

Drive Controller SD4B

Hardware Description



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1 About this Manual

This chapter describes symbols, signal words and abbreviations possibly used in this manual.

Note

You can download more documentation from the SIEB & MEYER website under <https://www.sieb-meyer.com/downloads>.

1.1 Illustration of Warnings

In this manual, the warnings listed below are used. Depending on their degree of risk, the risk levels listed below exist:

⚠ DANGER



Imminent risk of injury

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

→ Follow the instructions in this manual to avoid danger.

⚠ WARNING



Risk of injury

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

→ Follow the instructions in this manual to avoid danger.

⚠ CAUTION



Slight risk of injury

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

→ Follow the instructions in this manual to avoid danger.

NOTICE

Notice

Indicates a hazardous situation which, if not avoided, may result in property damage.

→ Follow the instructions in this manual to avoid danger.

1.2 Technical Symbols

Symbol	Description
	LED indicator: LED on
	LED indicator: LED off
	LED indicator: LED flashes

1.3 Abbreviations

BDM	<u>b</u> asic <u>d</u> rive <u>m</u> odule
CCW	<u>c</u> ounter <u>c</u> lock <u>w</u> ise
CW	<u>c</u> lock <u>w</u> ise
DC	<u>d</u> iagnostic <u>c</u> overage of safety function
DHCP	<u>D</u> ynamic <u>H</u> ost <u>C</u> onfiguration <u>P</u> rotocol: communication protocol for assigning the network configuration to clients using a server
HFT	<u>h</u> ardware <u>f</u> ault <u>t</u> olerance
HSPAM	<u>h</u> igh- <u>s</u> peed <u>p</u> ulse <u>a</u> mplitude <u>m</u> odulation
HSPWM	<u>h</u> igh- <u>s</u> peed <u>p</u> ulse <u>w</u> idth <u>m</u> odulation
HW	<u>h</u> ard <u>w</u> are
MF	<u>m</u> ultifuse
MTTFd	<u>m</u> ean <u>t</u> ime <u>t</u> o <u>f</u> ailure, <u>d</u> angerous
n.c.	<u>n</u> ot <u>c</u> onnected
OSSD	<u>o</u> utput <u>s</u> ignal <u>s</u> witching <u>d</u> evice
P2P	point to point (direct connection between two network nodes)
PAM	<u>p</u> ulse <u>a</u> mplitude <u>m</u> odulation
PELV	<u>p</u> rotective <u>e</u> xtra- <u>l</u> ow <u>v</u> oltage
PFH	<u>p</u> robability of dangerous <u>f</u> ailure per <u>h</u> our
PoE	<u>P</u> ower <u>o</u> ver <u>E</u> thernet: power supply via Ethernet
PWM	<u>p</u> ulse <u>w</u> idth <u>m</u> odulation
SELV	<u>s</u> afety <u>e</u> xtra- <u>l</u> ow <u>v</u> oltage
SERVO	servo control
SFF	<u>s</u> afe <u>f</u> ailure <u>f</u> raction
STO	safety function: <u>S</u> afe <u>T</u> orque <u>O</u> ff
SVC	<u>s</u> ensorless <u>v</u> ector <u>c</u> ontrol
TBD	<u>t</u> o <u>b</u> e <u>d</u> one
UVLO	<u>u</u> ndervoltage- <u>l</u> ock <u>o</u> ut
VCC	<u>v</u> oltage at the <u>c</u> ommon <u>c</u> ollector
VECTOR	vector control
VF	V/f characteristic curve

2 General Information

This manual describes the drive controllers of the series SD4B. Drive controllers of the generation SD4x are BDM (basic drive modules) that can be used either **as frequency converter or as servo drive**.

The SD4B devices allow operation of high-dynamic servo motors as well as asynchronous high-frequency spindles in the low-voltage range.

The devices provide interfaces for different digital encoder systems. In addition, motor systems without any sensors are supported, whereas different customized control methods are available. The devices can drive rotary and linear motors so that the number of device variants is reduced for the machine manufacturer.

For real-time requirements, the devices provide an optional fieldbus interface.

The devices are designed according to the standard DIN EN 61800-5-1.

This manual provides information on:

- ▶ Safety instructions and application advice
- ▶ Notes about the electromagnetic compatibility
- ▶ Description of the device (block diagram, type plate, module designation)
- ▶ Technical data, dimensions
- ▶ Connector pin assignment
- ▶ Wiring examples
- ▶ Status and error messages
- ▶ General information regarding the wiring (cables and line cross-sections)

This manual has the following demands on the trained staff of machine manufacturers:

Transport: only by skilled employees familiar with handling electrostatically sensitive components.

Installation: only by experts with electromechanical experience

Initial operation: only by experts with experience in the fields of electrical engineering / drive technology

Note

Information concerning the initial operation and parameterization of the digital drive controller can be found in the user manual for the software *drivemaster4*.

Note

You can download more documentation from the SIEB & MEYER website under <https://www.sieb-meyer.com/downloads>.

2.1 Approval for the Markets in USA and Canada

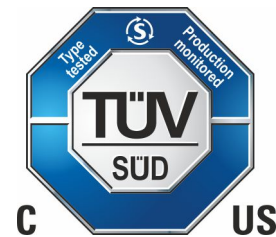
Using products in public buildings or industrial environments in the USA or Canada must be conform with the applicable national regulations. In particular electric products and machines are subject to testing and certification obligations and shall be labeled specifically.

The Occupational Safety and Health Administration (OSHA) only accepts devices that have been approved by an authorized NRTL laboratory (Nationally Recognized Testing Laboratory) and labeled with an appropriate test mark. An NRTL authorized by OSHA checks the legitimate status of the test mark by inspectors of the manufacturing sites, for example.

TÜV SÜD Product Service is an NRTL approved by OSHA and undertakes product certifications for industrial controls, electric drives and other products. The following link lists the approved NRTL laboratories:

<https://www.osha.gov/dts/otpc/nrtl/nrtllist.html>

The tested devices are labeled with the following symbol:



The device series SD4B is tested according to the harmonized standard IEC / UL 61800-5-1: "Standard for Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical Thermal and Energy"

- ▶ Date: 2023-12-18
- ▶ Device variants: 0SD4BB1D1P000Uxxxx, 0SD4BB1D1P100Uxxxx, 0SD4B-B1E1N100Uxxxx
- ▶ Certificate number: U10 096098 0010
- ▶ Certificate data base:

<https://www.tuvsud.com/en/services/product-certification/ps-cert>

(Enter the certificate number or "SIEB & MEYER AG" in the search field.)

<https://www.tuvsud.com/en/services/testing>

2.2 NRTL Requirements

Points of Exceptions of the Test Procedure and Conditions of Acceptability

Conditions of Acceptability:

- ▶ Power Drive System ((building in; open frame)
- ▶ When installing, requirements of mentioned Test Standards and Installation Guide have to be fulfilled.
- ▶ The equipments are intended for use in end-use application within final enclosure to maintain a Pollution Degree 2 or equivalent environment.
- ▶ The final enclosure has to fulfill the requirements for the protection in case of direct contact.
- ▶ The equipment shall not be installed over and below a flammable surface.
- ▶ Supply System: System Voltage 300 V, Overvoltage Category III or Overvoltage Category II
- ▶ Maximum Surrounding Air Temperature: +40 °C.
- ▶ The Terminal blocks are suitable for factory wiring only.
- ▶ The end-use application must be equipped with a Branch Circuit Protection that meets the requirements of the NRTL certificate.
- ▶ All Branch Circuit Protection shall have characteristic B.

- ▶ The diameter of the protective earthing conductor shall be 10 mm² (AWG 8) or higher.
- ▶ Construction Test only
- ▶ SFC (Single Fault Condition) are not included.
- ▶ Only valid for UL 61800-5-1, IEC 61800-5-1 and UL-1004-1.

Technical Considerations:

- ▶ The equipment under test was tested for use at the maximum ambient temperature permitted by the manufacturer's specification of: +40 °C.
- ▶ The maximum operation altitude of the equipment is specified for 1000 m.
- ▶ The tests were performed at the largest device versions.

Requirements to the power supply unit for SD4B

Specifications: AC-DC Industrial DIN rail power supply; NRTL license UL 508 File no. Exxxxx; IEC / UL / EN 60950-1 / EN 62368-1

- ▶ The power supply unit shall meet the requirements of the Overvoltage Category III and Pollution Degree 2: EN 61800-5-1; EN 60950-1 / EN 62368-1
- ▶ A safe isolation of circuits by means of a basic and additional protection (basic insulation plus insulation or protection shielding) or via an equivalent protection unit, e.g. reinforced insulation.
- ▶ Reinforced insulation:
Separate insulation system that is applied for active parts and that provides a level of protection against electric shock, which is equivalent to the double insulation according to the requirements defined in the corresponding IEC 60664-1 (Insulation coordination for equipment within low-voltage systems).

3 Safety Instructions



These safety instructions include important information regarding your safety and must be observed during installation and operation of SIEB & MEYER devices. Read them carefully and keep them for later use.

Also adhere to safety instructions in the product documentation and on the device.



3.1 Standards and Regulations

SIEB & MEYER devices comply with the regulations of the following standards and directives:

- ▶ Low-Voltage Directive 2014/35/EU:
EU declaration of conformity, DIN EN 61800-5-1
- ▶ EMC Directive 2014/30/EU:
EU manufacturer's certificate, DIN EN 61800-3
- ▶ Machinery Regulation (EU) 2023/1230:
EU manufacturer's certificate, DIN EN 61800-5-2 (safety functions)

SIEB & MEYER applies the product standard DIN EN 61800 for its devices.

Note

SD4B devices do not comply with the requirements for extra low voltage (ELV) according to IEC 61140. If required, the used power supply unit must ensure compliance with this standard.

Note

SIEB & MEYER frequency converters and servo drives do not fall within the scope of the Ecodesign Regulation (EU) 2019/1781 for motors and frequency converters as well as the accompanying amendment (EU) 2021/341 because the devices are not designed for the operation of the 50/60 Hz standard motors defined in the regulation.

Note

SIEB & MEYER products are no products according to the Machinery Regulation (EU) 2023/1230. The appropriate use of SIEB & MEYER devices in machines and installations is prohibited until the manufacturer of the machine or installation confirms the CE conformity of the complete machine or installation.

Note

If the mechanics or the electronics of the device are modified, the conformity with the EU directives and thus the CE label will expire.

3.2 Working on the Device

⚠ WARNING



Trained staff

- To avoid risks of serious injuries and material damage any works regarding installation, initial operation and maintenance must be carried out by trained staff only! Furthermore, electricians who connect feed-in systems must be approved by the local DSO (distribution system operator).
- Trained staff, according to this fundamental safety instruction, are persons familiar with the installation, mounting, initial and permanent operation of the product and they are qualified appropriately for the work. The standards DIN VDE 0100 and DIN VDE 0110 as well as the national accident prevention regulations shall be considered!
- When installing feed-in systems adhere to all applicable regulations, special safety instructions and technical connection conditions of the local DSO.

⚠ DANGER



Risk of serious damage to property and personal injury may occur:

- when covers are removed illegally
- due to improper use
- when either the installation or the operation is incorrect
- Observe the corresponding notes and information in the product documentation of your device.

⚠ WARNING



Risk of injuries and material damage due to illegal modifications

- Only change the settings of the device after having contacted SIEB & MEYER.

All Information and advice attached to the device, such as safety instructions or danger warnings and technical data (type plate) are:

- ▶ not to be removed
- ▶ not to be damaged
- ▶ to be kept readably (no covers, no paint over or the like)

3.3 Appropriate Use

Use the device according to its appropriate use only. Consider the corresponding information regarding the application fields of the device in the product documentation.

The device is intended for use within an enclosed cabinet by the OEM or end user to comply with pollution degree 2 or equivalent environmental conditions. That means: Ensure to avoid conductive impurities and humidity during the operation.

SIEB & MEYER products are **not** suitable for use in areas exposed to explosion hazards (ATEX zones) without appropriate housing.

Terms according to DIN EN 61800

Before initial operation, make sure that the machine will not expose danger (e.g. runaway moves). The conformity with the safety standards DIN EN 60204-1 and DIN EN 61800-5-1 must be ensured.

The manufacturer of the system or the machine has to meet the requirements of the legal values regarding the electromagnetic compatibility (EMC). SIEB & MEYER products are designed for the operation in industrial areas provided that the supplied manual "Unit Assembly Complying EMC" has been taken into consideration.

SIEB & MEYER tests all products in its own EMC laboratory to ensure that the products meet the respective standards, when they are installed properly.

When the installation of the device differs from the product documentation and the manual "Unit Assembly Complying EMC", the machine manufacturer has to carry out new measurements to comply with the standards.

SIEB & MEYER devices meet the requirements of the Low-Voltage Directive 2014/35/EU. The harmonized standards of the series DIN EN 60204-1 and DIN EN 61800-5-1 are applied consequently.

Technical data and the connection specification can be found in the respective product documents.

Line filters

If adequate interference suppression measures are applied and the appropriate use in industrial applications of the device is ensured, SIEB & MEYER devices comply with the EMC Directive 2014/30/EU in terms of the EMC Product Standard (PDS) DIN EN 61800-3.

The use of line filters helps reaching the following:

- ▶ Resistance to interference. The electronic system is protected against high-frequency disturbances, possibly infiltrated via the mains cable.
- ▶ Protection against radiation. High-frequency disturbances are reduced to legally authorized measure. This prevents effects of the transients to adjacent components or devices.
- ▶ Products, not equipped with an integrated AC supply line filter must be operated with an upstream line filter.
- ▶ Using SIEB & MEYER devices in residential or business areas as well in small businesses requires additional interference suppression.

For detailed information refer to the manual "Unit Assembly Complying EMC", chapter "EMC Product Standard DIN EN 61800-3 for PDS".

Note

Refer to the product documentation of your device to find out whether or not your device is equipped with a line filter. For detailed information on line filters refer to the manual "Unit Assembly Complying EMC".

3.4 Reasonably Foreseeable Misuse

The Machinery Directive defines a "reasonably foreseeable misuse" as "use of machinery in a way not intended in the instructions but which may result from predictable human behavior".

SIEB & MEYER products are no products according to the Machinery Regulation (EU) 2023/1230.

During design and construction of the machine as well as in the operation manual the machine manufacturer is obliged to give consideration to the intended (appropriate) use of the machine and risks arising from reasonably foreseeable misuse of the machine.



To avoid injuries and material damage any use, installation and setup of SIEB & MEYER products by non-experts which exceed the technical data specified in the product documentation (high voltages, temperatures etc.) is considered to be not intended use and forbidden.



Adhere to the safety instructions on the device and in the product documentation.

3.5 Electrical Connection

⚠ DANGER



Risk of serious injuries due to touch voltages

After electric devices have been switched off touch voltages may occur depending on the device up to 4 minutes. Longer construction-related discharge times are possible. Refer to the product documentation of your device.

- All work at and within the units must only be carried out, when the units are turned off, the mains supply is cut and the DC bus is completely discharged.
- Never touch energized parts after a device has been switched. off.
- Consider the VDE regulations and the applicable accident prevention regulations (e.g. VBG 1 and VBG 4).

⚠ DANGER



Risk of serious injuries due to improper connection to earth

Incorrect or insufficient connection of the system to earth may cause dangerous currents.

- Connection to earth must be realized according to the instructions in the product documentation of your device.

⚠ DANGER



High voltages at temperature sensors and Hall sensors

- Temperature and speed sensors (Hall sensors), which are mounted within the winding of the motor, require a safe electrical separation between sensor and motor winding according to EN 62477-1 and EN 61800-5-1. Only use these sensor interfaces of the frequency converter/servo drive, if you have ensured the electrical separation between sensor and motor winding.

The electrical installation must be carried out according to the relevant electrical codes (e.g. appropriate wire gauges, fuse protection and connections of ground conductors must be considered).

Note

SIEB & MEYER devices are conceived for connection to symmetrically grounded TN networks. For detailed information regarding the connection to TN networks or other networks refer to the manual "Unit Assembly Complying EMC", chapter "Connection to Different Supply System Types".

Recommendations for the installation complying EMC (e.g. shields, connection to earth and line installations) can be found in the technical manuals of your device (only for machine manufacturers). The manufacturer of the system or machine has to meet the requirements of the legislation regarding the EMC.

1. Consider that the mains supply must be protected via an overload release with restricted guidance for each mains phase. The mains line should not be switched on, before the work is completed.
2. Before turning on the unit the first time, make sure that the connected machine will not have runaway axes.
3. Never connect capacitive loads to the output phases of the servo drives and frequency converters.
4. Prevent cable loops. Therefore, the units must only be connected to earth at the provided PE connection for the mains supply line and the racks only at the provided earth screw.

⚠ DANGER



Hazardous voltage

The use of filters causes leakage currents on the protective earth conductor (PE), which in the event of an error may be considerably higher than the rated values. To protect persons against dangerous voltages filters must be connected to earth before they are taken into operation. Possibly a residual current device (RCD) cannot be used. According to DIN EN 61800-5-1 the following measures are required in the event of leakage currents ≥ 3.5 mA:

- Install a connection without connector on the device and attach a corresponding warning note on the device, which also must appear in the documentation of the device.
- Use a protective conductor with a minimum conductor cross-section of 10 mm² or
- install a second protective conductor: connect it in parallel to the first protective conductor by using separate terminals.

Operation with residual current device (RCD)

If you use a residual current device (RCD) for protection against electric shock, only RCDs of type B are permitted on the supply side. In addition, all RCDs connected upstream up to the transformer must be of type B.

Note

For detailed information regarding the operation with residual current device (RCD) refer to the manual "Unit Assembly Complying EMC", chapter "Safety-relevant Aspects, Residual Current Device (RCD)". Also consider the standard DIN EN 61800-5-1.

3.6 Operation

⚠ WARNING



Risk of serious injuries due to moving machine parts

During the operation of an installation with open doors or removed covers, persons may seriously be injured by moving machine parts.

- Keep the doors closed during the operation and do not remove covers.

⚠ WARNING



Risk of injuries and material damage due to flying parts

Persons may be injured or material be damaged, if screws of the front panels and housing parts are not fastened.

- Before the initial operation of the installation ensure that all screws are tightened.

⚠ WARNING



Risk of burns due to hot surfaces

During operation the units can have hot surfaces according to their protection system. In particular this applies to ventilation inlets and outlets.

Never touch device parts during operation apart from operating units.

When using ferrite rings temperatures may exceed 80 °C in some cases.

- Only use cables that are provided for temperatures over 90 °C. This corresponds to the flammability rating UL 94V-0, RTI 105 °C.
- Consider the relevant notes in the manual.

Systems, into which servo drives and frequency converters are mounted, possibly must be equipped with additional protective devices according to the valid safety instructions (e.g. law about technical material, rules for prevention of accidents, etc.)

3.7 Maintenance

The unit must be checked regularly for cleanness and functionality depending on the ambient pollution. This applies in particular for installed fans.

3.8 Disposal

Note

Make sure to consider country-specific waste and disposal laws and statutes for the disposal of packing material, used batteries and irreparable devices.

SIEB & MEYER products meet the requirements of the following directive:

- ▶ 2011/65/EU (EU-directive RoHS 2 on the restriction of the use of hazardous substances in electrical and electronic equipment)

SIEB & MEYER products do not exceed the limits of the directive 2011/65/EU for hazardous substances.

SIEB & MEYER products labeled with the adjacent symbol also meet the regulations of the following directive:

- ▶ SJ/T 11364-2014 (China RoHS 2 on the restriction of the use of hazardous substances in electrical and electronic equipment)



SIEB & MEYER products labeled with the symbol above do not exceed the limits of the directive SJ/T 11364-2014 for hazardous substances.

3.9 Legal Warranty

SIEB & MEYER products are liable to a legal warranty of at least one year. Any claims for the products beyond this warranty shall be declared in an additional contractual agreement between SIEB & MEYER and the customer.

Claims for damages are excluded:

- ▶ due to improper use of the device
- ▶ when the device has been installed nonstandard or improperly, especially by electricians without license
- ▶ when the device has been employed although the protection equipment was defective
- ▶ when the maximum permissible input voltage has been exceeded
- ▶ due to improper operation
- ▶ when the device or its equipment have been modified
- ▶ due to repairs that were not carried out by SIEB & MEYER or a repair shop approved by SIEB & MEYER
- ▶ when the device was affected by foreign material or force majeure

NOTICE

Due diligence of the machine manufacturer

- A first programming carried out by SIEB & MEYER does not release the machine manufacturer from his duty to check the programmed values for correctness.

4 Unit Assembly Complying EMC

Note

The EU guidelines for electromagnetic compatibility (EMC) must be considered for the initial operation of all SIEB & MEYER devices.

The manual "Unit Assembly Complying EMC" is available in German and English and includes:

- ▶ EMC rules
- ▶ information regarding the professional grounding and wiring
- ▶ safety-relevant aspects
- ▶ extracts from the EMC product standard
- ▶ possibilities for the connection to different supply system types

Availability:

- ▶ PDF file under <https://www.sieb-meyer.com/downloads>

5 Drive Controller SD4B

5.1 Connection Examples

The following connection diagram is an example for the complete wiring of the SD4B drive. Optional connections have dashed lines.

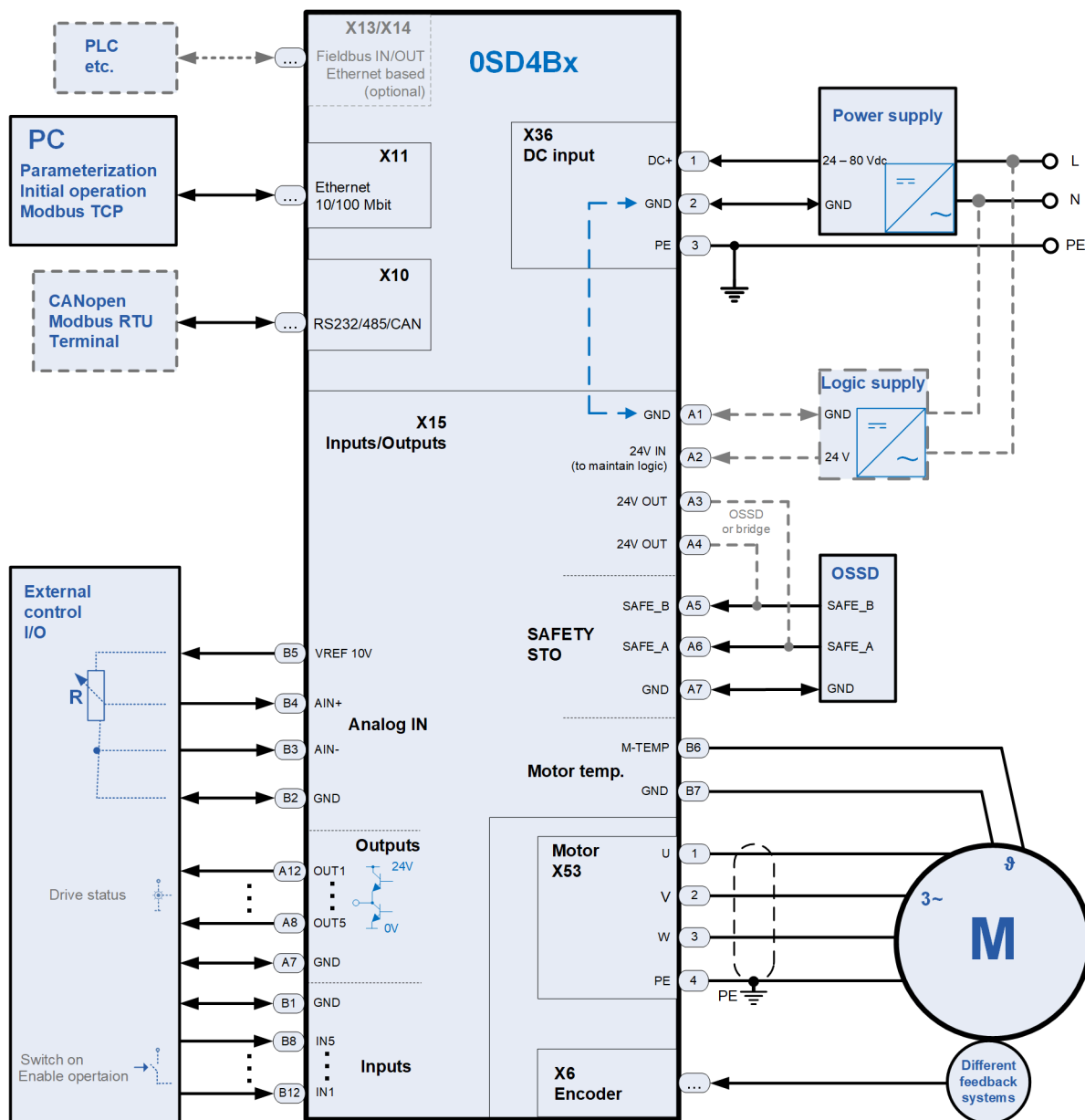


Fig. 1: SD4B connection examples

5.2 Type Plate

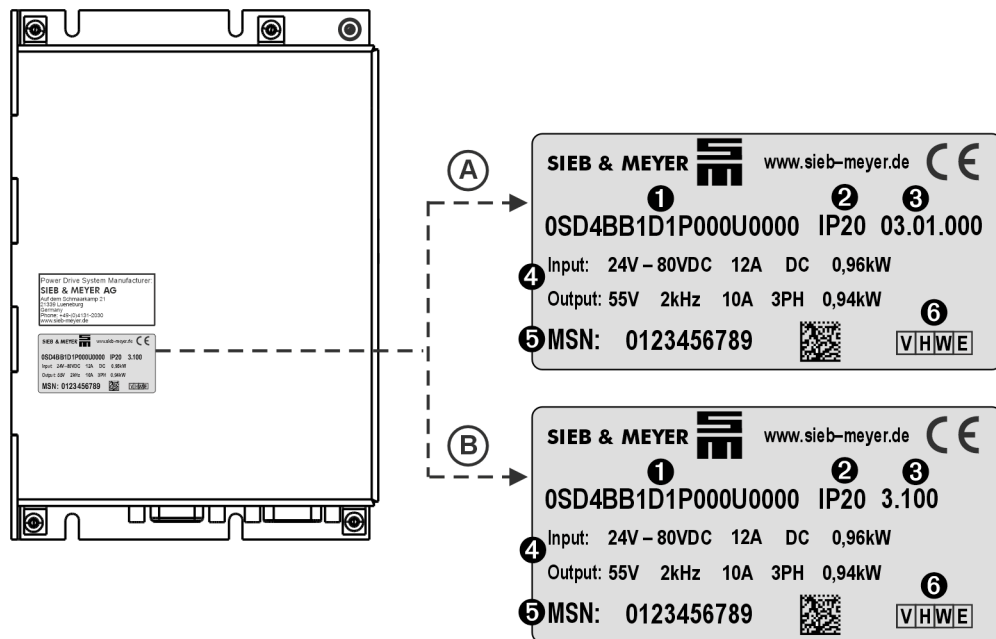


Fig. 2: Example of type plate SD4B

- [A] Current type plate: 7-digit device version ③
- [B] Old type plate: 4-digit device version ③

No.	Meaning	Explanation
①	Type code	indicates the exact device type (see page 21)
②	IP code	Indicates the level of protection of the device against touching or intrusion of solid objects (1st digit) and water ingress (2nd digit)
③	Device version	Indicates the version of the hardware; if no version is existent, 0.000 or 00.00.000 is indicated here
④	Technical data	Specifies technical data such as the input and output power, the output frequency, etc.
⑤	Serial number	Indicates the individual number of the device
⑥	QA label	Test steps for quality assurance: ▶ V = pretest or partial test ▶ H = high-voltage test ▶ W = thermal test ▶ E = final tests During testing, the QA test steps are marked, see below.

Markings of QA test steps

The QA test steps can have the following markings:

- ✗ two diagonal lines: Test step is completed.
- ✓ one diagonal line: Test step is not required.
- No marking: Test step was not yet carried out.

Note

Which test steps are required is specified in the corresponding test instruction.

Example:

Pretest (V) and high-voltage test (H) were successfully completed; thermal test (W) is not required; final tests (E) still need to be carried out.

5.3 SD4B Type Designation

The type designation is made up of the following parts::

- ▶ type code: e.g. **0SD4B B1 D1P 000U 0000**
- ▶ device version: e.g.. **04.01.000** (current format) or **4.100** (old format)

5.3.1 Type Code

	0SD4	B	b	k	X	Y	Z	f	p	s	z	a	b	c	d
Generation 0SD4															
Product series [A-Z] B = basic/board															
b: size (width × height × depth) [A-Z] B = 25 × 165 × 120 mm															
k: type of cooling [0-9] 1 = passive air cooling															
X: current class [A-Z] [Arms] D = 14 E = 17.5															
Y: number of output stages or current class of double-axis device [1-4, A-Z] 1 = single output stage															
Z: voltage class (input voltage [Vac=A-M, Vdc=N-Z] / output voltage [Vac]) N = input 48 Vdc / output 33 Vac P = input 80 Vdc / output 55 Vac															
f: variant fieldbus [0-9] 0 = no fieldbus 1 = EtherCAT / POWERLINK / PROFINET IO															
p: extension module (no retrofit) [0-9] 0 = no extension module															
s: safety option (STO is always available) [0-9] 0 = no additional safety functions 1 = SFM/SLOF															
z: export license [A-Z] U = unlimited output frequency L = max. output frequency limited to 599 Hz															
abcd: administrative options [0-9, A-Z]															

5.3.2 Device version

The device version is a continuous counter. Currently delivered devices have a 7-digit device version (xx.xx.xxx), older devices have a 4-digit device version (x.xxx). If no version is existent, 00.00.000 or 0.000 is indicated here.

If a device is exchanged by a device of another version, please contact SIEB & MEYER to check whether the devices are compatible or not.

In addition, the device version indicates the update capability of the internal device software, e.g. BIOS, FPGA or Firmware.

5.4 SD4B Variants Overview

The following table indicates the functional differences between the different device variants of the drive series SD4B.

0SD4B...		B1D1Pxxxx	B1E1Nxxxx
Construction size		B1	B1
S [VA] at 16 kHz	24 V _{DC} supply	290	380
	48 V _{DC} supply	590	760
	80 V _{DC} supply	980	–
P [W] at 16 kHz		940	750
I [A _{rms}] at 8 kHz		10.0	13.0
I [A _{rms}] at 16 kHz		10.0	13.0
I [A _{rms}] at 24 kHz		9.5	12.3
I [A _{rms}] at 32 kHz		9.0	11.5
Dimensions H×W×D [mm]		165×25×120	165×25×120
Fieldbus extension ⁽¹⁾		Possible	Possible
Safety		STO	STO

⁽¹⁾ The fieldbus and encoder extensions are not retrofit options; the desired extensions must be selected when ordering the device.

Tab. 1: SD4B variants

5.5 General Technical Data

The following data apply to all devices of the series SD4B.

5.5.1 Storage and Transport

Avoid improper mechanical load of the device. The following points must especially be taken into consideration:

- ▶ Never touch electronic components.
- ▶ Avoid stacking of unpacked devices during transport and storage.
- ▶ Sudden changes of the temperature must not exceed 0.5 °C/min.

The following climatic conditions apply to transport and storage. If required, appropriate measures must be taken to ensure these climatic conditions (installation of heating/air conditioning systems etc.):

Environmental Conditions		Storage acc. to DIN EN IEC 60721-3-1 in product package (up to 6 months) ⁽¹⁾	Transport acc. to DIN EN IEC 60721-3-2 in shipping package (over 6 months)
Climatic conditions		Class 1K4	Class 2K3
Ambient temperature ⁽²⁾	Min.	–25 °C	–25 °C
	Max.	55 °C	70 °C
Vibrations		Class 1M2	Class 2M1
Chemically active substances		Class 1C1	Class 2C1
Relative/absolute humidity		Class 1K3 (5 % RH to 85 % RH)	Class 2K3 (5 % RH to 85 % RH)
Rain		Not permissible	Not permissible
Water (not rain)		Not permissible	Not permissible
Condensation, water spray and ice		Not permissible	
Salt spray		Not permissible	

⁽¹⁾ The product package used by SIEB & MEYER does not comply with the standard of a shipping package. In addition, it does not provide protection against water spray, ice and salt spray.

⁽²⁾ The limit values apply with the coolant removed.

Tab. 2: Environmental conditions for storage and transport

Note

The maximum storage period is 2 years. Electrolytic capacitors produce high leakage currents when a voltage is applied after a long storage period without applied voltage and must be reformed. For this purpose, the operating voltage is applied via a 1 kΩ series resistor for one hour. Please contact the SIEB & MEYER service department for details.

5.5.2 Installation and Operation

NOTICE

Damage of electrostatically sensitive components due to improper handling

→ Never touch electronic components.

The following requirements are to be considered for the installation and the operation of the device. Noncompliance with these requirements is regarded as **abnormal operating condition**:

Environmental Conditions		Operation acc. to DIN EN IEC 60721-3-3
Place of installation		Switch cabinet installation, indoor, weatherprotected, without air conditioning
Climatic conditions		Class 3K3
Temperature range		5 °C to 60 °C (100 % rated current up to max. 40 °C, at higher temperatures the rated current must be reduced by 1.5 % per 1 °C.)
Humidity range		5 % RH to 85 % RH (non-condensing)
Degree of pollution acc. to DIN EN 61800-2		2
Max. site altitude		2000 m above MSL (Units with air cooling only: 100 % rated current up to 1000 m above MSL; at higher altitudes the rated current must be reduced by 1.5 % per 100 m.)
Moisture level of human skin		Dry
Chemically active substances		Class 3C1 (no salt spray)
Mechanically active substances		Class 3S1 (no requirement)
Mechanical conditions	Class	Class 3M2
	Vibrations	2 to 8 Hz: Amplitude excursion = 1.5 mm 9 to 200 Hz: Amplitude of acceleration = 5 m/s ²
	Shock	Peak acceleration = 40 m/s ²
Biological conditions		Class 3B1 (no requirement)
UV resistance		No requirement

Tab. 3: Environmental conditions during operation



Important

Make sure that the aeration elements are free and open, so that the air circulation is not restricted.

5.5.3 Current Derating Due to Site Altitude and Temperature

The following table indicates the rated current in percent depending on the site altitude and the ambient temperature:

Temperature	Site altitude above MSL	
	≤ 1000 m	≤ 2000 m
≤ 40 °C	100 %	85 %
≤ 50 °C	85 %	70 %
≤ 60 °C	70 %	55 %
Linear interpolation is allowed.		

Tab. 4: Current Derating Due to Site Altitude and Temperature

5.5.4 Current Derating Due to Low Speed

During phases of a static rotating field or low rotating field frequencies ($f \leq 5$ Hz) the power semiconductors of the output stage are subject to higher loads.

For devices of the generation SD4x the current will be limited at rotating field frequencies $< f_{\text{derating}}$ as shown in the following figure.

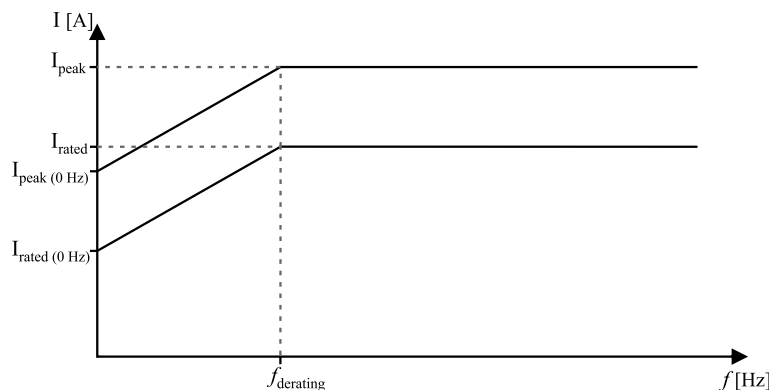


Fig. 3: Current derating at low output frequencies

5.5.5 S6 Duty Type

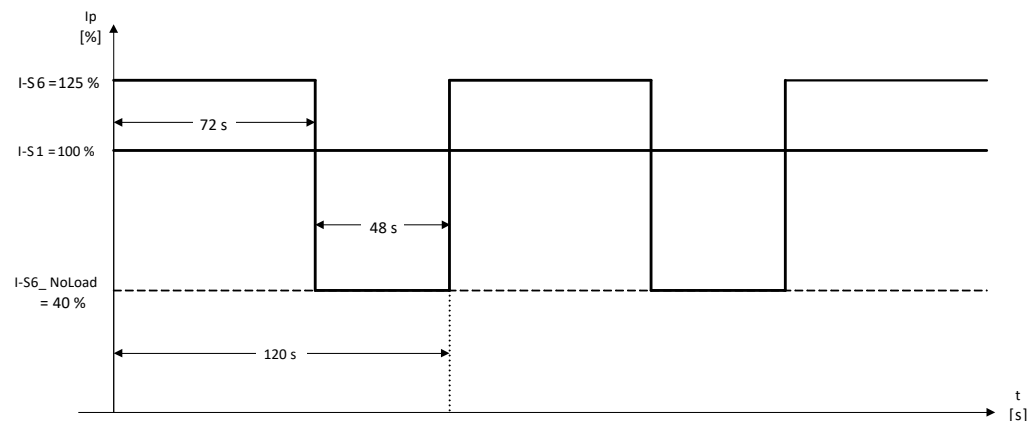
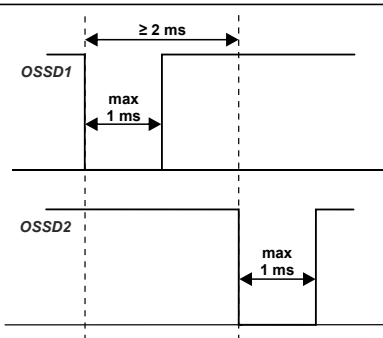


Fig. 4: Continuous-operation periodic duty (S6)

5.5.6 Technical Data of Interfaces

Interface	Property	Value
X6 encoder ▶ quadrature A/B, pulse/direction, up/down, 2.5 Mbaud encoder, BISS-C, 5 V pulse encoder (compatible with RS422), Sanyo Denki	Interface type	RS422 (5 V)
	Encoder supply	5.3 V max. 200 mA
	Count frequency	5 MHz per track 20 MHz after quadruplication
	Short-circuit proof	Yes
	Encoder failure monitoring	Yes
X10 serial interfaces	RS232 (operating terminal)	Compliant with EIA/TIA-232-F
	RS485 (Modbus RTU)	Compliant with TIA/EIA-485-A
	CAN (CANopen)	Compliant with ISO 8482:1993
	Encoder supply	5.3 V
X15 analog input ▶ differential	Working range	±10 V
	Max. input voltage	±12 V
	Resolution	14 Bit
	Linearity	< 0.1 %
	Offset error	< 0.1 %
	Input impedance	10 kΩ
	Sampling rate	4 kHz
X15 10 V reference voltage (VREF 10V)	Max. output current	50 mA
	Accuracy	±0.5 %
	Short-circuit proof	Yes
X15 digital inputs IN1 to IN5 ▶ referenced to GND	Low level (0 V = logic 0 = L)	< 2.6 V
	High level (24 V = logic 1 = H)	> 12.5 V
	Sampling rate software	4 kHz
	Electric strength	35 V
	Typical delay time L → H	< 8 μs
	Typical delay time H → L	< 19 μs
	Typical current consumption	1.2 mA
X15 digital inputs IN4, IN5 ▶ referenced to GND ▶ used as touch probe input	Low level (0 V = logic 0 = L)	< 0.98 V
	High level (24 V = logic 1 = H)	> 6.5 V
	Sampling rate FPGA	2 MHz
	Electric strength	35 V
	Typical delay time L → H	< 3.5 μs
	Typical delay time H → L	< 1 μs
	Typical current consumption	1.2 mA
X15 digital outputs OUT1 to OUT5 ▶ referenced to GND ▶ high-side or low-side configurable via parameters (only as group); high-side ± 24 V at X15/A2	Sampling rate software	4 kHz
	Short-circuit proof	Yes
	Max. operate time	< 13 μs
	Max. release time	< 6 μs
	Max. load capacity individually	20 mA (100 mA with 24 V logic supply)
	Max. load capacity together	100 mA (400 mA with 24 V logic supply)
	Others	For resistive load only, no internal free-wheeling path
X15 motor protection (M-TEMP)	Sensor range	0.3 kΩ to 2.5 kΩ
	Galvanic isolation	No
	Supported sensor types	PTC NTC PT1000 KTY84130 KTY83122

Interface	Property	Value
X15 safety circuit ▶ STO inputs	Voltage range: safe input level low	< 2.4 V
	Voltage range: safe input level high	>18 V
	Electric strength	48 V
	Response time	4 ms
	OSSD test signals	

Tab. 5: Technical data of the interfaces

5.5.7 Motor Control

Sampling rate	Unit	Value
Sampling rate commutation	kHz	2 × switching frequency
Sampling rate current control	kHz	16
Sampling rate speed control	kHz	16
Sampling rate position control	kHz	16

Tab. 6: Motor control

5.5.8 Specification of Real Time Clock

The real time clock is used to determine the timing of device status messages.

When the device is connected via fieldbus or Ethernet, clock synchronization is possible via this interface.

Real time clock	
Battery	Lithium coin cell BR1225
Service life under standard conditions ⁽¹⁾	> 6 years
Service life with clock synchronization	Unlimited

⁽¹⁾ The device must be supplied with 24 V logic supply at least 50 % of the time. If this is not the case, the service life decreases.

Tab. 7: Specification of the real time clock

Should the battery fail, the physical device functionality remains unaffected. The only consequence is that the drive cannot determine the timing of new device status messages.

Note

A battery change may only be carried out by SIEB & MEYER or a repair shop approved by SIEB & MEYER. Unauthorized opening of the device results in the loss of warranty!

6 Device Variant 0SD4B B1 xxx xxxx

Features:

- ▶ DC power supply
 - 0SD4B B1 D1P xxxx: adjustable from 24 to 80 V_{DC}
 - 0SD4B B1 E1N xxxx: adjustable from 24 to 48 V_{DC}
- ▶ Output power
 - 0SD4B B1 D1P xxxx: up to 940 W
 - 0SD4B B1 E1N xxxx: up to 750 W
- ▶ safety circuit (STO)

6.1 Dimensions and Mounting

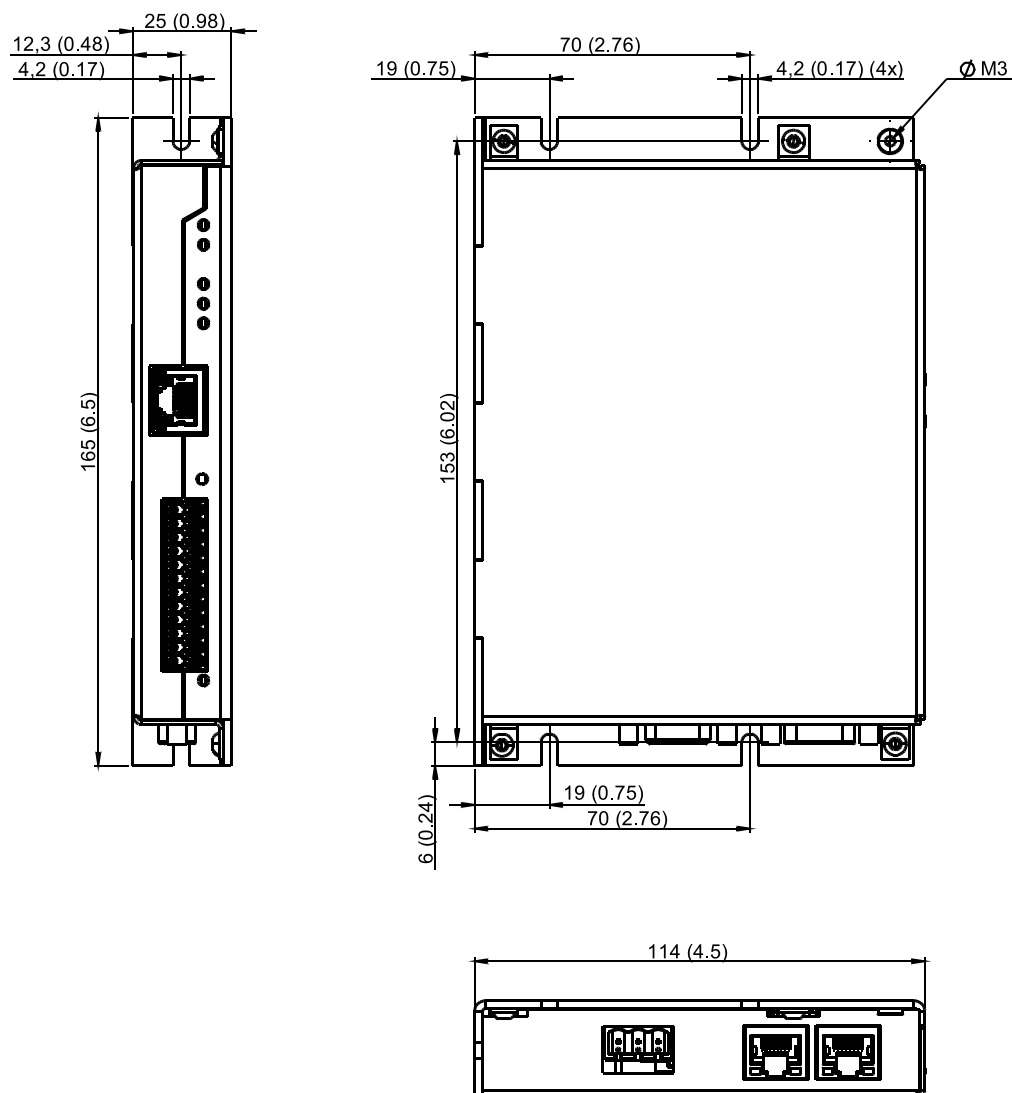


Fig. 5: Dimensions of SD4B in mm (inch)

Mounting Instructions

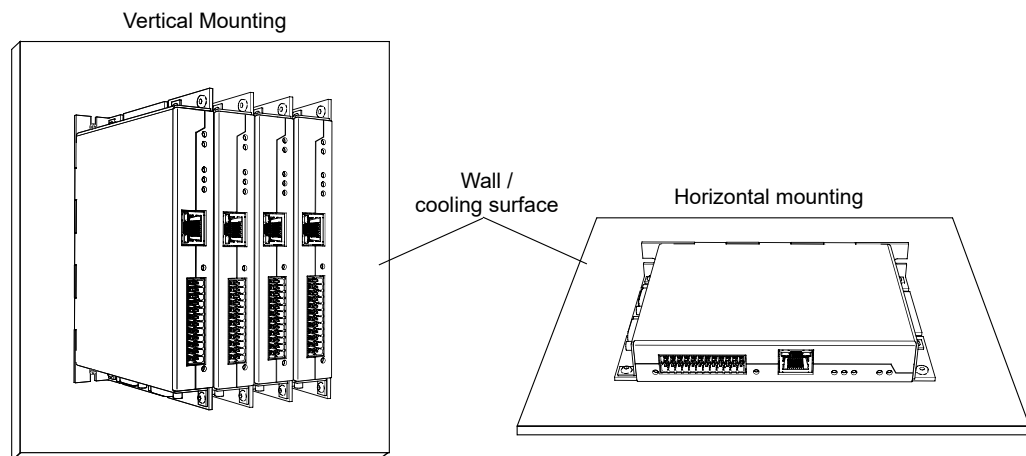


Fig. 6: Mounting options

- ▶ The device is mounted horizontally or vertically to a mounting wall. The mounting surface is used for cooling.
- ▶ The mounting surface must be able to dissipate a heat output of 25 W at a housing temperature of 60 °C for each device.
- ▶ With vertical mounting several device can be mounted next to each other without any space in-between.

6.2 Technical Data 0SD4B B1 D1P xxxx

6.2.1 Electrical Specification

Device variant		Unit	0SD4B B1 D1P xxxx			
Power supply						
Overvoltage category acc. to DIN EN 61800-5-1			III			
Rated power supply ⁽¹⁾		V _{DC}	24 / 48 / 80			
Input voltage range		V _{DC}	20 ... 90			
Rated input current		A _{rms}	12			
Rated input power		VA	1,030			
DC link						
Capacity of DC link		mF	1.320			
Undervoltage threshold		V _{DC}	10			
Overvoltage threshold		V _{DC}	110			
Discharge time		min	10			
Logic supply						
Rated supply voltage (SELV) –15 % +20 %		V _{DC}	24			
Power consumption		A	< 0.5			
Output data (±3 %)						
Drive function			Vector control / V/f control / BLDC control			
Operating frequency		kHz	8	16	24	32
Rated output current ⁽²⁾		A _{rms}	10.0	10.0	9.5	9.0
Peak output current ⁽²⁾		A _{rms}	14.0 (5.0 s)	14.0 (5.0 s)	14.0 (4.3 s)	14.0 (3.7 s)
S6 current (see page 24)		A _{rms}	12.0	12.0	11.4	10.8
Rated current derating frequency	see page 24	Hz	5	5	5	5
Rated output current at 0 Hz		A _{rms}	7.0	7.0	7.0	7.0
Peak output current at 0 Hz		A _{rms}	14.0 (1.1 s)	14.0 (1.1 s)	14.0 (1.1 s)	14.0 (1.2 s)
Rated output apparent power at 24 V _{DC} supply		VA	290	290	280	260
Rated output apparent power at 48 V _{DC} supply		VA	590	590	560	530
Rated output apparent power at 80 V _{DC} supply		VA	980	980	930	880
Peak output apparent power at 24 V _{DC} supply		VA	410	410	410	410
Peak output apparent power at 48 V _{DC} supply		VA	820	820	820	820
Peak output apparent power at 80 V _{DC} supply		VA	1,370	1,370	1,370	1,370
Max. output rotating field frequency		Hz	599 ⁽³⁾ /1,500	599 ⁽³⁾ /3,000	599 ⁽³⁾ /3,000	599 ⁽³⁾ /3,000
Switch-off temperature		°C	85.0	85.0	85.0	85.0
Output voltage 3 phases (rated power)		V _{rms}	0 to 0.7 × input voltage			
Stability of output frequency		%	<0.2			
Power Loss						
Power loss in rated operation		W	25			
Power loss with output stage deactivated		W	4.5			
Ballast circuit						
Internal ballast resistor		Ω	22			
Rated power, internal ballast resistor		W	50.0			
Pulse energy, internal ballast resistor		kJ	1.0			
Device						
IP code			IP 20			
Protection class acc. to DIN EN 61800-5-1			I			
Weight		kg	0.525			
Primary cooling medium			Air			

⁽¹⁾ Admissible voltage ripple: max. 10 %

- (2) Value applies when mounted to cooling surface of the installation; minimum size of cooling surface: 6 dm² (natural convection).
- (3) Applies to device variant 0SD4B B1 D1P xxxL only (with limited output frequency), not for device variant 0SD4B B1 D1P xxxU (with unlimited output frequency).

Tab. 8: Electrical data 0SD4B B1 D1P xxxx

6.2.2 Overload Times

Load cutoff:

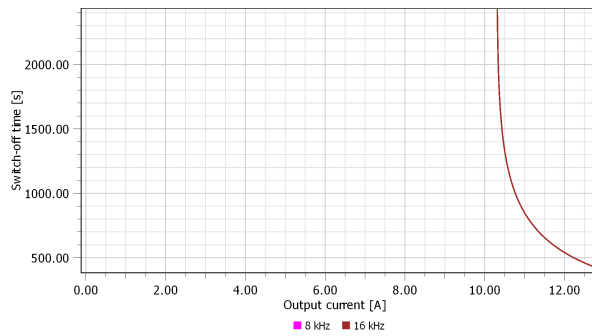


Fig. 7: Load cutoff 0SD4B B1 D1P xxxx

Overload cutoff:

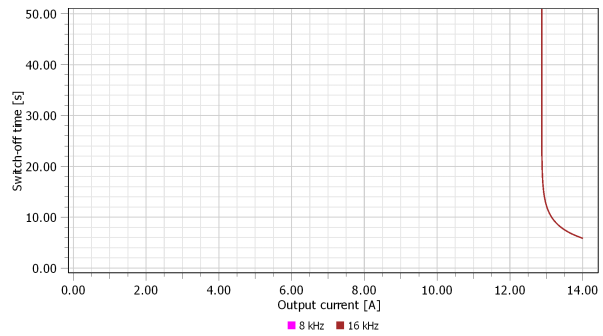


Fig. 8: Overload cutoff 0SD4B B1 D1P xxxx

6.3 Technical Data 0SD4B B1 E1N xxxx

6.3.1 Electrical Specification

Device variant		Unit	0SD4B B1 E1N xxxx			
Power supply						
Overvoltage category acc. to DIN EN 61800-5-1			III			
Rated power supply ⁽¹⁾		V _{DC}	24 / 48			
Input voltage range		V _{DC}	20 ... 50			
Rated input current		A _{rms}	16			
Rated input power		VA	800			
DC link						
Capacity of DC link		mF	1.880			
Undervoltage threshold		V _{DC}	10			
Overvoltage threshold		V _{DC}	75			
Discharge time		min	10			
Logic supply						
Rated supply voltage (SELV) –15 % +20 %		V _{DC}	24			
Power consumption		A	< 0.5			
Output data (±3 %)						
Drive function			Vector control / V/f control / BLDC control			
Operating frequency		kHz	8	16	24	32
Rated output current ⁽²⁾		A _{rms}	13.0	13.0	12.3	11.5
Peak output current ⁽²⁾		A _{rms}	17.5 (5.0 s)	17.5 (5.0 s)	17.5 (4.3 s)	17.5 (3.7 s)
S6 current (see page 24)		A _{rms}	15.6	15.6	14.7	13.8
Rated current derating frequency		see page 24	Hz	5	5	5
Rated output current at 0 Hz			A _{rms}	9.2	9.2	8.7
Peak output current at 0 Hz			A _{rms}	17.5 (1.0 s)	17.5 (1.0 s)	117.5 (1.0 s)
Rated output apparent power at 24 V _{DC} supply		VA	380	380	360	340
Rated output apparent power at 48 V _{DC} supply		VA	760	760	720	680
Peak output apparent power at 24 V _{DC} supply		VA	510	510	510	510
Peak output apparent power at 48 V _{DC} supply		VA	1,030	1,030	1,030	1,030
Max. output rotating field frequency		Hz	599 ⁽³⁾ /1,500	599 ⁽³⁾ /3,000	599 ⁽³⁾ /3,000	599 ⁽³⁾ /3,000
Switch-off temperature		°C	85.0	85.0	85.0	85.0
Output voltage 3 phases (rated power)		V _{rms}	0 to 0.7 × input voltage			
Stability of output frequency		%	<0.2			
Power Loss						
Power loss in rated operation		W	25			
Power loss with output stage deactivated		W	4.5			
Ballast circuit						
Internal ballast resistor		Ω	10			
Rated power, internal ballast resistor		W	50.0			
Pulse energy, internal ballast resistor		kJ	1.0			
Device						
IP code			IP 20			
Protection class acc. to DIN EN 61800-5-1			I			
Weight		kg	0.525			
Primary cooling medium			Air			

⁽¹⁾ Admissible voltage ripple: max. 10 %

⁽²⁾ Value applies when mounted to cooling surface of the installation; minimum size of cooling surface: 6 dm² (natural convection)

⁽³⁾ Applies to device variant 0SD4B B1 E1N xxxL only (with limited output frequency), not for device variant 0SD4B B1 E1N xxxU (with unlimited output frequency).

Tab. 9: Electrical data 0SD4B B1 E1N xxxx

6.3.2 Overload Times

Load cutoff:

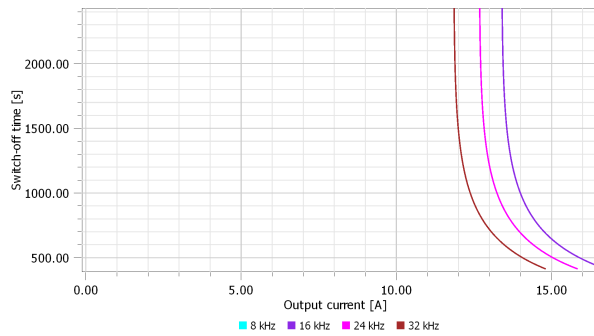


Fig. 9: Load cutoff 0SD4B B1 E1N xxxx

Overload cutoff:

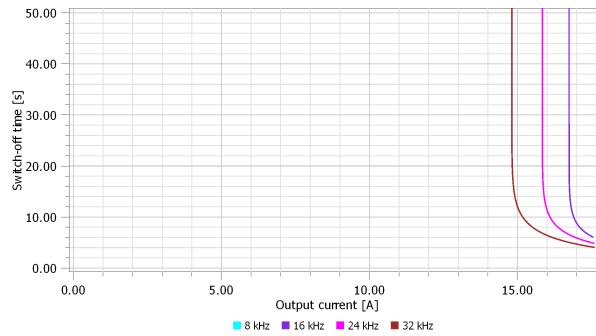


Fig. 10: Overload cutoff 0SD4B B1 E1N xxxx

6.4 Connectors, Displays and Buttons

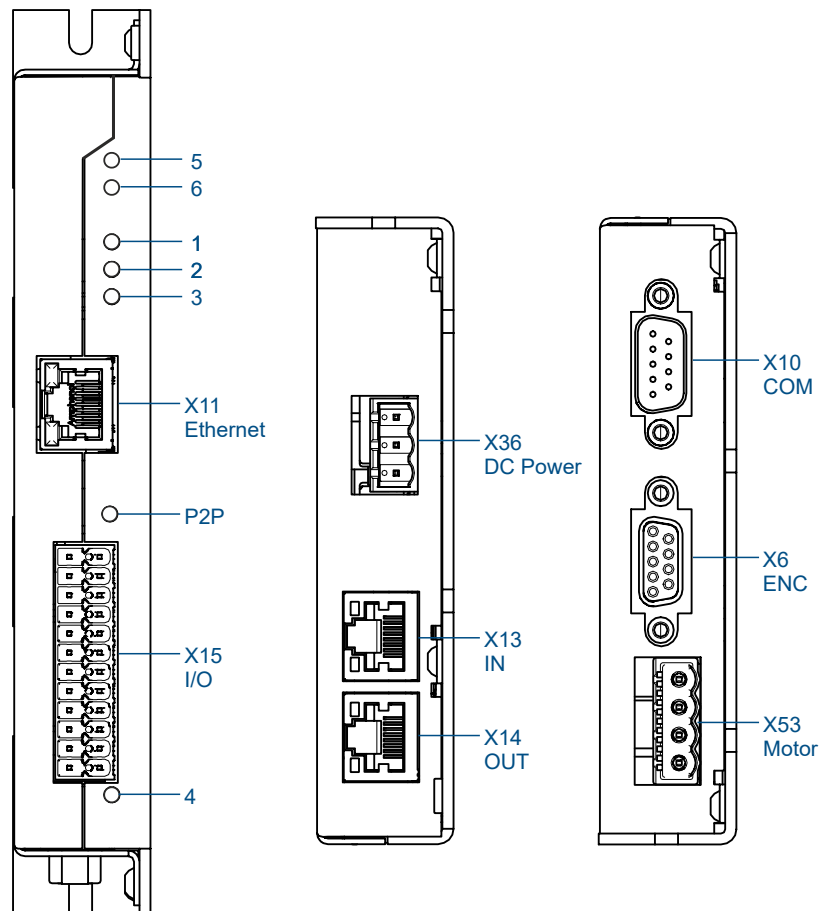


Fig. 11: Views of SD4B: front panel (left), top side (middle) and bottom side (right)

Name	Meaning	Description
1/2/3	Status LEDs for the device	page 62
4/5/6	Status LEDs for the fieldbus	
P2P	P2P button	page 39
X6 ENC	Encoder input	page 39
X10 COM	COM interface (RS232/RS485/CAN)	page 43
X11 Ethernet	Ethernet interface	page 45
X13 IN	Fieldbus input	page 47
X14 OUT	Fieldbus output	
X15 I/O	Inputs/outputs	page 48
X36 DC Power	DC power input	page 52
X53 Motor	Motor output	page 53

Note

You can order the appropriate connector kit for drive controller SD4B at SIEB & MEYER:

- ▶ device variant 0SD4B B1 D1P xxxx: article number [32299587](#)
- ▶ device variant 0SD4B B1 E1N xxxx: article number [32299635](#)

7 Connectors

7.1 Operation of the Terminal Connectors

SIEB & MEYER uses terminal blocks by Phoenix Contact (www.phoenixcontact.com).

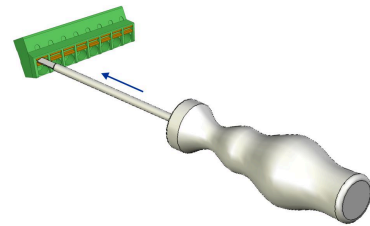
In this manual you find the following supplementary notes for connection via terminal blocks:

- ▶ Phoenix Contact name of the terminal block (e.g. "MC", "PC4")
- ▶ min. conductor cross-section of the terminals according to the rated current of the SIEB & MEYER device
- ▶ max. conductor cross-section according to the specification of the manufacturer Phoenix Contact
- ▶ max. tightening torque of the screws for screw terminals according to the specification of the manufacturer Phoenix Contact

7.1.1 Spring-cage Connection

The individual conductors are fixed in the terminal by means of spring-cage connection. In order to plug and unplug a conductor proceed as follows:

- ▶ Push a screwdriver into the designated groove above the chamber to operate the spring-cage connection as shown in the figure.
- ▶ Put the conductor into the chamber / remove the conductor from the chamber.
- ▶ Release the screwdriver.



Note

Solid wires or conductors with ferrules can be put directly into the chamber without the help of a screwdriver.

7.1.2 Push-in Spring Connection

Terminals using the push-in connection technology work on the pressure spring principle:

The contact spring presses the cable against the conducting copper bar. The special spring profile allows direct and tool-free wiring of solid and stranded cables previously assembled with ferrule or compressed conductor ends (0.25 mm² or greater).

- ▶ When the cable is inserted into the clamping unit the spring opens automatically.
- ▶ In order to loosen the conductor or connect smaller ones with a cross-section of 0.14 mm² or greater, you must press the push button of contrasting color using a slot screwdriver.

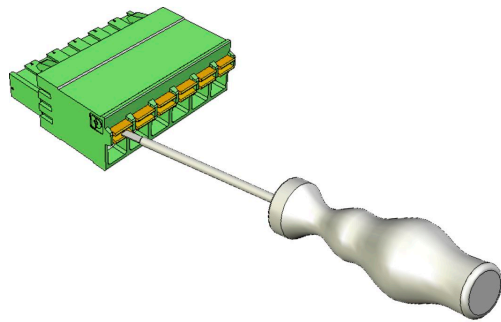


Fig. 12: Open clamping unit

7.2 Cable Requirements

The cables described in this chapter meet the SIEB & MEYER requirements for cables and connectors in order to ensure their proper function.

NOTICE

Risk of cable damage due to mechanical loads

Cables that are exposed to mechanical loads, e.g. trailing chains or similar, must be suited for this purpose. Otherwise, damage may occur. SIEB & MEYER cables are not suitable for trailing chains!

- The machine manufacturer must ensure that only cables are used that are suitable for this purpose.
- All cables used to connect the devices must be equipped with an appropriate strain relief according to DIN EN 61800-5-1. This is particularly important, if no shield connection clamps (SK 8-D, SK14-D Phoenix clamps) are used at the chassis frame.

In general, the following principles apply for the cables (see also documentation "Unit Assembly Complying EMC")

- ▶ Motor and signal cables must not be wired in the same cable protection hose!
- ▶ Motor cables must have a wire-meshed shield. They must be wired separately from signal cables.
- ▶ Signal lines must have a wire-meshed shield. Differential signals should only be transmitted with twisted-pair lines. They must be wired separately from motor cables.
- ▶ The cable shields must be connected to the connector shell inside of the connectors. In the switch cabinet they should be connected to a ground bus.
- ▶ Cable shields not ending in a connector inside of the switch cabinet such as motor cables must be connected to the ground bus.
- ▶ Both ends of the shield of shielded cables must generally be connected to the shell.

The line cross-sections should be selected carefully so that the maximum admissible current is not exceeded at the maximum ambient temperature (see technical data). DIN EN 60204-1 defines the admissible values for the individual line cross-sections which must absolutely be taken into account.

The current carrying capacity in connection with the line cross-section of copper conductors isolated with PVC or cables according to DIN EN 60204-1 for different types of wiring are indicated in the following table. All values are related to an ambient temperature of +40 °C and an operating temperature at the conductor of 70 °C.

Conductor cross-section A [mm²]	Admissible current I [A]		
	B2 wiring ⁽¹⁾	Wiring type C ⁽²⁾	Wiring type E ⁽³⁾
0,75	8,5	9,8	10,4
1,00	10,1	11,7	12,4
1,50	13,1	15,2	16,1
2,50	17,4	21	22
4	23	28	30
6	30	36	37
10	40	50	52
16	54	66	70
25	70	84	88
35	86	104	110
50	103	125	133
70	130	160	171
95	156	194	207
120	179	225	240

⁽¹⁾ cable laying in installation tubes or closed installation channels on or under the wall surface or in channels for underfloor (multicore or sheathed cables)

⁽²⁾ direct cable laying on or under the wall/ceiling or in cable trays (multicore or sheathed cables)

⁽³⁾ free cable laying with suspension ropes or on cable racks with a min. distance of $0.3 \times$ cable diameter to the wall (multicore or sheathed cables)

Tab. 10: Current carrying capacity according to DIN EN 60204-1

The following correction factors are provided for deviating ambient temperatures:

Ambient temperature T [°C]	Correction factor
30	1,15
35	1,08
40	1,00
45	0,91
50	0,82
55	0,71
60	0,58

Cross-sections of round conductors

The standard values of the cross-section of round copper conductors as well as the approximate ratio of metric ISO and AWG/MCM values are shown in the following table.

Standardized cross-sections of round conductors:

ISO cross-section [mm²]	AWG/MCM	
	Value	Equivalent cross-section [mm²]
0,2	24	0,205
–	22	0,324
0,5	20	0,519
0,75	18	0,82
1,0	–	–
1,5	16	1,3
2,5	14	2,1
4,0	12	3,3
6,0	10	5,3
10	8	8,4
16	6	13,3

ISO cross-section [mm²]	AWG/MCM	
	Value	Equivalent cross-section [mm²]
25	4	21,2
35	2	33,6
50	0	53,5
70	00	67,4
95	000	85,0
–	0000	107,2
120	250 MCM	127

Note

The line corresponds to a value when the connection possibilities are taken into account.

7.2.1 Motor Cable

⚠ DANGER



Dangerous shock currents

connect the motor housing to the ground of the machine or
connect the ground terminal of the motor connector to the central ground point of the machine.

→ Consider the following with regard to shielding: Always use shielded motor cables.

NOTICE

Disturbing ground loops

Incorrect connection of protective earth connections in motor cables may cause disturbing ground loops and malfunction of the motor.

- The described measures prevent disturbing ground loops.
- Connect the protective earth conductors additionally led in motor cables directly to the shield line and label them with $\perp$ or PE.
- If the procedure turns out to be impracticable, omit the earth conductor connection in the motor cables and wire a separate earth conductor in parallel to the motor cables..
- Ensure to return the cable to the drive! Do not wire the cable with another ground loop.

Use shielded cables for the motor in order to keep interference as low as possible.

The cable shield must be connected large-area with 360° shield termination. In addition, the motor cable should be as short as possible to reduce electromagnetic radiation and capacitive currents.

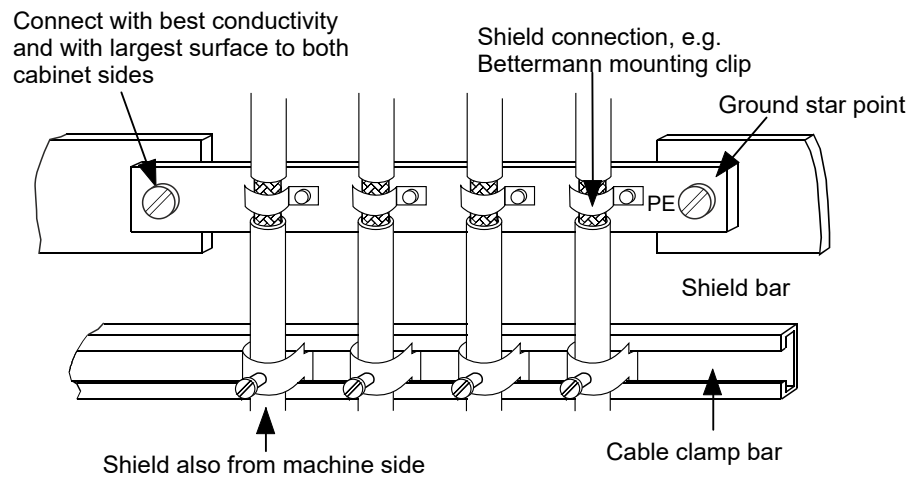


Fig. 13: Motor connection

Requirements to the motor cable

The maximum admissible length of the motor cable is 100 m. The capacity must not exceed 5.2 nF.

Example: If the cable capacity is 0.26 nF per meter, the maximum admissible length of the motor cable is 20 m.

7.2.2 Communication Cables

Please connect the communication interfaces only with high-quality cables according to the relevant standards.

NOTICE

Ungrounded test setups

→ So-called "flying test systems" that are not or not sufficiently grounded can cause damage to the communication interfaces or to the connected devices.

RJ45

Use only high-quality RJ45 cables.

Low priced RJ45 cables can damage the female RJ45 connector. The dimensions of the cable connectors deviate frequently from the standard dimensions. Thus, they cause problems with the electrical contact after only few connecting cycles.

7.2.3 Cables for the Rotor Position Detection

Use shielded lines and shielded D-sub shells for wiring the different measuring systems. Connect the cable shield to both connector shells: At the drive connect the shield to the D-sub shell and at the motor to the shell of the measuring system connector.

Differential signals should only be transmitted with twisted-pair lines.

7.3 P2P Button

On the front panel of the device you find a small circular opening. The P2P button is located behind this opening. By means of this button you can switch from the parameterized IP mode to the temporary IP mode “Point to point (AutoIP)”.

This is required, for example, when the parameterized IP mode is not correct and you have no connection with the device to change the parameterization. In this case, proceed as follows:

1. Push the button using a pointed object (e.g. ball pen) for at least 1 second.
2. Disconnect the LAN cable (X11) and connect it directly to the PC.
The new IP mode is indicated via the LEDs and is then active. Now, you can change the parameterization.
3. To exit the temporary P2P mode, push the P2P button again for at least 1 second or switch the device off and on.

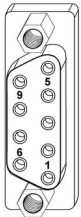
For a detailed description of the procedure refer to the document “Drive Controller SD4x – Ethernet Configuration”.

7.4 X6 – Encoder

Encoder input for motor feedback

- ▶ encoder (quadrature A/B, pulse/direction, up/down)
- ▶ 5 V pulse encoder
- ▶ BiSS C
- ▶ RENISHAW BiSS C
- ▶ Sanyo Denki encoder

9-pole female D-sub connector; see [specification \(p. 25\)](#)

X6 (ENC1)	Pin	I/O	Name	Meaning (measuring system 1)
	1	I/O	M1_A+	Track A+
	2	I/O	M1_A-	Track A-
	3	I/O	M1_N+	Zero pulse +
	4	I/O	M1_N-	Zero pulse -
	5	I/O	GND	Ground
	6	I/O	M1_B+	Track B+
	7	I/O	M1_B-	Track B-
	8	O	VCC5.3	5.3 V supply voltage
	9	I	M1_AUX+	Pulse IN (5 V)

The cable shield is connected to the connector shell.

Stud bolt flange: max. tightening torque = 0.7 Nm

7.4.1 Encoder Signals

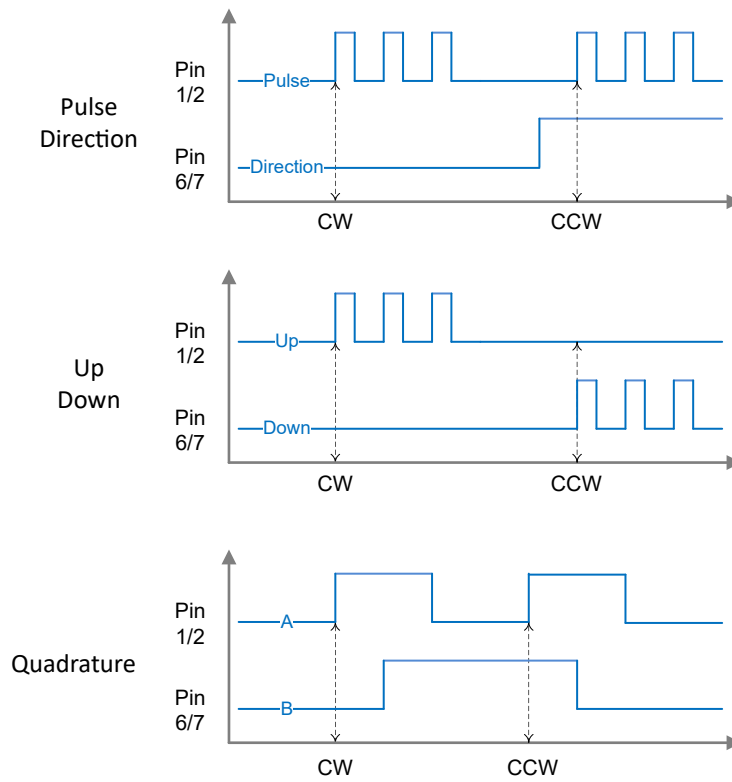


Fig. 14: Encoder signals (X6)

7.4.2 Hall Sensor RS422

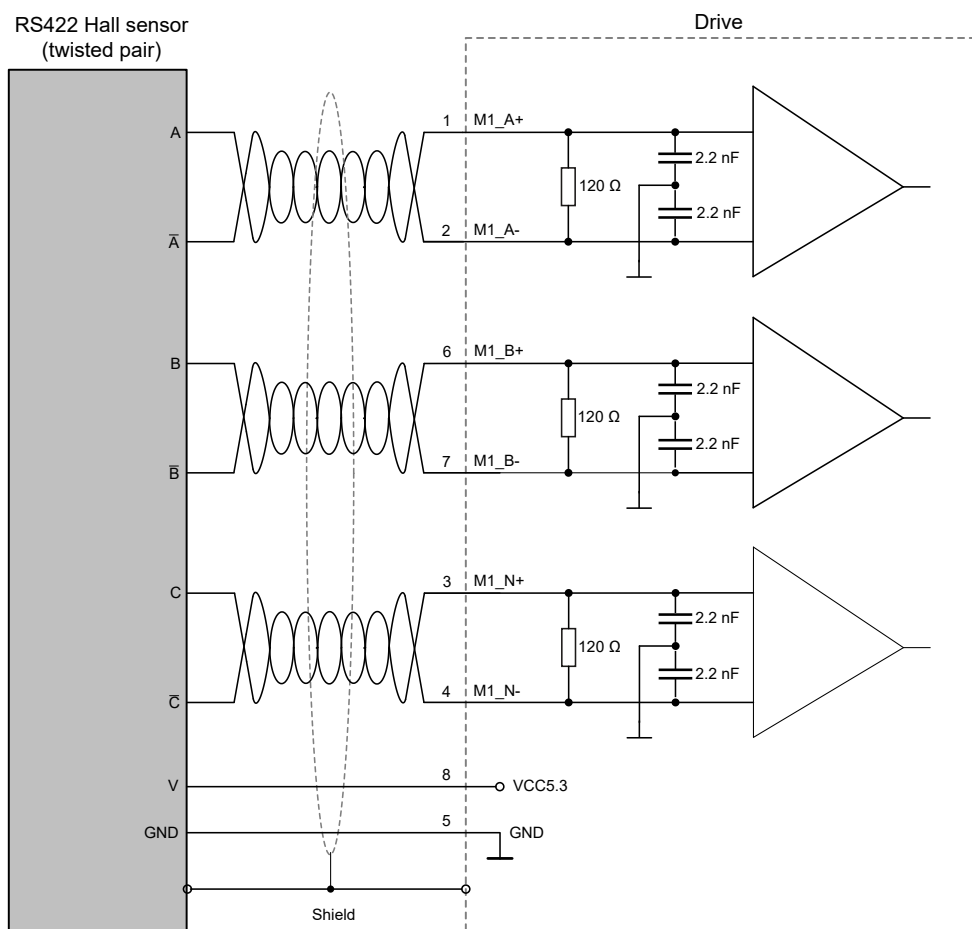


Fig. 15: Hall sensor RS422 (X6)

7.4.3 Pulse Encoder 5 V

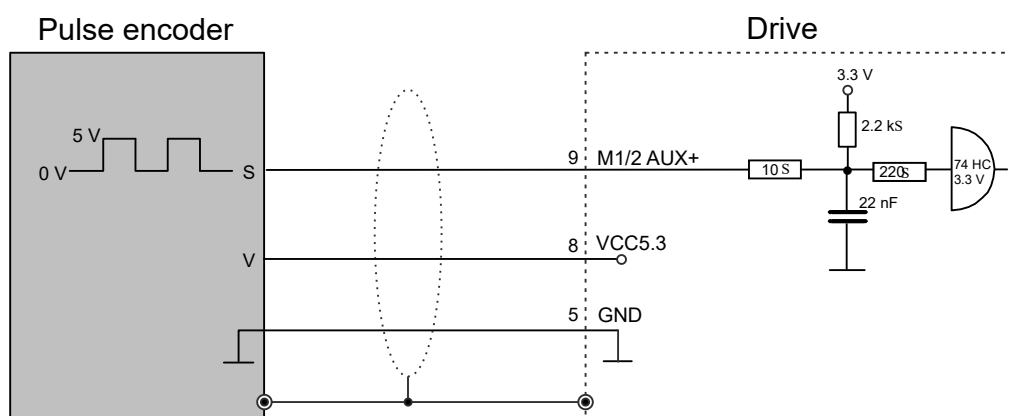


Fig. 16: Pulse encoder 5 V (X6)

7.4.4 Incremental Encoder with TTL Signals

The connection is implemented according to interface standard EIA-422.

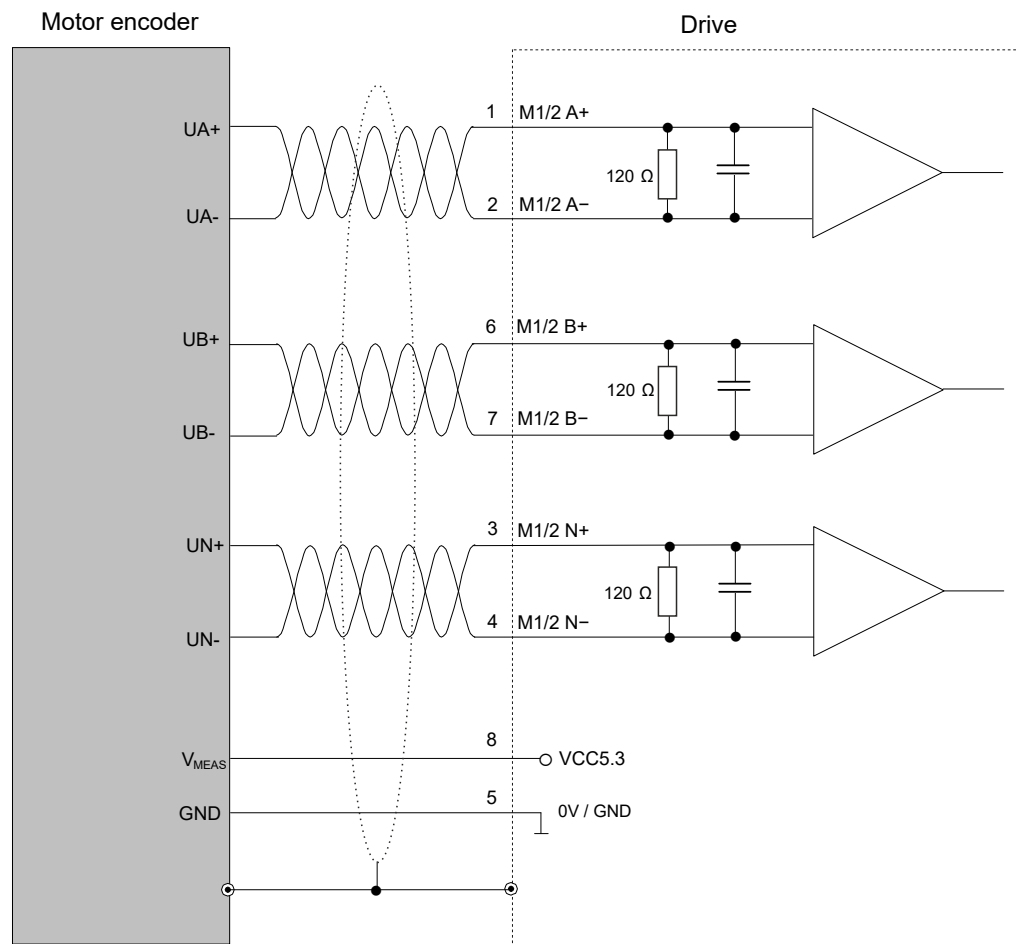


Fig. 17: Incremental encoder with TTL signals (X6)

7.4.5 Sanyo Denki Encoder

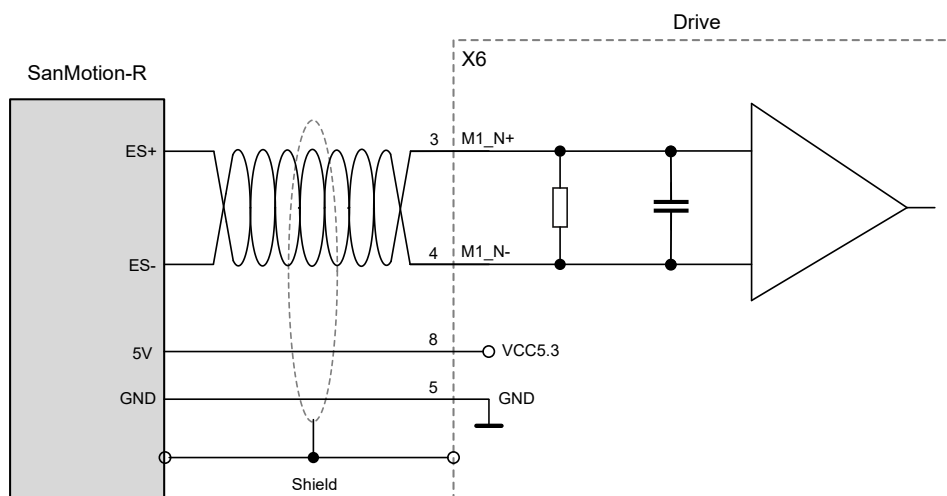
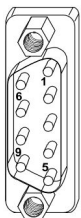


Fig. 18: Sanyo Denki encoder (X6)

7.5 X10 – Communication RS232/RS485/CAN

COM interface for the connection of the operating terminal and for CANopen and Modbus RTU networks

9-pole male D-sub connector; see [specification \(p. 25\)](#)

X10	Pin	I/O	Name	Meaning
	1	O	VCC5.3	5.3 V supply voltage (power supply for optional operating terminal)
	2	I	RS232_Rx	Receive data
	3	O	RS232_Tx	Transmit data
	4	I/O	CAN_L	CAN Low
	5	I/O	GND	Ground
	6	I/O	RS485_D+	Data+
	7	I/O	RS485_D-	Data-
	8	I/O	CAN_H	CAN High
	9	I/O	GND	Ground

Stud bolt flange: max. tightening torque = 0.7 Nm

Note

CAN bus: This is a multiport connector. Therefore the pin assignment does not comply with the CiA standard und must be adapted accordingly.

7.5.1 RS232 Diagnosis

Note

This RS232 interface provided at connector X10 is a lower level diagnosis interface, e.g. for the program PuTTY.

Do **not** use this interface for the communication with the software *drivemaster4*. Please, use the Ethernet-Interface X11 for this purpose.

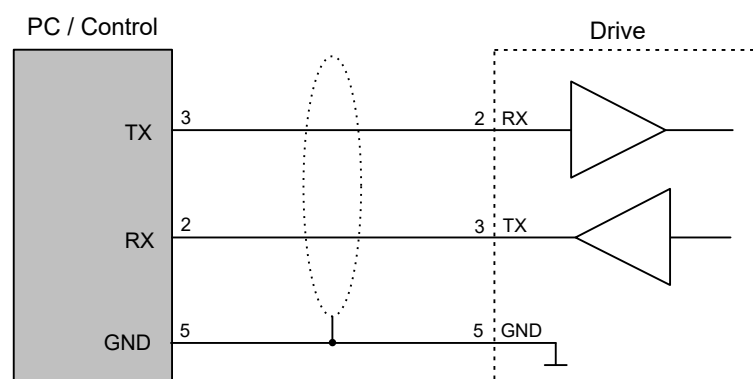


Fig. 19: RS232 interface (X10)

If you connect X10 to a standard RS232 interface of a PC (9-pole male D-sub connector), the used cable must be constructed as follows:

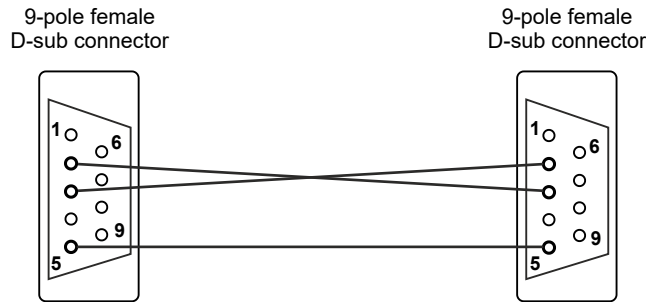


Fig. 20: RS232 cable

7.5.2 RS485 Bus

The RS485 interface is a two-wire connection with differential signals. The lines have a rated impedance of $120\ \Omega$. At both ends of the bus cable, the signal lines are connected to a terminating resistor of $120\ \Omega$ (see figure). Since the drives do not provide an internal terminating resistor, the bus termination must be installed in the bus cable.

You can realize an external safety circuit using an ohmic voltage divider. Thereby, resistors create a differential bus voltage to put the receivers in a safe status. These resistors with a value of approximately $560\ \Omega$ are usually implemented in the main device (client). The drives do not provide the resistors for this purpose.

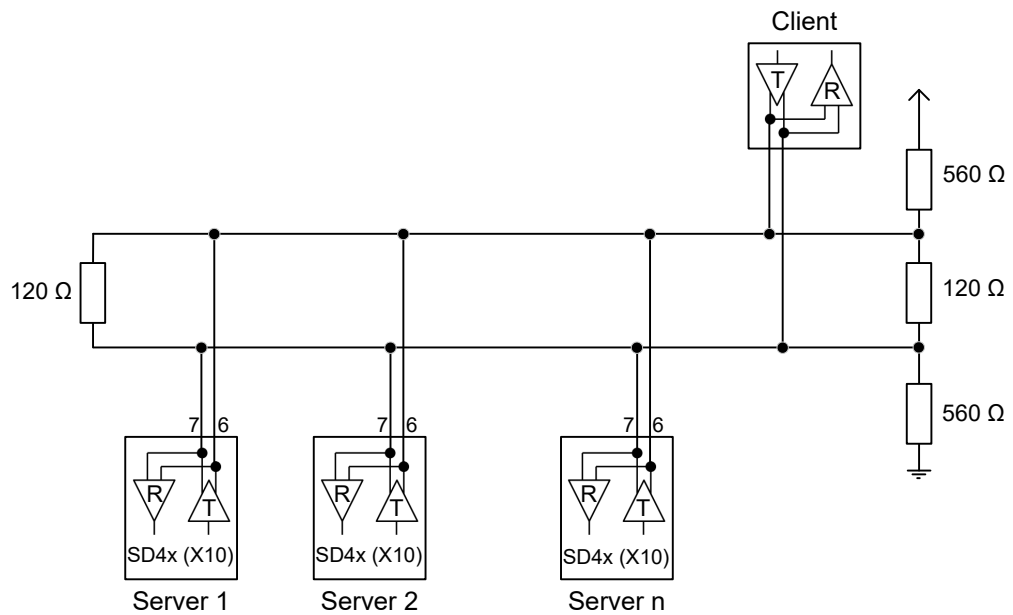


Fig. 21: RS485 bus

7.5.3 CAN interface

The CAN interface is designed according to ISO 11898. It is a two-wire connection with differential signals. ISO 11898 specifies a bus cable with two signal lines, CAN_H and CAN_L. The lines have a rated impedance of $120\ \Omega$. The signal lines are connected to a terminating resistor ($120\ \Omega$) at both ends of the bus cable (see figure).

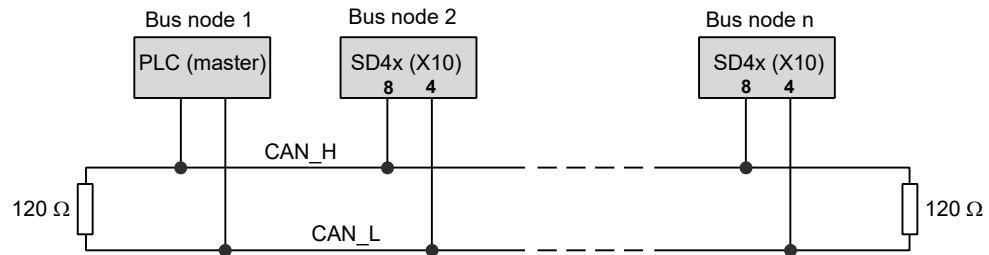


Fig. 22: CAN interface

The total length of the bus cable must not exceed the specified lengths. The following table indicates physical limitations valid for specific transmission rates:

Baud rate	Max. bus length
50 kBd	1000 m
125 kBd	500 m
250 kBd	250 m
500 kBd	100 m
1000 kBd	25 m

The number of bus nodes is also limited by the specification according to ISO 11898. The limiting value is between 32 and 100 bus nodes depending on the used cable and transmission rate. For further information on the maximum number of bus nodes refer to the document “CAN Physical Layer” by the user organization CiA.

7.6 X11 – Ethernet 10/100 Mbit

Ethernet interface for the communication with the connected PC for parameterization and initial operation (Modbus TCP protocol)

8-pole female RJ45 connector, shielded, Ethernet connection for standard patch cables

X11	Pin / LED	I/O	Name / Status	Meaning
	LED 0	O	Green Flickers green	No data exchange Data exchange (TX/RX) active
	8	I/O	VC-	PoE (NC)
	7			
	6	I	RX-	Receive data -
	5	I/O	VC+	PoE (NC)
	4			
	3	I	RX+	Receive data +
	2	O	TX-	Transmit data -
	1	O	TX+	Transmit data +
	LED 1	O	Yellow	Ethernet connection established

7.6.1 Ethernet communication

The drive communicates with the software *drivemaster4* via the Ethernet interface . By means of the software *drivemaster4*, the SD4B drives are parameterized, put into operation and maintained.

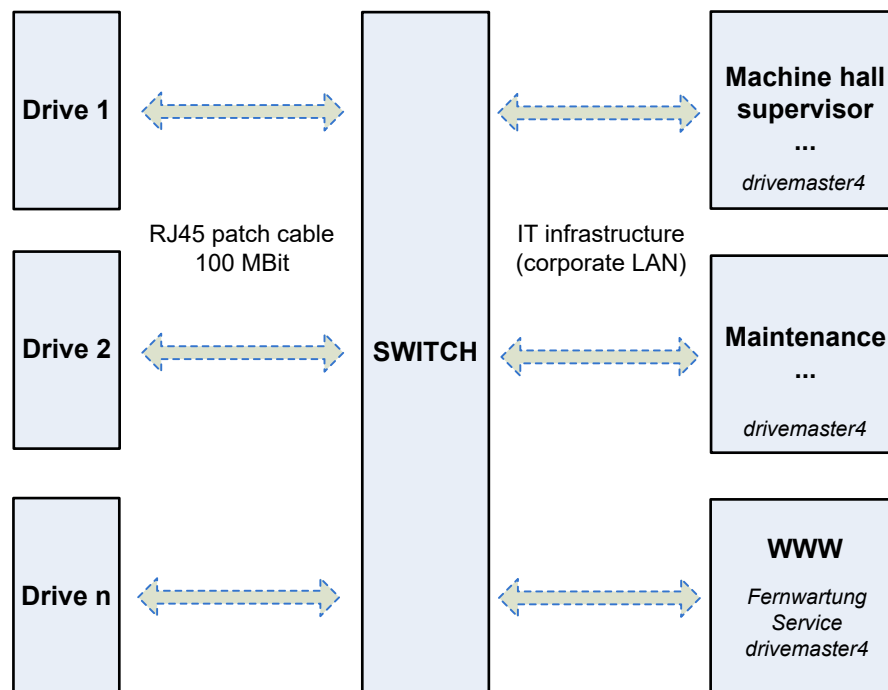
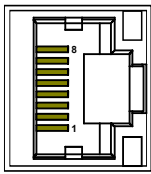


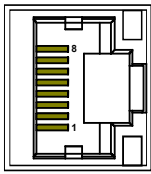
Fig. 23: Ethernet communication (X11)

7.7 X13/X14 – Fieldbus IN/OUT

Fieldbus extension for the connection of a PLC (no retrofit possible)

2 × 8-pole female RJ45 connector, shielded

X13 IN	Pin / LED	I/O	Name/Color	Meaning
	8	I/O	VC-	PoE (NC)
	7			
	6	I	RX-	Receive data -
	5	I/O	VC+	PoE (NC)
	4			
	3	I	RX+	Receive data +
	2	O	TX-	Transmit data -
	1	O	TX+	Transmit data +

X14 OUT	Pin / LED	I/O	Name/Color	Meaning
	8	I/O	VC-	PoE (NC)
	7			
	6	I	RX-	Receive data -
	5	I/O	VC+	PoE (NC)
	4			
	3	I	RX+	Receive data +
	2	O	TX-	Transmit data -
	1	O	TX+	Transmit data +

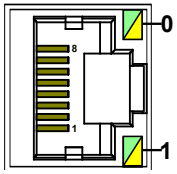
The fieldbus interface can be delivered with various optional Ethernet real-time protocols.

LED states

The status of the real-time Ethernet connection is indicated via the LEDs at the female RJ45 connectors and depend on the bus protocol.

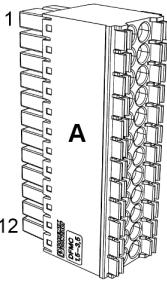
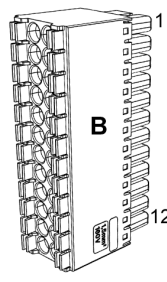
For a description of the fieldbus LEDs at the device refer to [chapter 9 “LED Status Displays”, page 62](#).

EtherCAT:

Female RJ45 connectors	LED	Status	Meaning
X13 / X14 	LED 0	○ Off	No connection
		● Green	Link: The device has established a connection with Ethernet, but does not send/receive Ethernet frames.
		⚙ Flickers green (load-dependent)	Activity: The device has established a connection with Ethernet and sends/receives Ethernet frames.
	LED 1	○ Off	This LED is not used.

7.8 X15 – Inputs/Outputs / Safety Circuit (STO)

2 × 12-pole Mini-Combicon connector, suitable for mating connector DFMC 1,5/12-ST-3,5 (Phoenix Contact); see [specification \(p. 25\)](#)

Mating connector X15	Pin	I/O	Name	Meaning
	A1	I/O	GND ⁽¹⁾	Ground
	A2	I	24V IN ⁽¹⁾	Logic supply 24 V
	A3	O	24V OUT ⁽²⁾	Logic voltage 24 V
	A4	O	24V OUT ⁽²⁾	Logic voltage 24 V
	A5	I	SAFE B / OSSD2	Enable of the safety circuit ► Permanent load approx. 15 mA/24 V ► Startup peak current is negligible under normal conditions.
	A6	I	SAFE A / OSSD1	Enable of the safety circuit ► Continuous load at 24 V > 160 mA/24 V, dependent on the device performance ► Startup peak current per device can exceed 8 A/24 V during the first 2 ms.
	A7	I/O	GND	Ground
	A8	O	OUT5	Digital output
	A9	O	OUT4	Digital output
	A10	O	OUT3	Digital output
	A11	O	OUT2	Digital output
	A12	O	OUT1	Digital output
	B1	I/O	GND	Ground
	B2	I/O	GND	Ground
	B3	I	A IN–	Reference point for AIN+ (pin B4)
	B4	I	A IN+	Analog input
	B5	I	VREF 10V	10 V supply voltage
	B6	I	M-TEMP	Motor temperature (to be connected towards GND)
	B7	I/O	GND	Ground
	B8	I	IN5	Digital input
	B9	I	IN4	Digital input
	B10	I	IN3	Digital input
	B11	I	IN2	Digital input
	B12	I	IN1	Digital input

⁽¹⁾ Consider that there must be no potential differences between the GND connectors of logic supply and power supply (X36).

⁽²⁾ The 24 V output is not suited to supply external safety circuits because an external voltage source is necessary to comply with the applicable standards.

Note

The power supply unit is only activated when SAFE A and SAFE B are connected. If the safety function is not required, pin A5 and pin A6 must be bridged to pin A4.

The following figure shows the mating side:

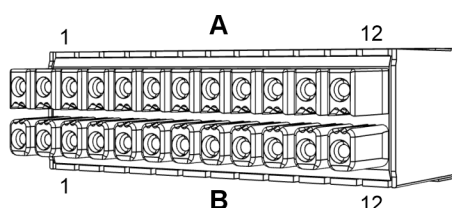


Fig. 24: Mating side X15

Specification of terminal connections

- ▶ Conductor cross-section solid/stranded: 0.2 to 1.5 mm²
- ▶ Connection method: spring-cage connection (handling: see [page 34](#))

Related topics

[Safety Circuit / Restart Lock \(STO\), page 55](#)

7.8.1 Digital Inputs

The meanings of the digital inputs can be defined by parameters.

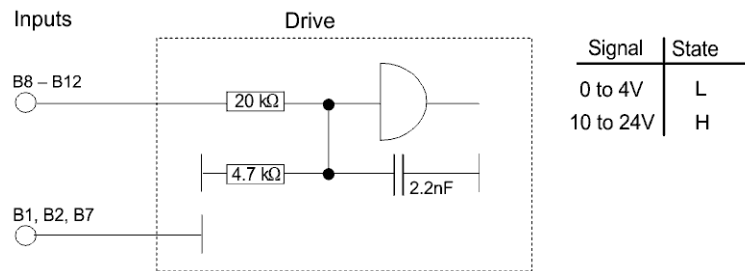


Fig. 25: Digital inputs (X15)

7.8.2 Digital Outputs

The output driver can operate as low-side driver or as high-side driver. You can set the desired driver type in the software *drivemaster4*.

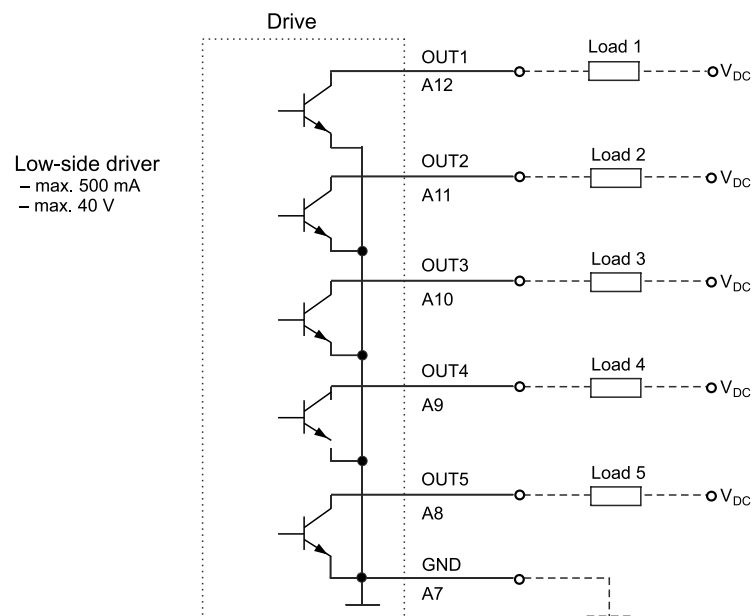


Fig. 26: Digital outputs (X15) parameterized as low-side driver

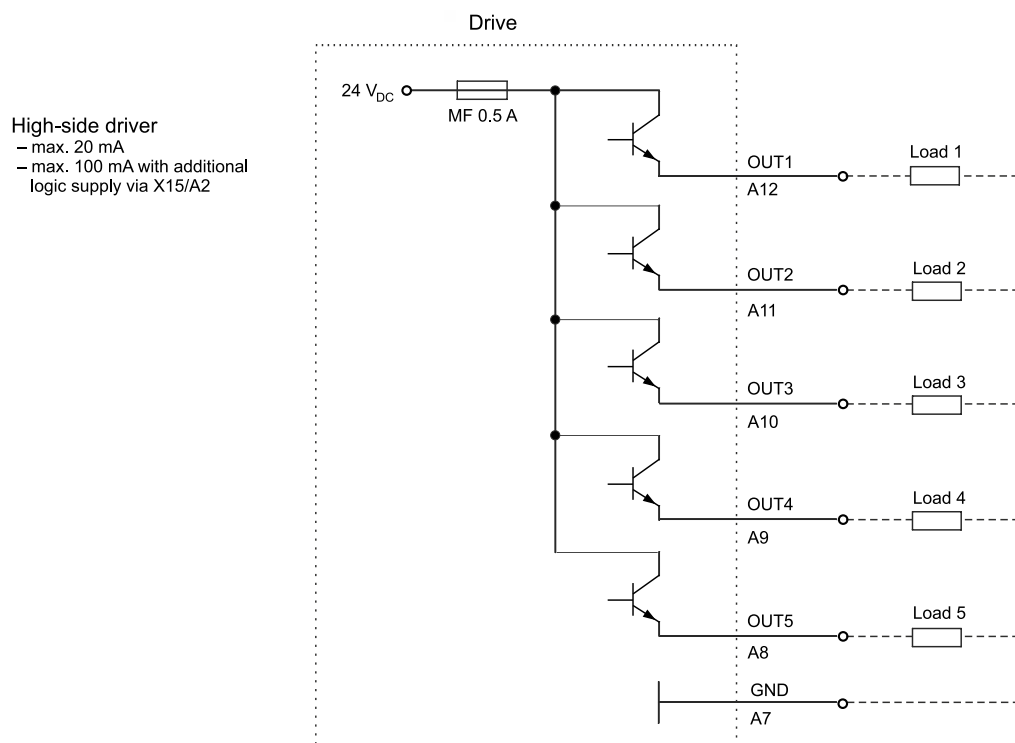


Fig. 27: Digital outputs (X15) parameterized as high-side driver

7.8.3 Analog Input

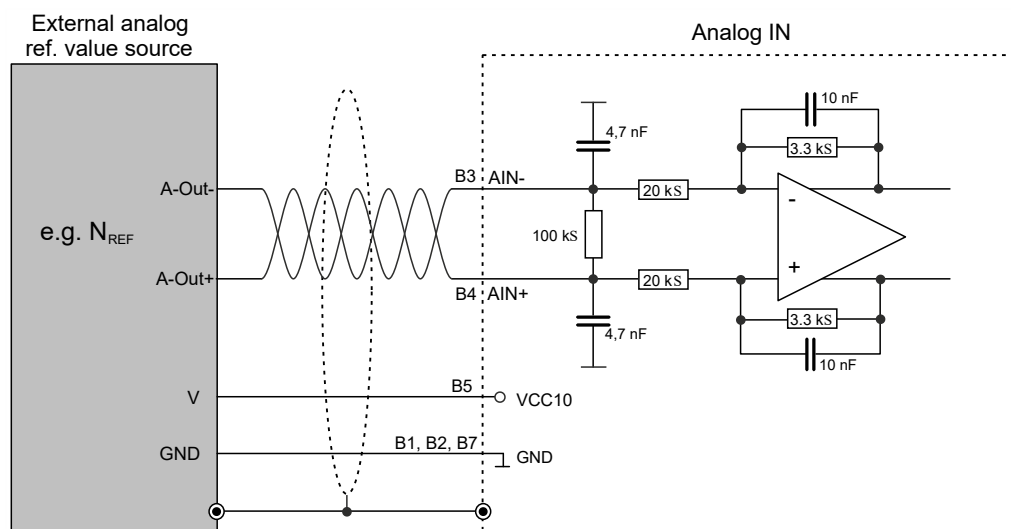


Fig. 28: Analog Input (X15)

Voltage interface with input voltage range: ± 10 V

Can also be connected to potentiometer (500 Ω – 5 k Ω)

7.8.4 Connecting the Motor Protection

INPUT/OUTPUT: The thermal motor protection is evaluated via these connectors.

The SD4B drive supports evaluating the temperature monitoring integrated in the motor. The NTC/PTC behavior of the monitoring is defined in the software (motor parameters). The controller is deactivated as soon as the critical motor temperature is reached.

The following sensor types are available: NTC, PTC, KTY84130, KTY83122 and PT1000.

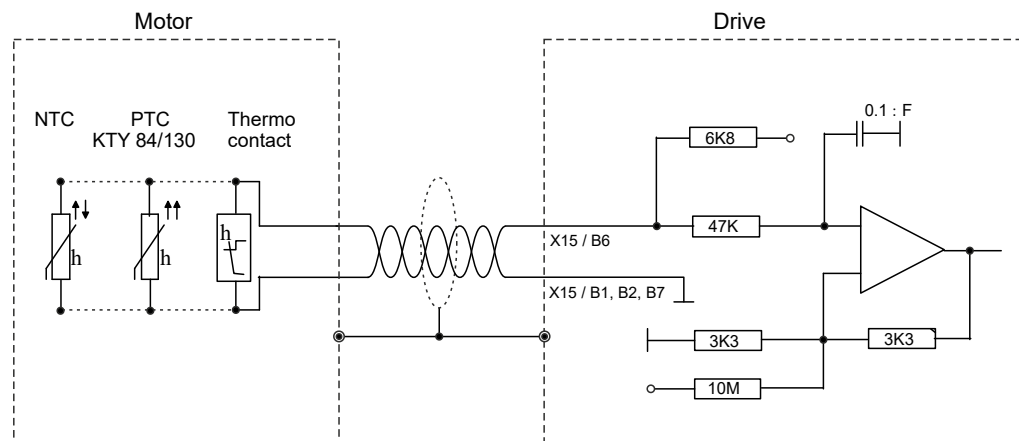


Fig. 29: Temperature sensor of the motor

The temperature sensor must have an internal resistor between 250 Ω and 2 k Ω .

Note

If no motor temperature sensor is connected, the input must be connected with GND.

7.8.5 Connecting the Safety Circuit

Note

See also [chapter 8.1 "Safety Circuit / Restart Lock \(STO\)". page 55.](#)

7.8.5.1 Wiring with OSSD

OSSD = Output Signal Switching Device

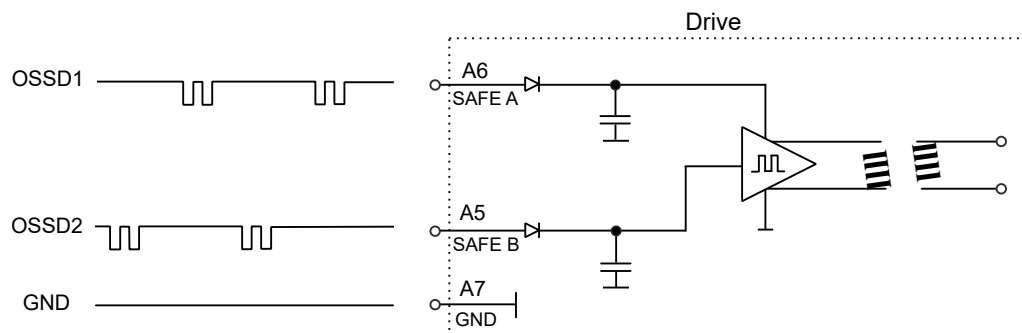


Fig. 30: Safety circuit (STO) - wiring with OSSD

7.8.5.2 Wiring without OSSD

OSSD = Output Signal Switching Device

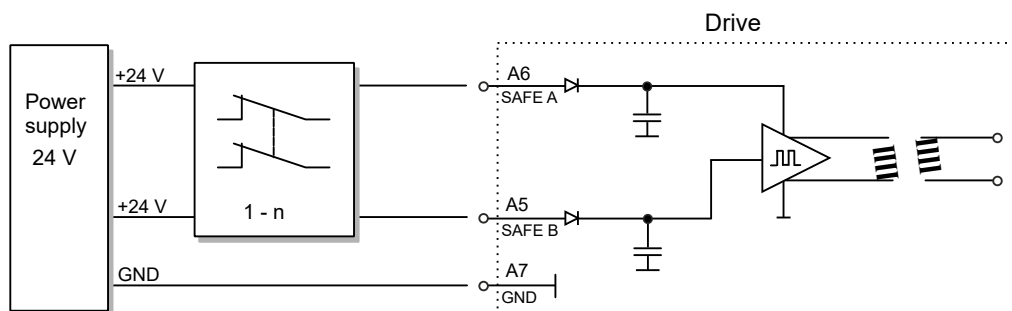
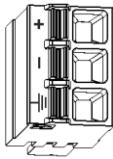


Fig. 31: Safety circuit (STO) - wiring without OSSD

7.9 X36 – DC Power Supply

3-pole Combicon connector, suitable for the following mating connectors:

- ▶ device variant 0SD4B B1 D1P xxxx: FKCN 2,5/ 3-ST-5,08 (Phoenix Contact)
- ▶ device variant 0SD4B B1 E1N xxxx: FKCN HC 2,5/ 3-ST-5,08 (Phoenix Contact)

Mating connector X36	Pin	Name	Meaning
	1	DC+	DC power supply +
	2	GND ⁽¹⁾	Ground
	3	PE	Protective conductor

⁽¹⁾ Consider that there must be no potential differences between the GND connectors of power supply and logic supply (X15).

Voltage range: 24 to 80 V_{DC}, voltage ripple max. 10 %

Specification of terminal connections

- ▶ Conductor cross-section solid: 1 to 1.5 mm²
- ▶ Conductor cross-section stranded: 1 to 2.5 mm²
- ▶ Connection method: push-in spring connection (handling: see [page 34](#))

NOTICE

Wiring error

- To prevent wiring errors and subsequent damage to the device you must always wire all pins (incl. pin 2 / DC-) with adequate conductor cross-section.

7.9.1 Connecting the Voltage Supply

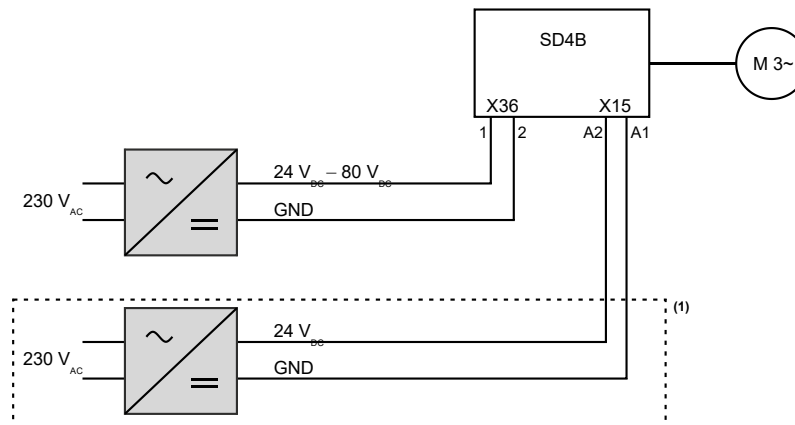


Fig. 32: DC power supply connection for X36 and X15

- (1) The logic supply at X15 is required under the following conditions:
- ▶ maintaining the error messages after switch-off is desired
 - ▶ higher output currents of the digital outputs (> 20 mA), see connection example [chapter 7.8.2 "Digital Outputs", page 49](#)

7.10 X53 – Motor Connection

4-pole Combicon connector, suitable for the following mating connectors:

- ▶ device variant 0SD4B B1 D1P xxxx: FKCN 2,5/ 4-ST-5,08 (Phoenix Contact)
- ▶ device variant 0SD4B B1 E1N xxxx: FKCN HC 2,5/ 4-ST-5,08 (Phoenix Contact)

Mating connector X53	Pin	I/O	Name	Meaning
	1	O	U	Motor phase U
	2	O	V	Motor phase V
	3	O	W	Motor phase W
	4		PE	Protective conductor

Specification of terminal connections

- ▶ Conductor cross-section solid: 1 to 1.5 mm²
- ▶ Conductor cross-section stranded: 1 to 2.5 mm²
- ▶ Connection method: push-in spring connection (handling: see [page 34](#))

7.10.1 Connecting the Motor Phases

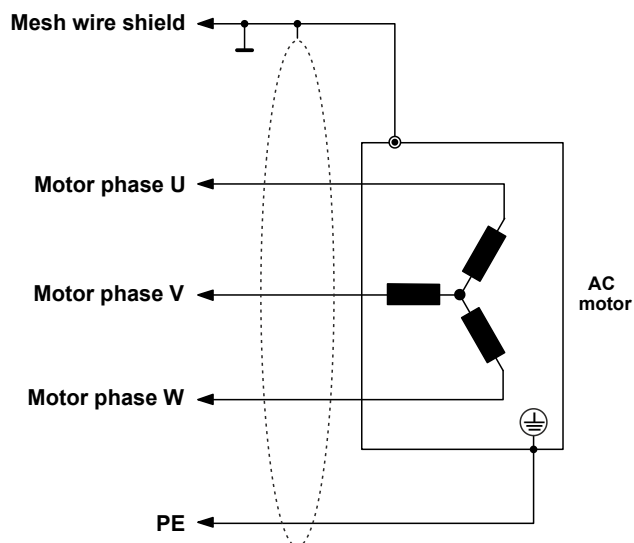


Fig. 33: Connection of the motor phases

Ground the motor housing in the machine!

⚠ DANGER



Dangerous shock currents

connect the motor housing to the ground of the machine or
connect the ground terminal of the motor connector to the central ground point of the machine.

→ Consider the following with regard to shielding: Always use shielded motor cables.

8 Functional Safety

The following chapters describe the safety functions provided by the drive controller SD4B.

8.1 Safety Circuit / Restart Lock (STO)

► according to DIN EN ISO 13849-1:2023 (PL e), DIN EN 61508:2011 SIL 3

The restart lock is provided for preventing an unintentional start of a speed-variable drive from the standstill and can, for example, be used in the machine function “Safe stop”. The stop function is used to shut down the drive in normal operation.

SIEB & MEYER drives provide a restart lock approved according to DIN EN ISO 13849-1 and a stop function according to DIN EN 60204-1, stop category 0 (see stop categories below). A stop category 1 can be achieved by using an approved safe emergency stop device with delay or a safe PLC according to DIN EN 60204-1.

The stop functions are defined according to DIN EN 60204-1 (VDE 0113-1) paragraphs 9.2.1 and 9.2.2.3. The following categories of stop functions are available:

- Category 0** Standstill by immediate interruption of the energy supply to the machine drive elements, i.e. uncontrolled standstill.
- Category 1** A controlled standstill where the energy supply between motor and machine drive elements is maintained to reach the standstill. The energy supply is interrupted at that moment the machine is at a secure standstill.
- Category 1b** A controlled standstill where the energy supply between motor and machine drive elements is maintained to reach the standstill. The maintenance of the stop condition is monitored. If the stop condition is no longer applicable, the energy supply is interrupted without creating a dangerous situation.
- Category 2** A controlled standstill where the energy supply between motor and machine drive elements is maintained.

Every machine must be equipped with a stop function according to category 0. Stop functions according to category 1 and/or 2 must be integrated into the machine if they are necessary for safety and/or operational reasons.

The disadvantages of the disconnection can be eliminated by the consequent use of electronic elements. The DIN EN 60204-1 standard “Safety of machinery - Electrical equipment of machines” also allows the use of electronic equipment for the stop function in case of an emergency, if these – under application of the standards DIN EN ISO 13849-1 and/or DIN EN 61508 – meet the same safety requirements as required according to DIN EN 60204-1.

This approved safety circuit was conceived according to the concept paper by Drivecom “Technical Guide for Safety Drives” from 04/23/2004. The concept paper was approved by the BIA and the TÜV Rheinland: It was confirmed that the required standards and regulations were met.

Before the shutdown of the drive, the standstill of the machine must be caused by a higher-ranking control and a stop function of at least category 2 must be ensured.

The restart lock interrupts the energy supply between drive and motor by cutting off the supply of the output stage control. Thus, any rotation of the motor is made impossible.

The advantage of this circuit is that a single drive can be locked safely in an installation with several drives, while the other drives remain in operation. Besides, a drive can be locked without having to recharge the DC link before a restart.

⚠ DANGER



Danger due to electric shock

The restart lock does not galvanically separate the output stages from the motor. Thus, the restart lock does not protect against electric shock.

- The complete machine must always be galvanically separated from the mains by use of the main switch(DIN EN 60204-1 5.3) for any interruptions of the operation, maintenance, repair or cleaning work at the machine or system.

Note

All mounting locations for safety devices of the control system as well as components mounted outside have to correspond to an IP Code IP54, if mounted correctly.

8.1.1 Functional Description of the Restart Lock

The restart lock disables the respective drive of an installation. All other drive modules (servo drives / frequency converters) remain operational.

At the drive to be locked, a TÜV approved safety circuit accesses relevant control units of the output stage transistors by interrupting the voltage supply of the control units. Thus, no control pulses can be passed on to the transistors of the output stages and the motor is at a secure standstill.

⚠ DANGER



No torque when restart lock is active

The motor cannot provide a torque when the restart lock is activated. Thus non-self-locking drives could be released.

- Non-self-locking drives as hanging loads must be blocked with a mechanical brake.

OSSD (output signal switching device)

Definition: Part of the electro-sensitive protective equipment (ESPE), which is connected with the machine control and switches into the OFF state, when the sensor unit is triggered during the intended operation (source DIN EN IEC 61496-1).

The OSSD signal is a pulsed signal, of which the phase position is shifted in relation to the different channels. All error can be detected by checking the pulse pattern, short-circuit for supply, cross-circuit or defect of the device. This ensures a very high safety level (SIL 4).

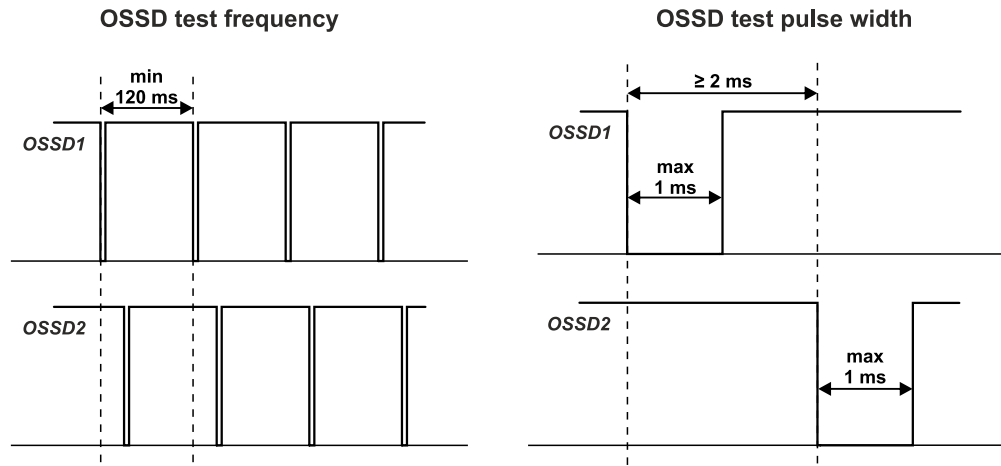


Fig. 34: OSSD Signals

The safety circuit is controlled by the OSSD1+2 signal or via one or several emergency stop switch devices, see also [chapter 8.1.2 "Wiring Example", page 58](#).

If the OSSD signals or at least one of the +24 V conductors fail, the safety circuit switches the pulse pattern of the output stage control sectors off. The response time of the restart lock is **max. 4 ms**.

The restart lock must only be controlled when

- ▶ the drive is at a secure standstill (stop category 2),
- ▶ the higher-ranking control has deactivated the drive module,
- ▶ (reference speed value 0)
- ▶ the holding brake of the motor has been arrested.

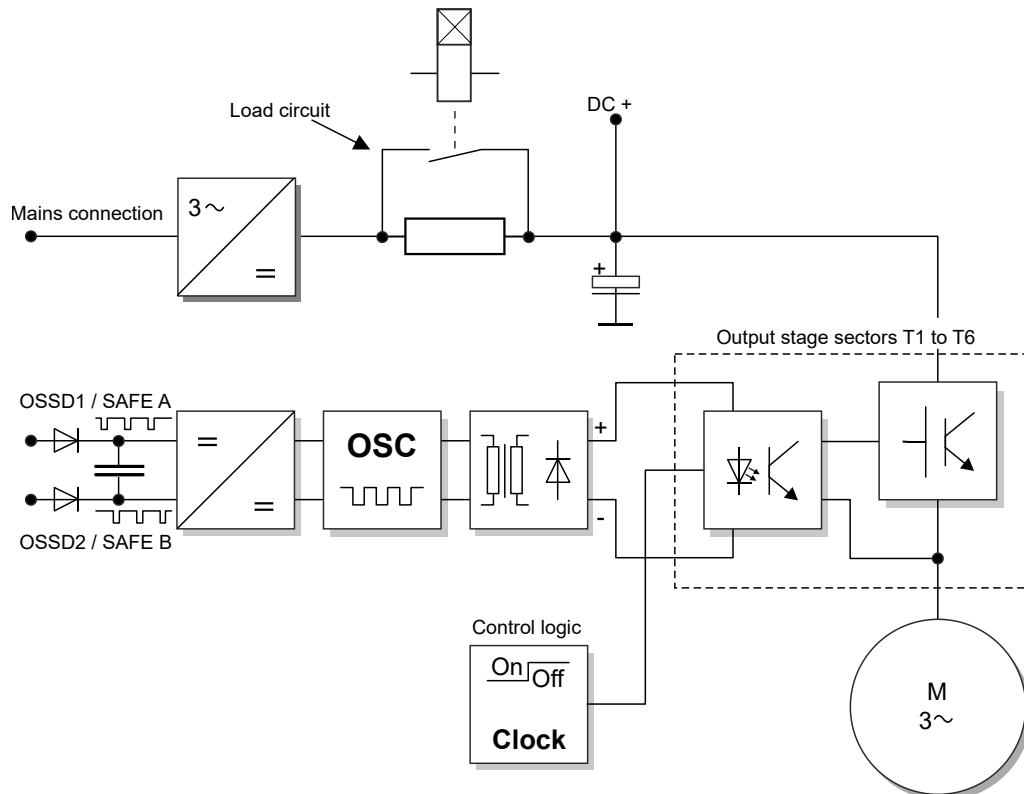


Fig. 35: Safety circuit control

8.1.2 Wiring Example

Combining a safe emergency stop command device with an OSSD safety relay or a light barrier with OSSD outputs and the safe switching off of the pulse patterns allows the creation of an error detection circuit, which achieves a safe stop (according to stop function category 0+1) according to the safety requirements of SIL 3 (DIN EN 61508). With this circuit you can connect several emergency stop devices in series, which are permanently monitored.

Circuit with OSSD (SIL 3)

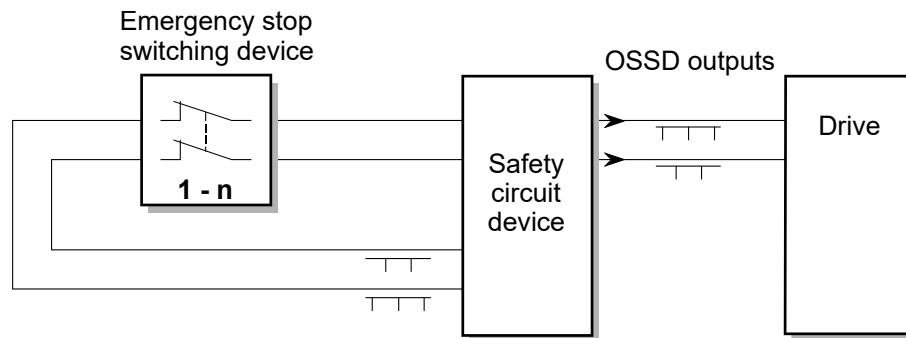


Fig. 36: Wiring with OSSD

Circuit without OSSD (SIL 3)

The following figure shows a circuit without OSSD safety device, whilst only safety directed command devices with forcibly opened contacts in two-channel design are used. SIL 3 (according to DIN EN 61508) is achieved. It is also possible to cascade several different safe emergency stop devices, position switches or door locks to one safety circuit.

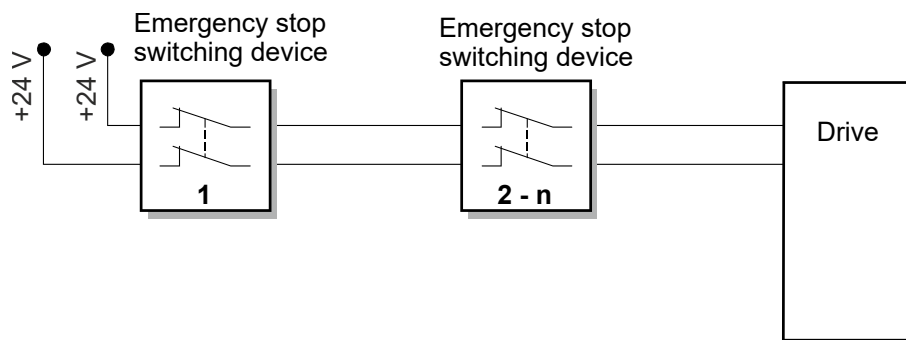


Fig. 37: Wiring without OSSD

Note

The safety relay as well as the emergency stop device must be certified as safety devices of at least level SIL 3 to obtain safety level SIL 3 according to DIN EN 61508.

Note

In order to obtain the safety level SIL 3 according to DIN EN 61508, the circuit and the layout have been designed according to IEC 60664-1:2008. Supporting material according to IEC 60249 covered by a nonaging protective coat of lacquer according to IEC 60664-3:2003 have been used. The conformity of standard have been tested and approved by the TÜV-Nord CERT.

8.1.3 Requirements and Standards

The following parameters are achieved according to the safety case:

- ▶ according to DIN EN ISO 13849-1:2023
 - MTTFd: >100 years
 - DC = 99%
 - Category 4
 - Performance Level e
- ▶ according to DIN EN 61508:2011 und DIN EN 61800-5-2:2017
 - PFH = 9.37×10^{-11}
 - SFF = 99.74 %
 - HFT = 1

The safety concept K1/K2 meets the requirements of SIL 3 according to the standards named above.

Requirements according to DIN EN 61800-5-2:2017

When connected appropriately, the safety concept K1/K2 does not supply any share of dangerous, undetected errors in the safety chain for the function STO.

Thus the stop function 0+1 according to DIN EN 60204-1 is realized.

8.1.4 Restart Lock Procedure

The following diagram shows the restart lock procedure by means of a time axis, including the required steps that must be performed in order to be able to restart the device after an activated restart lock.

STO Behavior

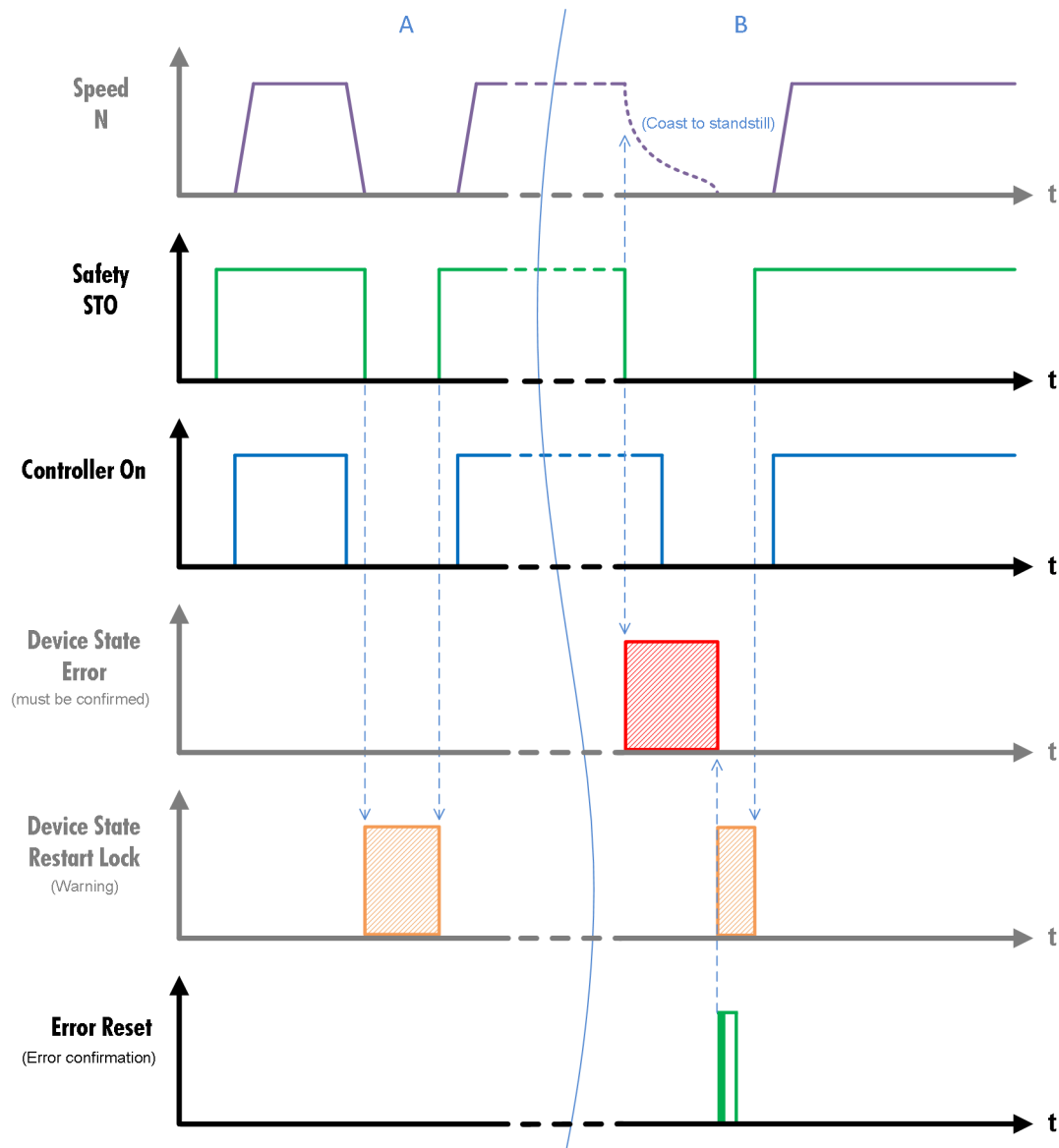


Fig. 38: Behavior STO / restart lock - timing and required actions

Use case A If the safety function STO is activated with the power output stage switched off, the drive controller cannot apply torque to a connected motor. The drive controller switches to the status “switch on disabled”. The drive controller can apply torque to a connected motor as soon as the safety function STO is deactivated and the power output stage is switched on.

Use case B If the safety function STO is activated with the power output stage switched on, the power output stage will be switched off and the drive controller cannot apply torque to a connected motor. The drive controller switches to the status “fault”. The drive controller can apply torque to a connected motor as soon as the fault is acknowledged, the safety function STO is deactivated and the power output stage is switched on.

9 LED Status Displays

The device provides three RGB LEDs for the device status (1, 2, 3) and three RGB LEDs for the fieldbus status (4, 5, 6). Not all colors are used.

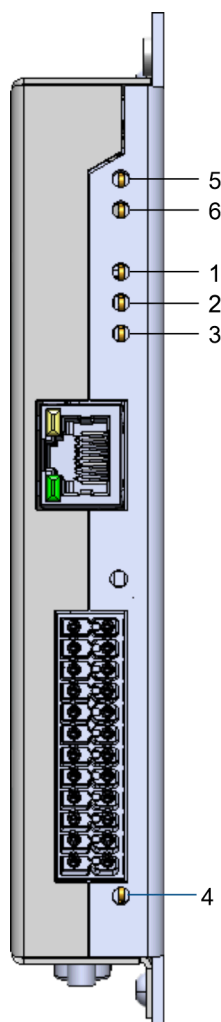


Fig. 39: LEDs

LED 1	LED 2	LED 3	Device status
Bootloader LED sequence⁽¹⁾			
○ Off	○ Off	○ Off	Bootloader active: step 1
○ Off	○ Off	● Green	Bootloader active: step 2
○ Off	● Green	● Green	Bootloader active: step 3
● Green	● Green	● Green	Bootloader active: step 4
Operational state			
○ Off	○ Off	○ Off	CPU is not running
● Blue	○ Off	○ Off	Not ready to switch on
● Blue	○ Off	● Blue	Switch on disabled
● Green	○ Off	● Blue	Quick stop
● Green	○ Off	○ Off	Ready to switch on
● Green	● Green	○ Off	Switched on
● Green	● Green	● Green	Operation enabled
○ Off	● Red	○ Off	Fault
○ Off	● Red	● Blue	Fault reaction active
○ Off	● Red fl.	○ Off	Unknown status
● Turquoise fl.	● Green fl.	● Turquoise fl.	Device identification by <i>drivemaster4</i> software
IP address mode			
● Blue fl.	○ Off	● Blue fl.	P2P button pushed for longer than 1 second
○ Off	● Yellow fl.	○ Off	Display of active IP address mode after system start and after briefly pushing (<0.8 seconds) the P2P button Count the number of times LED 2 flashes yellow: ▶ 1 ×: (0) Automated (DHCP client) ▶ 2 ×: (1) Static or (2) Static + address selection switch ▶ 3 ×: (3) Point to point (DHCP server) ▶ 4 ×: (4) Point to point (AutoIP)
○ Off	● Red fl.	○ Off	▶ DHCP server mode: cancel because another DHCP server was found. ▶ DHCP client mode: cancel because the IP address already exists.
CPU error			
● Blue fl.	● Red fl.	● Blue fl.	CPU exception: CPU error announcement (see Appendix (p. 73))

⁽¹⁾ Green LED sequence when the bootloader mode of the drive is active (e.g. during system software update): The steps 1 to 4 are repeated until the bootloader is exited.

Fieldbus LEDs 4, 5 and 6

The fieldbus LED 4 indicates the status of the CAN bus interface. For the optional real-time Ethernet connection, the communication LED COM 0 (LED 5) indicates the system status and COM 1 (LED 6) possible error states.

In the following you find the LED status descriptions depending on the fieldbus protocol.

CAN bus:

LED	Status	Meaning
LED 4	○ Off	CAN bus is not the control channel of the drive controller.
	🟢 Green fl.	The device is in the Operational status.
	1 × 🟢 Green fl.	The device is in the Stopped status.
	🟢 Green	The device is in the Pre-Operational status.
	🔴 Red fl.	Error in CAN configuration
	1 × 🔴 Red fl.	A CAN error counter has reached the warning level .
	2 × 🔴 Red fl.	Heartbeat / Node guarding error
	3 × 🔴 Red fl.	Synchronization error
	🔴 Red	Bus off status

EtherCAT:

LED	Status	Meaning
LED 5	○ Off	The device is in the Init status.
	🟢 Green fl.	The device is in the Operational status.
	1 × 🟢 Green fl.	The device is in the Safe-Operational status.
	🟢 Green	The device is in the Pre-Operational status.
LED 6	○ Off	No error
	🔴 Red fl.	Invalid configuration Possible reason: Due to register or object settings the fieldbus control (MainDevice) cannot change the status.
	1 × 🔴 Red fl.	Local error The device application has modified the EtherCAT status on its own. Possible reasons: ▶ A host watchdog timeout has occurred. ▶ Synchronization error, the device switched automatically to Safe--Operational
	2 × 🔴 Red fl.	Process data watchdog timeout A process data watchdog timeout has occurred. Possible reason: Sync-Manager-watchdog timeout

POWERLINK:

LED	Status	Meaning
LED 5	○ Off	The device is initialized.
	🟢 Green fl. (2.5 Hz)	The device is in the Stopped status.
	🟢 Green fl. (10 Hz)	The device is in the Basic Ethernet status.
	1 × 🟢 Green fl.	The device is in the Pre-Operational 1 status.
	2 × 🟢 Green fl.	The device is in the Pre-Operational 2 status.
	3 × 🟢 Green fl.	The device is in the Ready to Operate status.
	🟢 Green	The device is in the Pre-Operational status.
LED 6	○ Off	No error
	🔴 Red	The device has detected an error .

PROFINET IO:

LED	Status	Meaning
LED 5	○ Off	No error
	⚙️ Red fl. (1 Hz, 3 s)	DCP signal service is triggered via the bus.
	⚙️ Red	Error: watchdog timeout; channel, generic or extended diagnosis available; system error
LED 6	○ Off	No error
	⚙️ Red fl. (2 Hz)	No data exchange
	⚙️ Red	Error: no configuration; slow or no physical connection

10 SD4x Drive Messages

The drive messages include error and operating messages. All messages are displayed in the software *drivemaster4* or output via the used fieldbus system.

Note

The following messages apply to the entire SD4x series. According to the device type or operating mode, certain messages may not appear.

In addition, these messages are available on the Internet under www.sieb-meyer.com/downloads as English and German texts in the form of a CSV file. The CSV file is to be found under your "Drive Controller SD4" in the section "Equipment". You can read and edit CSV files e.g. using the program Microsoft Office Excel.

10.1 Error Messages

Drive errors always cause a shutdown of the power output stage or the power supply unit. All errors must be reset via an error reset command. The error memory is a ring buffer. This ring buffer can save up to 32 error data sets. For several errors, you can parameterize the error reaction in the software *drivemaster4*.

Error code	Name	DS402 (error code)	Error reaction	Configurable via parameters
E00	No error	0x0000	None	No
E01, E02	Reserved			
E03	Motor identification	0x71B0	Coast to standstill	No
E03-1	Motor identification - Not possible	0x71B1	Coast to standstill	No
E03-2	Motor identification - Invalid parameters	0x71B2	Coast to standstill	No
E03-3	Motor identification - Process error	0x71B3	Coast to standstill	No
E03-4	Motor identification - Wrong motor	0x71B4	Coast to standstill	No
E03-5	Motor identification - Not supported	0x71B5	Coast to standstill	No
E04, E05	Reserved			
E06	Limit switch error	0x8080	Deceleration	Yes
E06-1	Hardware limit switch positive	0x8081	Deceleration	Yes
E06-2	Hardware limit switch negative	0x8082	Deceleration	Yes
E06-3	Software limit switch negative	0x8083	Deceleration	Yes
E06-4	Software limit switch negative	0x8084	Deceleration	Yes
E07	Reserved			
E08	Setup heartbeat	0x8A10	Deceleration	Yes
E09	Communication error II	0x8130	Deceleration	Yes
E09-1	Communication error - Heartbeat	0x8131	Deceleration	Yes
E09-2	Communication error - Node guarding	0x8132	Deceleration	Yes
E09-3	Communication error - SYNC timeout	0x8133	Deceleration	Yes
E09-9	Communication error - Recovery from bus off	0x8139	Deceleration	Yes
E09-10	Communication error - RX bus passive	0x813A	Deceleration	Yes
E09-11	Communication error - TX bus passive	0x813B	Deceleration	Yes
E09-12	Communication error - Unexpected SYNC data length	0x813C	Deceleration	Yes
E09-13	Communication error - Consumer remote reset	0x813D	Deceleration	Yes
E10	Error during parameter set change	0x6380	Coast to standstill	No
E10-1	Parameter set change - With active output stage	0x6381	Deceleration / coast to standstill	Yes
E10-2	Parameter set change - Parameter set not available	0x6382	Deceleration / coast to standstill	Yes

Error code	Name	DS402 (error code)	Error reaction	Configurable via parameters
E11	Reserved			
E12	Error of reference value generator	0x8B00		
E12-1	Error setpoint generator - Current-controlled ramps	0x8B01	Immediate switch-off	No
E12-2	Error of setpoint generator - Interpolation	0x8B02	Deceleration	Yes
E13	Reserved			
E14	External error	0x9000	Immediate switch-off	Yes
E14-1	External error - DIN 'External error'	0x9001	Immediate switch-off	Yes
E14-2	External error - AIN1 broken cable	0x9002	Immediate switch-off	Yes
E14-3	External error - AIN2 broken cable	0x9003	Immediate switch-off	Yes
E15	Error - Digital outputs	0x5080	Deceleration	Yes
E15-1	Digital outputs - Supply voltage error	0x5081	Deceleration	Yes
E15-2	Digital outputs - Temperature monitoring error	0x5082	Deceleration	Yes
E15-3	Digital outputs - Output current error	0x5083	Deceleration	Yes
E15-4	Digital outputs - Short circuit output 1 (no detection for output 1 due to downstream MOSFET relay)	0x5084	Deceleration	Yes
E15-5	Digital outputs - Short circuit output 2	0x5085	Deceleration	Yes
E15-6	Digital outputs - Short circuit output 3	0x5086	Deceleration	Yes
E15-7	Digital outputs - Short circuit output 4	0x5087	Deceleration	Yes
E15-8	Digital outputs - Short circuit output 5	0x5088	Deceleration	Yes
E15-9	Digital outputs - Short circuit VCC24_User	0x5089	Deceleration	Yes
E16	Safety error I	0xFF20		
E17	Safety error II	0xFF30		
E18	STO with active output stage	0xFF40	Immediate switch-off	No
E19	Reserved			
E20	Hardware temperature too high	0x4110	Deceleration	Yes
E20-1	Ambient temperature - CPU temperature too high	0x4111	Deceleration	Yes
E21	Reserved			
E22	Parameter error	0x6320	Deceleration / switch-off	Yes
E22-1	Parameter error - Motor parameters not consistent	0x6321	Deceleration / switch-off	Yes
E22-2	Parameter error - Device database entry missing	0x6322	Deceleration / switch-off	Yes
E23	Internal software	0x6100	Deceleration / switch-off	Yes
E23-1	Internal software - FPGA heartbeat monitoring	0x6101	Deceleration / switch-off	Yes
E23-2	Internal setpoints - Analog front end	0x6102	Deceleration / switch-off	Yes
E23-3	Internal software - Fieldbus	0x6103	Deceleration / switch-off	Yes
E24	Internal hardware	0x5090		
E24-1	Internal hardware - AIN reference voltage	0x5091	Deceleration / switch-off	Yes
E24-2	Internal hardware - AIN offset NOK	0x5092	Deceleration / switch-off	Yes
E24-3	Internal hardware - Motor temperature reference voltage NOK	0x5093	Deceleration / switch-off	Yes
E24-4	Internal hardware - Motor temperature offset NOK	0x5094	Deceleration / switch-off	Yes
E24-5	Internal hardware - Fan failure 1	0x5095	Deceleration / switch-off	Yes
E24-6	Internal hardware - Fan failure 2	0x5096	Deceleration / switch-off	Yes
E24-7	Internal hardware - Fan failure 3	0x5097	Deceleration / switch-off	Yes
E25	Motor - Error during magnetic alignment	0x8B10		
E25-1	Motor - Error during magnetic alignment 1	0x8B11	Immediate switch-off	Yes
E25-2	Motor - Error during magnetic alignment 2	0x8B12		
E26	Motor - Speed error	0x8490	Immediate switch-off	Yes
E26-1	Motor - Speed error too high	0x8491	Immediate switch-off	Yes
E26-2	Motor - Speed dropped below minimum value	0x8492	Immediate switch-off	Yes
E26-3	Motor - Overspeed	0x8493	Immediate switch-off	Yes
E26-4	Device - Output frequency too high	0x8494	Immediate switch-off	Yes
E26-5	Speed too high for operation without VPM	0x8495	Immediate switch-off	Yes
E27	Motor - Phase connection faulty	0x7190	Immediate switch-off	Yes

Error code	Name	DS402 (error code)	Error reaction	Configurable via parameters
E27-1	Motor - Phase U connection faulty	0x7191	Immediate switch-off	Yes
E27-2	Motor - Phase V connection faulty	0x7192	Immediate switch-off	Yes
E27-3	Motor - Phase W connection faulty	0x7193	Immediate switch-off	Yes
E28	Motor - Model faulty	0x71A0	Immediate switch-off	No
E28-1	Motor - Model emf deviates	0x71A1	Immediate switch-off	No
E29	Motor - Temperature	0x4310	Immediate switch-off	Yes
E29-1	Motor - Temperature 1	0x4311	Immediate switch-off	Yes
E29-2	Motor - Temperature 2	0x4312	Immediate switch-off	Yes
E30	Motor - I²t	0x2312	Immediate switch-off	Yes
E31	Motor - Overcurrent	0x7180	Immediate switch-off	No
E31-1	Motor - Overcurrent U	0x7181	Immediate switch-off	No
E31-2	Motor - Overcurrent V	0x7182	Immediate switch-off	No
E31-3	Motor - Overcurrent W	0x7183	Immediate switch-off	No
E32, E33	Reserved			
E34	Feedback 1 - Monitoring	0x7320	Coast to standstill or deceleration	Yes
E34-1	Feedback 1 - Track A not OK	0x7321	Coast to standstill or deceleration	Yes
E34-2	Feedback 1 - Track B not OK	0x7322	Coast to standstill or deceleration	Yes
E34-3	Feedback 1 - Track N not OK	0x7323	Coast to standstill or deceleration	Yes
E34-4	Feedback 1 - Encoder failure	0x7324	Coast to standstill or deceleration	Yes
E34-5	Feedback 1 - Evaluation error	0x7325	Coast to standstill or deceleration	Yes
E34-6	Feedback 1 - Short circuit	0x7326	Coast to standstill or deceleration	Yes
E34-7	Feedback 1 - Input amplitude too low	0x7327	Coast to standstill or deceleration	Yes
E34-8	Feedback 1 - Input amplitude too high	0x7328	Coast to standstill or deceleration	Yes
E34-9	Feedback 1 - CRC1 error	0x7329	Coast to standstill or deceleration	Yes
E34-10	Feedback 1 - Error 10	0x732A	Coast to standstill or deceleration	Yes
E34-11	Feedback 1 - Error 11	0x732B	Coast to standstill or deceleration	Yes
E34-12	Feedback 1 - Error 12	0x732C	Coast to standstill or deceleration	Yes
E34-13	Feedback 1 - Error 13	0x732D	Coast to standstill or deceleration	Yes
E34-14	Feedback 1 - Error 14	0x732E	Coast to standstill or deceleration	Yes
E34-15	Feedback 1 - Error 15	0x732F	Coast to standstill or deceleration	Yes
E35	Feedback 2 - Monitoring	0x7380	Coast to standstill or deceleration	Yes
E35-1	Feedback 2 - Track A not OK	0x7381	Coast to standstill or deceleration	Yes
E35-2	Feedback 2 - Track B not OK	0x7382	Coast to standstill or deceleration	Yes
E35-3	Feedback 2 - Track N not OK	0x7383	Coast to standstill or deceleration	Yes
E35-4	Feedback 2 - Encoder failure	0x7384	Coast to standstill or deceleration	Yes

Error code	Name	DS402 (error code)	Error reaction	Configurable via parameters
E35-5	Feedback 2 - Evaluation error	0x7385	Coast to standstill or deceleration	Yes
E35-6	Feedback 2 - Short circuit	0x7386	Coast to standstill or deceleration	Yes
E35-7	Feedback 2 - Input amplitude too low	0x7387	Coast to standstill or deceleration	Yes
E35-8	Feedback 2 - Input amplitude too high	0x7388	Coast to standstill or deceleration	Yes
E35-9	Feedback 2 - CRC1 error	0x7389	Coast to standstill or deceleration	Yes
E35-10	Feedback 2 - Error 10	0x738A	Coast to standstill or deceleration	Yes
E35-11	Feedback 2 - Error 11	0x738B	Coast to standstill or deceleration	Yes
E35-12	Feedback 2 - Error 12	0x738C	Coast to standstill or deceleration	Yes
E35-13	Feedback 2 - Error 13	0x738D	Coast to standstill or deceleration	Yes
E35-14	Feedback 2 - Error 14	0x738E	Coast to standstill or deceleration	Yes
E35-15	Feedback 2 - Error 15	0x738F	Coast to standstill or deceleration	Yes
E36 to E38	Reserved			
E39	Ballast circuit - Overtemperature	0x4510	Immediate switch-off	No
E40	Ballast circuit - I²t	0x7115	Immediate switch-off	No
E40-1	Ballast circuit - Faulty connection of ballast resistor ⁽¹⁾	0x7116	Immediate switch-off	No
E41	Ballast circuit - Overcurrent	0x7112	Immediate switch-off	No
E42	Reserved			
E43	DC/DC converters - Overtemperature	0x4610	Immediate switch-off	No
E44	DC/DC converters - I²t	0x71C0	Immediate switch-off	No
E45	DC/DC converters - Overcurrent	0x71D0	Immediate switch-off	No
E46	Reserved			
E47	Power supply unit load - I²t	0x2180	Immediate switch-off	Yes
E47-1	Power supply - Bus ripple too high	0x2181	Immediate switch-off	Yes
E47-2	Power supply - Maximum power exceeded	0x2182	Immediate switch-off	Yes
E47-3	Power supply - I ² t overload	0x2183	Immediate switch-off	Yes
E48	Power supply unit - Mains failure with active output stage	0x3130	Deceleration	Yes
E48-1	Power supply unit - Phase failure L1 with active output stage	0x3131	Deceleration	Yes
E48-2	Power supply unit - Phase failure L2 with active output stage	0x3132	Deceleration	Yes
E48-3	Power supply unit - Phase failure L3 with active output stage	0x3133	Deceleration	Yes
E49	Power supply unit - Overtemperature	0x4410	Immediate switch-off	Yes
E50	Power supply unit - Error in external power supply unit	0x3280	Immediate switch-off	No
E51	Power supply unit - Charge monitoring	0x3230	Immediate switch-off	No
E51-1	Power supply unit - Charge monitoring - Short circuit	0x3231	Immediate switch-off	No
E51-2	Power supply unit - Charge monitoring - Overvoltage	0x3232	Immediate switch-off	No
E51-3	Power supply unit - Charge monitoring - Zero point error	0x3233	Immediate switch-off	No
E52	Supply voltage	0x5110	Immediate switch-off	No
E52-1	Supply voltage 15 V	0x5111	Immediate switch-off	No
E52-2	Supply voltage 24 V	0x5112	Immediate switch-off	No
E52-3	Supply voltage 5 V	0x5113	Immediate switch-off	No

Error code	Name	DS402 (error code)	Error reaction	Configurable via parameters
E53	Reserved			
E54	Power output stage - I²t overload	0x2310	Immediate switch-off	Yes
E54-1	Power output stage - I ² t load	0x2311	Immediate switch-off	Yes
E55	Output stage - Overtemperature	0x4210	Immediate switch-off	Yes
E55-1	Output stage - Overtemperature phase U	0x4211	Immediate switch-off	Yes
E55-2	Output stage - Overtemperature phase V	0x4212	Immediate switch-off	Yes
E55-3	Output stage - Overtemperature phase W	0x4213	Immediate switch-off	Yes
E56	Output stage - Short to ground	0x2330	Immediate switch-off	No
E57	Output stage - Short circuit	0x2340	Immediate switch-off	No
E57-1	Output stage - Short circuit overcurrent phase U	0x2341	Immediate switch-off	No
E57-2	Output stage - Short circuit overcurrent phase V	0x2342	Immediate switch-off	No
E57-3	Output stage - Short circuit overcurrent phase W	0x2343	Immediate switch-off	No
E57-4	Output stage - Short circuit hardware	0x2344	Immediate switch-off	No
E57-5	Output stage - Short circuit hardware phase U	0x2345	Immediate switch-off	No
E57-6	Output stage - Short circuit hardware phase V	0x2346	Immediate switch-off	No
E57-7	Output stage - Short circuit hardware phase W	0x2347	Immediate switch-off	No
E58	Output stage - Error	0x5410	Immediate switch-off	No
E58-1	Output stage - UVLO phase U	0x5411	Immediate switch-off	No
E58-2	Output stage - UVLO phase V	0x5412	Immediate switch-off	No
E58-3	Output stage - UVLO phase W	0x5413	Immediate switch-off	No
E59	Undervoltage in DC link	0x3220	Immediate switch-off	No
E59-1	Undervoltage in DC link - Power output stage	0x3221	Immediate switch-off	No
E59-2	Undervoltage in DC link - Power supply unit	0x3222	Immediate switch-off	No
E60	Overvoltage in DC link	0x3210	Immediate switch-off	No
E60-1	Overvoltage in DC link - Power output stage	0x3211	Immediate switch-off	No
E60-2	Overvoltage in DC link - Power supply unit	0x3212	Immediate switch-off	No
E60-3	Overvoltage neutral point - Power output stage	0x3213	Immediate switch-off	No
E61	Reserved			
E62	Configuration error	0x6080	Coast to standstill	No
E62-1	Device configuration	0x6081	Coast to standstill	No
E63	System error - Type plate	0x6170	Coast to standstill	No
E63-1	System error - RTOS	0x6171	Coast to standstill	No
E63-2	System error - FPGA	0x6172	Coast to standstill	No
E63-3	System error - STM / analog front end	0x6173	Coast to standstill	No
E63-4	System error - time basis	0x6174	Coast to standstill	No
E63-5	System error - User parameters	0x6175	Coast to standstill	No
E63-6	System error - Error memory	0x6176	Coast to standstill	No
E63-7	System error - I ² C	0x6177	Coast to standstill	No
E63-8	System error - Device database	0x6178	Coast to standstill	No
E63-9	System error - FPGA synchronization	0x6179	Coast to standstill	No
E63-10	System error - Fieldbus system multiprotocol chip	0x617A	Coast to standstill	No
E63-11	System error - CLIO power stage interface	0x617B	Coast to standstill	No
E63-12	System error - Watchdog timeout	0x617C	Coast to standstill	No
E63-13	System error - Hyperflash size	0x617D	Coast to standstill	No
E64	CPU - Program error - Division by zero	0x6180	Coast to standstill	No
E64-1	CPU - Program error - Unaligned memory access	0x6181	Coast to standstill	No
E64-2	CPU - Program error - Coprocessor access not possible	0x6182	Coast to standstill	No
E64-3	CPU - Program error - Illegal EXC_RETURN	0x6183	Coast to standstill	No
E64-4	CPU - Program error - Illegal use of EPSR	0x6184	Coast to standstill	No
E64-5	CPU - Program error - Undefined command	0x6185	Coast to standstill	No
E64-6	CPU - Bus error - Valid error address in BFAR	0x6186	Coast to standstill	No
E64-7	CPU - Bus error - Stacking error for exception entry	0x6187	Coast to standstill	No
E64-8	CPU - Bus error - Unstacking error for exception entry	0x6188	Coast to standstill	No

Error code	Name	DS402 (error code)	Error reaction	Configurable via parameters
E64-9	CPU - Bus error - Imprecise data bus error	0x6189	Coast to standstill	No
E64-10	CPU - Bus error- Precise data bus error	0x618A	Coast to standstill	No
E64-11	CPU - Bus error - Error on prefetching instruction	0x618B	Coast to standstill	No
E64-12	CPU - Memory error - Valid error address in MMFAR	0x618C	Coast to standstill	No
E64-13	CPU - Memory error - Stacking error by ARM MPU	0x618D	Coast to standstill	No
E64-14	CPU - Memory error - Unstacking error by ARM MPU	0x618E	Coast to standstill	No
E64-15	CPU - Memory error - Instr fetch from protected location	0x618F	Coast to standstill	No

⁽¹⁾ The internal ballast resistor is active even though an external ballast resistor is parameterized.

Tab. 11: Error messages of SD4x series

10.2 Messages

The limit values for most messages are configurable by parameter, for example in the software *drivemaster4*. All messages are stored bit-coded in object 0x0258 "MESSAGE_REGISTER".

Code	Message
M00	Hardware input quick stop
M01	Hardware input positive limit switch
M02	Hardware input negative limit switch
M03	Hardware input external error
M04	Safe Torque Off (STO) is active
M05	Direction lock active
M06	Reference value too small
M07	Magnetic alignment NOK
M08	Voltage limit reached
M09	Current limit reached
M10	Upper torque limit reached
M11	Lower torque limit reached
M12	Overspeed
M13	Underspeed
M14	Speed error
M15	Speed zero
M16	Supply voltage NOK
M17	Power supply I ² t overload
M18	Power supply unit temperature
M19	Power supply unit overvoltage
M20	Power supply unit undervoltage
M21	Power supply I ² t load
M22	Ballast circuit I ² t
M23	Ballast circuit chopper active
M24	Load indicator 1
M25	Load indicator 1
M26	Load indicator 2
M27	Load indicator 2
M28	Power output stage I ² t load
M29	Power output stage temperature
M30	Power output stage overvoltage
M31	Power output stage undervoltage
M32	Motor I ² t load
M33	Motor temperature (For temperature sensors KTY and PT1000 only)
M34	Motor coasted to standstill and was not switched off at speed zero
M35	Motor break not released
M36	Ambient temperature too high
M37	Short circuiting of motor phases active
M38	Feedback 1 NOK
M39	Feedback 2 NOK
M40	Invert target value
M41	Skip bandwidth active
M42	Jog speed 1 active
M43	Jog speed 2 active
M44	Torque reduction via digital input is active
M45	Power output stage I ² t overload
M46	Halt active

Code	Message
M47	Hardware enable - Digital input "Switch On" missing ("Switch on" via fieldbus is available)
M48	Encoder 1 - M1_AUX+ NOK (signal error X6)
M49	Encoder 2 - M2_AUX+ NOK (signal error X7)
M50	Fieldbus error counter has reached "warning level"
M51	Target reached
M52	Power supply input voltage too low
M53	Power supply input frequency too low
M54	Power supply input frequency too high
M55	Reserved
M56	Fieldbus protocol error
M57	Fieldbus watchdog error

Tab. 12: Messages of SD4x series

Appendix

A CPU Exception

A **CPU exception** error announces a CPU error. For that purpose all 3 status LEDs flash simultaneously. Then, the middle LED flashes once or several times to indicate a sub error. The number of flashes may help with the diagnosis and finding the cause of error. CPU exception and sub error are displayed repeatedly.

The drive only leaves this error mode by means of a device restart (reset). If such an error occurs, please contact SIEB & MEYER.

LED 1	LED 2	LED 3	Device status
 Blue fl.	 Red fl.	 Blue fl.	CPU Exception (approx. 2 seconds): CPU error announcement
Sub error: usage fault			
 Off	1 ×  Red fl.	 Off	Executed an SDIV or UDIV instruction with a divisor of 0
 Off	2 ×  Red fl.	 Off	Made an unaligned memory access.
 Off	3 ×  Red fl.	 Off	Attempted an access to a coprocessor if the access is denied or privileged only (configurable in CPACR).
 Off	4 ×  Red fl.	 Off	Attempted an illegal load of EXC_RETURN to the PC, as a result of an invalid context, or an invalid EXC_RETURN value.
 Off	5 ×  Red fl.	 Off	Attempted to execute an instruction that makes illegal use of the EPSR.
 Off	6 ×  Red fl.	 Off	Attempted to execute an undefined instruction.
Sub error: bus fault			
 Off	7 ×  Red fl.	 Off	Bus fault occurred during floating-point lazy state preservation.
 Off	8 ×  Red fl.	 Off	Stacking for an exception entry has caused bus fault.
 Off	9 ×  Red fl.	 Off	Unstack for an exception return has caused bus fault.
 Off	10 ×  Red fl.	 Off	Imprecise data bus error.
 Off	11 ×  Red fl.	 Off	Precise data bus error.
 Off	12 ×  Red fl.	 Off	Error on prefetching an instruction.
Sub error: memory fault			
 Off	13 ×  Red fl.	 Off	MemManage fault occurred during floating-point lazy state preservation.
 Off	14 ×  Red fl.	 Off	Stacking error caused by ARM MPU violation.
 Off	15 ×  Red fl.	 Off	Unstacking error caused by ARM MPU violation.
 Off	16 ×  Red fl.	 Off	The processor attempted a load or store at a protected (by ARM MPU) location.

Tab. 13: CPU exception errors

B Manufacturers

B.1 SIEB & MEYER Accessories

In the following you find all accessories for SD4B that you can order at SIEB & MEYER.

Note

Consider the information on accessories suitable for your device in the technical manual.

B.1.1 Connector Kit

SIEB & MEYER article number	Device variant
32299587	0SD4B B1 D1P xxxx
32299635	0SD4B B1 E1N xxxx

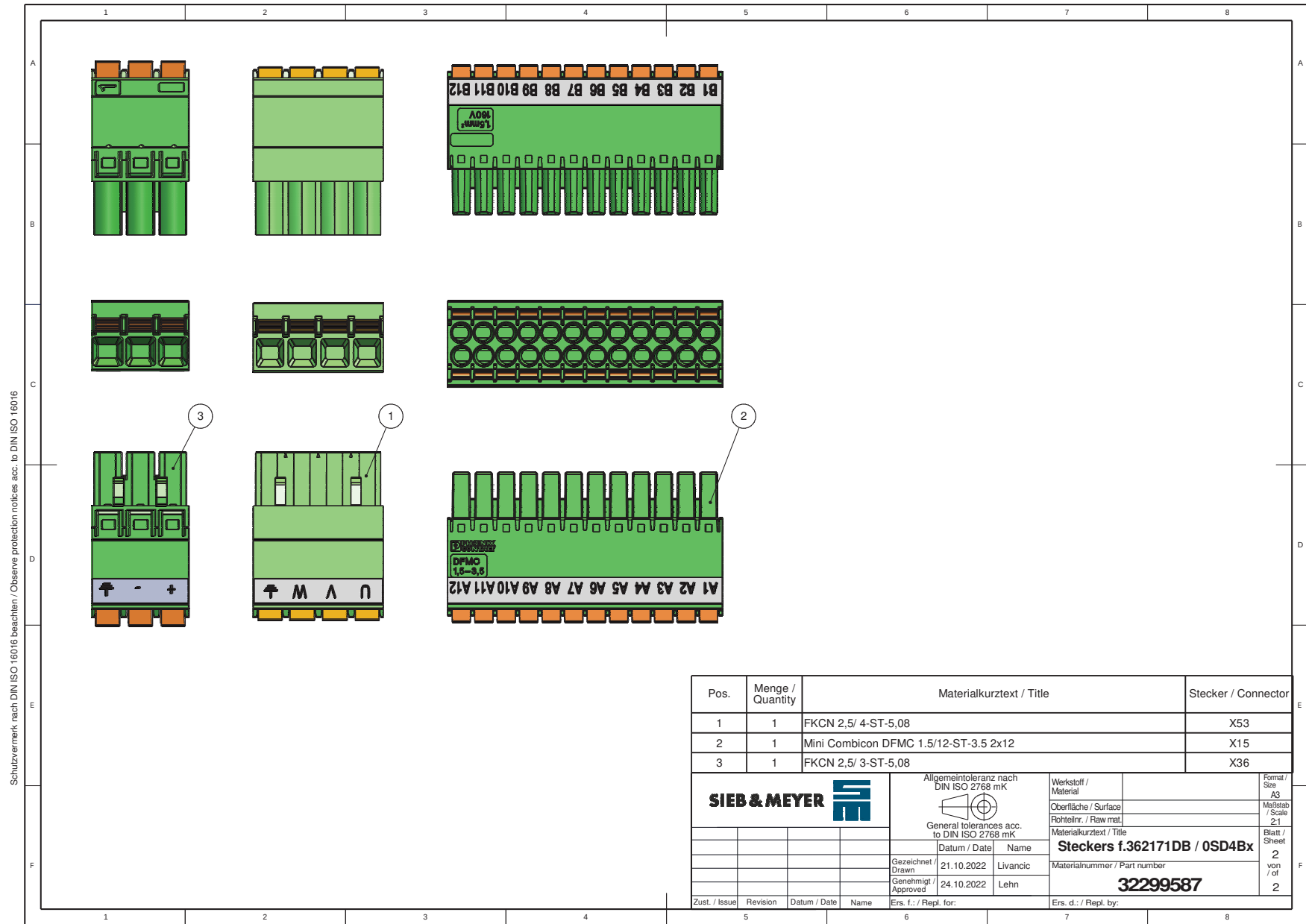


Fig. 40: Content of connector kit 32299587

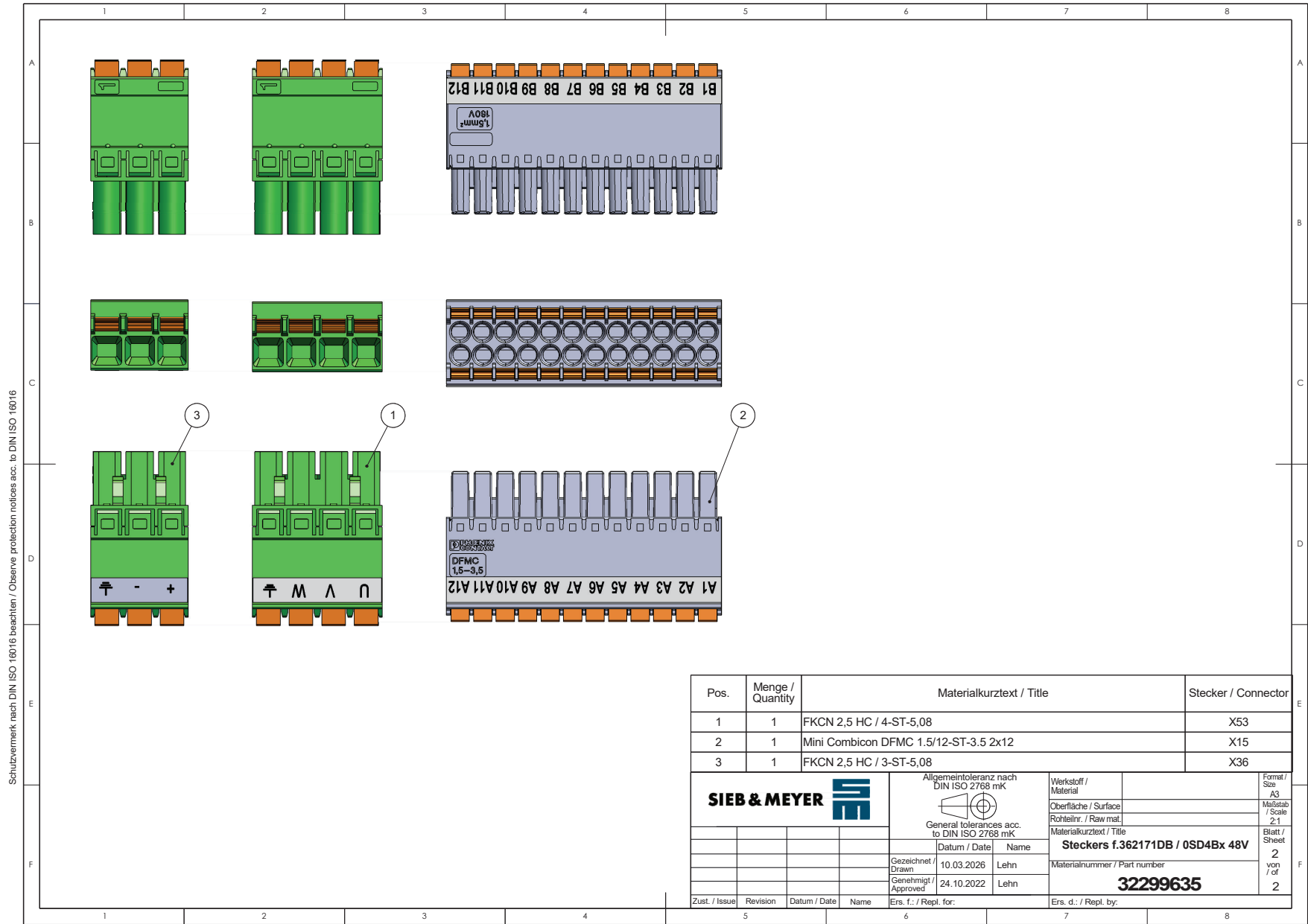
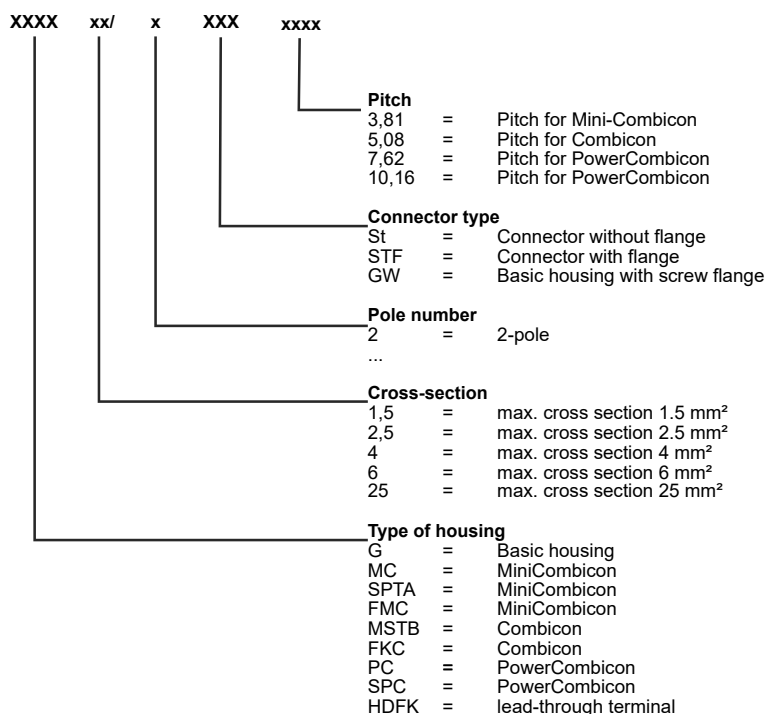


Fig. 41: Content of connector kit 32299635

B.2 Phoenix Contact

www.phoenixcontact.com

Order key for Phoenix connectors



Note

Labeled connectors can be ordered at SIEB & MEYER.

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