

Equipment Manual 04/2004 Edition

sinamics

SINAMICS S120
Control Units and
Additional System Components

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SINAMICS S120 Equipment Manual for Control Units and Additional System Components

Equipment Manual

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SINAMICS® Documentation

Printing history

Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the "Remarks" column.

Status code in the "Remarks" column:

- A** New documentation
- B** Unrevised reprint with new order no.
- C** Revised edition with new status

If factual changes have been made on the page in relation to the same software version, this is indicated by a new edition coding in the header on that page.

Edition	Order No.	Remarks
04.04	6SL3097-2AH00-0BP0	A

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We have checked that the contents of this document correspond to the hardware and software described. Nonetheless, differences might exist and therefore we cannot guarantee that they are completely identical. The information contained in this document is, however, reviewed regularly and any necessary changes will be included in the next edition. We welcome suggestions for improvement.

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Preface

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.

Danger and warning notices – symbol explanations

The following danger and warning notices are used in this document:



Danger

Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury, or substantial damage to property.



Warning

Indicates an potentially hazardous situation which, if not avoided, could result in death, or serious injury, or substantial property damage.



Caution

Used with the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

Caution

Used without safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Notice

Used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state.

Note

This notice indicates that there are further issues to be taken into consideration.

Definition: Qualified personnel

With reference to this manual and the warning labels on the product, a "qualified person" is someone who is familiar with the installation, mounting, startup, and operation of the equipment and who has certified qualifications for the type of responsibility involved, such as:

- Training and instruction, i.e. authority to switch on and off, to earth and to label circuits and equipment according to safety regulations.
- Training and instruction in maintenance and use of adequate safety equipment according to safety regulations.
- First aid training.

Finding information

To help you find information more easily, the following sections have been included in the appendix in addition to the table of contents:

1. References
2. Index

Technical information

Hotline

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

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Internet address

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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)

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.

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System Overview

1.1 Applications

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.

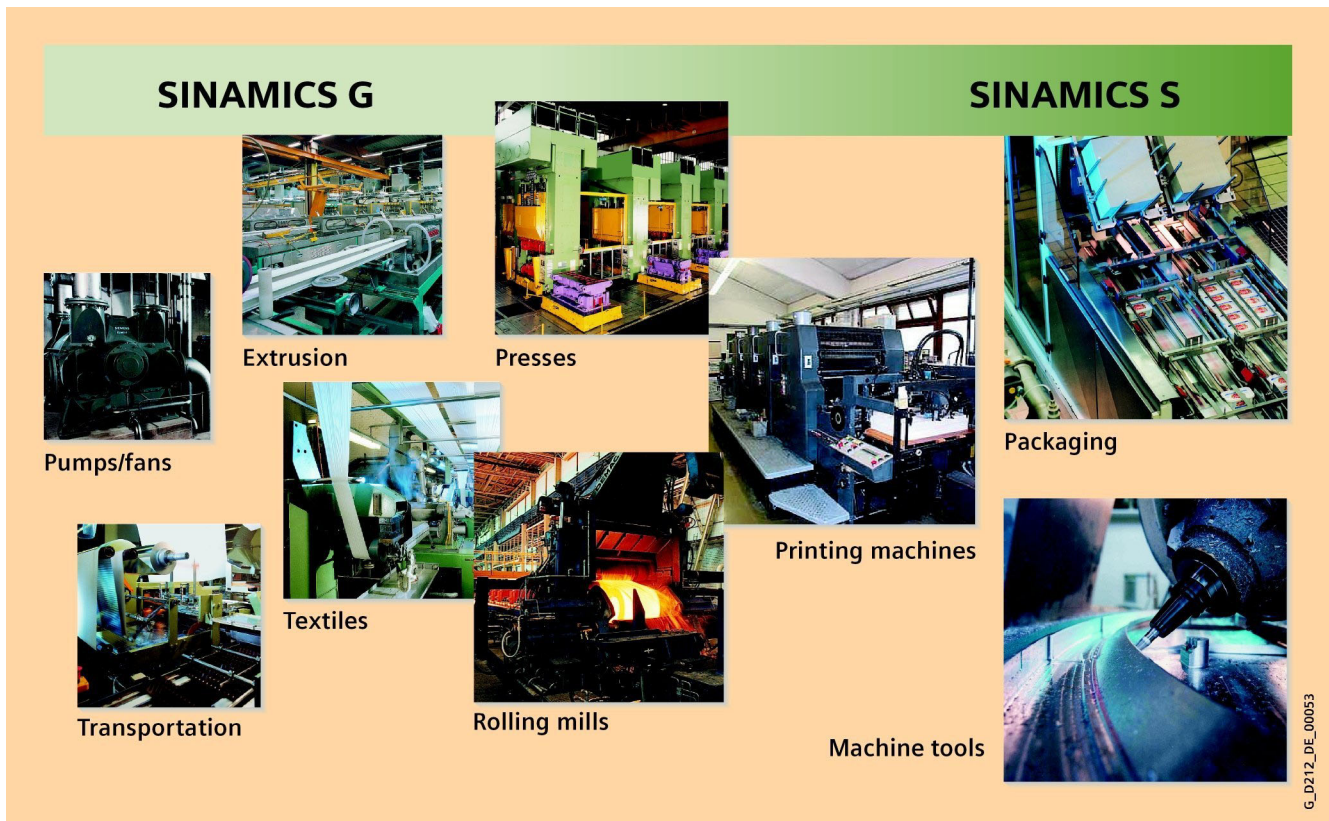


Figure 1-1 SINAMICS applications

1.2 Versions

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.

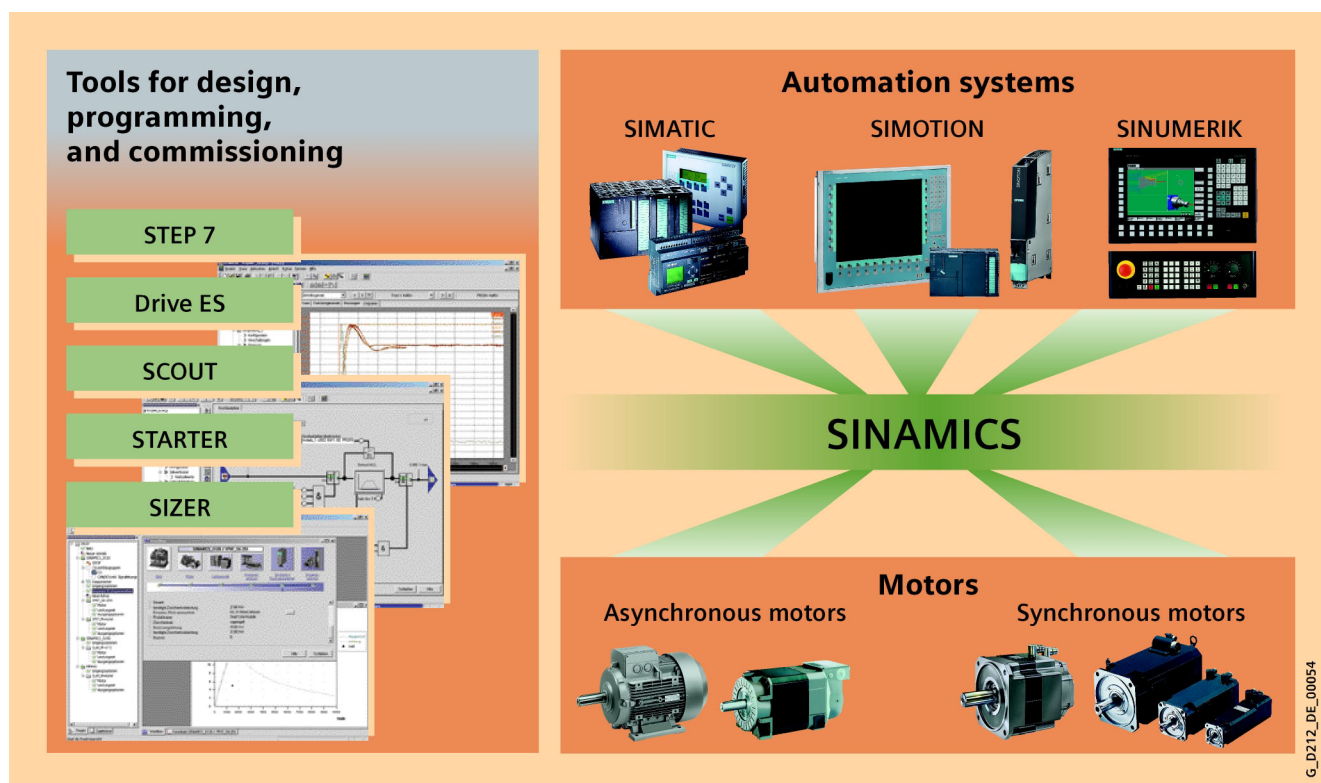


Figure 1-2 SINAMICS as part of the Siemens modular automation system

1.4 Introduction

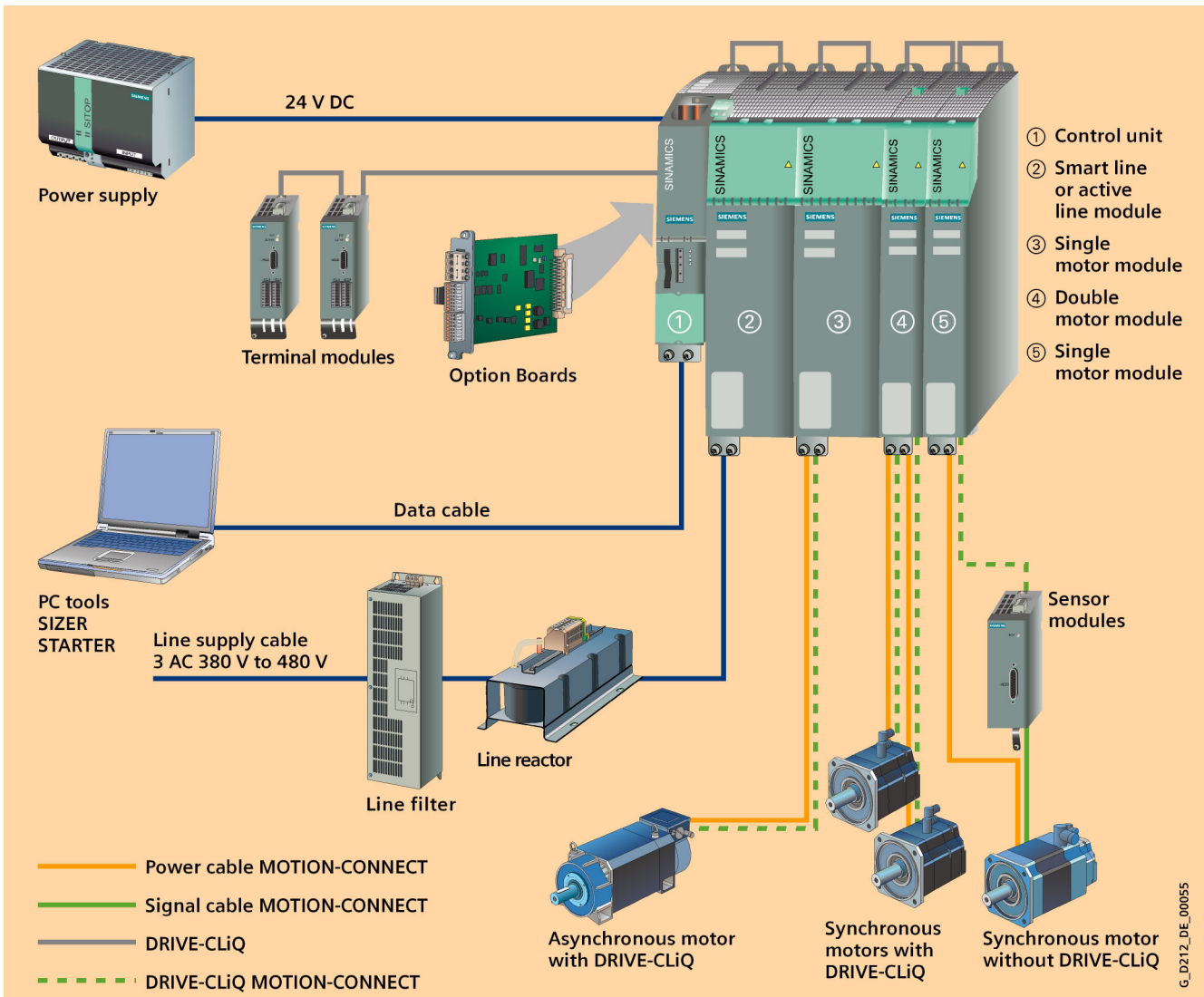


Figure 1-3 SINAMICS S120 System Overview

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.

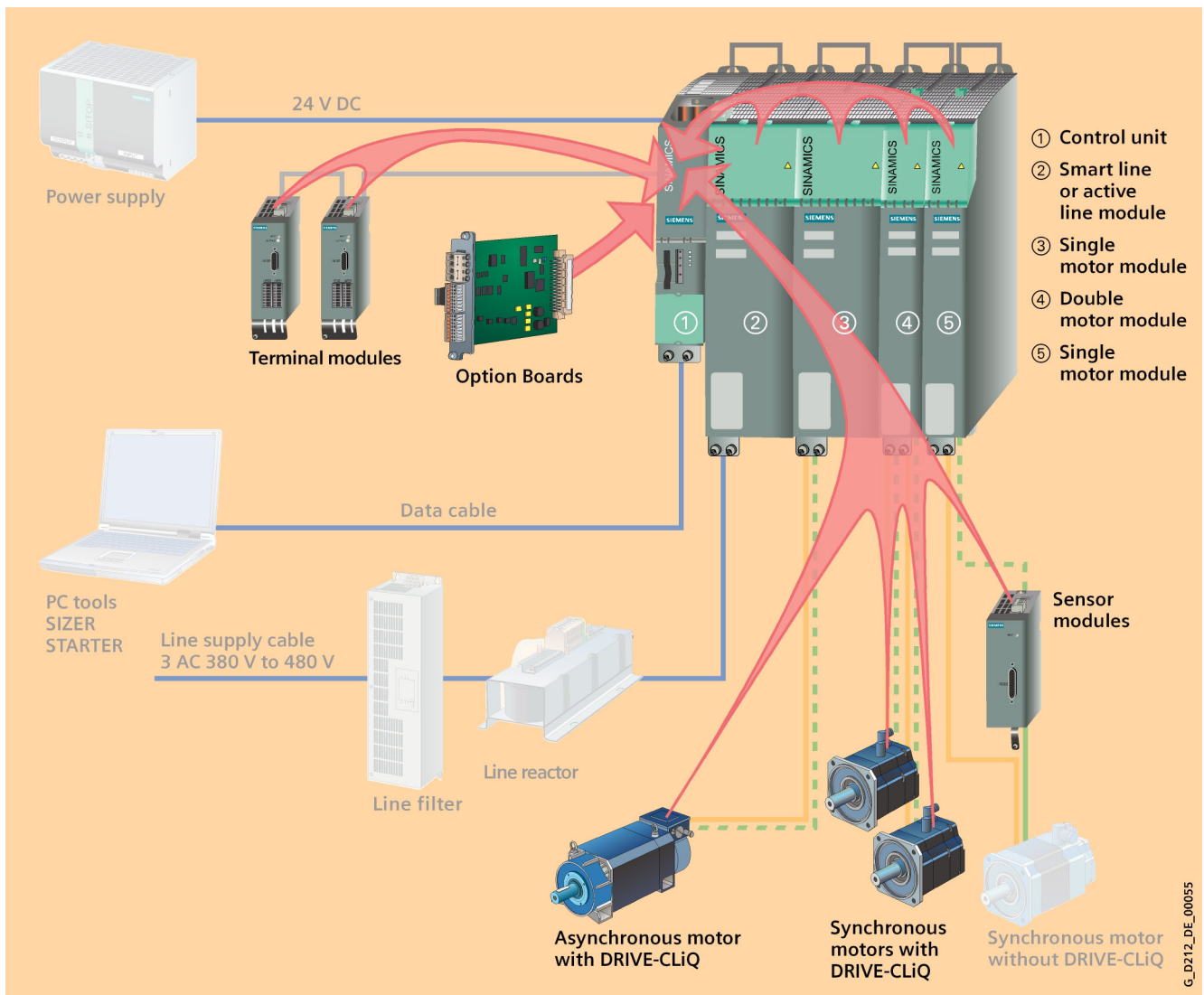


Figure 1-4 The electronic type plate for SINAMICS S120

1.5 SINAMICS S120 components

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

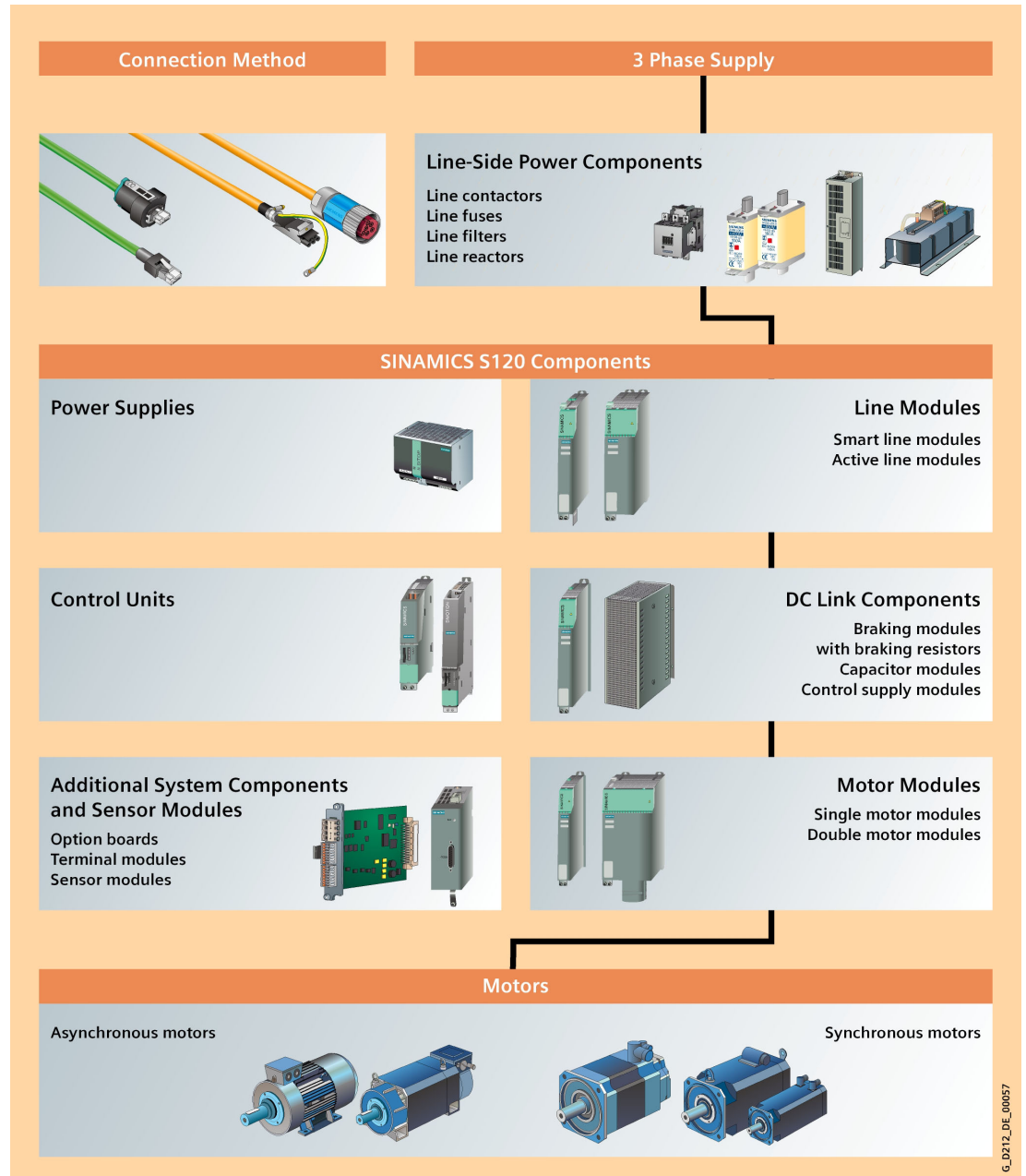


Figure 1-5 SINAMICS S120 component overview

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 all components of the SINAMICS S120 booksize drive system.

Electrical data	
Line connection voltage	3 AC 380 V to 480 V $\pm 10\%$ (-15% < 1 min)
Line frequency	47 – 63 Hz
Electronics power supply	24 V DC, -15/+20 %*
Radio interference suppression <ul style="list-style-type: none"> • Standard • With line filter 	No radio interference suppression Class A1 to EN 55011
Overtoltage category	Class III to EN 60 664-1

*If a motor holding brake is used, restricted tolerances may have to be taken into account.

Mechanical data	
Vibratory load <ul style="list-style-type: none"> • Transportation • Operation 	EN 60 721-3-2, class 2M3 EN 60 721-3-3, class 3M4
Shock load <ul style="list-style-type: none"> • Transportation • Operation 	EN 60 721-3-2, class 2M3 EN 60 721-3-3, class 3M4

Ambient conditions	
Degree of protection	IP 20 to EN 60 529
Protection class	Class I (with protective conductor system) and Class III (PELV) to EN 61 800-5-1
Type of cooling	Internal ventilator, power sections with increased air cooling by in-built fans
Permissible ambient and coolant temperature (air) during operation for line-side components, line modules and motor modules	0 °C to 40 °C without derating, >40 °C to +55 °C see derating characteristics
Permissible ambient and coolant temperature (air) during operation for control units, additional system components, DC link components and sensor modules	0 °C to +55 °C

Climatic ambient conditions <ul style="list-style-type: none"> • Storage • Transportation • Operation 	Class 1K3 to EN 60 721-3-1 Temperature -25 °C to +55 °C Class 2K4 to EN 60 721-3-3 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, \leq 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)
Environmental class/harmful chemical substances <ul style="list-style-type: none"> • Storage • Transportation • Operation 	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 <ul style="list-style-type: none"> • Storage • Transportation • Operation 	Class 1B1 to EN 60 721-3-1 Class 2B1 to EN 60 721-3-2 Class 3B1 to EN 60 721-3-3
Degree of contamination	2 to EN 60 664-1
Installation altitude	Up to 1,000 m above sea level without derating, >1,000 m to 5,000 m above sea level see derating characteristics

Approbation	
Certification	CE (low-voltage and EMC Directives), cULus (file nos.: E192450, E164110 and E70122)
Safety Integrated – safe standstill (SH) and safe brake control (SBC)	Safety Integrity Level (SIL) 2 to IEC 61508, control category 3 to EN 954-1

Modules	
Line modules in booksize format <ul style="list-style-type: none"> • Rated supply voltage 	3AC 380 V
Active line modules in booksize format <ul style="list-style-type: none"> • Rated pulse frequency 	8 kHz
Motor modules in booksize format <ul style="list-style-type: none"> • DC link connection voltage • Rated pulse frequency 	510 V DC to 750 V DC 4 kHz

Control Units

2.1 Introduction

Description

The control units of the SINAMICS S system are principally 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).

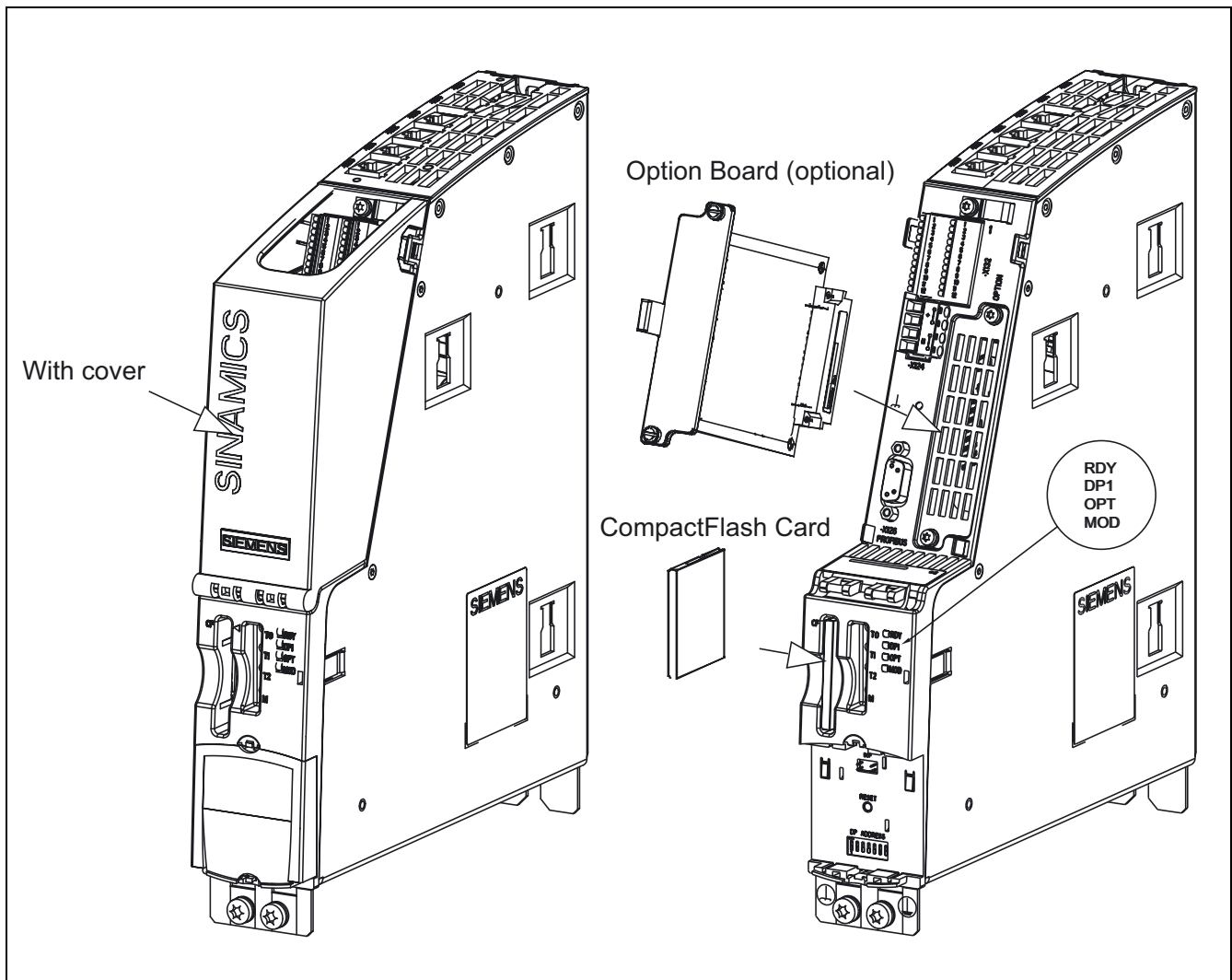


Figure 2-1 Overview of the control unit 320 (CU320)

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.

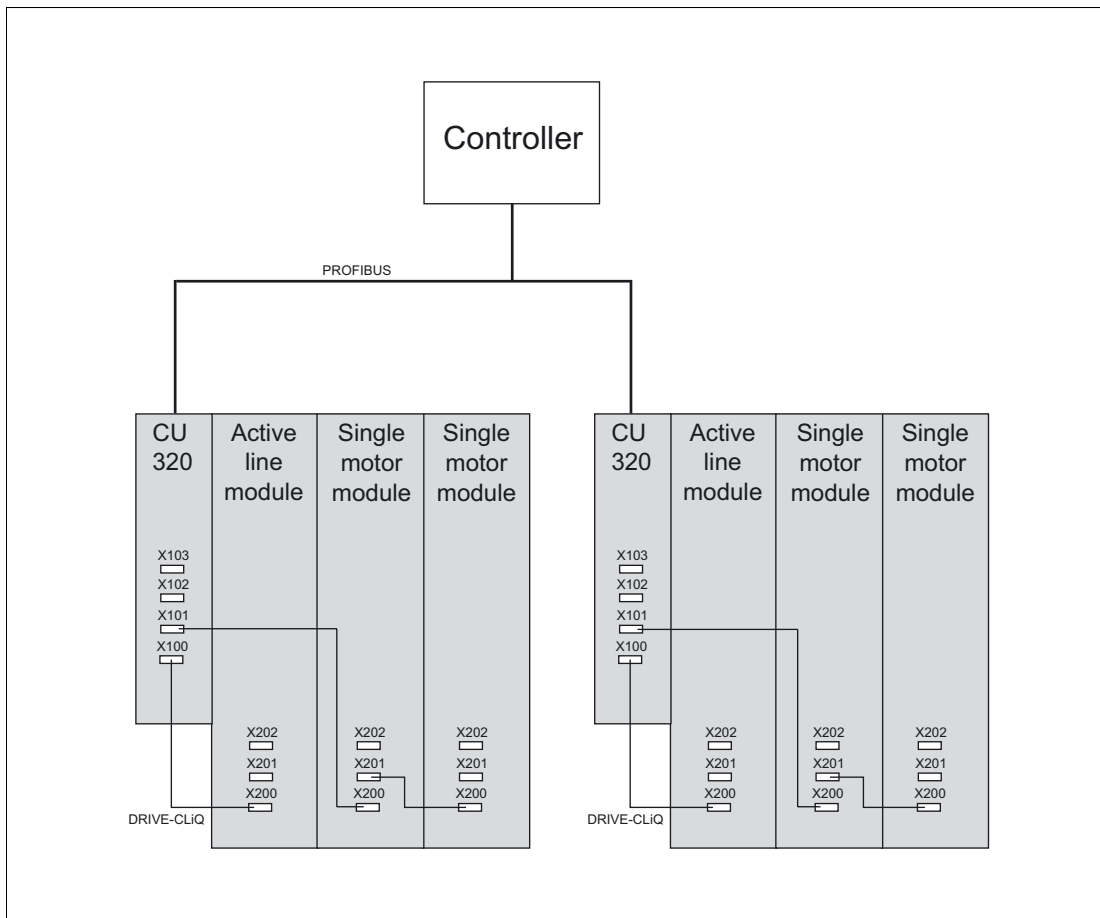


Figure 2-2 Sample configuration

2.2 Control Unit 320 (CU320)

2.2.1 Description

The 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. The unit protects itself from overheating by shutting down.

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

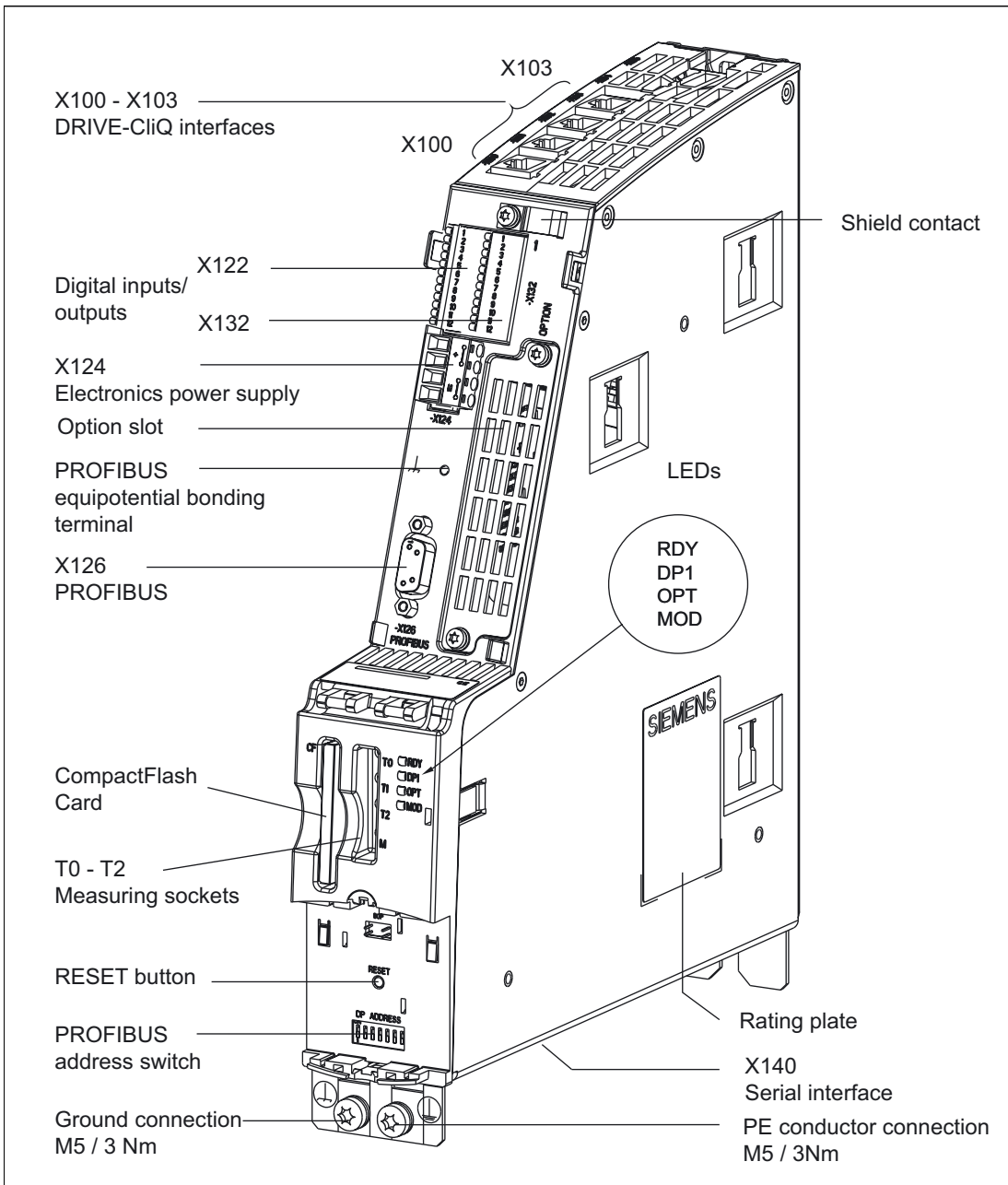


Figure 2-3 Interface description of the CU320 (covers removed)

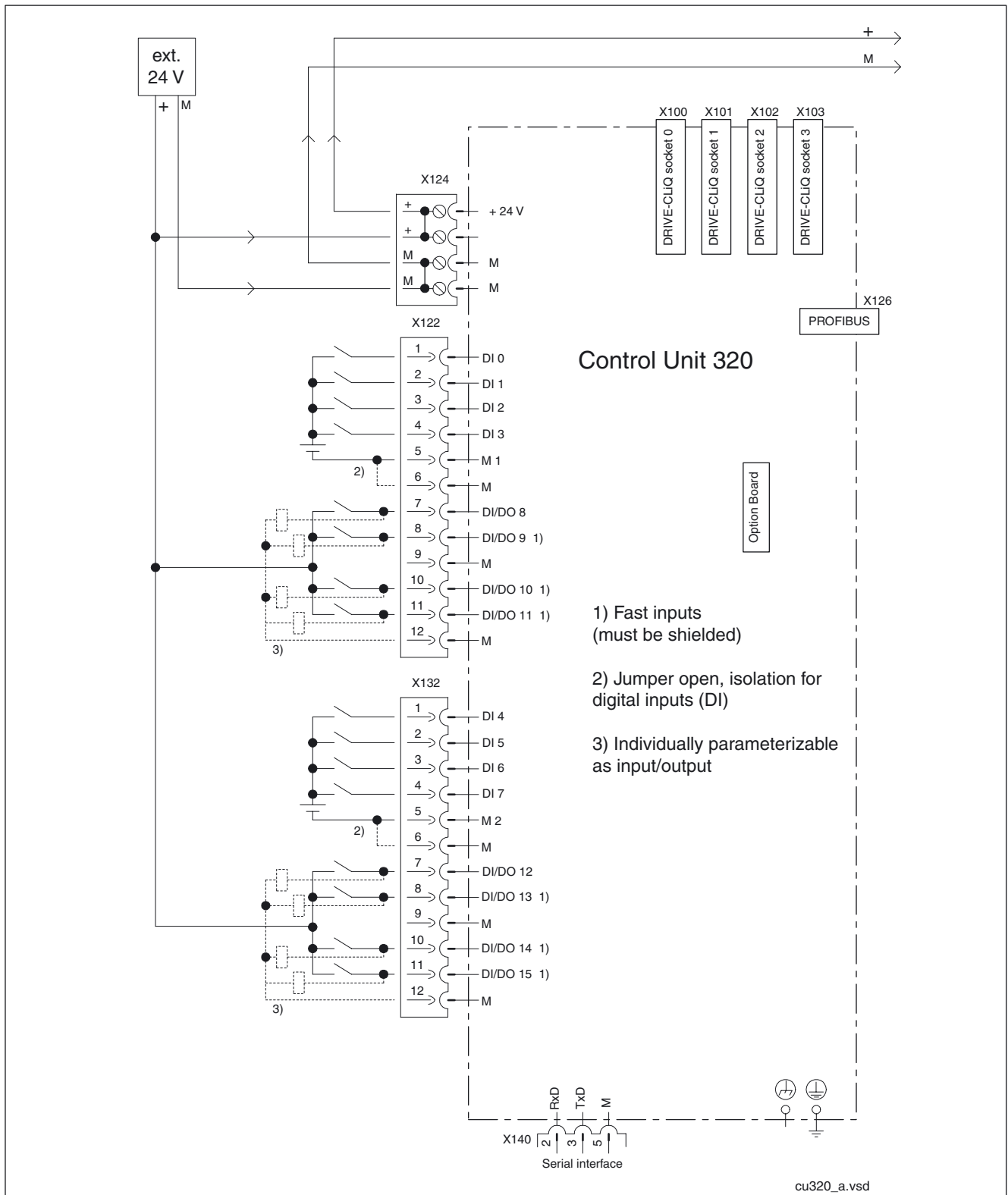
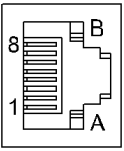


Figure 2-4 Example connection of CU320

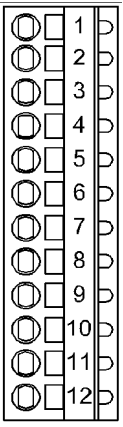
DRIVE-CLiQ interface X100 - X103

Table 2-2 DRIVE-CLiQ interface X100-X103

	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		

Digital inputs/outputs X122

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
	2	DI 1	
	3	DI 2	
	4	DI 3	
	5	M1	Signal propagation times: L → H: Approx. 50 μs H → L: Approx. 100 μs
	6	M (GND)	
	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: Max. 500 mA Continued-short-circuit-proof
	8	DI/DO 9	
	9	M (GND)	
	10	DI/DO 10	
	11	DI/DO 11	
	12	M (GND)	
Max. connectable cross-section: 0.5mm ² Type: Spring-loaded terminal 1 (see Appendix A)			

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 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 ground reference of the digital inputs, or

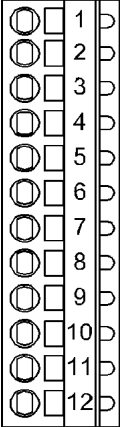
a jumper to terminal M (**Notice! This removes isolation for these digital inputs**).

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.

Digital inputs/outputs X132

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
	2	DI 5	
	3	DI 6	
	4	DI 7	
	5	M2	Signal propagation times: L → H: 50 μs H → L: 100 μs
	6	M (GND)	
	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" 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: Max. 500 mA Continued-short-circuit-proof
	8	DI/DO 13	
	9	M (GND)	
	10	DI/DO 14	
	11	DI/DO 15	
	12	M (GND)	
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:

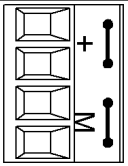
Connect the reference mass of the digital inputs, or a jumper to terminal M (**Notice! This removes isolation for these digital inputs**).

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.

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
	+	NC	
	M (GND)	Electronic ground	
	M (GND)	Electronic ground	
Max. connectable cross-section: 2.5 mm ² Type: Screw terminal 2 (see Appendix A)			

Note

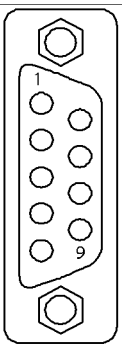
The two “+” and “M” terminals are jumpered in the connector and not in the unit. This ensures the supply voltage is looped through.

The total current consumption is the sum of the no-load current consumption plus the DRIVE-CLiQ, digital output and PROFIBUS teleservice current requirements.

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	SHIELD	Ground connection	
	2	M24_SERV	Power supply for teleservice, ground	0 V
	3	RxD/TxD-P	Receive/transmit data P (B/B')	RS485
	4	CNTR-P	Control signal	TTL
	5	DGND	PROFIBUS data reference potential (C/C')	
	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/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 150mA.

Terminating resistors

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

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

PROFIBUS address switches

Table 2-7 PROFIBUS address switches

Technical specifications	Switch	Significance																												
Significance: <table style="display: inline-table; vertical-align: middle; margin-left: 10px;"> <tr> <td style="text-align: center;">2^0</td> <td style="text-align: center;">2^1</td> <td style="text-align: center;">2^2</td> <td style="text-align: center;">2^3</td> <td style="text-align: center;">2^4</td> <td style="text-align: center;">2^5</td> <td style="text-align: center;">2^6</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">4</td> <td style="text-align: center;">8</td> <td style="text-align: center;">16</td> <td style="text-align: center;">32</td> <td style="text-align: center;">64</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">S1</td> <td style="text-align: center;">S2</td> <td style="text-align: center;">S3</td> <td style="text-align: center;">S4</td> <td style="text-align: center;">S5</td> <td style="text-align: center;">S6</td> <td style="text-align: center;">S7</td> </tr> </table> ON OFF Example: 1 + 4 + 32 = 37 PROFIBUS address = 37	2^0	2^1	2^2	2^3	2^4	2^5	2^6	1	2	4	8	16	32	64	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	S1	S2	S3	S4	S5	S6	S7	S1	$2^0 = 1$
	2^0	2^1	2^2	2^3	2^4	2^5	2^6																							
	1	2	4	8	16	32	64																							
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>																							
	S1	S2	S3	S4	S5	S6	S7																							
	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 factory setting for the PROFIBUS address switch (0 or 127) must be set via parameters.
The address switch is behind the blanking plate. The blanking plate is supplied.

Setting the PROFIBUS address

The following reference contains information about setting the PROFIBUS address:

Reference: /IH1/ SINAMICS S120 Installation and Start-Up Manual

Serial interface (RS232) X140

Reserved

Measurement sockets T0, T1, and T2

Table 2-8 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
T1	Measurement socket 1	
T2	Measurement socket 2	
M (GND)	Ground	The reference potential is terminal M

The measurement sockets are only suitable for bunch pin plugs with a diameter of 2 mm.

Note

The measurement sockets are only for support during start-up.

Slot for the CompactFlash Card

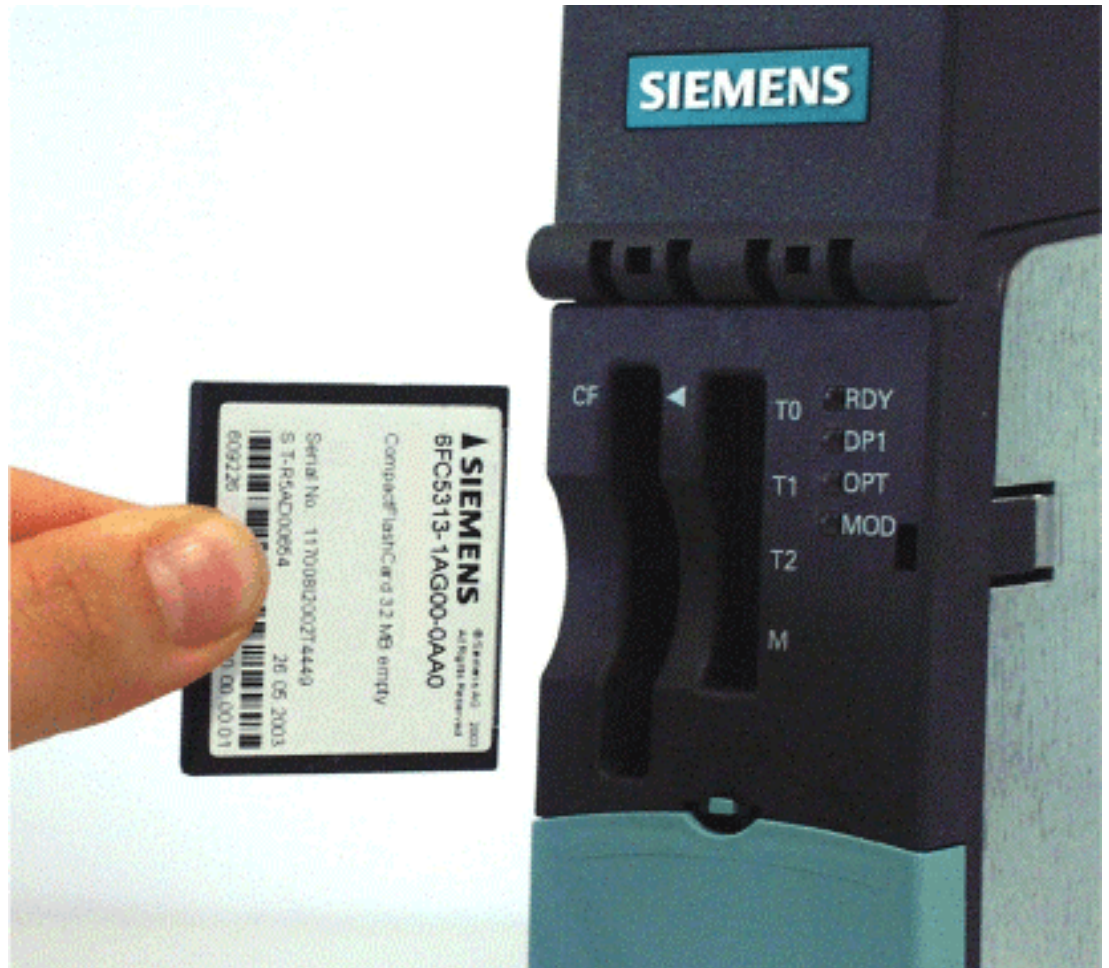


Figure 2-5 CompactFlash Card slot

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, otherwise the CompactFlash Card (together with the parameters, firmware, licenses, etc.) will be lost.

Description of the LEDs on the control unit

Table 2-9 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: <ul style="list-style-type: none"> 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 information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S120, Installation and Start-Up Manual

RESET button

The RESET button is located behind the blanking plate.

Function of the RESET button

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

Reference: /IH1/ SINAMICS S, Installation and Start-Up Manual

2.2.4 Dimension drawing

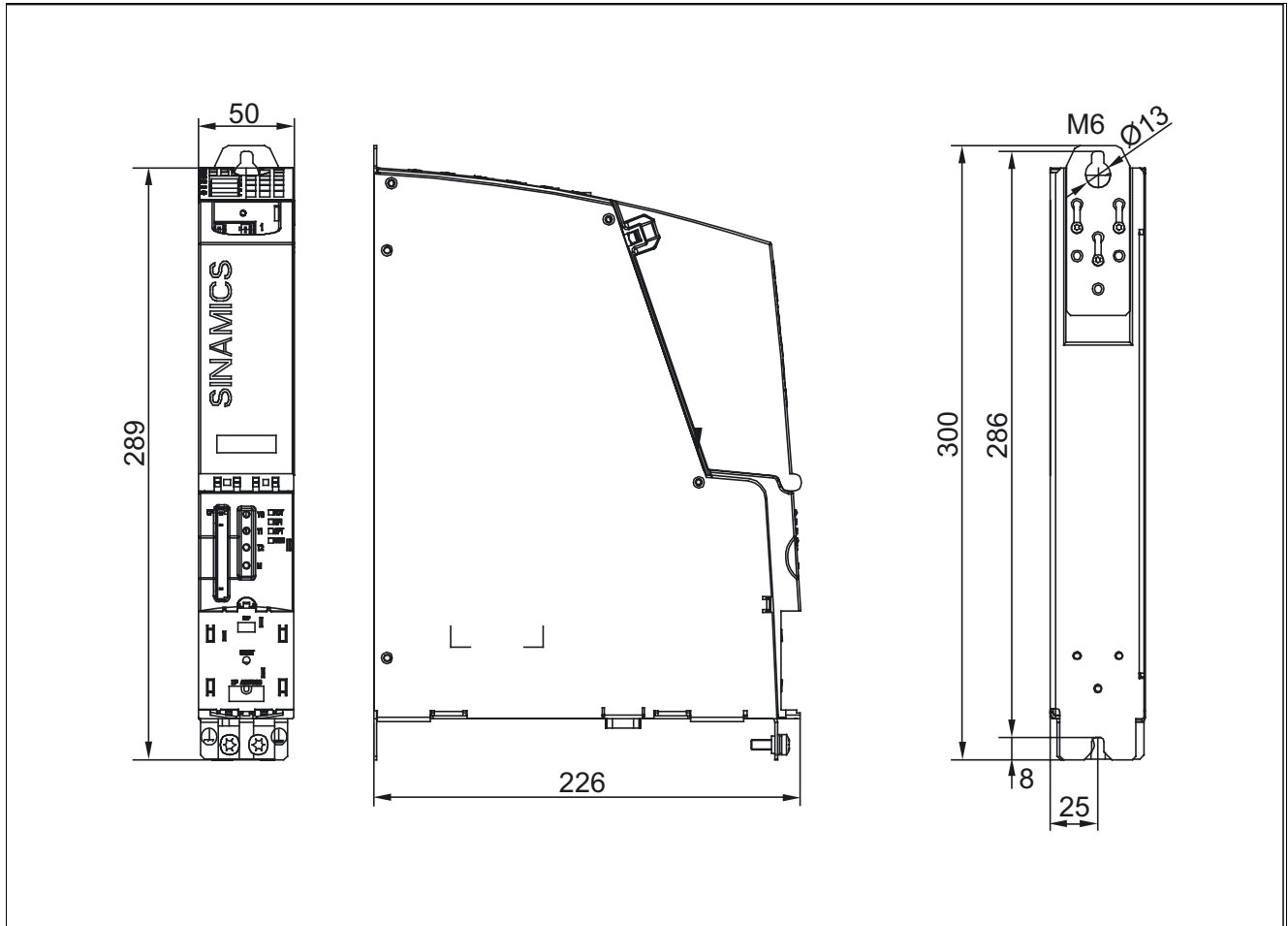


Figure 2-6 Dimension drawing of the CU320

2.2.5 Installation

Mounting the CU320 directly on a line module booksize

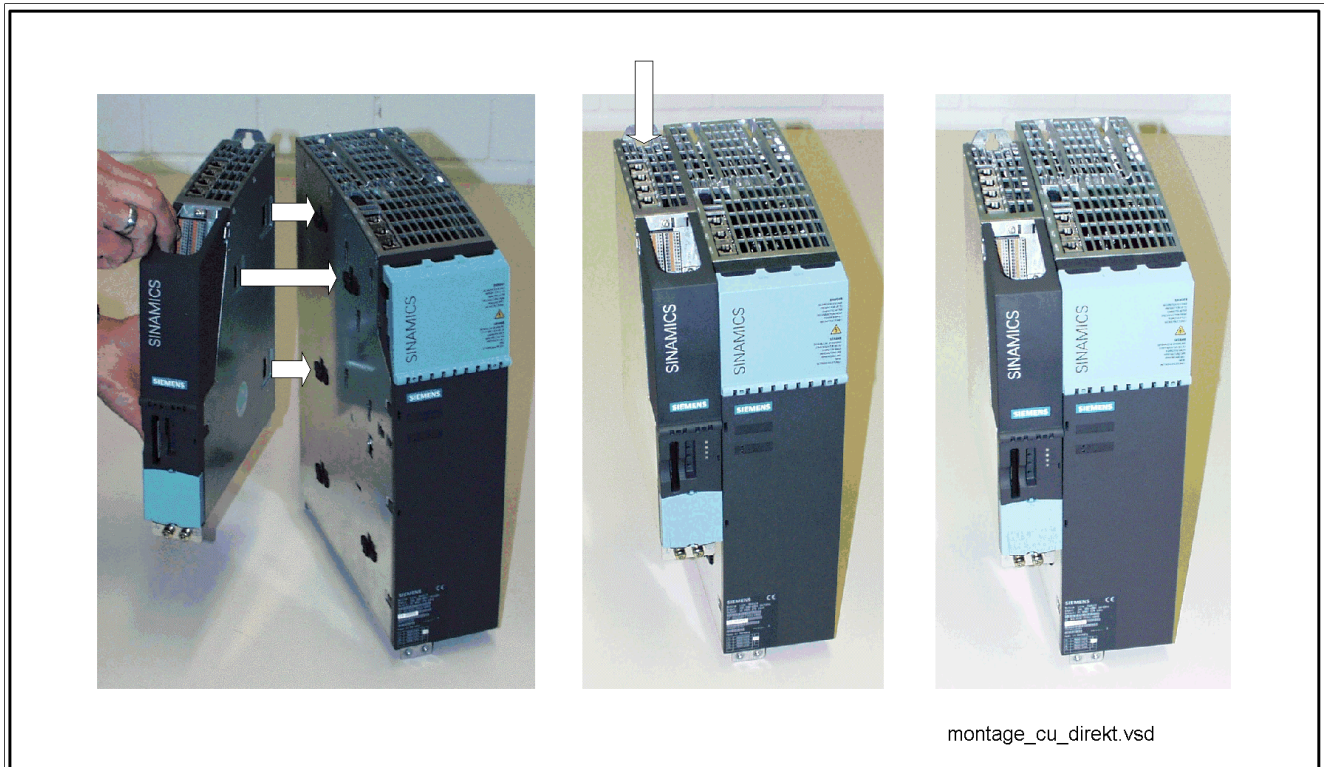


Figure 2-7 Mounting the CU320 directly on a line module booksize

Installing the CU320 directly on a mounting surface

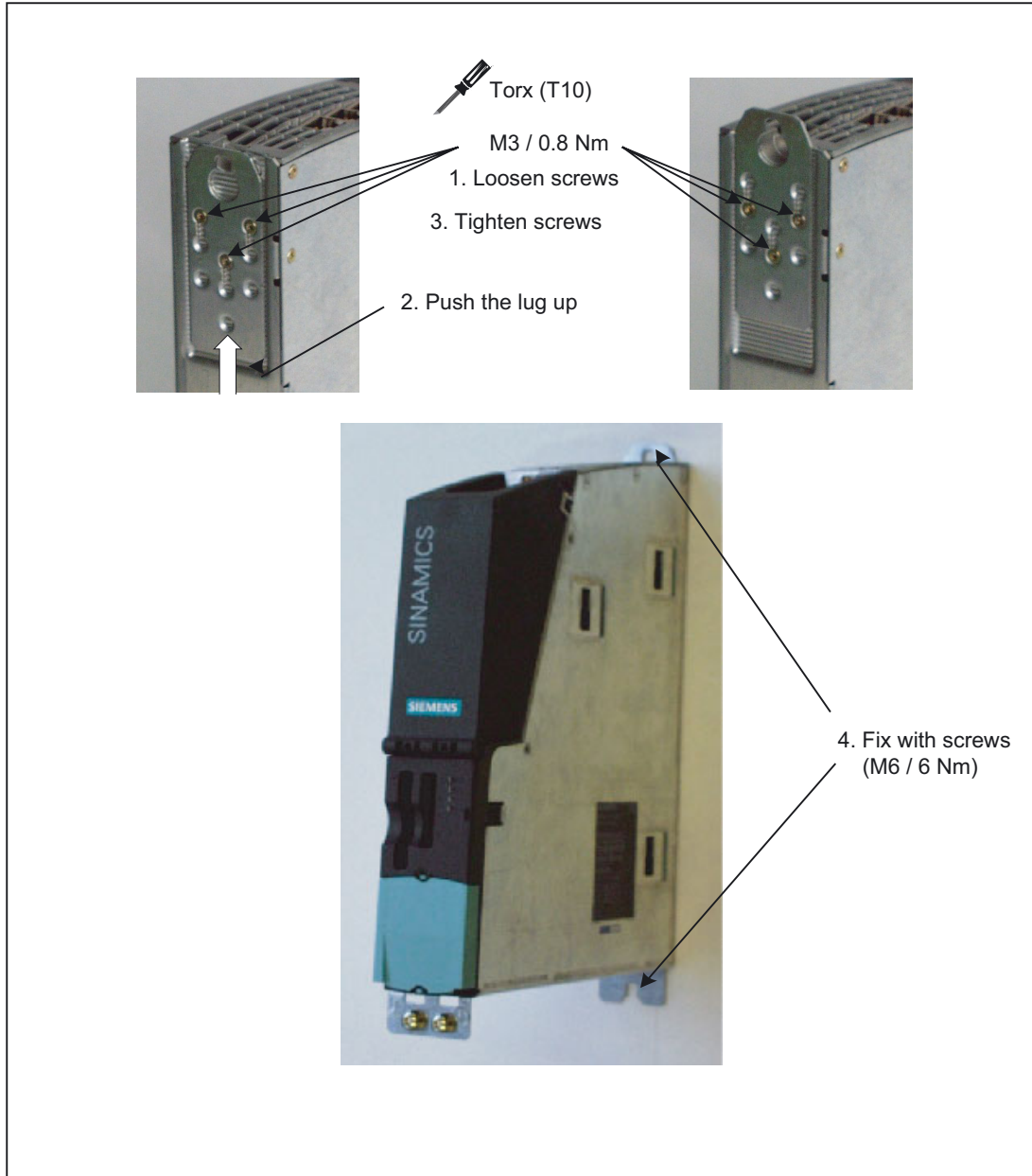


Figure 2-8 Installing the CU320 directly on a mounting surface

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.

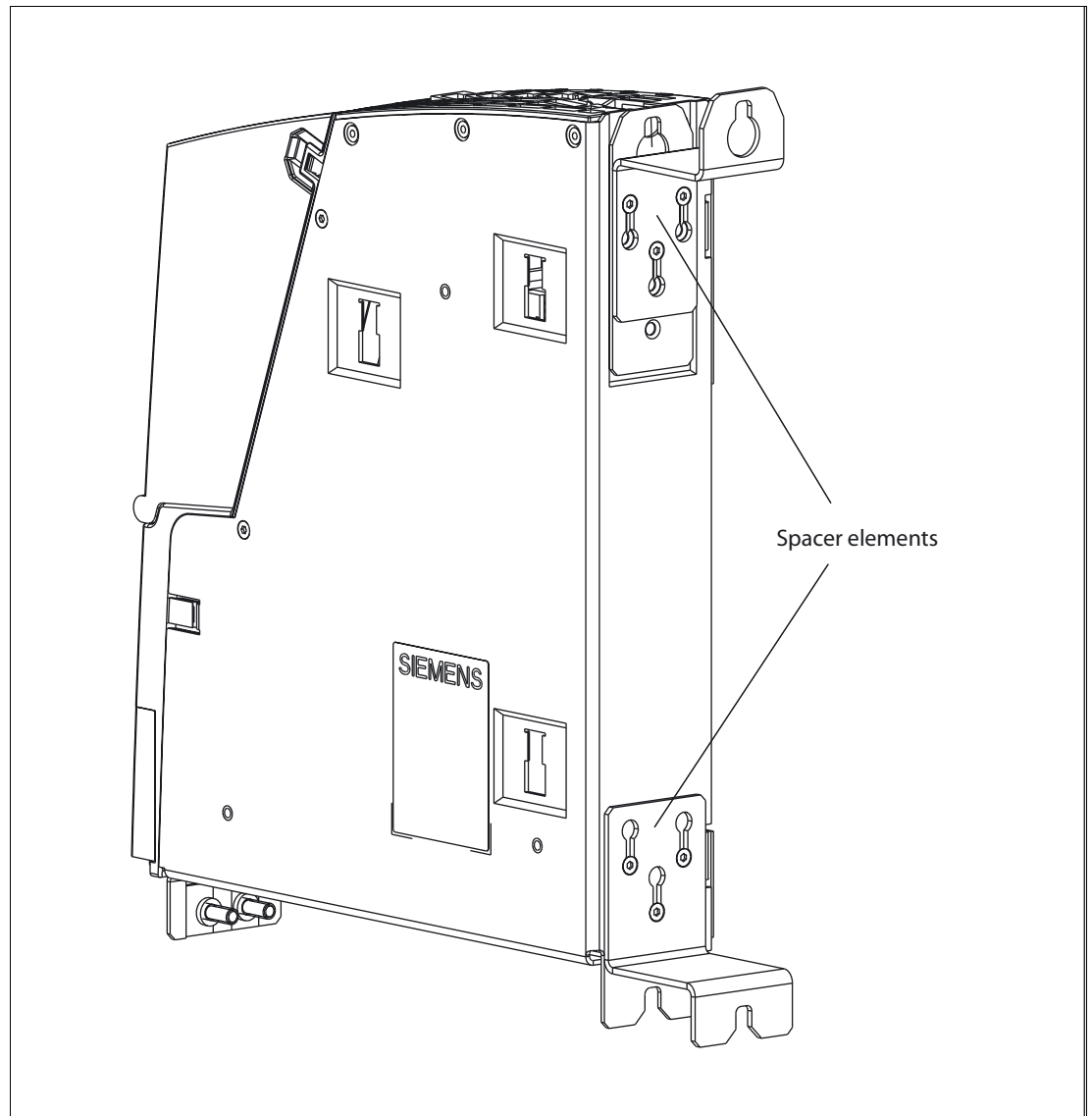


Figure 2-9 Installing the CU320 on a mounting surface using spacer elements

Removing/opening the protective cover of the CU320

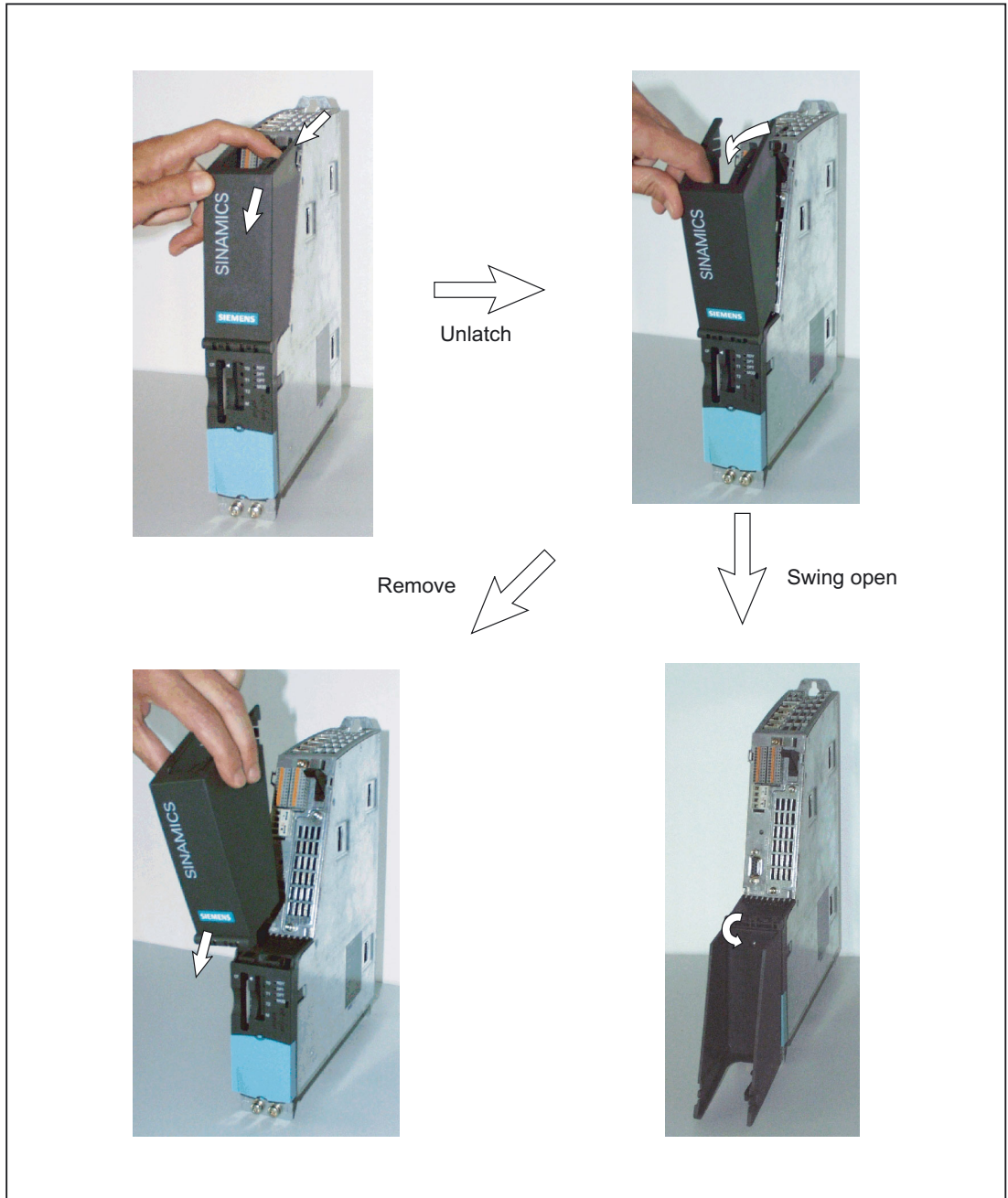


Figure 2-10 Removing/opening the protective cover of the CU320

2.2.6 Technical specifications

Table 2-10 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
PE/ground connection	On housing with M5/3Nm screw	
Weight	kg	1,5

Additional System Components

3.1 Communication Board CAN (CBC10)

3.1.1 Description

The 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

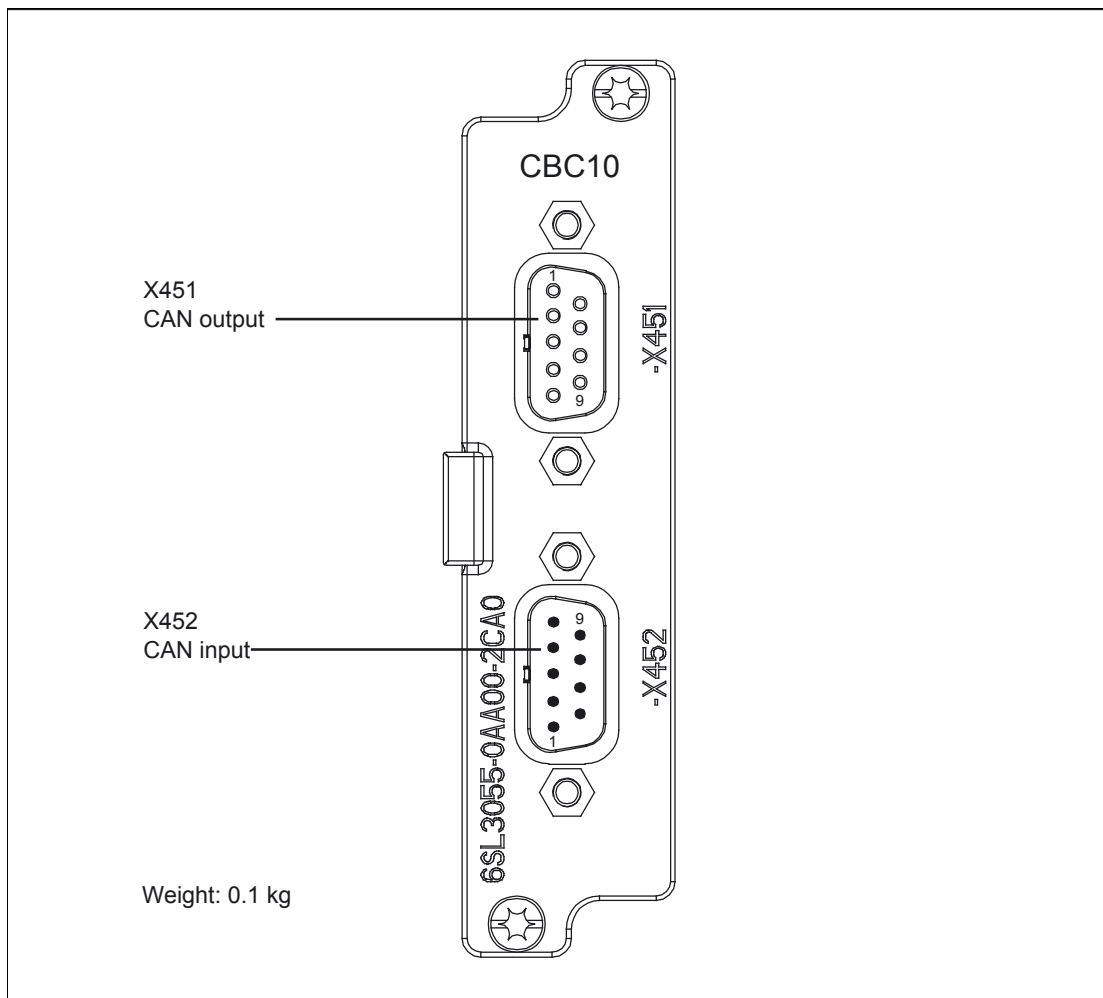
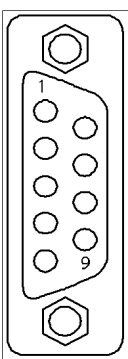


Figure 3-1 Interface description of the CBC10

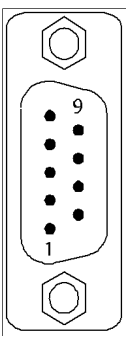
CAN bus interface X451

Table 3-1 CAN bus interface X451

	Pin	Designation	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			

CAN bus interface X452

Table 3-2 CAN bus interface X452

	Pin	Designation	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 Communication Board CAN (CBC10)

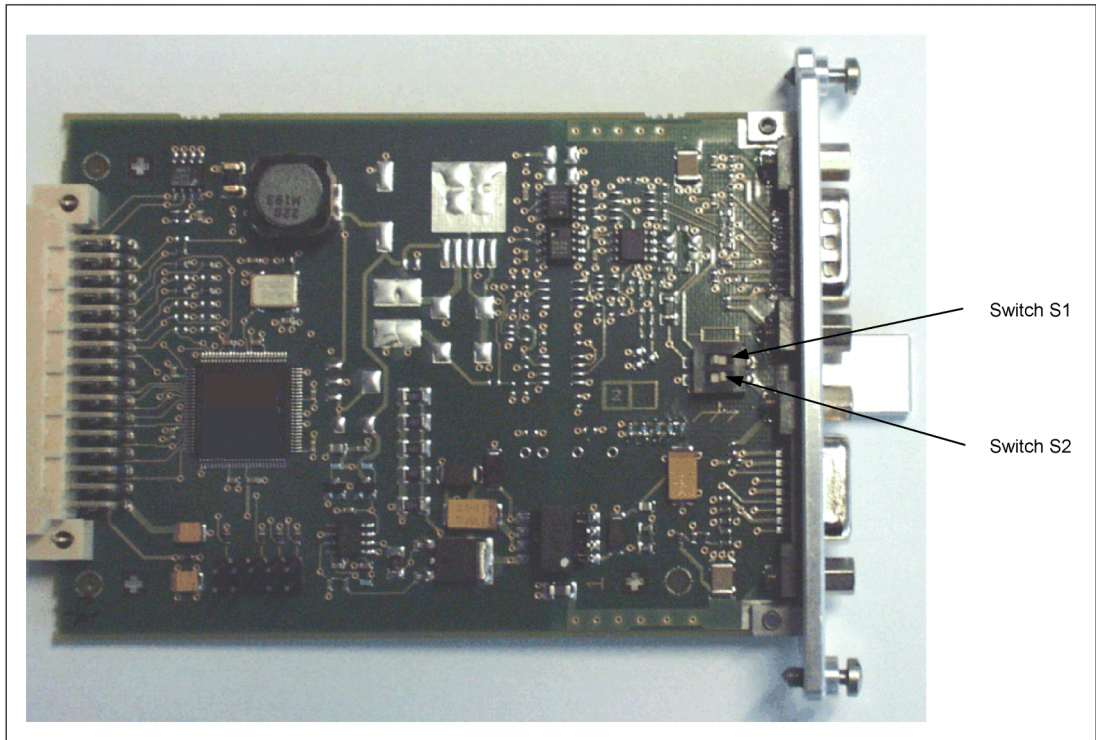




Figure 3-2 Switch S1/S2

Table 3-3 2-pin SMD DIL switch

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

3.1.4 Installation

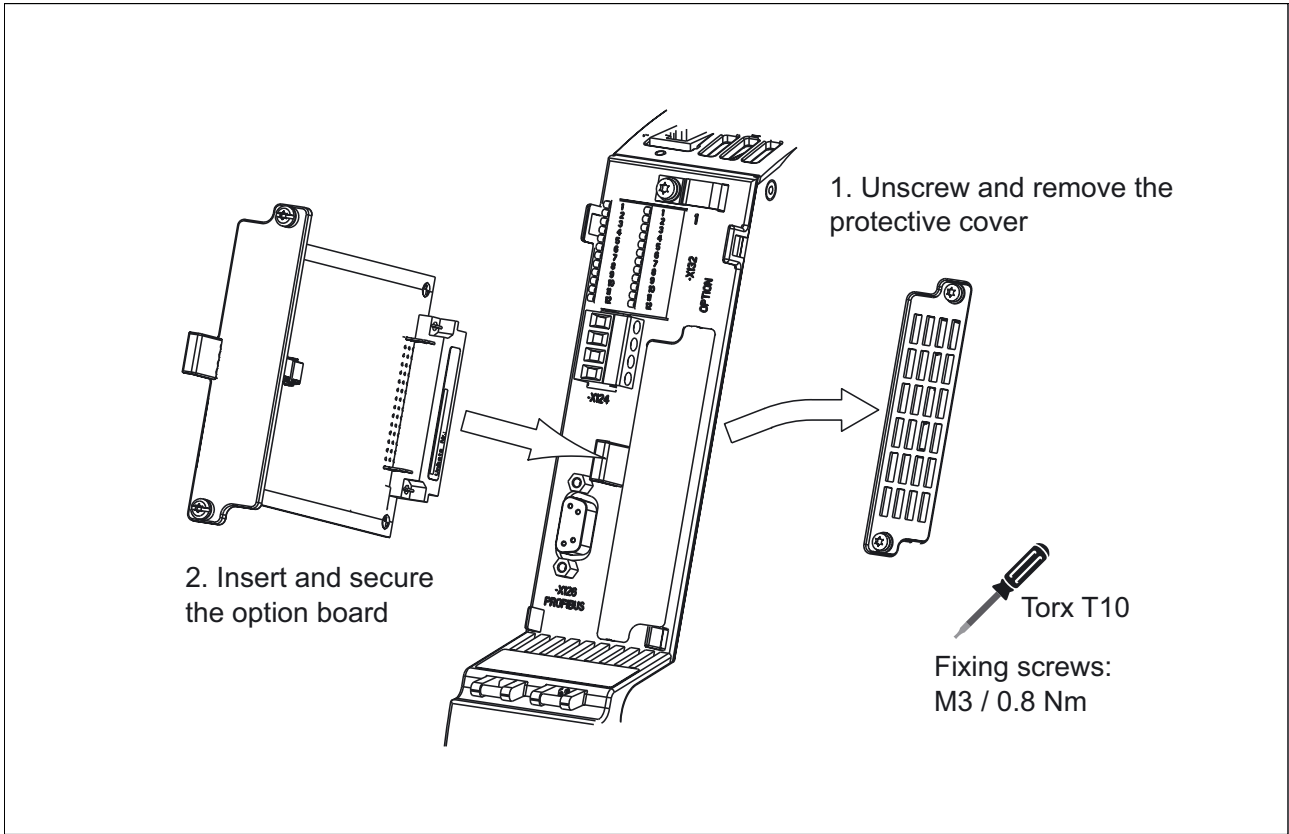


Figure 3-3 Installation CBC10

3.1.5 Technical specifications

Table 3-4 Technical specifications

Communication Board CAN (CBC10)		
Max. current requirements (at 24 V DC)	A _{DC}	0.1
Weight, approx.	kg	0.1

3.2 Option Board: Terminal Board 30 (TB30)

3.2.1 Description

The 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

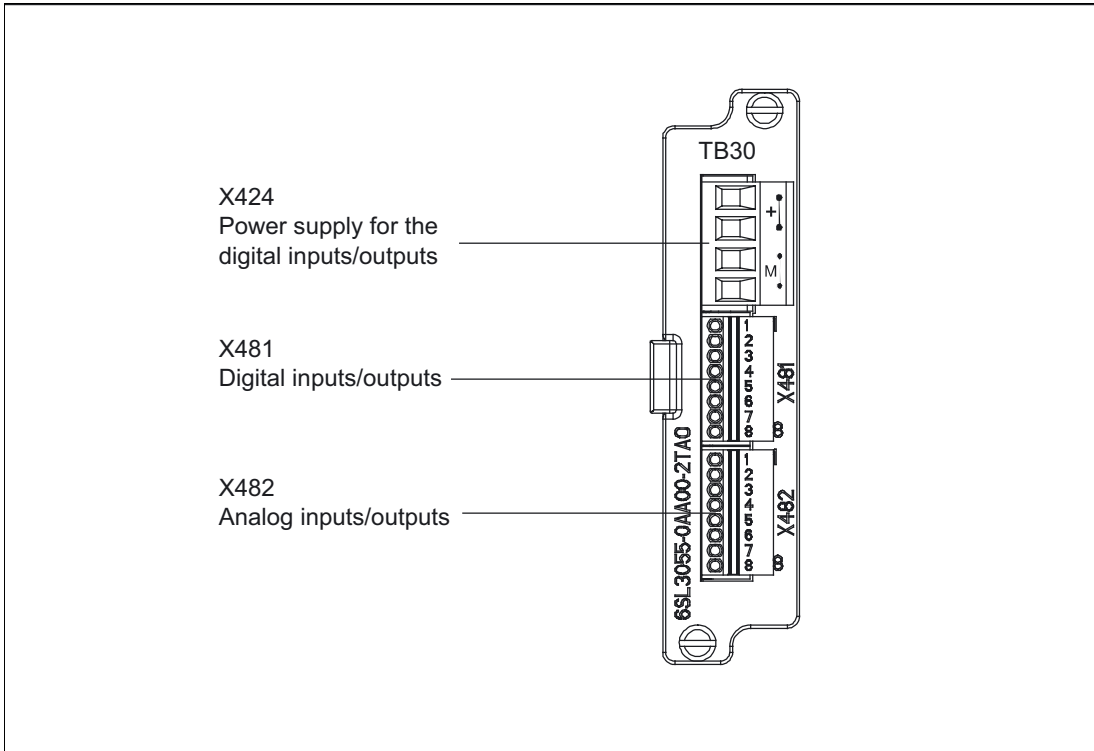


Figure 3-4 Interface description of the TB30

3.2 Option Board: Terminal Board 30 (TB30)

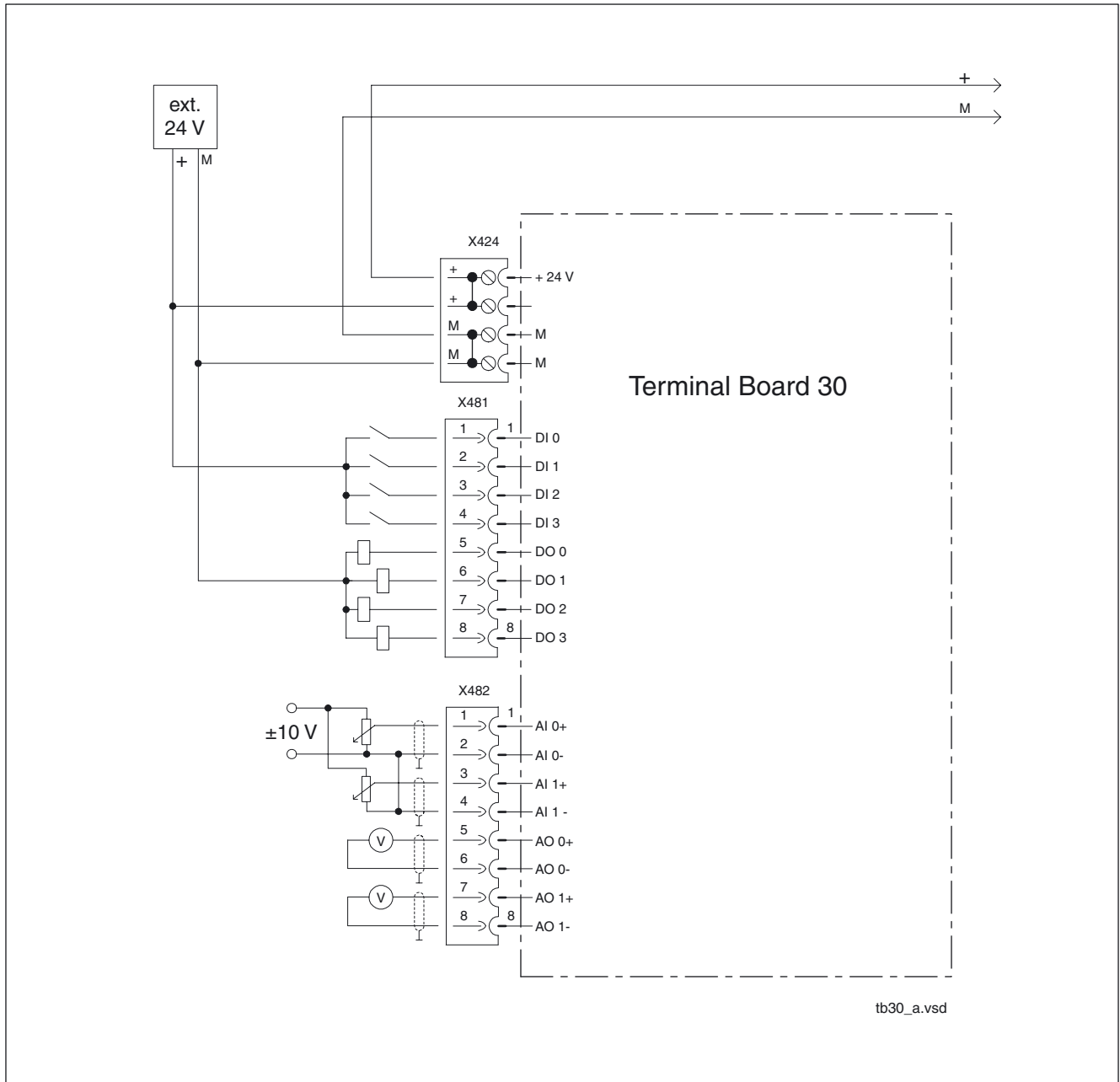
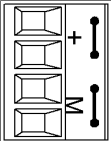


Figure 3-5 Example connection of TB30

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)
	+	Reserved, do not use	
	M (GND)	Ground	Max. current via jumper in connector: 20 A at 55 °C
	M (GND)	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

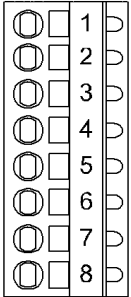
The power supply of the digital inputs/outputs and the electronics power supply of the control unit are isolated.

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.

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
	6	DO 1	Max. load current per output: 500 mA
	7	DO 2	Ground reference: X424.M
	8	DO 3	Continued-short-circuit-proof
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".

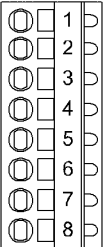
The power supply and the digital inputs/outputs are isolated from the control unit.

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.

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

Caution

A current of 40 mA must not be exceeded during current measurement.

The common-mode range must not be infringed, that is, 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.

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, Installation and Start-Up Manual

3.2.4 Installation

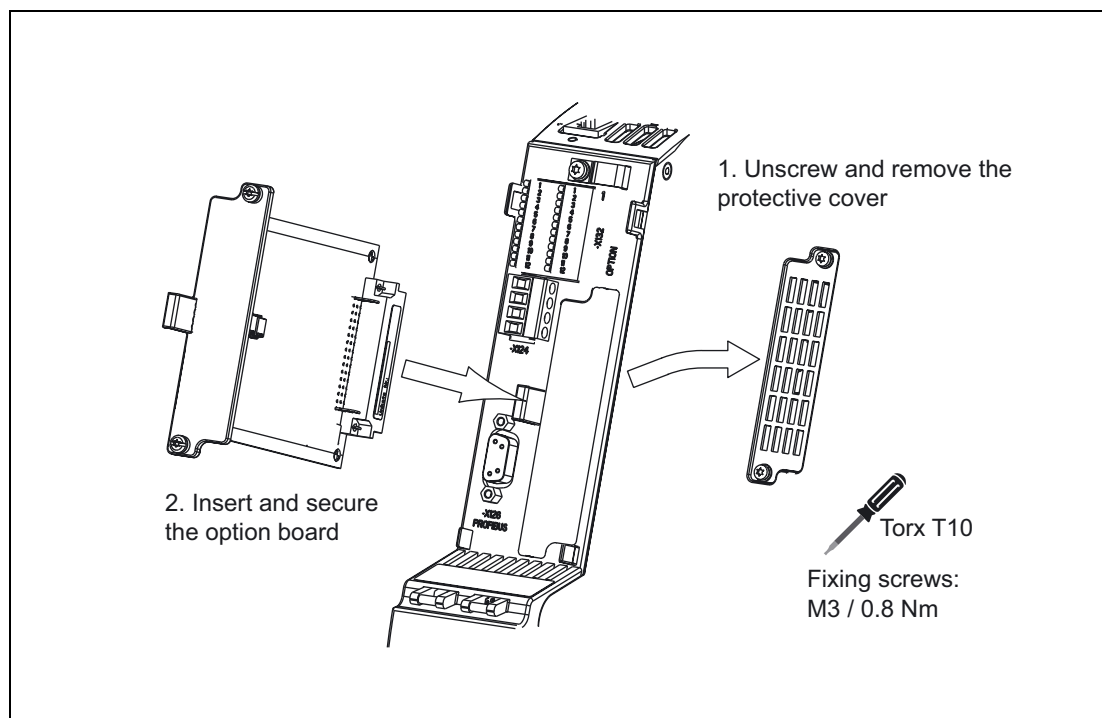


Figure 3-6 Installation TB30

3.2.5 Electrical connection

Shield connection of the TB30 on the control unit

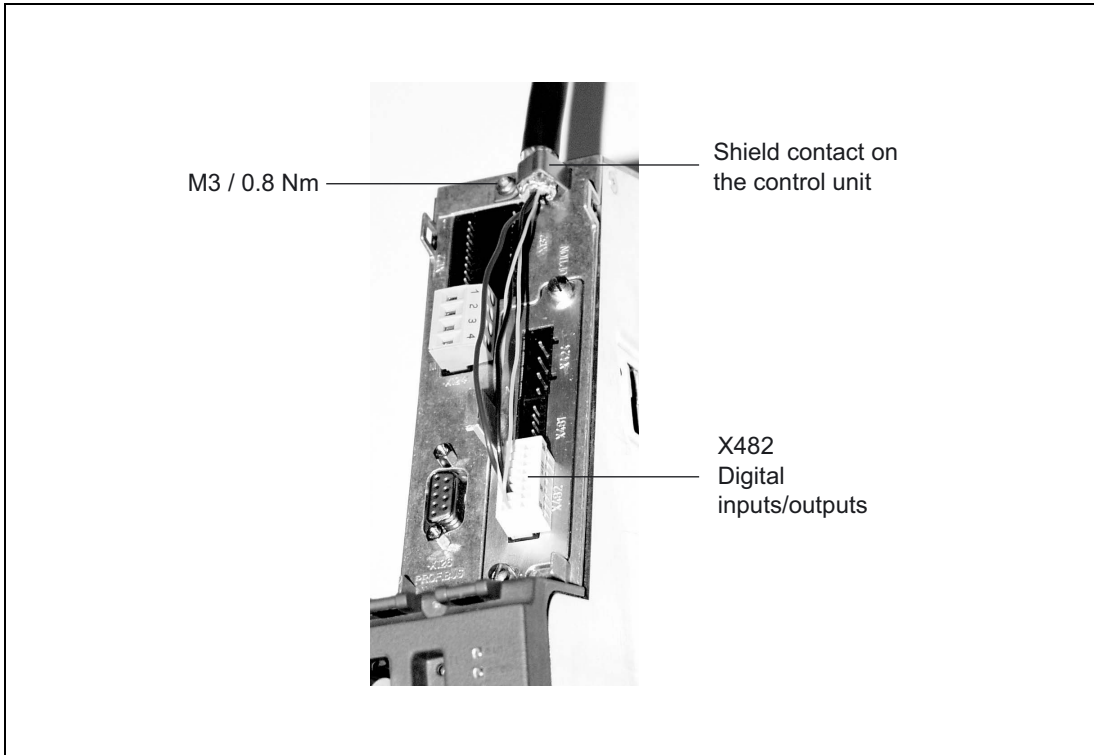


Figure 3-7 Shield contact for the TB30

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
PE/ground connection	On housing with M5/3Nm screw	
Weight	kg	0.1

3.3 Terminal Module 31 (TM31)

3.3.1 Description

The 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 3-10 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

3.3.2 Safety information



Danger

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

3.3.3 Interface description

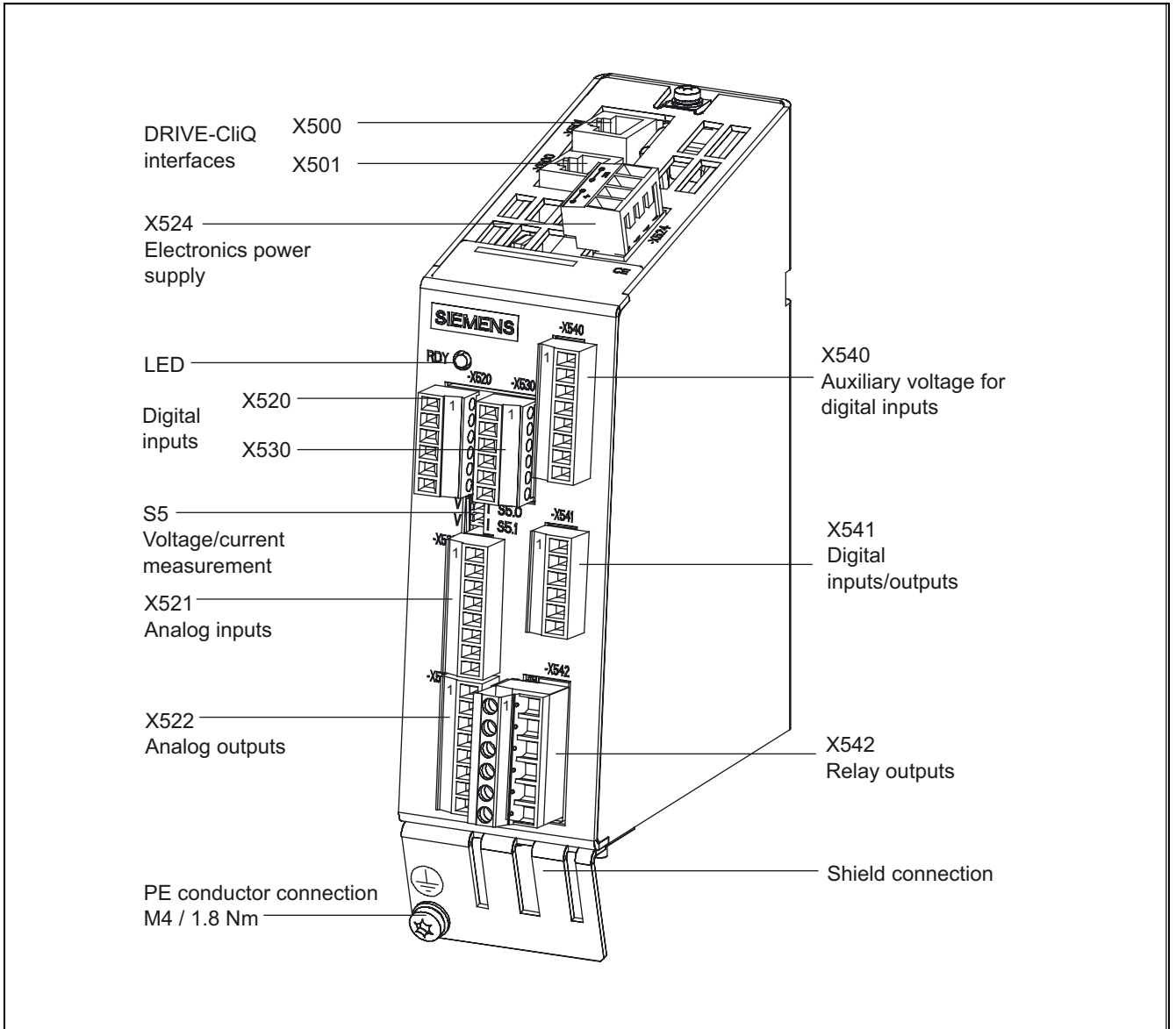


Figure 3-8 Interface description TM31

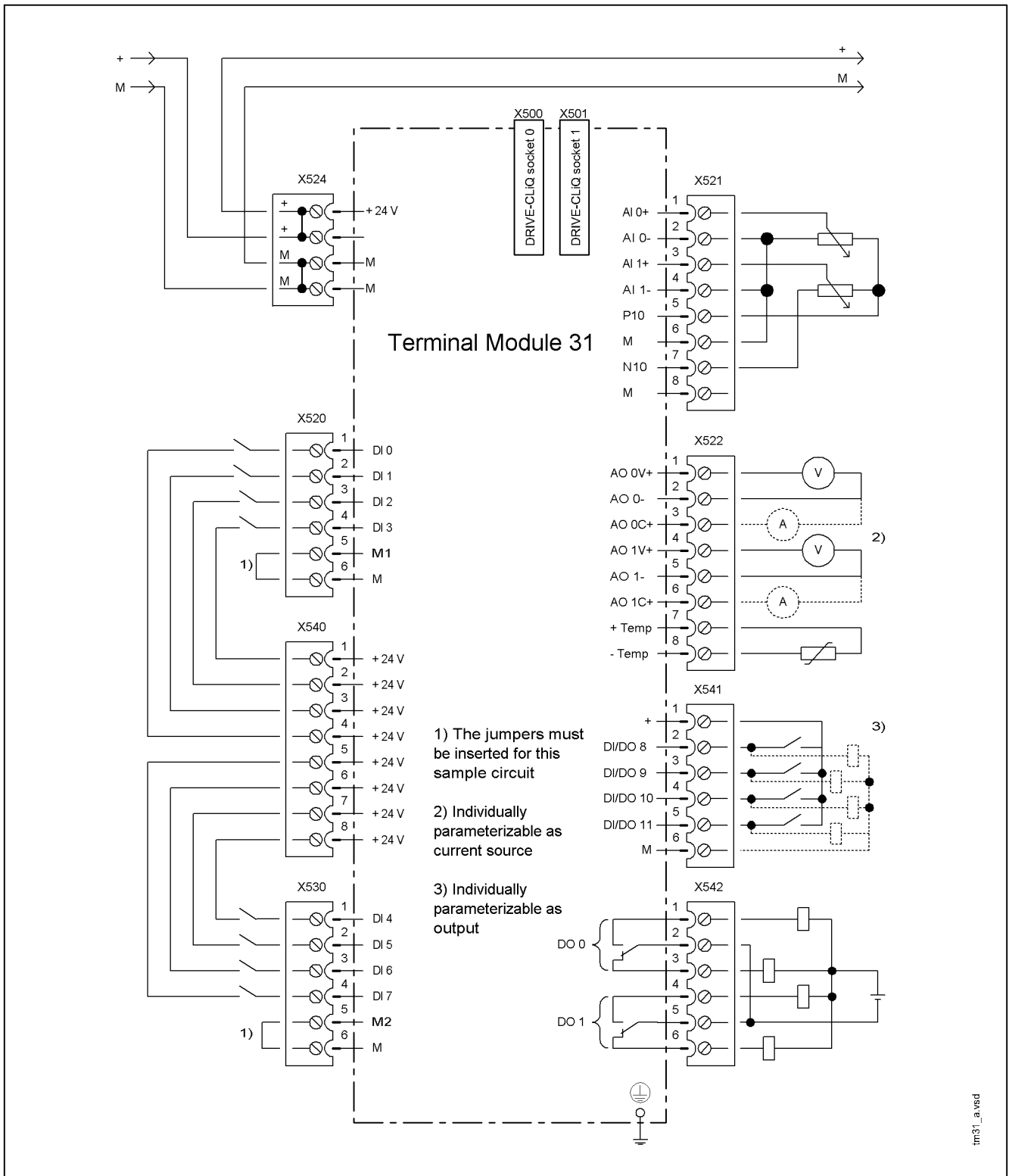
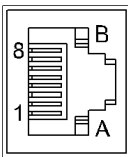


Figure 3-9 Example connection of TM31

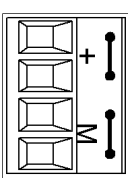
X500 and X501 DRIVE-CLiQ interface

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		

Electronics power supply X524

Table 3-12 Terminals for the electronics power supply

	Terminal	Designation	Technical specifications
	+	Electronics power supply	Voltage: 24 V DC (20.4 V – 28.8 V) Current consumption: Max. 0.5 A
	+	Reserved, do not use	
	M (GND)	Electronic ground	Max. current via jumper in connector: 20 A at 55 °C
	M (GND)	Electronic ground	
Max. connectable cross-section: 2.5 mm ² Type: Screw terminal 2 (see Appendix A)			

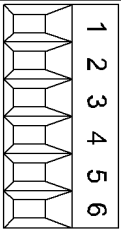
Note

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

The total current consumption is the sum of the no-load current consumption plus the DRIVE-CLiQ socket and the digital output current requirements.

Digital inputs X520

Table 3-13 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 (GND)	
Max. connectable cross-section: 1.5 mm ² Type: Screw terminal 1 (see Appendix A)			

1) DI: Digital input; M: Electronic ground; M1: Ground reference

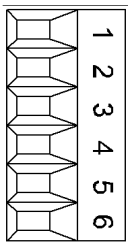
Note

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

- 1) The ground reference of the digital inputs, or
- 2) A jumper to terminal M (**Notice! This removes isolation for these digital inputs**).

Digital inputs X530

Table 3-14 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 (GND)	
Max. connectable cross-section: 1.5 mm ² Type: Screw terminal 1 (see Appendix A)			

1) DI: Digital input; M: Electronic ground; M2: Ground reference

Note

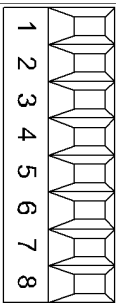
An open input is interpreted as "low".

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

- 1) The ground reference of the digital inputs, or
- 2) A jumper to terminal M (**Notice! This removes isolation for these digital inputs**).

Auxiliary voltage for the digital inputs X540

Table 3-15 Screw terminal X540

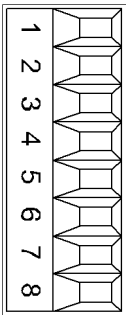
	Terminal	Designation	Technical specifications
	1	+24 V	Voltage: +24 V DC Max. total load current: 150 mA
	2	+24 V	
	3	+24 V	
	4	+24 V	
	5	+24 V	
	6	+24 V	
	7	+24 V	
	8	+24 V	
Max. connectable cross-section: 1.5 mm ²			
Type: Screw terminal 1 (see Appendix A)			

Note

This voltage supply is only for powering the digital inputs.

Analog inputs X521

Table 3-16 Terminal block X521

	Terminal	Name ¹⁾	Technical specifications
	1	AI 0+	You can set the following input signals using parameters: Voltage: -10 V to 10 V; $R_i = 100\text{ k}\Omega$ Current 1: 4 mA to 20 mA; $R_i = 250\ \Omega$ Current 2: -20 mA to 20 mA; $R_i = 250\ \Omega$ Current 3: 0 mA to 20 mA; $R_i = 250\ \Omega$ 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 (GND)	
	7	N10	
	8	M (GND)	
Max. connectable cross-section: 1.5 mm ² 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 exceeded during current measurement.

The common-mode range must not be infringed, that is, 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.

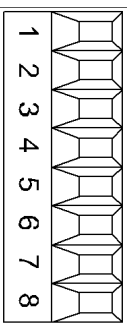
S5 current/voltage changeover switch for analog inputs

Table 3-17 Current/voltage selector S5

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

Analog outputs/temperature sensor connection X522

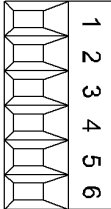
Table 3-18 Terminal block X522

	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)
	2	AO 0-	
	3	AO 0C+	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: 4 mA to 20 mA (max. load resistance ≤ 500 Ω) Resolution: 11 bits + sign Continued-short-circuit-proof
	4	AO 1V+	
	5	AO 1-	
	6	AO 1C+	Temperature sensor connection KTY84-1C130/PTC
	7	+ Temp	
		8	- Temp
Max. connectable cross-section: 1.5 mm ² Type: Screw terminal 1 (see Appendix A)			

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

Bidirectional digital inputs/outputs X541

Table 3-19 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
	2	DI/DO 8	
	3	DI/DO 9	
	4	DI/DO 10	
	5	DI/DO 11	
	6	M (GND)	As output: Voltage: 24 V DC Max. load current per output: 100 mA Max. total current of outputs: 400 mA Continued-short-circuit-proof
Max. connectable cross-section: 1.5 mm ² 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

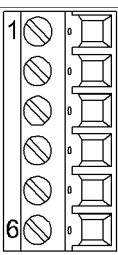
If a momentary interruption in the voltage occurs in the 24 V supply, the digital outputs will be deactivated until the interruption has been rectified.

Notice

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

Relay outputs X542

Table 3-20 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} , 30V _{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
	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

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

Table 3-21 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	The firmware is being downloaded. Component recognition via LED is activated (p0154).

Cause and rectification of faults

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

Reference: /IH1/ SINAMICS S, Installation and Start-Up Manual

3.3.4 Dimension drawing

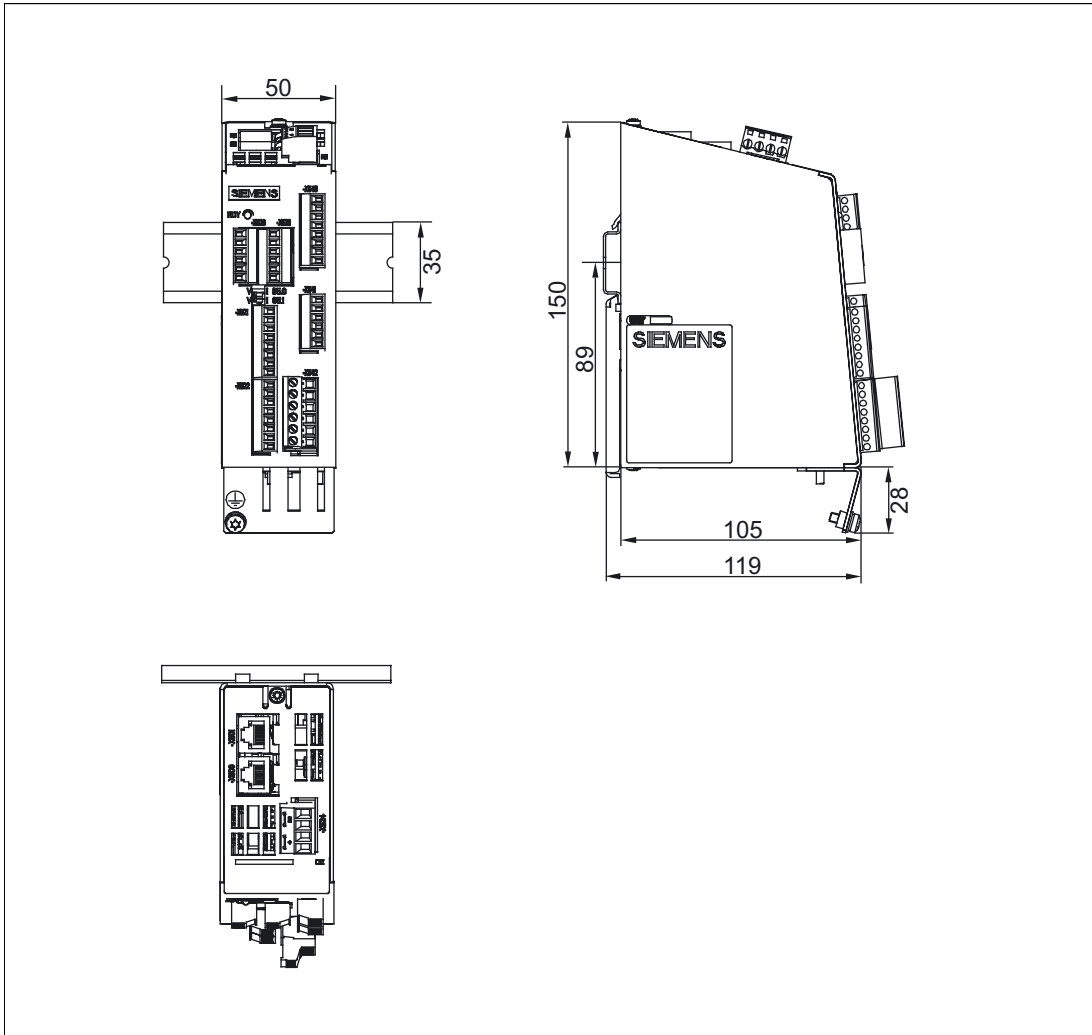


Figure 3-10 Dimension drawing of the TM31

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

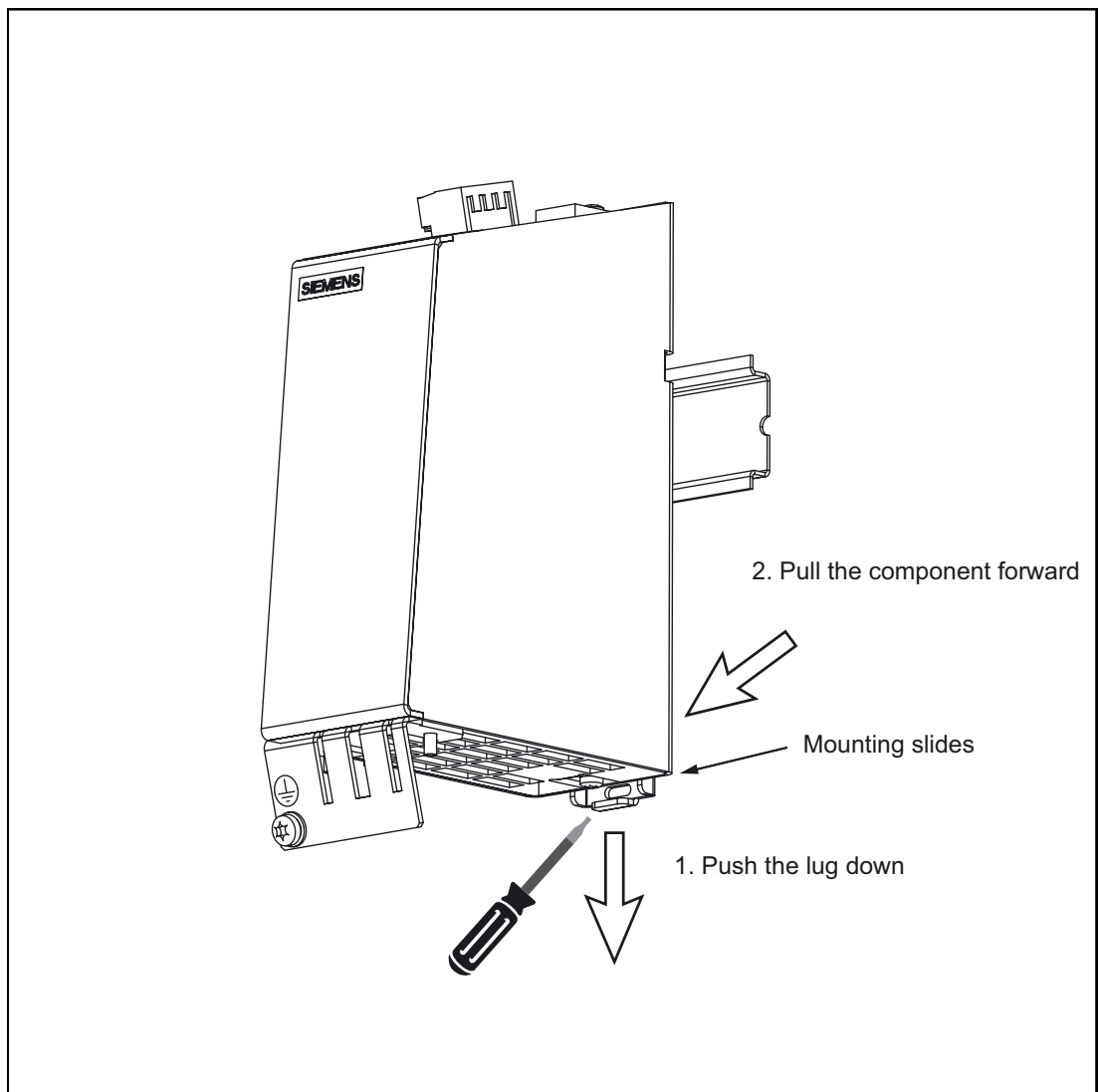


Figure 3-11 Releasing the component from a DIN rail

3.3.6 Electrical connection

Shield contacts for the component are available from Weidmüller and Phönix

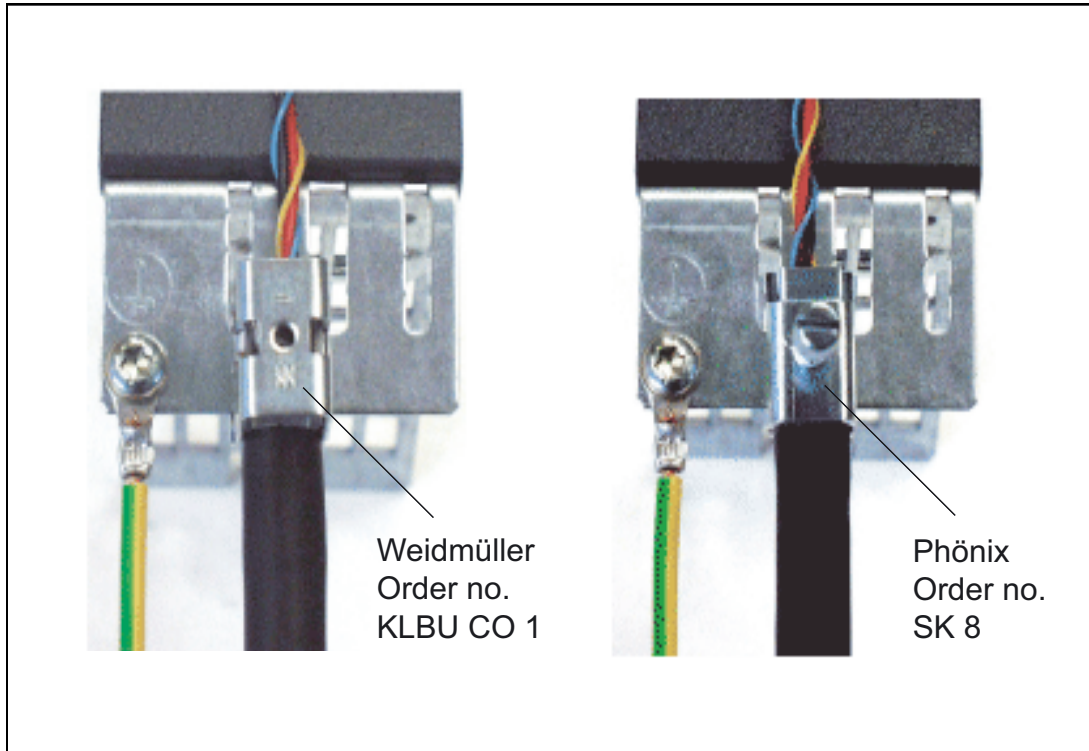


Figure 3-12 Shield contacts

Company internet addresses:

Weidmüller: <http://www.weidmueller.com>

Phönix: <http://www.phoenixcontact.com>

Connector codes

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

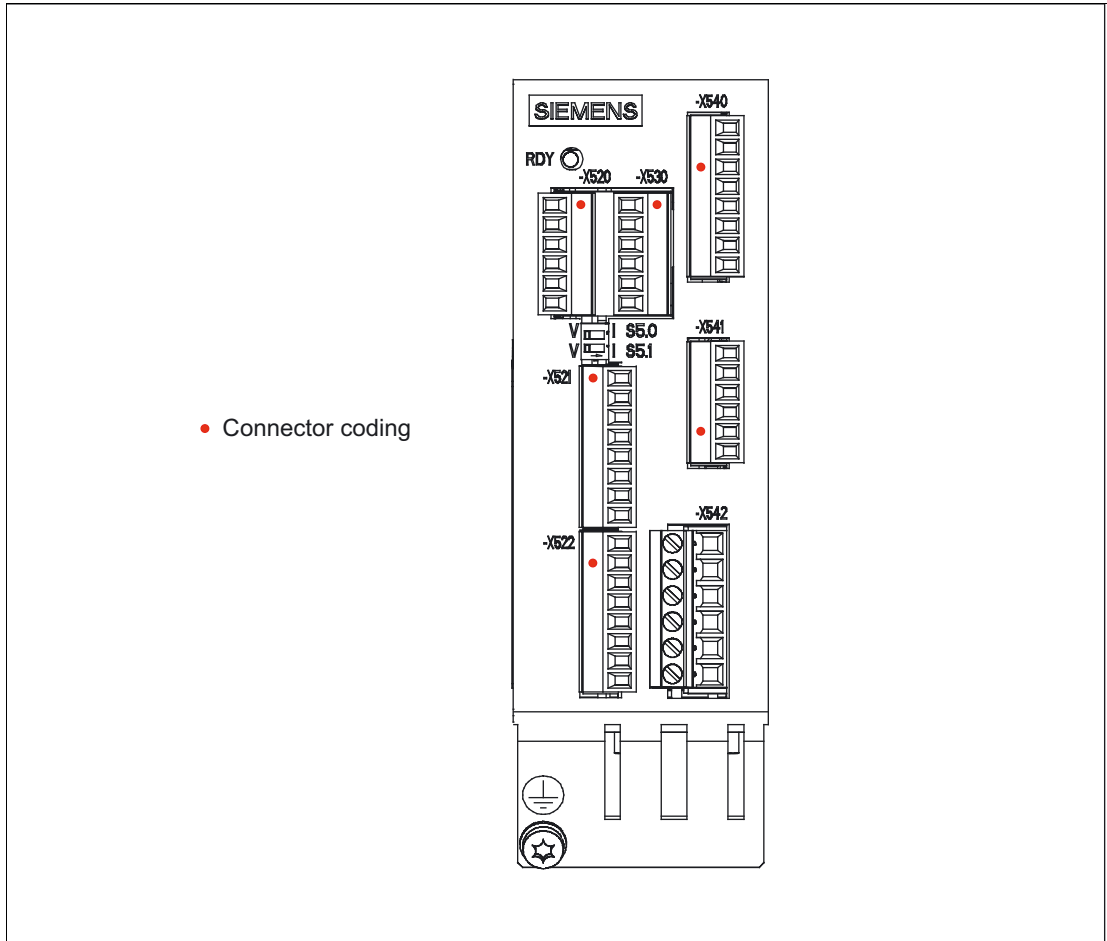


Figure 3-13 Connector codes of the TM31

3.3.7 Technical specifications

Table 3-22 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
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	1

Sensor System Connection

4.1 Introduction

The sensor modules evaluate the signals from the connected motor sensors or external sensors and convert them to DRIVE-CLiQ. The sensor system can only be connected to SINAMICS S120 via DRIVE-CLiQ, whereby motor sensors are connected to the associated motor module, while external sensors are connected to the control unit. In conjunction with motor sensors, the motor temperature can also be evaluated using sensor modules.

Cabinet-mounted sensor modules (SMC)

Cabinet-mounted sensor modules (SMC) can be ordered and configured separately. They can be 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.

4.2 Overview of sensor modules

4.2.1 Description

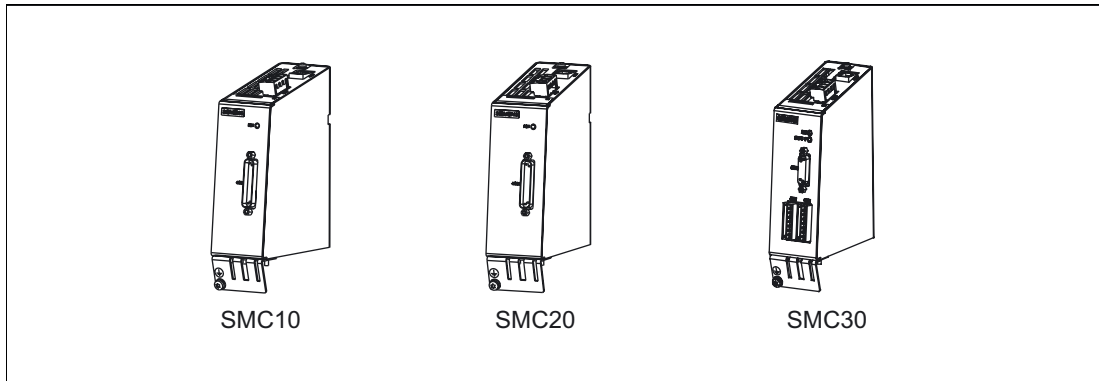


Figure 4-1 Sensor modules

Connectable sensor systems

Table 4-1 Connectable sensor systems

Measuring systems	SMC		
	SMC10	SMC20	SMC30
Resolver	yes	-	-
Incremental encoder sin/cos (1Vpp)	-	yes	-
Absolute encoder EnDat	-	yes	-
Incremental encoder TTL/HTL	-	-	yes
Temperature evaluation	yes	yes	yes

4.2.2 Sensor connections

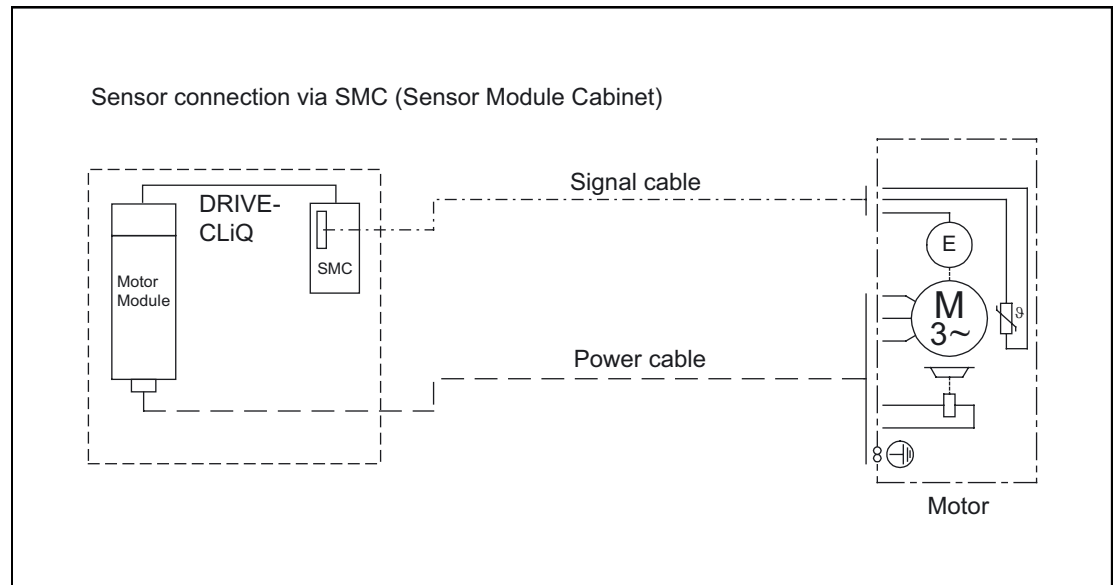


Figure 4-2 Sensor connection

4.3 Sensor Module Cabinet 10 (SMC10)

4.3.1 Description

The cabinet-mounted sensor module 10 (SMC10) evaluates sensor signals and transmits the speed/position, 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.

The maximum signal cable lengths are:

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

The module may be 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

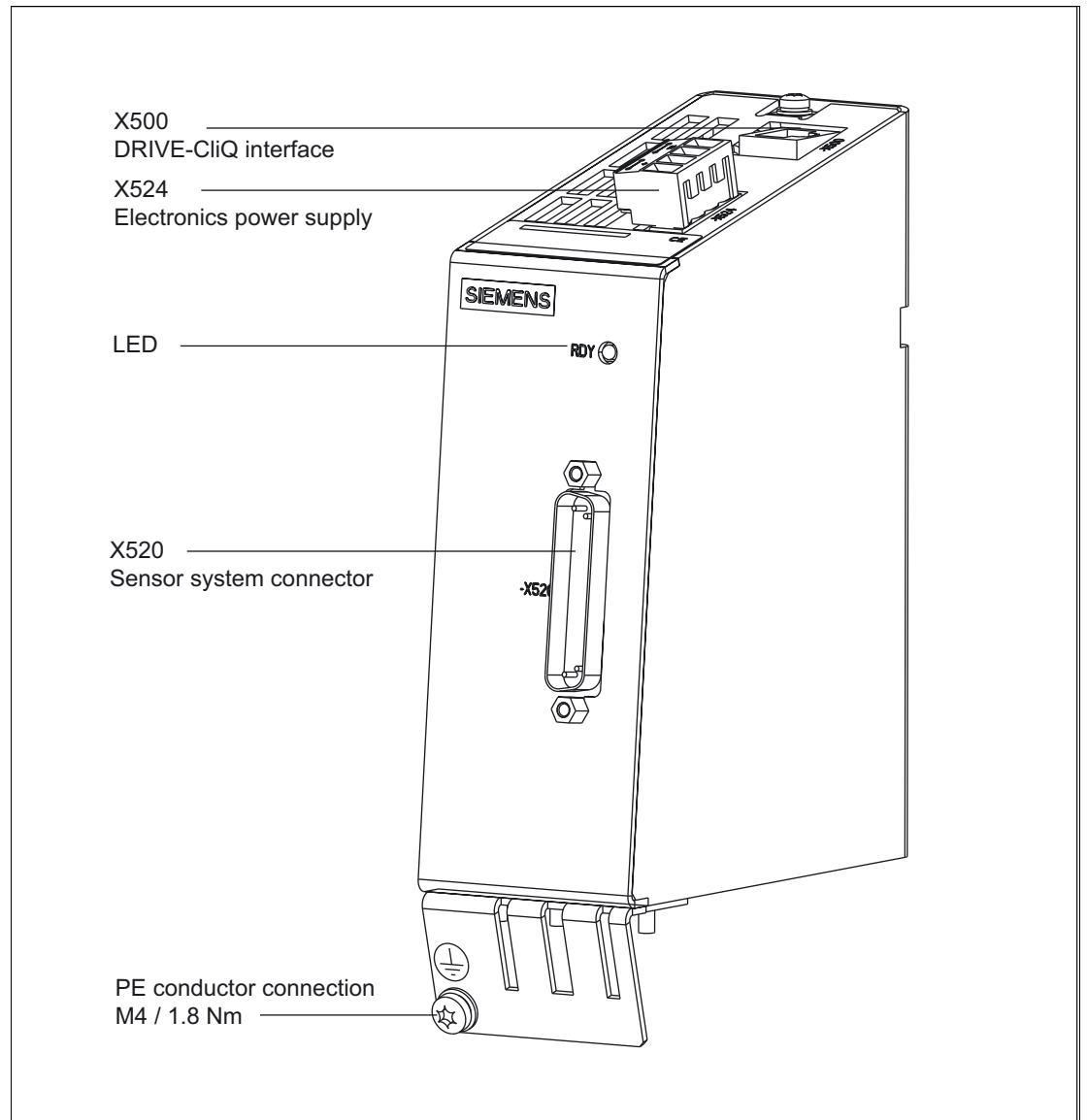
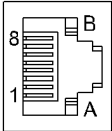


Figure 4-3 Interface description SMC10

DRIVE-CLiQ interface X500

Table 4-2 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			

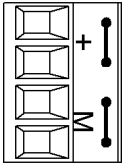
X520 sensor system

Table 4-3 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	

Electronics power supply X524

Table 4-4 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
	+	Reserved, do not use	
	M (GND)	Electronic ground	
	M (GND)	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.

Description of the LEDs on the SMC10

Table 4-5 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	The firmware is being downloaded. Component recognition via LED is activated (p0144).

Cause and rectification of faults

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

Reference: /IH1/ SINAMICS S, Installation and Start-Up Manual

4.3.4 Dimension drawing

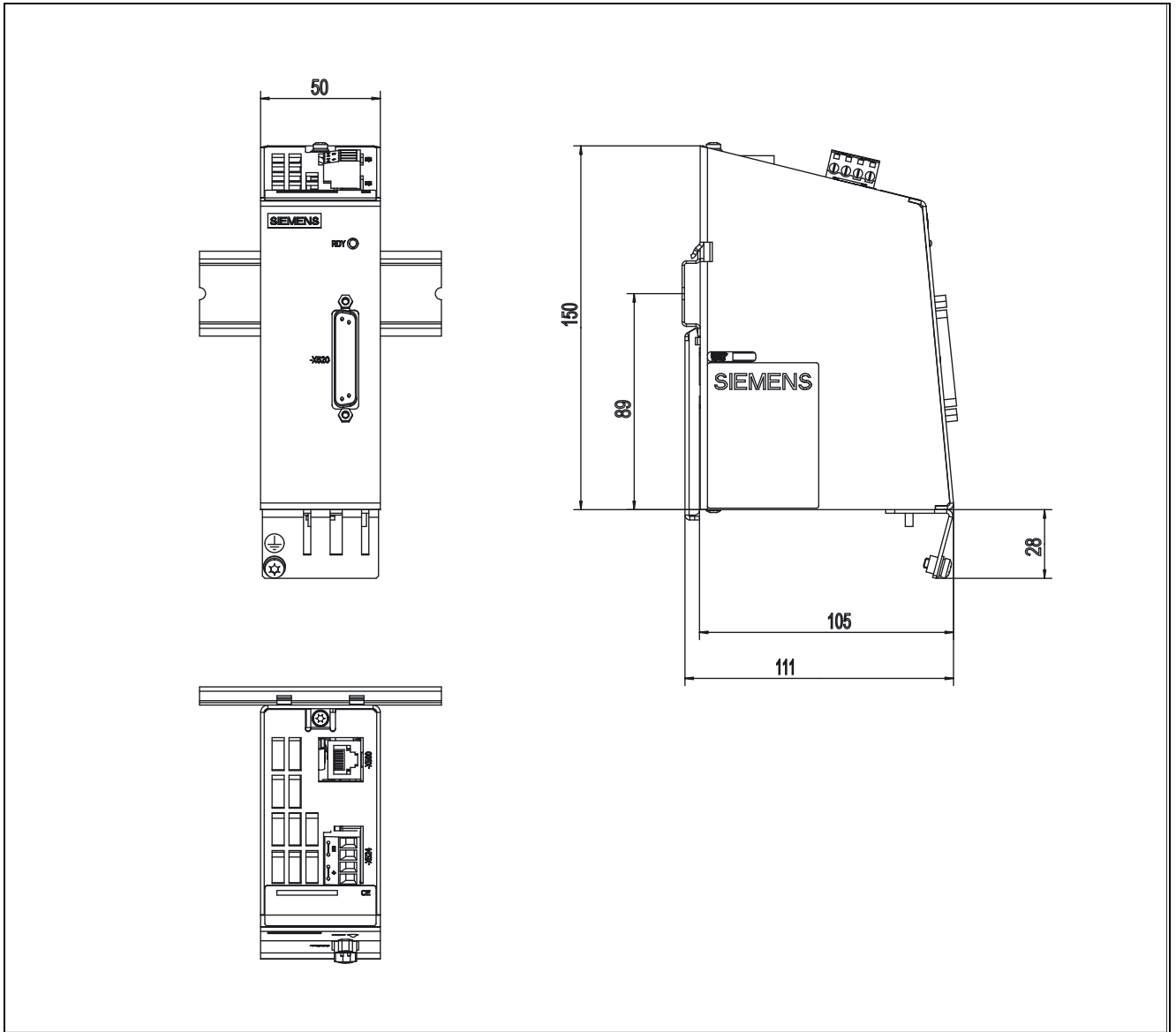


Figure 4-4 Dimension drawing of the SMC10

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

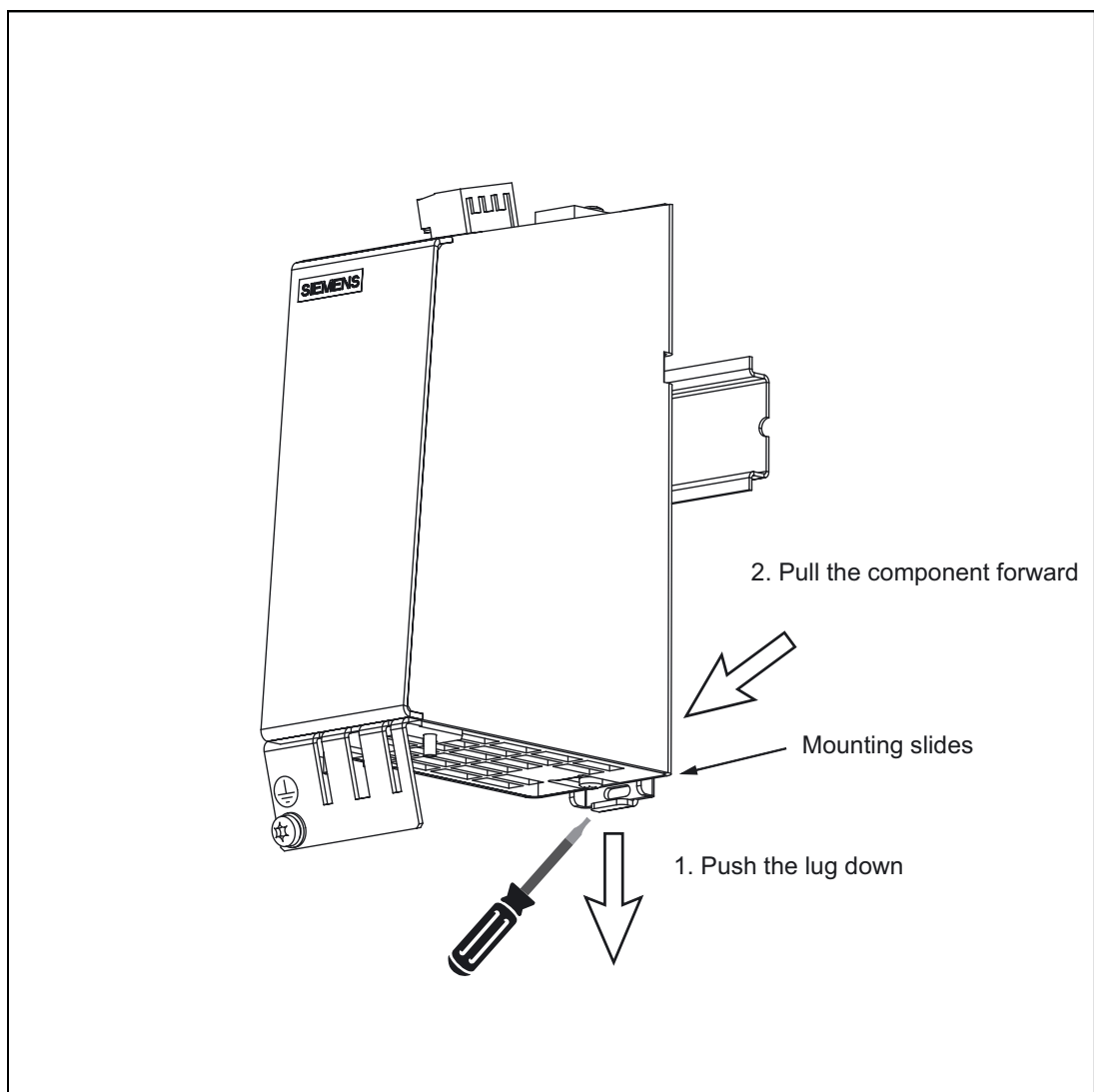


Figure 4-5 Releasing the component from a DIN rail

4.3.6 Technical specifications

Table 4-6 Technical specifications

	Unit	Value
Electronics power supply		
Voltage	V _{DC}	24 DC (20.4 – 28.8)
Current	A _{DC}	Max. 0.3
PE/ground connection	On housing with M4/1.8Nm screw	
Weight	kg	0.8

4.4 Sensor Module Cabinet 20 (SMC20)

4.4.1 Description

The cabinet-mounted sensor module 20 (SMC20) evaluates sensor signals and transmits the speed/position, 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

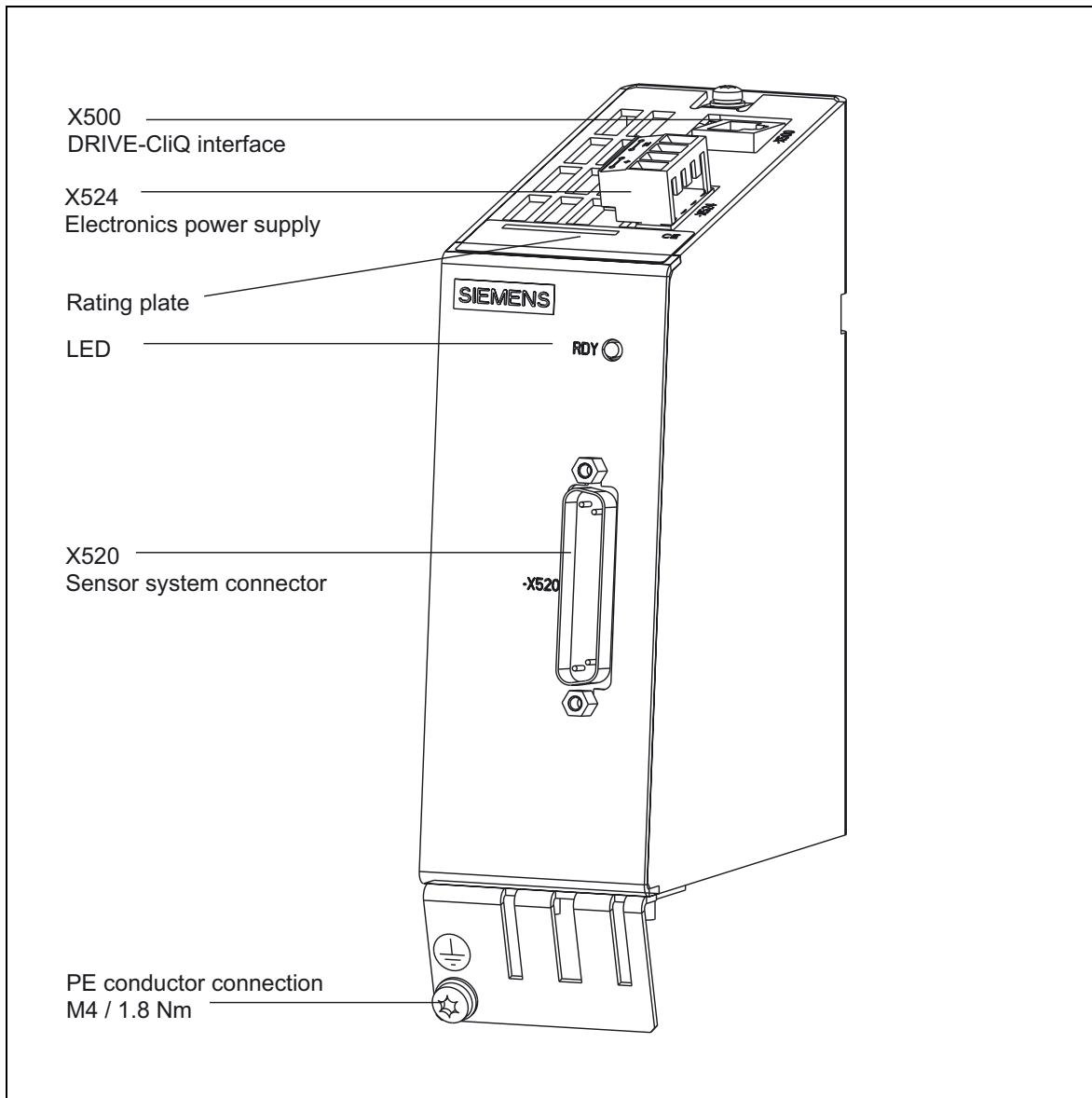
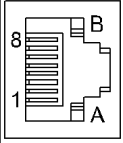


Figure 4-6 Interface description of the SMC20

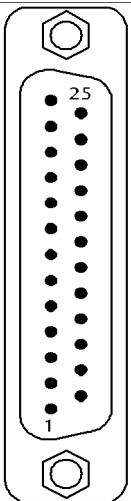
DRIVE-CLiQ interface X500

Table 4-7 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		

X520 sensor system

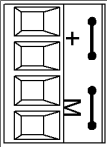
Table 4-8 Sensor interface X520



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

Electronics power supply X524

Table 4-9 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
	+	Reserved, do not use	
	M (GND)	Electronic ground	
	M (GND)	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.

Description of the LEDs on the SMC20

Table 4-10 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	The firmware is being downloaded. Component recognition via LED is activated (p0144).

Cause and rectification of faults

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

Reference: /IH1/ SINAMICS S, Installation and Start-Up Manual

4.4.4 Dimension drawing

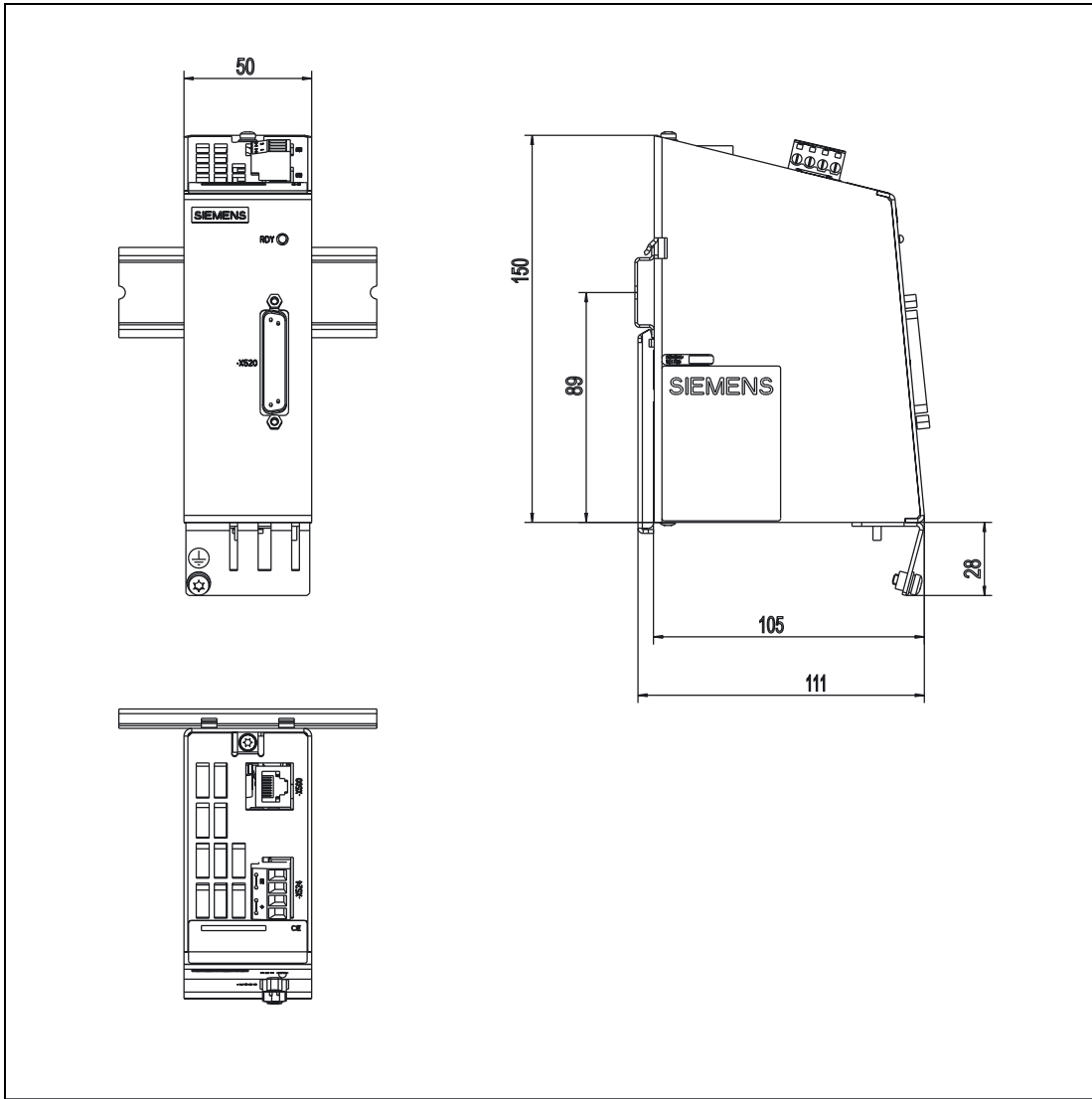


Figure 4-7 Dimension drawing of the SMC20

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

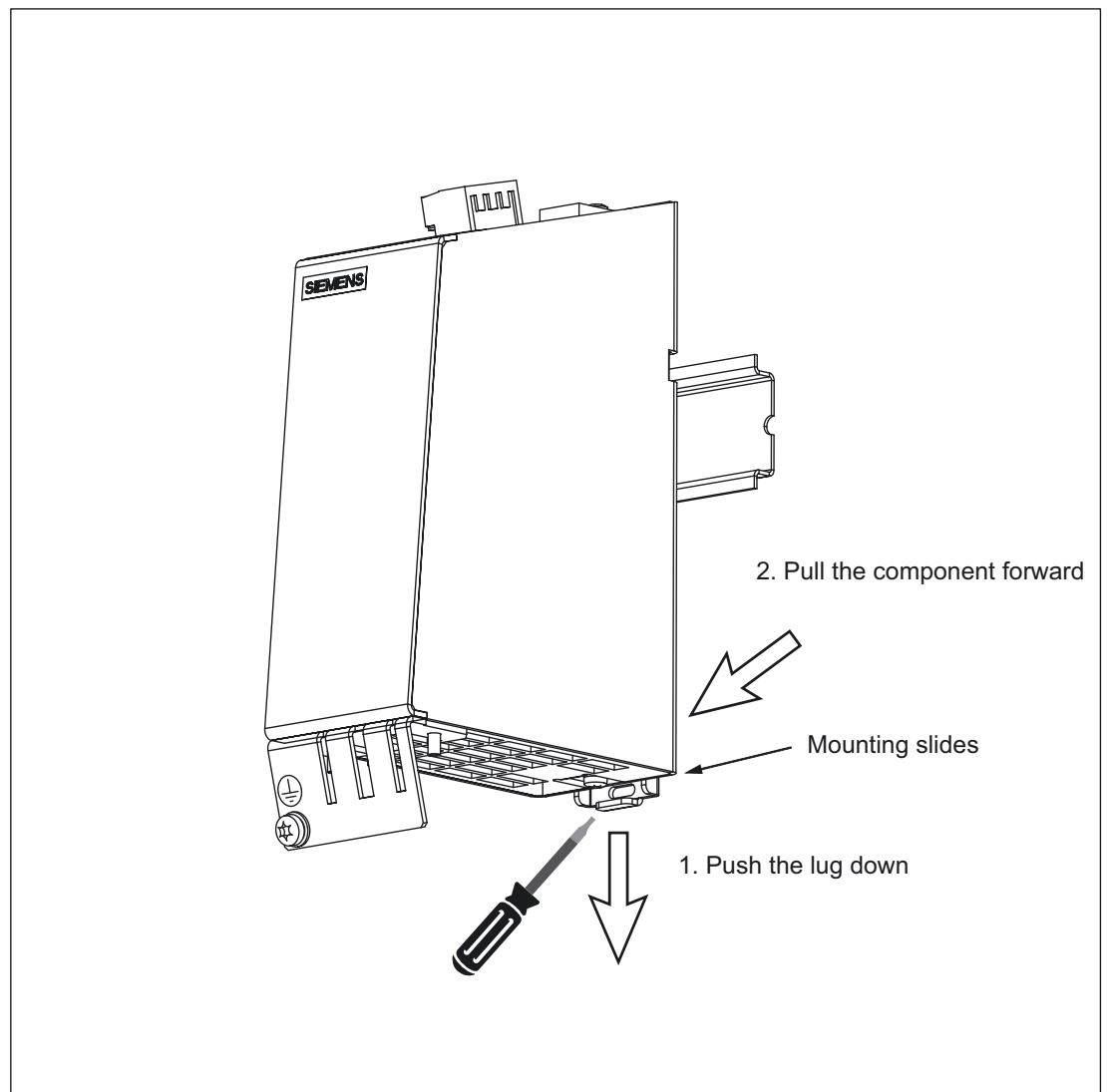


Figure 4-8 Releasing the component from a DIN rail

4.4.6 Technical specifications

Table 4-11 Technical specifications

	Unit	Value
Electronics power supply		
Voltage	V _{DC}	24 DC (20.4 – 28.8)
Current	A _{DC}	Max. 0.4
PE/ground connection	On housing with M4/1.8Nm screw	
Weight	kg	0.8

4.5 Sensor Module Cabinet 30 (SMC30)

4.5.1 Description

The cabinet-mounted sensor module 30 (SMC30) evaluates sensor signals and transmits the speed/position, rotor position and, if necessary, the motor temperature and reference point via DRIVE-CLiQ to the control unit.

TTL and HTL rectangular signal sensors can be connected.

Table 4-12 Maximum signal cable lengths

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

*For TTL sensor on X520 → Remote Sense → 100 m

For TTL sensors with 5 V supply on X521/X531, the cable lengths (for 0.5 mm² cable cross-sections) depend on the sensor current:

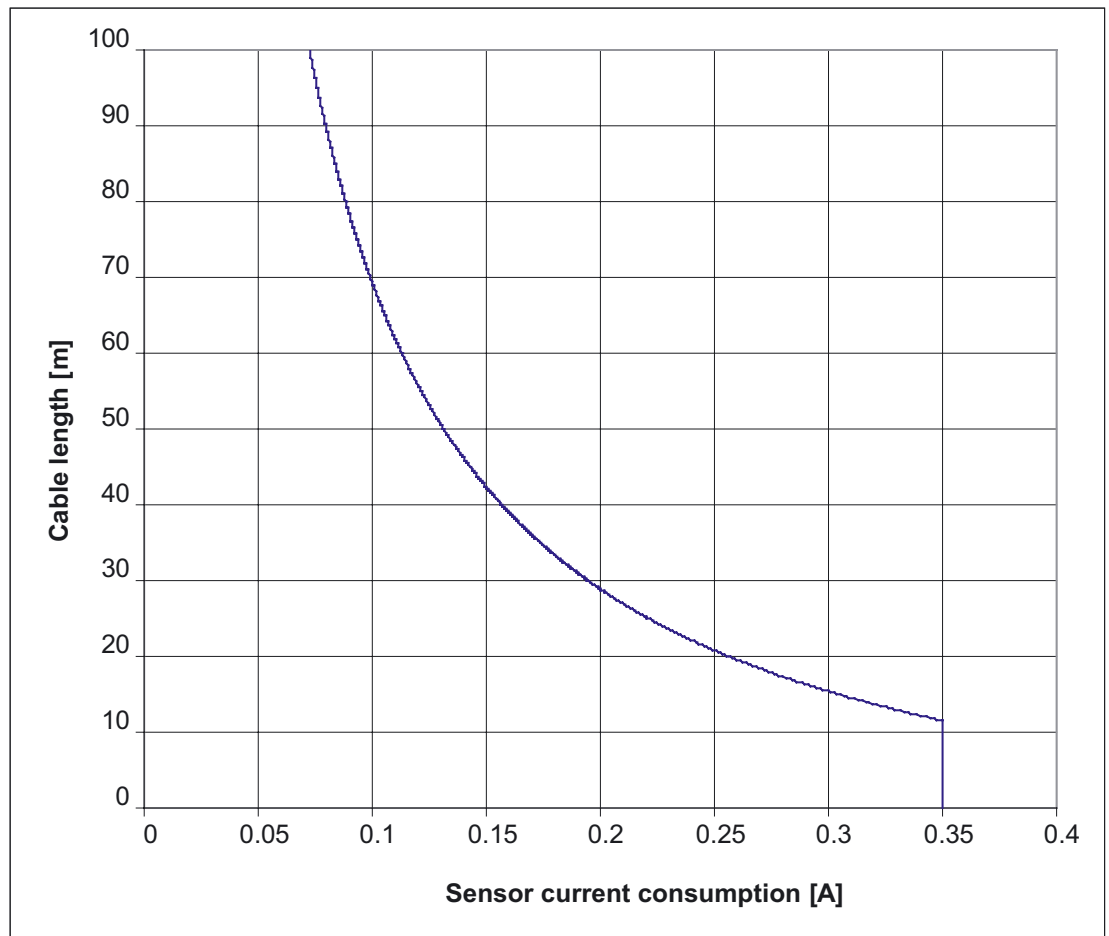


Figure 4-9 Cable length as a function of the sensor current consumption

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

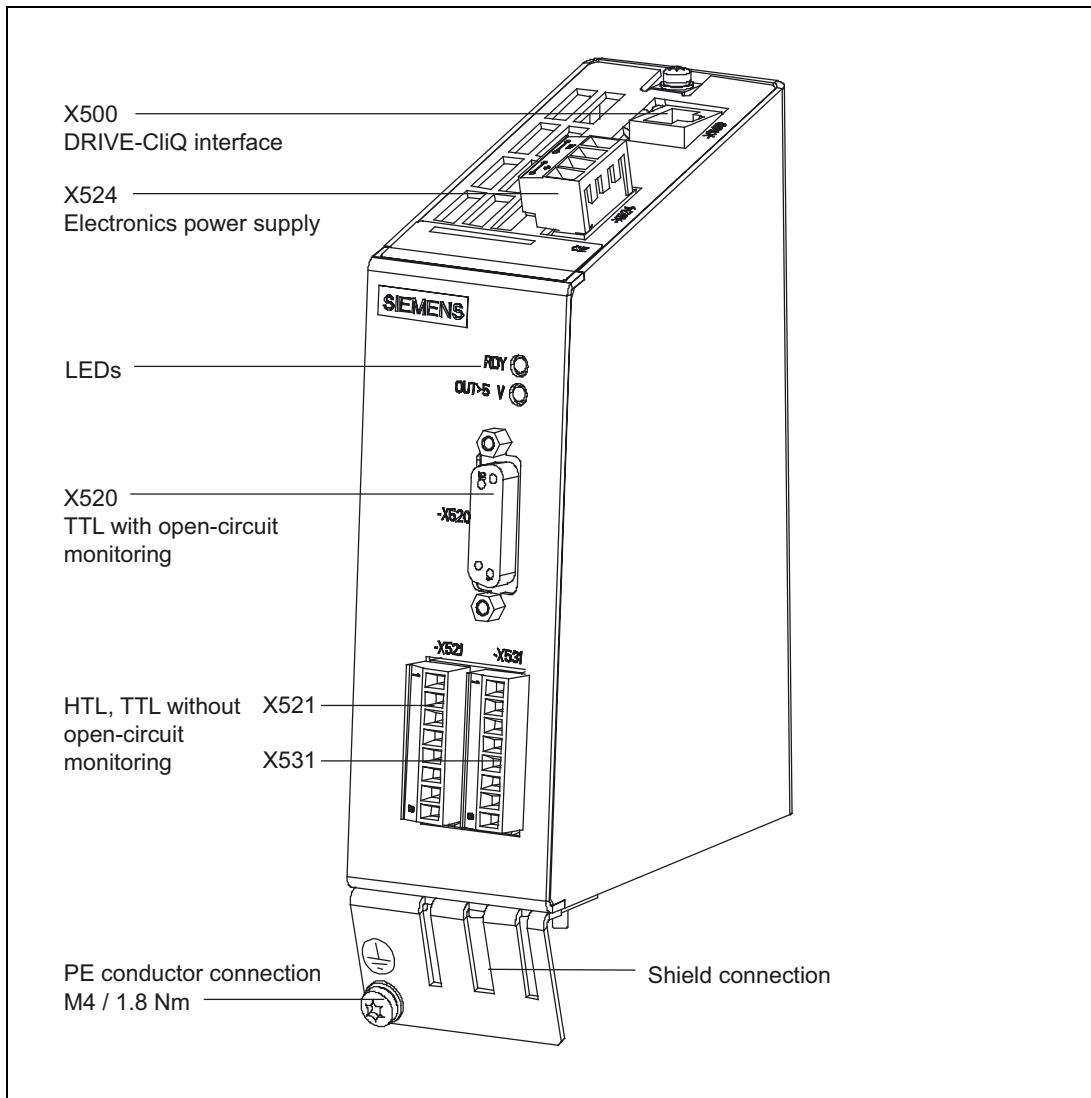
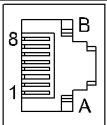


Figure 4-10 Interface description SMC30

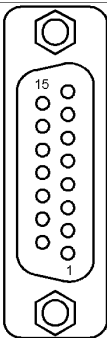
DRIVE-CLiQ interface X500

Table 4-13 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			

X520 sensor connection 1 TTL with open-circuit monitoring

Table 4-14 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

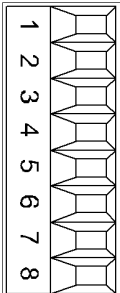
Caution

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

Shield brackets for the SMC30 are available from:
 Weidmüller: <http://www.weidmueller.com>
 Phönix: <http://www.phoenixcontact.com>

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

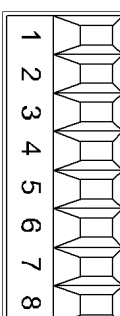
Table 4-15 Sensor connection X521

	Pin	Designation	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*	Reference signal R*
	7	CTRL	Control signal
	8	M (GND)	Ground via inductivity

Max. connectable cross-section: 1.5 mm²
 When unipolar HTL sensors are used, terminal block A*, B*, and R* must be jumpered with M.

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

Table 4-16 Sensor connection X531

	Pin	Designation	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
	4	+ Temp	Motor temperature measurement KTY84-1C130
	5	Reserved, do not use	
	6	Reserved, do not use	
	7	Reserved, do not use	
	8	Reserved, do not use	

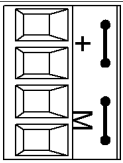
Max. connectable cross-section: 1.5 mm²

Note

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

Electronics power supply X524

Table 4-17 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
	+	Reserved, do not use	
	M (GND)	Electronic ground	
	M (GND)	Electronic ground	
Max. connectable cross-section: 2.5 mm ²			

Note

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

Description of the LEDs on the SMC30

Table 4-18 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	The firmware is being downloaded. Component recognition via LED is activated (p0144).
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 information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S, Installation and Start-Up Manual

4.5.4 Dimension drawing

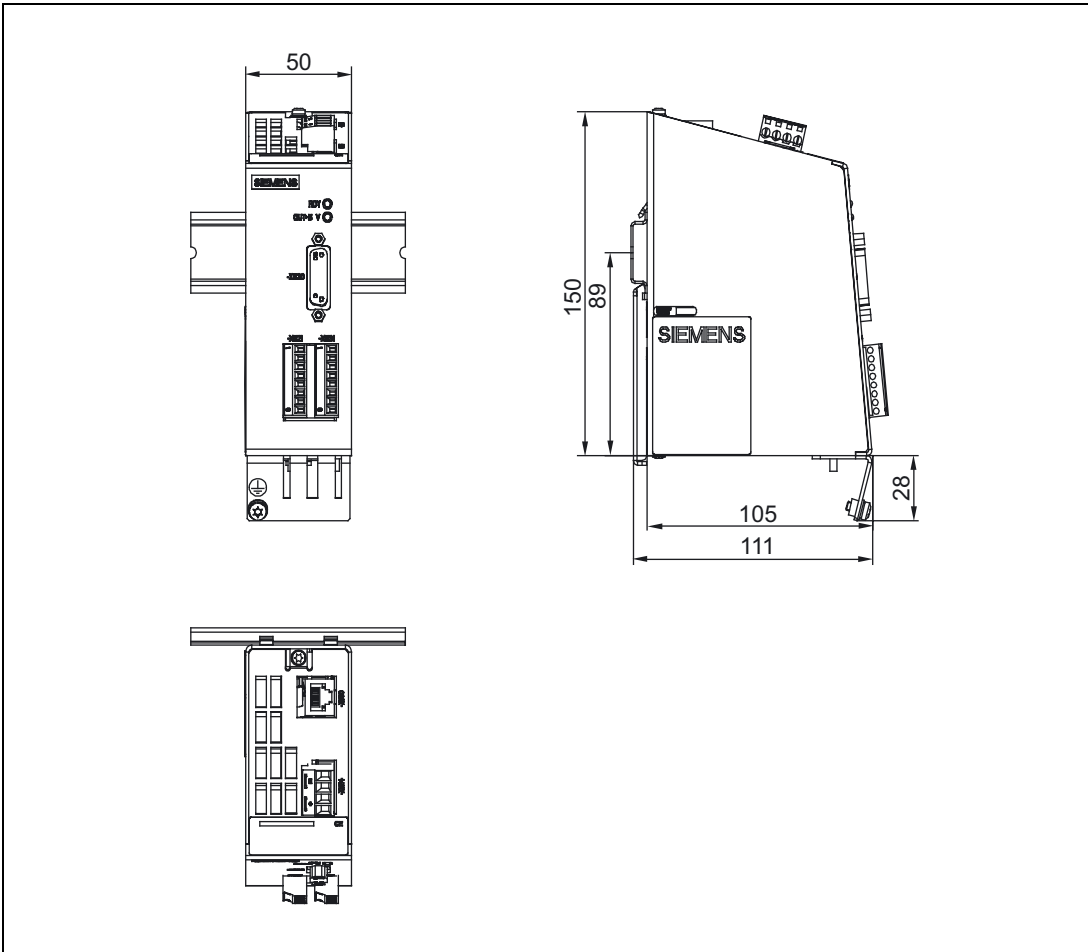


Figure 4-11 Dimension drawing of the SMC30

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

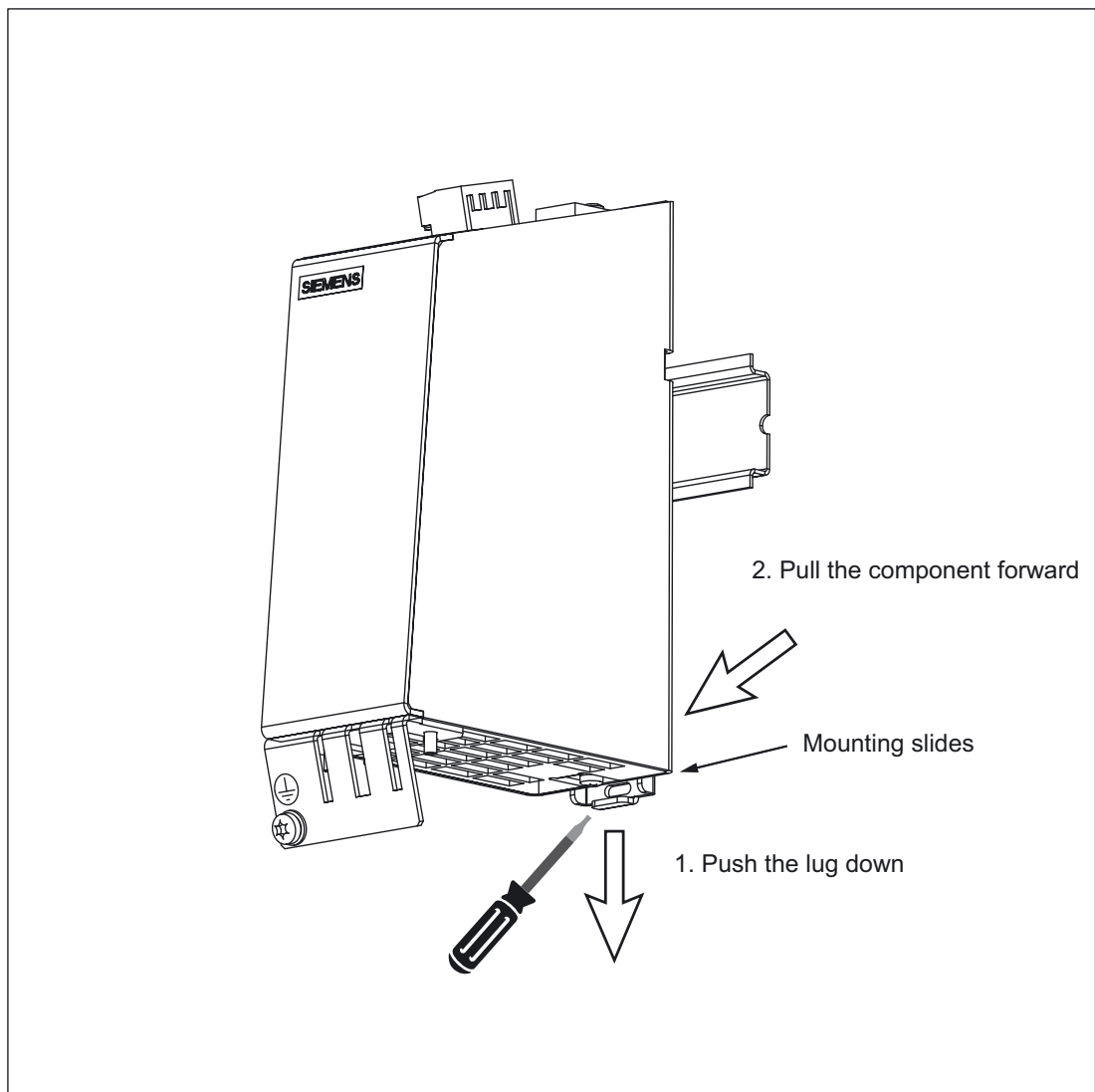


Figure 4-12 Releasing the component from a DIN rail

4.5.6 Electrical connection

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

Shield contacts for the SMC30 from Weidmüller and Phönix

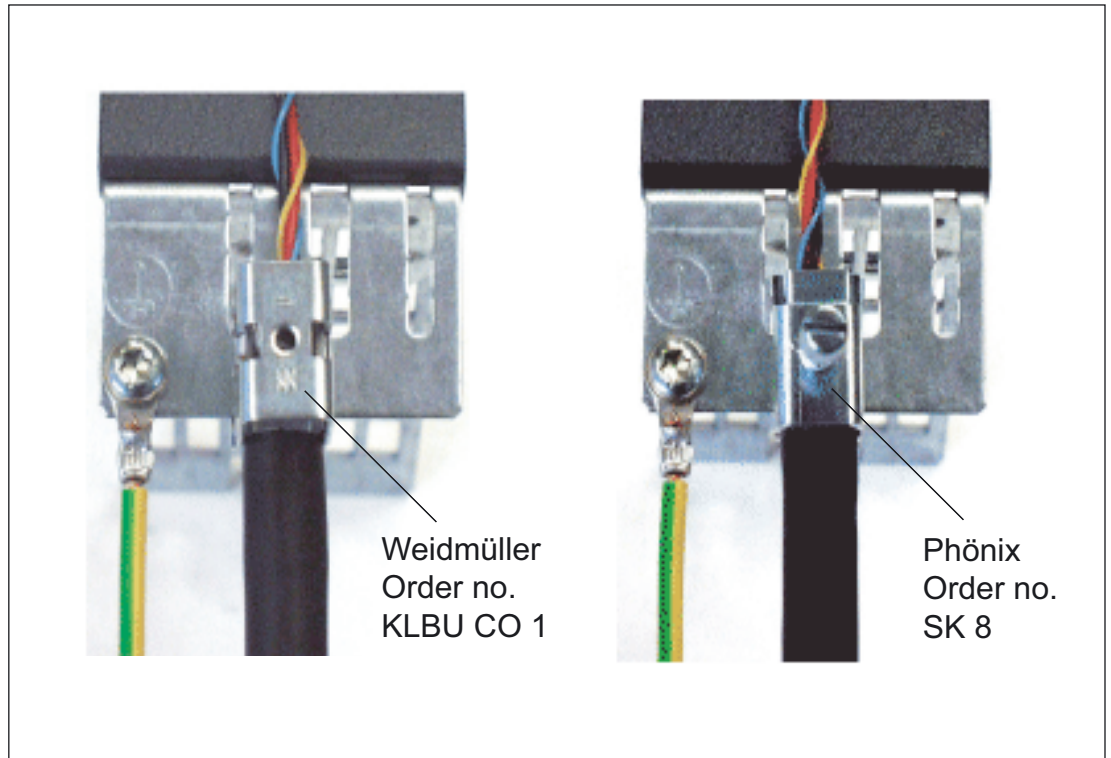


Figure 4-13 Shield contacts for the SMC30

Weidmüller: <http://www.weidmueller.com>

Phönix: <http://www.phoenixcontact.com>

4.5.7 Technical specifications

	Unit	Value
Electronics power supply		
Voltage	V _{DC}	24 DC (20.4 – 28.8)
Current	A _{DC}	Max. 0.6
PE/ground connection	On housing with M4/1.8Nm screw	
Weight	kg	0.8

Appendix A

A.1 Spring-loaded terminals/screw terminals

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	

Appendix A

A.1 Spring-loaded terminals/screw terminals

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	

Appendix B

B.1 List of abbreviations

Table B-1 List of abbreviations

Abbreviation	English
A	
A...	Alarm
AC	Alternating Current
ADC	Analog Digital Converter
AI	Analog Input
AO	Analog Output
AOP	Advanced Operator Panel
ASCII	American Standard Code for Information Interchange
B	
BB	Operating condition
BERO	Tradename for a type of proximity switch
BI	Binector Input
BIA	Berufsgenossenschaftliches Institut für Arbeitssicherheit (German Institute for Occupational Safety)
BICO	Binector Connector Technology
C	
C	Capacitance
CAN	Controller Area Network
CBC	Communication Board CAN
CD	Compact Disc
CDS	Command Data Set
CI	Connector Input
CNC	Computer Numerical Control
CO	Connector Output
CO/BO	Connector Output/Binector Output
COM	Mid-position contact of a change-over contact
CP	Communications Processor

Appendix B

B.1 List of abbreviations

Abbreviation	English
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CT	Constant Torque
CU	Control Unit
D	
DAC	Digital Analog Converter
DC	Direct Current
DCN	Direct Current Negative
DCP	Direct Current Positive
DDS	Drive Data Set
DI	Digital Input
DI/DO	Bidirectional Digital Input/Output
DMC	DRIVE-CLiQ Module Cabinet (Hub)
DO	Digital Output
DO	Drive Object
DPRAM	Dual Port Random Access Memory
DRAM	Dynamic Random Access Memory
DRIVE-CLiQ	Drive Component Link with IQ
DSC	Dynamic Servo Control
E	
EDS	Encoder Data Set
EMC	Electromagnetic Compatibility
EMK	Electromagnetic force
EN	European Standard
EnDat	Encoder-Data-Interface
EP	Enable Pulses
ES	Engineering System
ESD	Electrostatic Sensitive Devices
F	
F ...	Fault
FAQ	Frequently Asked Questions
FCC	Function Control Chart
FCC	Flux Current Control
FEPROM	Flash-EEPROM
FG	Function Generator
FI	Residual-Current Circuit-Breaker (RCCB)
FP	Function diagram
FW	Firmware
G	
GC	Global Control Telegram (broadcast telegram)
GSD	Device master file: Describes the features of a PROFIBUS slave

Abbreviation	English
H	
HF	High Frequency
HFD	High frequency reactor
HLG	Ramp-function generator
HMI	Human Machine Interface
HTL	High Threshold Logic
HW	Hardware
I	
I/O	Input/Output
IBN	Commissioning
ID	Identifier
IEC	International Electrotechnical Commission
IGBT	Insulated Gate Bipolar Transistor
In preparation:	In preparation: this feature is currently not available
IT	Insulated three-phase supply network
J	
JOG	Jogging
K	
KDV	Data cross-checking
KIP	Kinetic buffering
Kp	Proportional gain
KTY	Positive temperature coefficient temperature sensor
L	
L	Inductance
LED	Light Emitting Diode
LSB	Least Significant Bit
M	
M (GND)	Reference potential, zero potential
MB	Megabyte
MCC	Motion Control Chart
MDS	Motor Data Set
MLFB	Machine-readable product designation
MMC	Man-Machine Communication
MSB	Most Significant Bit
MSCY_C1	Master Slave Cycle Class 1
N	
N. C.	Not Connected
NC	Normally Closed (contact)
NC	Numerical Control

Appendix B

B.1 List of abbreviations

Abbreviation	English
NEMA	National Electrical Manufacturers Association
NM	Zero mark
NO	Normally Open (contact)
O	
OEM	Original Equipment Manufacturer
OLP	Optical Link Plug
OMI	Option Module Interface
P	
p ...	Adjustable parameter
PDS	Power Module Data Set
PE	Protective Earth
PELV	Protective Extra Low Voltage
PG	Programming terminal
PI	Proportional Integral
PLC	Programmable Logic Controller
PLL	Phase Locked Loop
PNO	PROFIBUS user organisation
PRBS	Pseudo Random Binary Signal
PROFIBUS	Process Field Bus
PS	Power Supply
PTC	Positive Temperature Coefficient
PTP	Point to Point
PWM	Pulse Width Modulation
PZD	PROFIBUS process data
Q	
R	
r ...	Display parameter (read only)
RAM	Random Access Memory
RCCB	Residual-Current Circuit-Breaker
RCD	Residual Current Device
RJ45	Standard. Describes an 8-pin plug connector with twisted pair Ethernet.
RO	Read Only
RS232	Serial interface
RS485	Standard. Describes the physical characteristics of a digital serial interface.
S	
S1	Continuous duty
S3	Periodic duty

Abbreviation	English
SBC	Safe Brake Control
SGE	Safe input signal
SH	Safe standstill
SI	Safety Integrated
SIL	Safety Integrity Level
SLVC	Sensorless Vector Control
SM	Sensor Module
SMC	Sensor Module Cabinet
SPC	Setpoint Channel
SPS	Programmable Logic Controller (PLC)
STW	PROFIBUS control word
T	
TB	Terminal Board
TIA	Totally Integrated Automation
TM	Terminal Module
TN	Grounded three-phase supply network
Tn	Integral time
TT	Grounded three-phase supply network
TTL	Transistor Transistor Logic
U	
UL	Underwriters Laboratories Inc.
V	
VC	Vector Control
Vdc	DC link voltage
VDE	Association of German Electrical Engineers
VDI	Association of German Engineers
Vpp	Volt peak to peak
VSM	Voltage Sensing Module
VT	Variable Torque
W	
WZM	Machine tool
X	
XML	Extensible Markup Language
Z	
ZK	DC link
ZSW	PROFIBUS Status Word

Appendix C

C.1 References

SINAMICS documentation

Catalogs

1. /DA51.2/ MICROMASTER Drive Converter 410/420/430/440. Catalog DA51.2 – 2002
Ordering information
Order no.: E86060-K5151-A121-A3-7600
2. /D11/ SINAMICS G150 Drive Converter
75 – 560 kW Cabinet Units
Order no.: E86060-K5511-A101-A1-7600
3. /D21.1/ SINAMICS S120 Vector Control
Drive system
Order no.: (in preparation)
4. /D21.2/ SINAMICS S120 Servo Control
Drive system (incl. servo motors)
Order no.: (in preparation)
5. /D21.3/ SINAMICS S120 Vector Control
Drive System Cabinet Units
Order no.: (in preparation)

Electronic documentation

1. /CD2/ SINAMICS
The SINAMICS Drive System
Order no.: 6SL3097-2CA00-0BP0, edition: 01.2004

User documentation

1. /BA1/ SINAMICS G150 Version A and C
Operating Instructions
Order no.: 6SL3798-1GX00-0BP0, edition: 03.2003
2. /GH1/ SINAMICS S120
Equipment Manual for Control Units and Additional System Components
Order no.: 6SL3097-2AH00-0BP0, edition: 01.2004

3. /GH2/ SINAMICS S120
Equipment Manual for Booksize Power Sections
Order no.: 6SL3097-2AC00-0BP0, edition: 01.2004
4. /GH3/ SINAMICS S120
Equipment Manual for Chassis Power Sections
Order no.: 6SL3097-2AE00-0BP0, edition: 01.2004
5. /GS1/ SINAMICS S120
Getting Started
Order no.: 6SL3097-2AG00-0BP0, edition: 01.2004
6. /IH1/ SINAMICS S120
Booksize Installation and Start-Up Manual
Order no.: 6SL3097-2AF00-0BP0, edition: 01.2004
7. /IH2/ SINAMICS S120
Installation and Start-up Manual for CANopen
Order no.: 6SL3097-2AA00-0BP0, edition: 01.2004
8. /LH1/ SINAMICS S
List Manual
Order no.: 6SL3097-2AP00-0BP0, edition: 01.2004

Catalogs for supplementary components

1. Components for Automation and Drive, Catalog CA 01
Ordering information
Order no.: E86060-D4001-A100-B8-7600
2. Cables, Connectors and System Components, Catalog NC Z
Ordering information
Order no.: E86060-K4460-A101-B1-7600
3. SIMATIC Products for Totally Integrated Automation, Catalog ST 70
Ordering information
Order no.: E86060-K4670-A111-A8-7600
4. SIMOTION Motion Control System, Catalog PM10 – 2002
Ordering information
Order no.: E86060-K4910-A101-A3-7600

Further supplementary documentation

1. SIMODRIVE AC Servo Motors 1FK7
Planning Guide
Order no.: 6SN1 197-0AC20-0BP0
2. SIMODRIVE AC Servo Motors 1FT6
Planning Guide
Order no.: 6SN1 197-0AD02-0BP0

3. SIMODRIVE AC Three-Phase Inductive Motors for Main Spindle Drives
1PH2, 1PH4, 1PH7
Planning Guide
Order no.: 6SN1 197-0AC60-0BP0
4. SIMODRIVE Hollow-Shaft Motors for Main Spindle Drives 1PM6 and 1PM4
Planning Guide
Order no.: 6SN1 197-0AD03-0BP0
5. SIMOTION SCOUT
Operating Instructions
SIMOTION Engineering System SCOUT
Order no.: 6AU1 900-0AD30-0BA0, edition: 02.2003
6. DRIVE ES Basic V5.1
Function Description
Engineering System for Drives from the Siemens A&D Product Range
Order no.: 6SW1 700-0JA00-0BA0, edition: 08.2001

PROFIBUS documentation

1. /IKPI/ Catalog IK PI 2002/2003
Industrial Communication and Field Equipment
Order no.: E86060-K6710-A101-B2-7600 (bound edition)
Order no.: E86060-K6710-A100-B2-7600 (loose-leaf edition)
2. /P1/ PROFIBUS-DP/DPV1 IEC 61158
Basics, Tips and Tricks for Users
Hüthig; Manfred Popp, 2nd edition
ISBN 3-7785-2781-9
3. /P2/ PROFIBUS-DP, Getting Started
PROFIBUS Nutzerorganisation e. V.; Manfred Popp
Order no.: 4.071
4. /P3/ Decentralization with PROFIBUS-DP
Architecture and Fundamentals, Configuration and Use of PROFIBUS-DP
with SIMATIC S7
SIEMENS; Publics MCD Verlag; Josef Weigmann, Gerhard Kilian
Order no.: A19100-L531-B714-7600
ISBN 3-89578-074-X
5. /P4/ Manual for PROFIBUS Networks, SIEMENS
Order no.: 6GK1 970-5CA10-0BA0
6. /P5/ PROFIBUS Profile PROFIdrive Profile Drive Technology
PROFIBUS Nutzerorganisation e. V.
Haid-und-Neu-Straße 7, 76131 Karlsruhe
Order no.: 3.171, Version 3, September 2000
7. /STPI/ PROFIBUS & AS Interface
Components on the Field Bus, Catalog ST PI 1999
Order no.: E86060-K4660-A101-A3-7600 (bound edition)
Order no.: E86060-K4660-A100-A3-7600 (loose-leaf edition)

8. /PPA/ PROFIdrive Profile Drive Technology
Draft PROFIBUS Profile
PROFIBUS Nutzerorganisation e. V.
Haid-und-Neu-Straße 7, 76131 Karlsruhe
Order no.: 3.172, Version 3.1, July 2002
9. /PPD/ PROFIBUS, Profile for Variable-Speed Drives, PROFIDRIVE
PROFIBUS Nutzerorganisation e. V.
Haid-und-Neu-Straße 7, 76131 Karlsruhe
Order no.: 3.071, edition: September 1997
- 10./PDP/ PROFIBUS Installation Guideline
Installation Guideline for PROFIBUS-FMS/DP
Installation and Wiring Recommendation for RS 485 Transmission
Order no.: 2.111 (German)
2.112 (English), Version 1.0

Documentation for safety equipment

Note

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

www.siemens.com/safety

Some of the available documentation relating to safety is listed below.

1. /NSK/ Low-Voltage Switchgear (with CD-ROM CA 01)
Catalog NS K
Order no.: E86060-K1002-A101-A2-7600
2. /NSCD/ Operating Instructions and Manuals for Low-Voltage Switchgear
CD-ROM
Order no.: E20001-D10-P301-V2-7400-7600
3. /MRL/ Directive 98/37/ECC of the European Parliament and Council
(Machine Directive)
Bundesanzeiger-Verlags GmbH, edition: 22.06.1998
4. /FBSI/ SINUMERIK 840D / SIMODRIVE 611 digital
Function Description SINUMERIK Safety Integrated
Order no.: 6FC5297-6AB80-0BP2, edition: 09.2003
5. /SIAH/ Safety Integrated
The Safety Program for International Industry
Application Manual, 4th edition, Siemens AG Automation and Drives
Order no.: 6ZB5000-0AA01-0BA0, edition: 01.2003
6. /SICD/ Safety Integrated
The Fully Integrated Safety System
CD-ROM
Order no.: E20001-D10-M103-X-7400-7600

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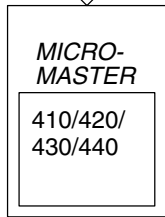
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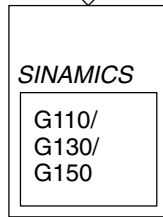
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Overview of SINAMICS Documentation (01.2004)

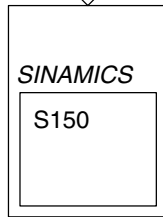
General Documentation / Catalogs



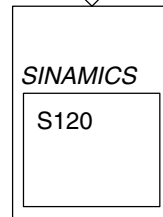
DA 51.2
Converter
0.12–250kW



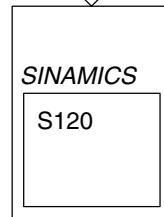
D11
Converter
0.12–3kW Booksize Units
75–560kW Cabinet Units



D 21.3
Vector Control
Cabin Units

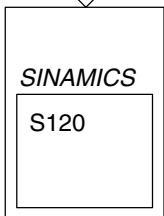


D 21.1
Vector Control
Drive System

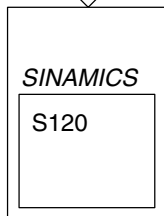


D 21.2
Servo Control
Drive System
(incl. servo motors)

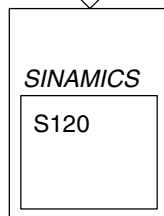
Manufacturer/Service Documentation



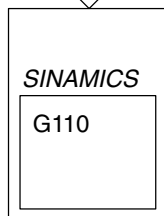
Equipment Manual
Control Unit



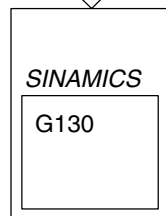
Equipment Manual
Booksize Power Sections



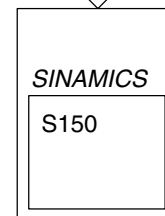
Equipment Manual
Chassis Power Section



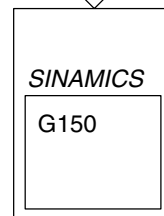
Operating Instructions



Operating Instructions

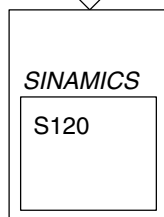


Operating Instructions

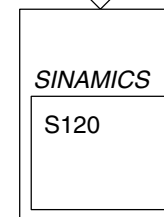


Operating Instructions

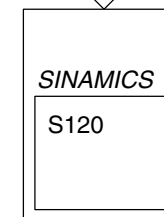
Manufacturer/Service Documentation



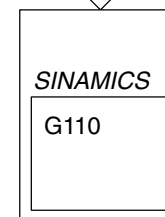
Installation & Start-Up Manual
Booksize



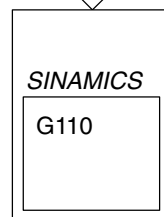
Getting Started



List Manual
Parameter,
Faults and Alarms
Function Diagrams

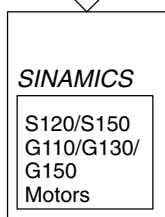


List Manual
Parameter,
Function Diagrams



Getting Started

Electronic Documentation



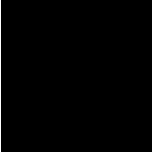
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