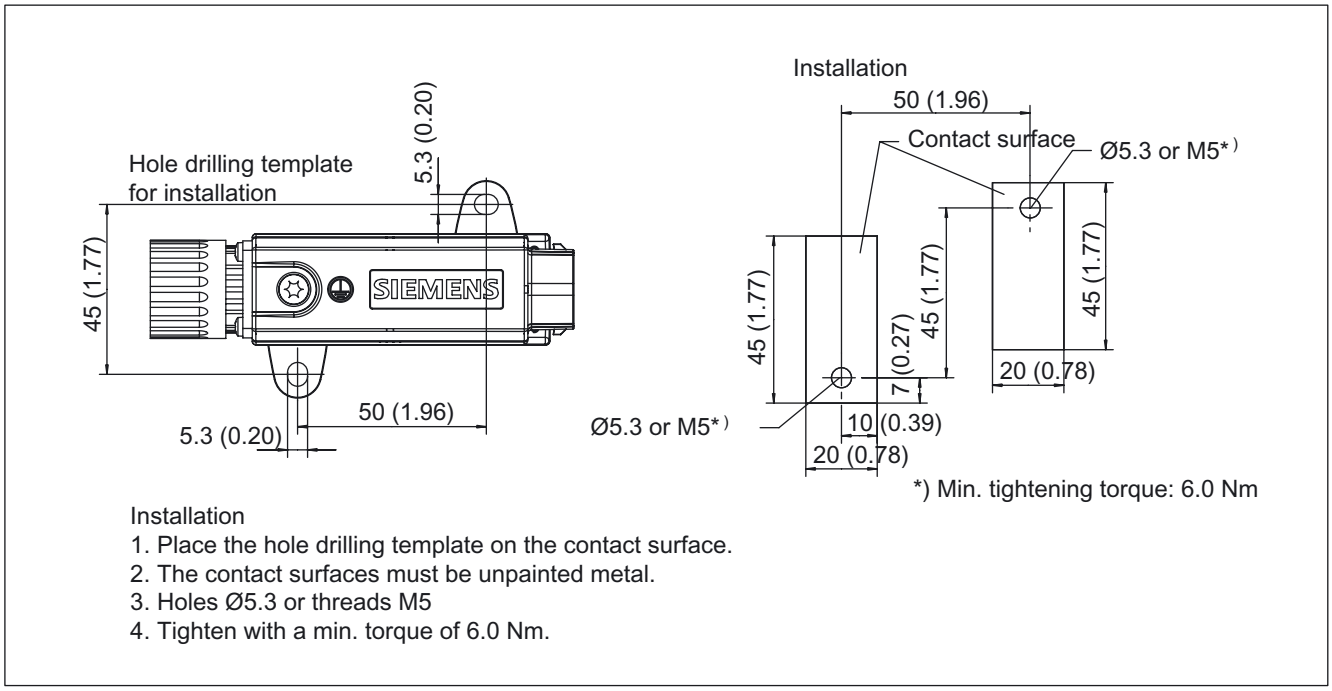


Figure 4-24 Dimension drawing of the SME25

4.7.5 Installation



Installation
1. Place the hole drilling template on the contact surface.
2. The contact surfaces must be unpainted metal.
3. Holes Ø5.3 or threads M5
4. Tighten with a min. torque of 6.0 Nm.

Figure 4-25 Installing the SME20/SME25

4.7.6 Technical specifications

Table 4-27 Technical specifications

Sensor Module External (SME25) 6SL3055-0AA00-5HAx	**Unit**	**Value**
Electronics power supply Voltage Power loss	 V_{DC} W	24 DC (20.4 – 28.8)
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	0.18
Degree of protection	IP 67	

Electromagnetic Compatibility (EMC) 5

5.1 Cabinet design and EMC: booksize

Information on cabinet design and electromagnetic compatibility (EMC) can be found in:

/GH2/ SINAMICS S120

Equipment Manual for Booksize Power Sections

Order No.: 6SL3097-2AC00-0AP2, edition: 06.2005

Spring-Loaded Terminals/Screw Terminals

A

Connectable conductor cross-sections of spring-loaded terminals

Table A-1 Spring-loaded terminals

Spring-loaded terminal type			
1	Connectable conductor cross-sections	Flexible With wire end ferrule, without plastic sleeve With wire end ferrule, with plastic sleeve	0.14 mm^2 to 1.5 mm^2 0.25 mm^2 to 1.5 mm^2 0.25 mm^2 to 0.5 mm^2
	Insulation stripping length	7 mm	
	Tool	Screwdriver 0.4 x 2.0 mm	
2	Connectable conductor cross-sections	Flexible	0.08 mm^2 to 2.5 mm^2
	Insulation stripping length	8 to 9 mm	
	Tool	Screwdriver 0.4 x 2.0 mm	

Connectable conductor cross-sections of screw terminals

Table A-2 Screw terminals

Screw terminal type			
1	Connectable conductor cross-sections	Flexible With wire end ferrule, without plastic sleeve With wire end ferrule, with plastic sleeve	0.14 mm^2 to 1.5 mm^2 0.25 mm^2 to 1.5 mm^2 0.25 mm^2 to 0.5 mm^2
	Insulation stripping length	7 mm	
	Tool	Screwdriver 0.4 x 2.0 mm	
	Tightening torque	0.22 to 0.25 Nm	
2	Connectable conductor cross-sections	Flexible With wire end ferrule, without plastic sleeve With wire end ferrule, with plastic sleeve	0.2 mm^2 to 2.5 mm^2 0.25 mm^2 to 1 mm^2 0.5 mm^2 to 1 mm^2
	Insulation stripping length	7 mm	
	Tool	Screwdriver 0.6 x 3.5 mm	
	Tightening torque	0.5 to 0.6 Nm	
3	Connectable conductor cross-sections	Flexible With wire end ferrule, without plastic sleeve With wire end ferrule, with plastic sleeve	0.2 mm^2 to 2.5 mm^2 0.25 mm^2 to 1 mm^2 0.25 mm^2 to 1 mm^2
	Insulation stripping length	9 mm	
	Tool	Screwdriver 0.6 x 3.5 mm	
	Tightening torque	0.5 to 0.6 Nm	

Screw terminal type			
4	Connectable conductor cross-sections	Flexible With wire end ferrule, without plastic sleeve With wire end ferrule, with plastic sleeve	0.2 mm^2 to 4 mm^2 0.25 mm^2 to 4 mm^2 0.25 mm^2 to 4 mm^2
	Insulation stripping length	7 mm	
	Tool	Screwdriver 0.6 x 3.5 mm	
	Tightening torque	0.5 to 0.6 Nm	
5	Connectable conductor cross-sections	Flexible With wire end ferrule, without plastic sleeve With wire end ferrule, with plastic sleeve	0.5 mm^2 to 6 mm^2 0.5 mm^2 to 6 mm^2 0.5 mm^2 to 6 mm^2
	Insulation stripping length	12 mm	
	Tool	Screwdriver 1.0 x 4.0 mm	
	Tightening torque	1.2 to 1.5 Nm	
6	Connectable conductor cross-sections	Flexible With wire end ferrule, without plastic sleeve With wire end ferrule, with plastic sleeve	0.5 mm^2 to 10 mm^2 0.5 mm^2 to 10 mm^2 0.5 mm^2 to 10 mm^2
	Insulation stripping length	11 mm	
	Tool	Screwdriver 1.0 x 4.0 mm	
	Tightening torque	1.5 to 1.8 Nm	

List of Abbreviations

B

Table B-1 List of abbreviations

Abbreviation	German	English
A		
A...	Warnung	Alarm
AC	Wechselstrom	Alternating Current
ADC	Analog-Digital-Konverter	Analog Digital Converter
AI	Analogeingang	Analog Input
ALM	Active Line Module	Active Line Module
AO	Analogausgang	Analog Output
AOP	Advanced Operator Panel	Advanced Operator Panel
ASC	Ankerkurzschluss	Armature Short-Circuit
ASCII	Amerikanische Code-Norm für den Informationsaustausch	American Standard Code for Information Interchange
B		
BB	Betriebsbedingung	Operating Condition
BERO	Firmenname für einen Näherungsschalter	Tradename for a type of proximity switch
BI	Binektoreingang	Binector Input
BIA	Berufsgenossenschaftliches Institut für Arbeitssicherheit	Berufsgenossenschaftliches Institut für Arbeitssicherheit (German Institute for Occupational Safety)
BICO	Binektor-Konnektor-Technologie	Binector Connector Technology
BLM	Basic Line Module	Basic Line Module
BOP	Basic Operator Panel	Basic Operator Panel
C		
C	Kapazität	Capacitance
C...	Safety-Meldung	Safety message
CAN	Controller Area Network	Controller Area Network
CBC	Kommunikationsbaugruppe CAN	Communication Board CAN
CBP	Kommunikationsbaugruppe PROFIBUS	Communication Board PROFIBUS
CD	Compact Disc	Compact Disc
CDS	Befehlsdatensatz	Command Data Set
CI	Konnektoreingang	Connector Input
CNC	Computergestützte numerische Steuerung	Computer Numerical Control
CO	Konnektorausgang	Connector Output
CO/BO	Konnektor-/Binektorausgang	Connector Output/Binector Output
COB-ID	CAN Object Identification	CAN object identification

Abbreviation	German	English
COM	Mittelkontakt eines Wechselkontaktes	Mid-position contact of a changeover contact
CP	Kommunikationsprozessor	Communications Processor
CPU	Zentralbaugruppe	Central Processing Unit
CRC	Checksummenprüfung	Cyclic Redundancy Check
CU	Control Unit	Control Unit
D		
DAC	Digital-Analog-Konverter	Digital Analog Converter
DC	Gleichstrom	Direct Current
DCN	Gleichstrom negativ	Direct Current Negative
DCP	Gleichstrom positiv	Direct Current Positive
DDS	Antriebsdatensatz	Drive Data Set
DI	Digitaleingang	Digital Input
DI/DO	Digitaleingang/-ausgang bidirektional	Bidirectional Digital Input/Output
DMC	DRIVE-CLiQ Module Cabinet (Hub)	DRIVE-CLiQ Module Cabinet (Hub)
DO	Digitalausgang	Digital Output
DO	Antriebsobjekt	Drive Object
DPRAM	Speicher mit beidseitigem Zugriff	Dual-Port Random Access Memory
DRAM	Dynamischer Speicher	Dynamic Random Access Memory
DRIVE CLiQ	Drive Component Link with IQ	Drive Component Link with IQ
DSC	Dynamic Servo Control	Dynamic servo control
I		
EDS	Geberdatensatz	Encoder Data Set
EGB	Elektrostatisch gefährdete Baugruppen	Electrostatic Sensitive Devices
EMK	Elektromagnetische Kraft	Electromagnetic force
EMC	Elektromagnetischer Verträglichkeit	Electromagnetic Compatibility
EN	Europäische Norm	European Standard
EnDat	Geber-Schnittstelle	Encoder-Data-Interface
EP	Impulsfreigabe	Enable Pulses
ES	Engineering System	Engineering System
ESR	Erweitertes Stillsetzen und Rückziehen	Extended Stop and Retract
F		
F...	Störung	Fault
FAQ	Häufig gestellte Fragen	Frequently Asked Questions
FCC	Function Control Chart	Function Control Chart
FCC	Flussstromregelung	Flux Current Control
FEPROM	Schreib- und Lesespeicher nichtflüchtig	Flash-EPROM
FG	Funktionsgenerator	Function Generator
FI	Fehlerstromschutzschalter	Residual-Current Circuit-Breaker (RCCB)
FP	Funktionsplan	Function diagram
FW	Firmware	Firmware
G		
GC	Global-Control-Telegram (Broadcast-Telegramm)	Global Control Telegram (broadcast telegram)
GSD	Gerätestammdatei: beschreibt die Merkmale eines PROFIBUS-Slaves	Device master file: describes the features of a PROFIBUS slave
GSV	Gate Supply Voltage	Gate Supply Voltage

Abbreviation	German	English
H		
HF	Hochfrequenz	High Frequency
HFD	Hochfrequenzdrossel	High frequency reactor
HLG	Hochlaufgeber	Ramp-Function Generator
HMI	Mensch-Maschine-Schnittstelle	Human Machine Interface
HTL	Logik mit hoher Störschwelle	High threshold logic
HW	Hardware	Hardware
I		
i. V.	in Vorbereitung: diese Eigenschaft steht zur Zeit nicht zur Verfügung	In preparation: this feature is currently not available
IBN	Inbetriebnahme	Commissioning
I/O	Eingang/Ausgang	Input/Output
ID	Identifizierung	Identifier
IEC	Internationale Norm in der Elektrotechnik	International Electrotechnical Commission
IGBT	Bipolartransistormit isolierter Steuerelektrode	Insulated Gate Bipolar Transistor
IL	Impulslöschung	Pulse suppression
IT	Drehstromversorgungsnetz ungeerdet	Insulated three-phase supply
J		
JOG	Tippen	Jogging
K		
KDV	Kreuzweiser Datenvergleich	Data cross-checking
KIP	Kinetische Pufferung	Kinetic buffering
Kp	Proportionalverstärkung	Proportional gain
KTY	Spezieller Temperatursensor	Positive temperature coefficient temperature sensor
L		
L	Induktivität	Inductance
LED	Leuchtdiode	Light Emitting Diode
LSB	Niederwertigstes Bit	Least Significant Bit
LSS	Netzschalter	Line Side Switch
M		
M	Masse	Reference potential, zero potential
MB	Megabyte	Megabyte
MCC	Motion Control Chart	Motion Control Chart
MDS	Motordatensatz	Motor Data Set
MLFB	Maschinenlesbare Fabrikatebezeichnung	Machine-readable product designation
MMC	Mensch Maschine Kommunikation	Man Machine Communication
MSB	Höchstwertigstes Bit	Most Significant Bit
MSCY_C1	Zyklische Kommunikation zwischen Master (Klasse 1) und Slave	Master Slave Cycle Class 1
N		
N. C.	Nicht angeschlossen	Not Connected
N...	Keine Meldung oder Interne Meldung	No Report
NAMUR	Normenarbeitsgemeinschaft für Mess- und Regeltechnik in der chemischen Industrie	Standardization association for measurement and control in chemical industries
NC	Öffner	Normally Closed contact

Abbreviation	German	English
NC	Numerische Steuerung	Numerical Control
NEMA	Normengremium in USA (Unites States of America)	National Electrical Manufacturers Association
NM	Nullmarke	Zero mark
NO	Schliesser	Normally Open contact
O		
OEM	Original Equipment Manufacturer	Original Equipment Manufacturer
OLP	Busstecker für Lichtleiter	Optical Link Plug
OMI	Option Module Interface	Option Module Interface
P		
p...	Einstellparameter	Adjustable parameter
PcCtrl	Steuerungshoheit	Master Control
PDS	Leistungsteildatensatz	Power Module Data Set
PE	Schutzerde	Protective Earth
PELV	Schutzkleinspannung	Protective Extra Low Voltage
PG	Programmiergerät	Programming device
PI	Proportional Integral	Proportional Integral
PID	Proportional Integral Differential	Proportional Integral Differential
PLC	Speicherprogrammierbare Steuerung (SPS)	Programmable Logic Controller
PLL	Baustein zur Synchronisierung	Phase Locked Loop
PNO	PROFIBUS Nutzerorganisation	PROFIBUS user organisation
PRBS	Weißes Rauschen	Pseudo Random Binary Signal
PROFIBUS	Serieller Datenbus	Process Field Bus
PS	Stromversorgung	Power Supply
PTC	Positiver TemperaturKoeffizient	Positive Temperature Coefficient
PTP	Punkt-zu-Punkt	Point To Point
PWM	Pulsweitenmodulation	Pulse Width Modulation
PZD	PROFIBUS Prozessdaten	PROFIBUS process data
R		
r …	Beobachtungsparameter (nur lesbar)	Display parameter (read only)
RAM	Speicher zum Lesen und Schreiben	Random Access Memory
RCCB	Fehlerstromschutzschalter	Residual-Current Circuit-Breaker
RCD	Fehlerstromschutzschalter	Residual Current Device
RJ45	Norm. Beschreibt eine 8-polige Steckverbindung mit Twisted-Pair Ethernet.	Standard Describes an 8-pole plug connector with twisted pair Ethernet.
RKA	Rückkühlanlage	Recooling system
RO	Nur lesbar	Read Only
RPDO	Receive Process Data Object	Receive Process Data Object
RS232	Serielle Schnittstelle	Serial interface
RS485	Norm. Beschreibt die Physik einer digitalen seriellen Schnittstelle.	Standard Describes the physical characteristics of a digital serial interface.

Abbreviation	German	English
S		
S1	Dauerbetrieb	Continuous duty
S3	Aussetzbetrieb	Periodic duty
SBC	Sichere Bremsenansteuerung	Safe Brake Control
SBH	Sicherer Betriebshalt	Safe operating stop
SBR	Sichere Bremsrampe	Safe braking ramp
SE	Sicherer Software-Endschalter	Safe software limit switch
SG	Sicher reduzierte Geschwindigkeit	Safely reduced speed
SGA	Sicherheitsgerichteter Ausgang	Safety-related output
SGE	Sicherheitsgerichtetes Eingangssignal	Safe input signal
SH	Sicherer Halt	Safe standstill
SI	Safety Integrated	Safety Integrated
SIL	Sicherheitsintegrietätsgrad	Safety Integrity Level
SLM	Smart Line Module	Smart Line Module
SLVC	Geberlose Vektorregelung	Sensorless Vector Control
SM	Sensor Module	Sensor Module
SMC	Sensor Module Cabinet	Sensor Module Cabinet
SN	Sicherer Software-Nocken	Safe software cam
SPC	Sollwertkanal	Setpoint Channel
SPS	Speicherprogrammierbare Steuerung	Programmable Logic Controller (PLC)
STW	PROFIBUS Steuerwort	PROFIBUS Control Word
T		
TB	Terminal Board	Terminal Board
TIA	Totally Integrated Automation	Totally Integrated Automation
TM	Terminal Module	Terminal Module
TN	Drehstromversorgungsnetz geerdet	Grounded three-phase supply
Tn	Nachstellzeit	Integral time
TPDO	Transmit Process Data Object	Transmit Process Data Object
TT	Drehstromversorgungsnetz geerdet	Grounded three-phase supply
TTL	Transistor-Transistor-Logik	Transistor Transistor Logic
U		
UL	Underwriters Laboratories Inc.	Underwriters Laboratories Inc.
USV	Unterbrechungsfreie Stromversorgung	Uninteruptible power supply
V		
VC	Vektorregelung	Vector control
Vdc	Zwischenkreisspannung	DC link voltage
VDE	Verband Deutscher Elektrotechniker	Association of German Electrical Engineers
VDI	Verein Deutscher Ingenieure	Association of German Electrical Engineers
Vpp	Volt Spitze zu Spitze	Volt peak to peak
VSM	Voltage Sensing Module	Voltage sensing module

Abbreviation	German	English
W		
WZM	Werkzeugmaschine	Machine tool
X		
XML	Erweiterbare Auszeichnungssprache (Standardsprache für Web-Publishing und Dokumentenmanagement)	Extensible Markup Language
Z		
ZK	Zwischenkreis	DC Link
ZSW	PROFIBUS Zustandswort	PROFIBUS status word

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C

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ISBN 3-7785-2781-9

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Order no.: 6GK1970-5CA20-0BA0

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Order no. 2.111 (German), Version 1.0
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Documentation for Safety Equipment

Note

For more information about technical documentation for Safety Integrated, visit the following address:

http://www.siemens.de/safety

The following list contains some of the safety-related documentation available.

/LVP/ Low-Voltage Switchgear
Catalog
Order no.: E86060-K1002-P101-A5, edition: 2005

/LV10/ Controlgear for Industry
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Index

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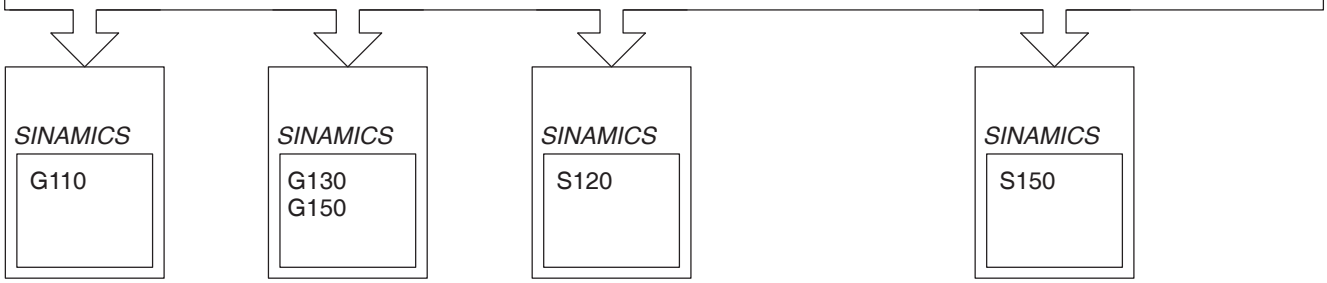

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– D21.2: Servo Control Drive System

D21.3
Vector Control Cabinet Units
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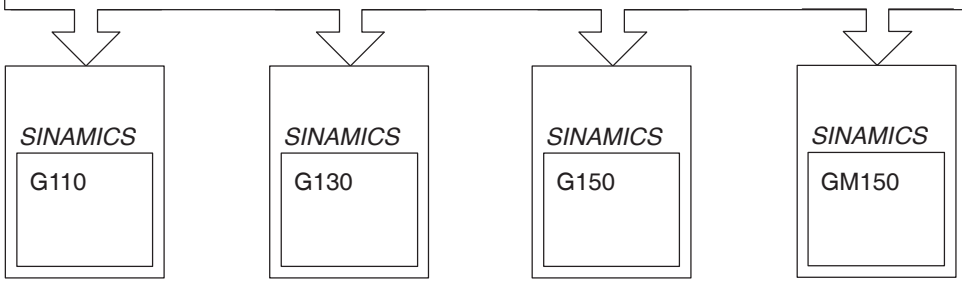

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– List Manual

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– List Manual

– Operating Instructions
– List Manual

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– Getting Started
– Equipment Manual Control Units and Additional System Components
– Equipment Manual Booksize Power Sections
– Equipment Manual Booksize Power Sections Cold-Plate
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– Function Manual
– List Manual

– Operating Instructions
– List Manual

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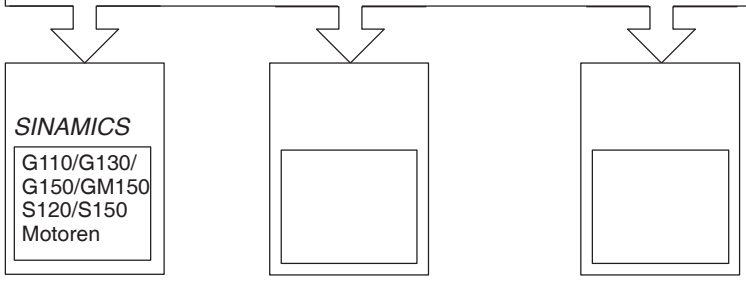

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