SIEB & MEYER

Drive System SD2S

Hardware Description

D-00000024.4
2022-09-02

Copyright

Original instructions, Copyright © 2022 SIEB & MEYER AG

All rights reserved.

This manual or extracts thereof may only be copied with the explicit authorization by SIEB & MEYER AG.

Trademarks

All product, font and company names mentioned in this manual may be trademarks or registered trademarks of their respective companies.

SIEB & MEYER Worldwide

For questions regarding our products and technical problems please contact us.

SIEB & MEYER AG
Auf dem Schmaarkamp 21
21339 Lueneburg
Germany

Phone: +49 4131 203 0
Fax: +49 4131 203 2000
info@sieb-meyer.de
http://www.sieb-meyer.com

SIEB & MEYER Shenzhen Trading Co. Ltd.
Room A208 2/F,
Internet Innovation and Creation Services Base Building (2),
No.126, Wanxia road, Shekou, Nanshan district,
Shenzhen City, 518067
P.R. China

Phone: +86 755 2681 1417 / +86 755 2681 2487
Fax: +86 755 2681 2967
info@sieb-meyer.cn
http://www.sieb-meyer.cn

SIEB & MEYER Asia Co. Ltd.
5 Fl, No. 578, Sec. 1
Min-Sheng N. Road
Kwei-Shan Hsiang
Guishan Dist., Taoyuan City 33393
Taiwan

Phone: +886 3 311 5560
Fax: +886 3 322 1224
info@sieb-meyer.tw

1 About this Manual

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

Note

You can download more documentation from the SIEB & MEYER website under http://www.sieb-meyer.de/downloads.html.

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 Abbreviations

FPAM	flux pulse amplitude modulation
HSBLOCK	high-speed block commutation
HSPAM	high-speed pulse amplitude modulation
HSPWM	high-speed pulse width modulation
HW	hardware

n.c.	not connected
PAM	pulse amplitude modulation
PWM	pulse width modulation
SERVO	servo control
SVC	sensorless vector control
UVLO	undervoltage-lockout
VF	V/f characteristic curve
VCC	voltage at the common collector
VECTOR	vector control

2 General Information

This manual describes the drive systems of the series SD2S. These devices allow operation of high-dynamic servo motors as well as synchronous and asynchronous high-frequency spindles.

The devices are equipped with interfaces for different sensor systems allowing to drive motors with resolvers as well as SinCos, EnDat, Hall, linear Hall, incremental and field plate sensors. Motor systems without any sensors are also supported, whereas different customized control methods are available. In addition, the devices can drive rotary and linear motors. Thus, the number of device variants is reduced for the machine manufacturer.

For real-time requirements devices with EtherCAT slave interface are available.

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)
- External protection, ballast circuit

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 amplifier can be found in the manual of the software *drivemaster2*.

Note

You can download more documentation from the SIEB & MEYER website under http://www.sieb-meyer.de/downloads.html.

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 Directive 2006/42/EC:
  EU manufacturer's certificate, DIN EN 61800-5-2(safety functions)

Note

SIEB & MEYER frequency converters and servo amplifiers 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 EU Machinery Directive. 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 EC/EEC 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 approriate housing.

Terms according to DIN EN 61800

Before initial operation, make sure that the machine will not expose danger (e.g. run-away 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 units can be operated in industrial areas, provided that the attached EMC information 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.

Installation of the device differing from the product documentation and the manual "EMC Guidelines" means that the machine manufacturer has to carry out new measurements to comply with the regulations.

SIEB & MEYER devices meet the requirements of the Low-Voltage Directive 2014/35/EU. The harmonized standards of DIN EN 50178 and DIN EN 60204-1 in combination with the standards DIN EN 60947 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 Directive 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 "EMC Guidelines", 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 "EMC Guidelines".

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 EU Machinery Directive.

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 Transport and Storage

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

- Protect the device against mechanical damage! Ensure that single shock loads do not exceed 40 m/s^2.
- Protect the device against dirt and humidity.
  Make sure that **dust plugs are plugged on optical fiber connectors equipped with them during transport of the device**. Otherwise, recommissioning is potentially not possible.
- Never touch electronic components.

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

- The storage area must be clean (dust-free, if possible), dry and well-ventilated.
- No storage in the open.
- The storage temperature must be in the range of −25 °C to +55 °C (−13 °F to +131 °F). Shortly it may be +70 °C (+158 °F).
- The relative humidity on the storage premises must be in the range of 5 % to 75 % (no bedewing).
- Sudden changes of the temperature or the humidity should be prevented.
- Avoid stacking of the devices during transport and storage.

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, the operating voltage is applied via a 1 kΩ series resistor for one hour. Contact the SIEB & MEYER service department for details.

3.6 Installation

NOTICE

Damage of electrostatically sensitive components due to improper handling

→ Never touch electronic components.

Note

Consider specific mounting instructions for your device.

Mechanical installation conditions for the system according to DIN EN 61800-2:

"Vibrations must remain within the limit values of the standard IEC 60721-3-3, class 3M1, for fixed equipment."

Frequency [Hz]	Amplitude [mm]	Acceleration [m/s²]
$2 \leq f < 9$	1.5	Not applicable
$9 \leq f < 200$	Not applicable	5

Tab. 1: Vibration limits of the system

"Vibrations which exceed these limits, or the use on mobile equipment, are considered as **abnormal mechanical conditions**."

Operating conditions:

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

- The device is conceived according to DIN EN 61800-2 for the dirt level 2. That means: Ensure to avoid conductive impurities during the operation.
- Devices with air cooling only can be loaded to their maximum up to a height of 1000 m above MSL (3281 ft above MSL). For an operation in areas higher than 1000 m (3281 ft) above MSL the capacity must be reduced by 1.5 % per 100 m (328 ft).

  The maximum site altitude is 2000 m (6562 ft) above MSL for IT mains and 3000 m (9843 ft) above MSL for symmetrically grounded TN and TT mains..
- The device must be protected against harmful gas, oil vapor and salty air at the place of installation.
- The ambient air must not contain aggressive, grinding, electrically conductive or flammable substances as well as any amount of dust.
- The maximum relative humidity during operation is 85 % (no condensation).
- The allowed ambient temperature for the operation is +5 °C to +40 °C (+41 °F to +104 °F). Extreme and sudden changes of the temperature should be prevented.
  - Ensure power derating for devices used in ambient temperatures over +40 °C (+104 °F) (see technical data). The following applies: -1.5 % per 1 °C. Note: F=C×9/5+32; C=(F-32)×5/9
  - Devices with polyester films: The polyester films must not be exposed to direct sunlight for extended periods of time. In conditions of high humidity (>80 %) the ambient temperature must not exceed +40 °C (+104 °F). The polyester films must not come in contact with benzyl alcohol or methylene chloride.
- Make sure that the aeration elements are free and open, so that the air circulation is not restricted.

3.7 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.

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 & MEYERdevices are conceived for connection to symmetrically grounded TN networks. For detailed information regading the connection to TN networks or other networks refer to the manual "EMC Guidelines", 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 amplifiers 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 cannot be used. According to DIN EN 61800-5-1/ DIN EN 60204-1 the following measures are required when leakage currents ≥3.5 mA occur:

→ 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 min. 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)

Note

For detailed information regarding the operation with residual current device (RCD) refer to the manual "EMC Guidelines", chapter "Safety-relevant Aspects, Residual Current Device (RCD)". Also consider the standard DIN EN 60204-1, section 8: additional requirements for electrical equipment with earth leakage currents greater than 10 mA.

3.8 Operation

⚠ WARNING

Risk of serious personal injury 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 burn 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. Dies entspricht der Entflammbarkeitsklasse UL 94V-0, RTI 105 °C.

→ Consider the relevant notes in the manual.

Systems, into which servo amplifiers 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.)

3.9 Maintenance

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

3.10 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 & MEYERproducts 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 & MEYERproducts do not exceed the limits of the directive 2011/65/EU for hazardous substances.

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

3.11 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 "EMC Guidelines" 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 www.sieb-meyer.de/downloads.html

4.1 Emission of Line and Field Interferences According to Category C3

According to the EMC product standard DIN EN 61800-3, chapter 6 (emission of line interferences), this device meets the interference limit values of the category C3 if the conditions listed below are met.

Requirements

- The device is equipped with basic interference elimination functions via an integrated line filter.

  If motor cables longer than 5 m are used, an external line filter is required.

  For detailed information on mounting and connecting line filters refer to the manual "Unit Assembly complying EMC".
- If no internal line filter is provided, an external line filter must be used to reach the category C3.

NOTICE

Connection of line filters

→ Consider the connection instructions of the line filter manufacturer to ensure sufficient filter effect.

Note

For detailed information on the used device refer to the section "Technical Data".

NOTICE

High-frequency interferences in a blic low-voltage distribution network

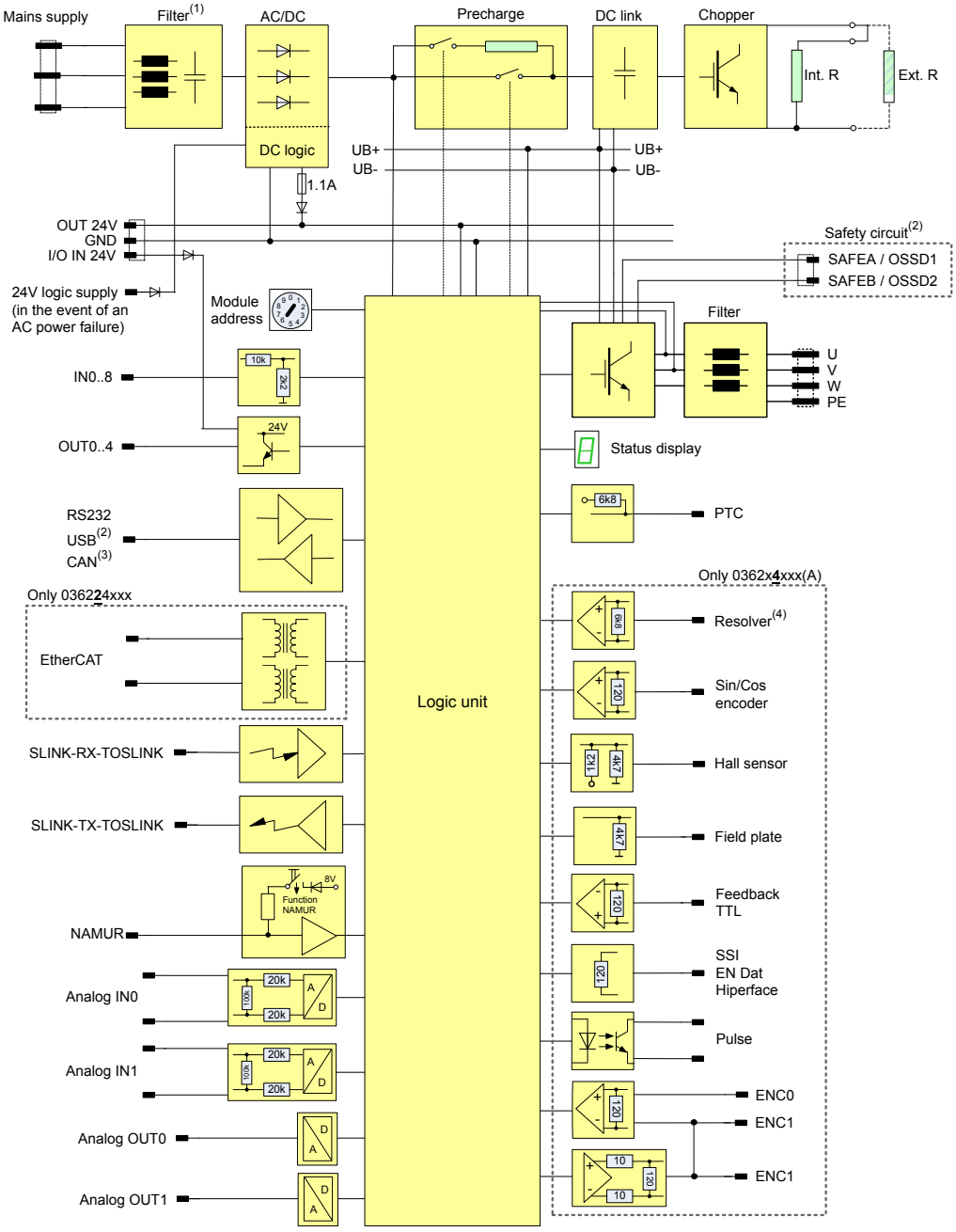
High-frequency interferences may occur, if the device is used in a public mains which supplies residential areas. These interferences may disturb the functioning of other devices.

→ Do not use the device in a public mains or ensure appropriate interference suppression measures.

5 Drive Amplifier SD2S

5.1 Block Diagrams SD2S

Block diagram for devices with **fix DC link voltage** (0362120xx, 0362121xx, 0362x40xx(A), 0362x41xx(A), 0362x45xx to 0362x48xx):



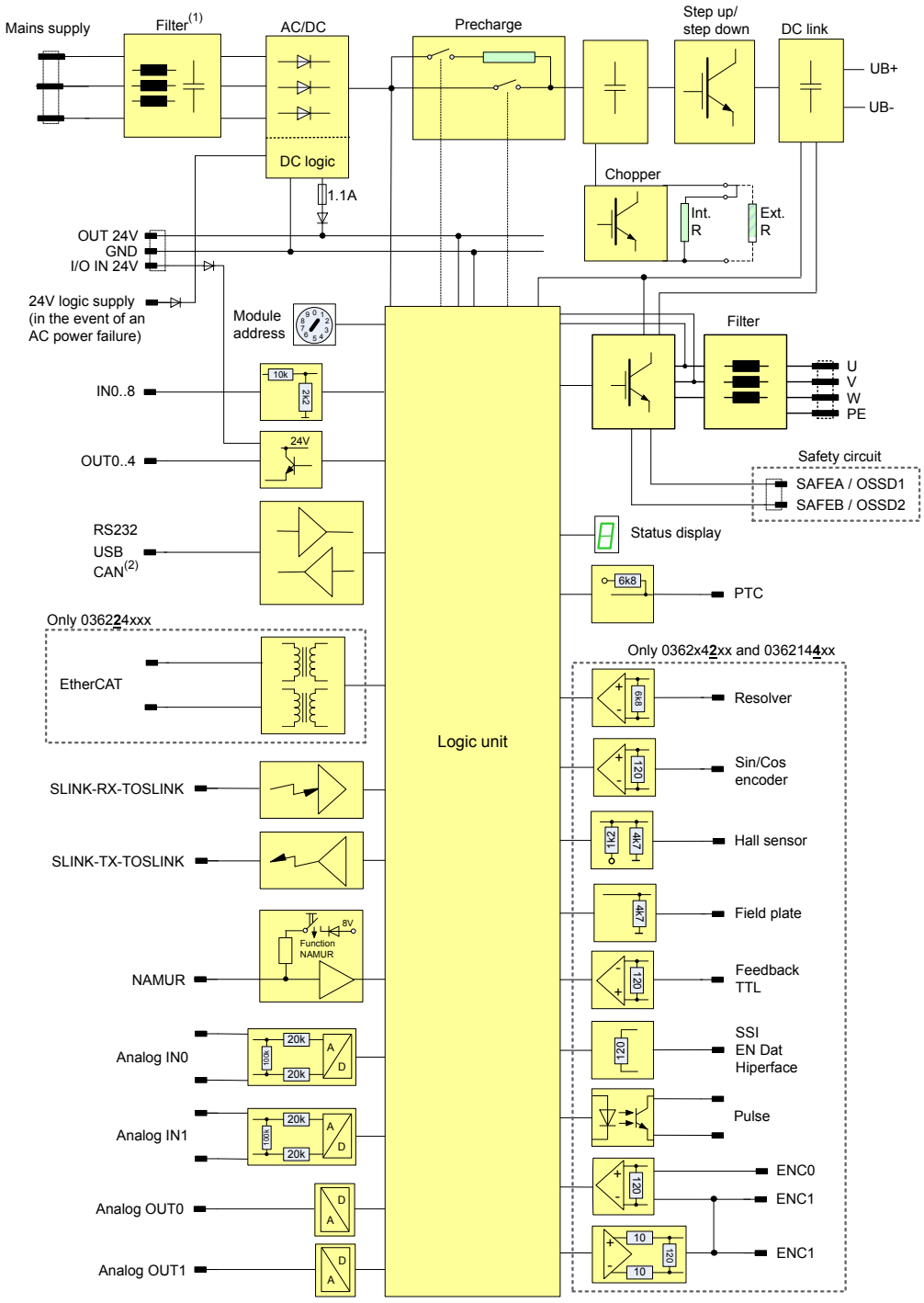
(1) Not integrated in 0362x45xx to 0362x48xx. These devices are to be operated with external line filter and external 24 V_{DC} logic voltage.

(2) Not integrated in older devices.

(3) Not integrated in older SD2S Light (036212xxx).

(4) Not integrated in the devices 0362140DCA and 0362x41ECA.

Block diagram for devices with **controlled DC link voltage** (0362x42xx, 0362x43xx, 0362144xx):



(1) A line filter is only integrated in device variant 0362x42DC. The devices 0362x42EC, 0362x43xx and 0362144xx must be operated with an external line filter.

(2) Not integrated in older 0362143xx devices.

5.2 Type Plate

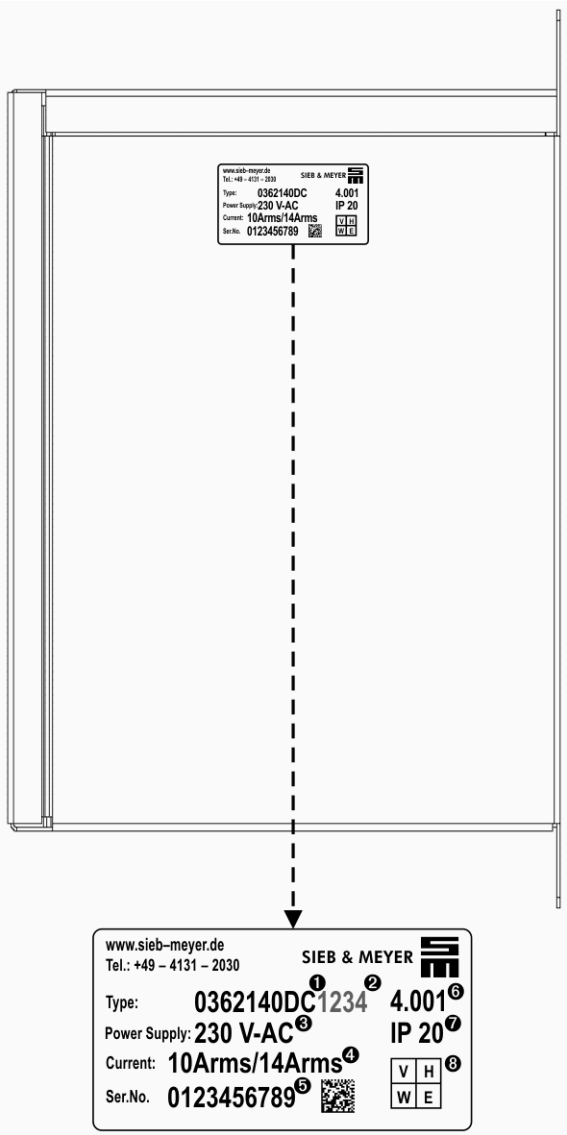
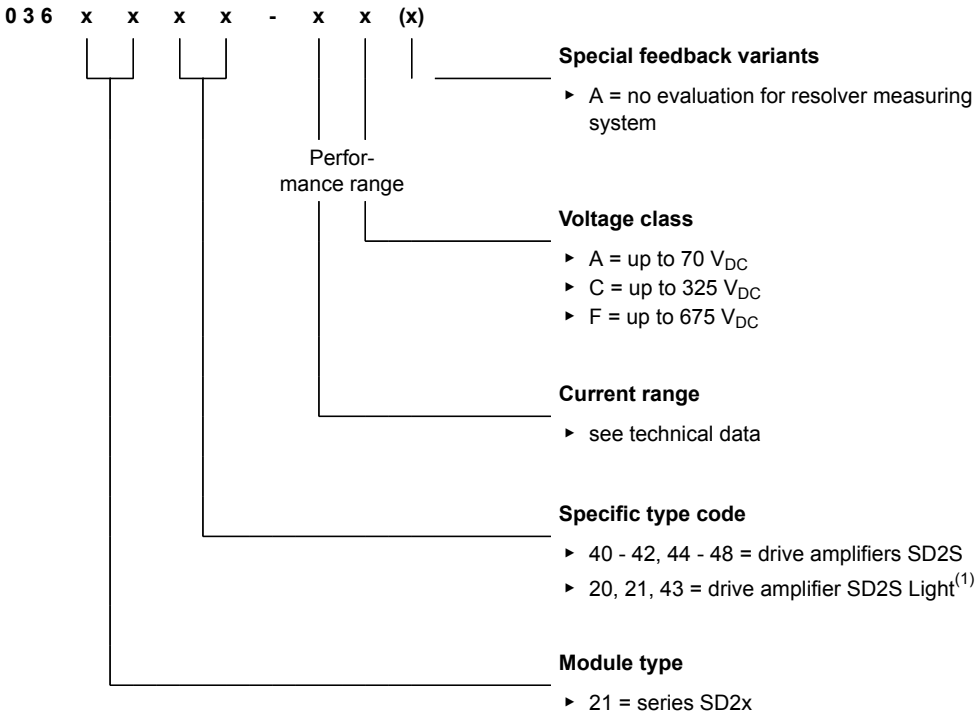


Fig. 1: Type plate (example for SD2S)

No.	Meaning	Explanation
❶	Device designation	Composed of module type with indication of performance range and max. DC link voltage
❷	Extension for customized devices	Indicates a 4 digit numeral code for customized devices; there is no code for standard devices
❸	Supply voltage	Indicates the maximum voltage range (if this row is left blank, an external power supply unit is necessary)
❹	Rated current/peak current	Applies to the output stage; indicated as RMS value
❺	Serial number	Indicates the individual number of the device
❻	Device version	Indicates the version of the hardware; if no version is existent, 0.000 is indicated here
❼	IP Code	Indicates the level of protection of the device against touching or intrusion of solid objects (1st digit) and water ingress (2nd digit)
❽	QA label	

5.3 Device Designation

e.g. **0362140DCA** **3.000**
Device type Device version



(1) The Light variants do not provide several interfaces for measuring systems.
(2) The EtherCAT option is not available with all SD2S devices (see descriptions of the device variants).

Note

The drive amplifiers 0362x49xx of the series SD2S (with TÜV certificate) are described in the manual “Drive System SD2S – Hardware Description 0362149xx / 0362249xx”.

Device version X.XXX

Serial counter. If there is no device version, 0.000 is indicated here. If a device is exchanged by a device of another version, please contactSIEB & 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 Functional Overview of the Device Variants

The following table indicates the functional differences between the device variants of series SD2S.

Note

The drive amplifiers 0362x49xx of the series SD2S (with TÜV certificate) are described in the manual “Drive System SD2S – Hardware Description 0362149xx / 0362249xx”.

Drive 0362x…[1]	Max. output power S1[2]	Mains supply		DC link		Drive functions[3] (= up to an output frequency of … kHz)								Interfaces	
		1-phase	3-phase	fix[4]	controlled	SERVO / VECTOR		HSBLOCK / FPAM			HSPWM	HSPAM / VF		X6/X7 (encoder 0/1)	X17 (feed-back)
						SERVO	SVC	HSBLOCK (with sensor)		FPAM (sensorless)		VF-PWM	VF-PAM		
								PWM (Hall)	PAM (Hall)						
…40xx(A)	1.5 / 4.3 kVA	✔ / –	– / ✔	✔	–	2 kHz	2 kHz	6 / 2 kHz	–	–	8 / – kHz	2 kHz	–	✔	✔ [5]
…41xx(A)	6.9 / 9.7 kVA	✔	✔	✔	–	2 kHz	2 kHz	6 kHz	–	–	4 / 8 kHz	2 kHz	–	✔	✔ [5]
…42DC	1.5 kVA	✔	–	–	0 – 350 V_{DC}	2 kHz	on request	–	8 kHz	8 kHz	–	–	8 kHz	✔	✔
…42EC	1.9/3.8 kVA	✔	✔	–	0 – 310 V_{DC}	2 kHz	2 kHz	–	8 kHz	8 kHz	–	–	8 kHz	✔	✔
…44xx	15.9 kVA	–	✔	–	0 – 530 V_{DC}	–	–	–	8 kHz	8 kHz	–	–	8 kHz[6]	✔	✔
…45xx	15.9 / 20.8 kVA	–	✔	✔	–	2 kHz	2 kHz	on request	–	–	4 / – kHz	2 kHz	–	✔	✔
…46xx	30.5 kVA	–	✔	✔	–	2 kHz	2 kHz	on request	–	–	4 kHz	2 kHz	–	✔	✔
…47xx	55.4 kVA	External DC power unit necessary		✔	–	2 kHz	2 kHz	on request	–	–	4 kHz	2 kHz	–	✔	✔
…48xx	55.4 kVA	–	✔	✔	–	2 kHz	2 kHz	on request	–	–	4 kHz	2 kHz	–	✔	✔
SD2S Light															
…43xx	1.9 / 3.8 kVA	✔	✔	–	0 – 310 V_{DC}	–	–	–	–	8 kHz	–	–	8 kHz	–	–
…20xx	1.5 kVA	✔	–	✔	–	–	2 kHz	–	–	–	8 kHz	2 kHz	–	–	–
…21xx	6.9 / 9.7 kVA	✔	✔	✔	–	–	2 kHz	–	–	–	4 / 8 kHz	2 kHz	–	–	–

[1] Fieldbus option: 03621… = without fieldbus interface; 03622… = with EtherCAT interface
[2] The maximum output power S1 refers to the device with the highest power range within the drive variant.
[3] A few drive functions are not available with older devices.
[4] The fix intermediate circuit voltage depends on the AC power supply.
[5] The device variants 0362x40DCA and 0362x41ECA do not provide the evaluation for a resolver measuring system.
[6] If you require this function, please contact the SIEB & MEYER service staff for project planning.

For detailed information refer to the technical data of your device.

6 Device Variants SD2S

6.1 Compact Device 0362x40xx(A) / 0362120xx

Features of SD2S device variant 0362x40xx(A) / 0362120xx:

- integrated power supply unit, 1- or 3-phase power supply
- safety circuit
- 0362x40xx(A): standard design with interfaces for measuring systems
  - 0362140xx = without fieldbus interface
  - 0362140DCA = without fieldbus interface, without resolver evaluation
  - 0362240xx = with EtherCAT interface
- 0362120xx: Light design without interfaces for measuring systems

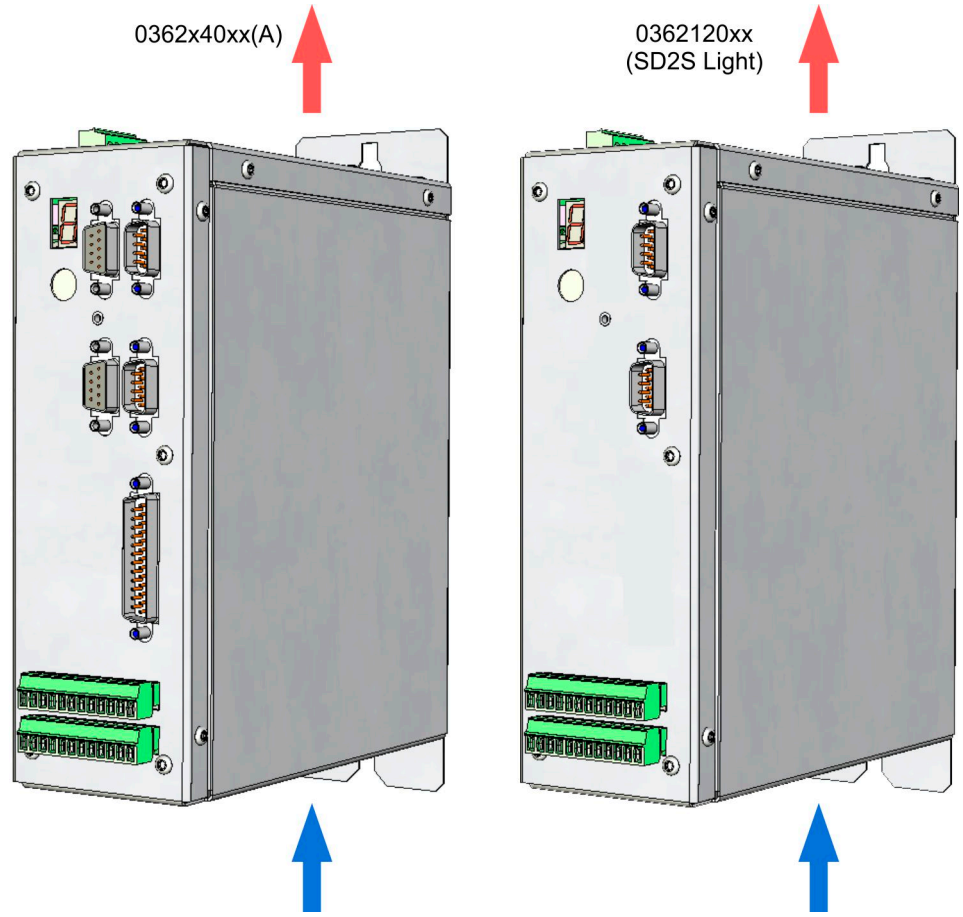


Fig. 2: Device view 0362x40xx(A) / 0362120xx

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.1.1 Dimensions

The gray-colored connectors are only available on device variant 0362x40xx(A):

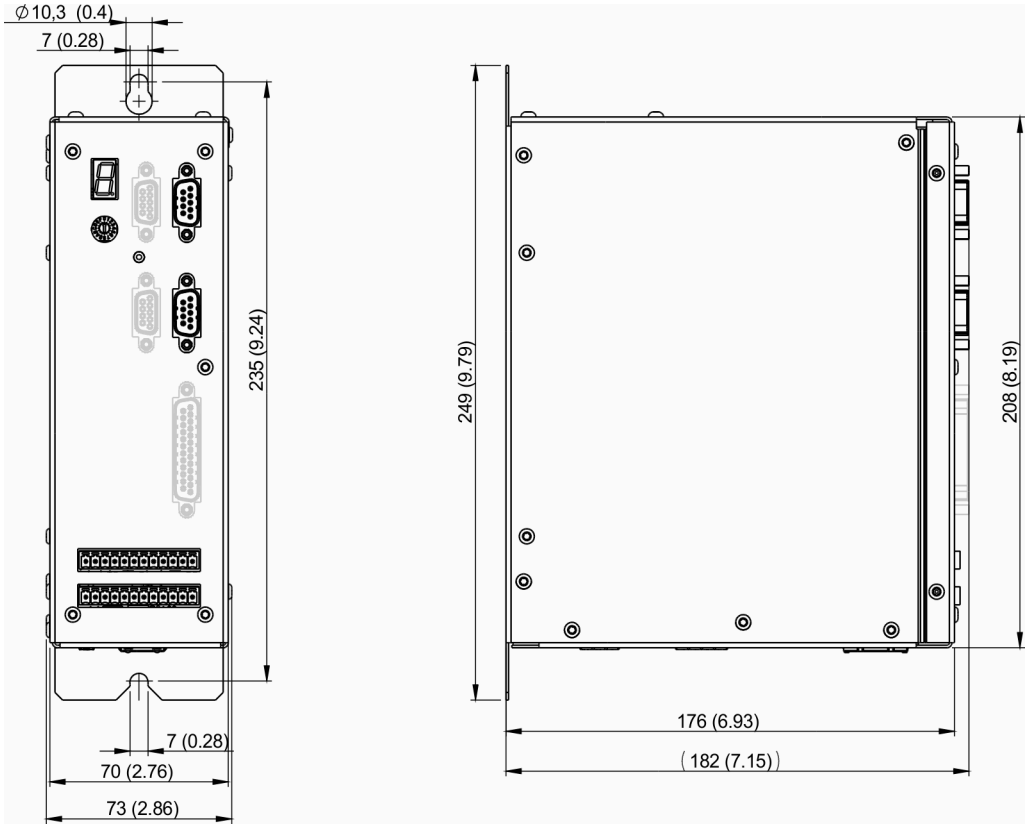


Fig. 3: Dimensions 0362x40xx(A) / 0362120xx (230 V mains supply) in mm (inch)

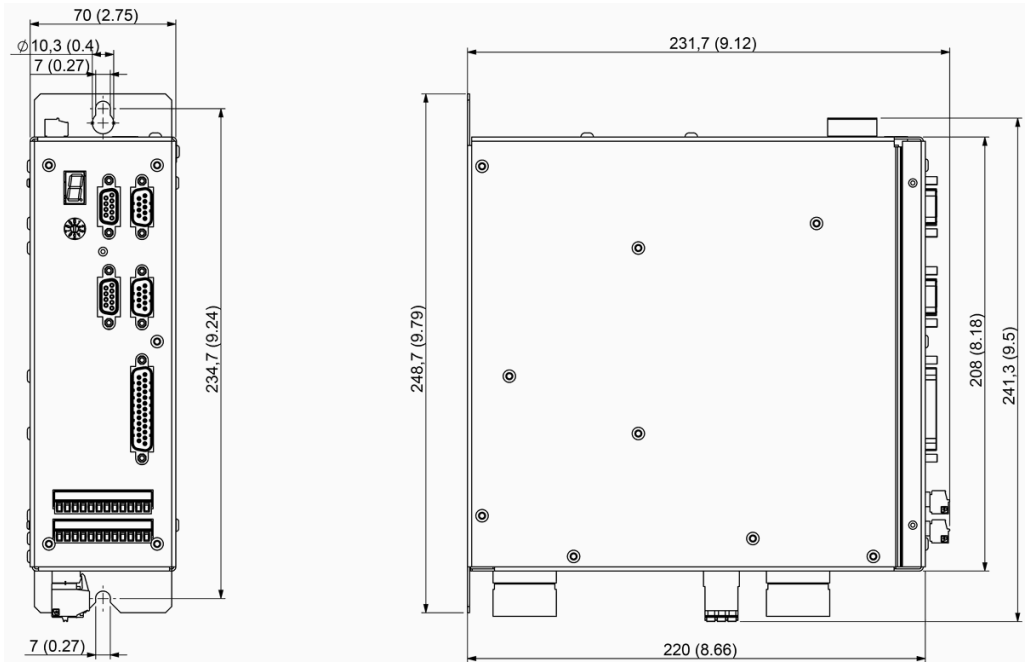


Fig. 4: Dimensions 0362x40EF (480 V mains supply) in mm (inch)

6.1.2 Technical Data

6.1.2.1 Mains supply 230 V_{AC}

Device variant	0362x40xx(A) / 0362120xx		
Performance range	**DC / DCA**	**EC**	**DA**
Continuous phase current of output stage (±3 %)	14 A_p / 10 A_{rms}	14 A_p / 10 A_{rms}	14 A_p / 10 A_{rms}
Peak phase current of output stage (±3 %)	20 A_p / 14 A_{rms}	40 A_p / 28 A_{rms}	20 A_p / 14 A_{rms}
Max. time for peak current	5 s	2 s	5 s
Max. temperature of the output stage	75° C		
Max. output frequency	8000 Hz		
Output frequency stability	≤ 0.2 %		
Mains supply (1-phase)	1 × 115 V_{AC} -10 % to 230 V_{AC} +10 % 50 Hz / 60 Hz		1 × 50 V_{AC} -10 % / +40 % 50 Hz / 60 Hz
Required mains choke	10 A, article No. 13015834[1]		
Short circuit current rating (SCCR)	1000 A		
Line filter	The internal line filter meets the interference limits of the category C3.[2]		
Mains fuse	16 A e.g. Siemens 5SE1 316, type NEOZED D01[3]		
DC link voltage	160 V_{DC} -10 % to 325 V_{DC} +10 %		70 V_{DC} -10 %/+40 %
Output power S1	0.75 kVA at 4.3 A_{rms} / 100 V_{AC} 1.5 kVA at 4.3 A_{rms} / 200 V_{AC}		0.33 kVA at 4.3 A_{rms} / 45 V_{AC}
Mains phase current at rated power	8 A		
Logic supply [4]	18 to 28 V_{DC} (0.5 A)		
Power loss of logic unit	12 W		
Power loss of power unit	Max. 5 % of the output motor power, at least 20 W		
Min. external ballast resistor	Not possible		
Internal ballast resistor	20 Ω / 100 W		10 Ω / 50 W
Ballast threshold	380 V_{DC}		120 V_{DC}
Overvoltage threshold	410 V_{DC}		140 V_{DC}
Undervoltage threshold	40 V_{DC}		30 V_{DC}
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C. Derating: 0.5°K/W ballast power		
IP code	IP20		
Max. weight	2.5 kg		

[1] For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

[2] If the motor lines are longer than 5 m, use an external line filter to comply with the standard EMC Directive 2014/30/EU. You find a list of the line filters available at SIEB & MEYER in the appendix (see page 197).

[3] An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

[4] The logic supply is necessary to maintain the error messages.

Rated current derating

Drive function[1]	SERVO		SVC; VF-PWM		HSBLOCK (with sensor)				HSPWM				
PWM frequency [kHz]	**8**	**16**	**8**	**16**	**8**	**16**	**32**	**64**	**8**	**16**	**32**	**64**	**128**
0362120DC rated current S1 [A_{rms}]	–	–	10	9.2	–	–	–	–	10	10	9.2	7	5
0362120EC rated current S1 [A_{rms}]	–	–	10	10	–	–	–	–	10	10	10	7	4
0362120DA rated current S1 [A_{rms}]	–	–	10	10	–	–	–	–	10	10	10	10	10
0362x40DC(A) rated current S1 [A_{rms}]	10	9.2	10	9.2	9.8	9	7	4	10	10	9.2	7	5
0362x40EC rated current S1 [A_{rms}]	10	10	10	10	10	10	7.3	4.5	10	10	10	7	4
0362x40DA rated current S1 [A_{rms}]	10	10	10	10	10	10	10	9.8	10	10	10	10	10

[1] For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

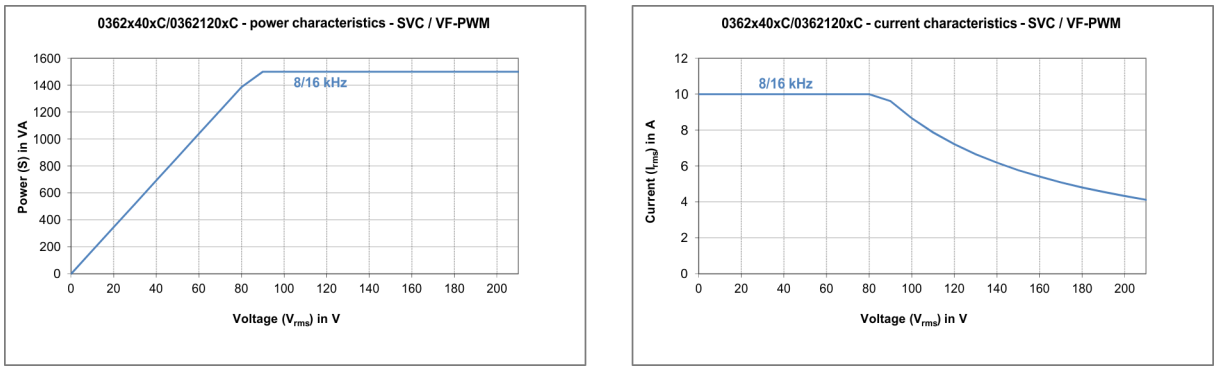


Fig. 5: Output characteristics for 0362x40xC(A) / 0362x20xC in SVC or VF-PWM mode

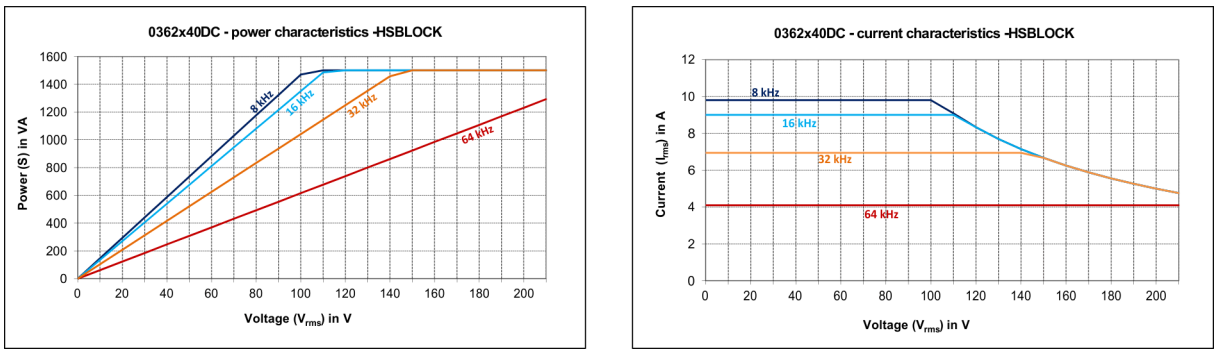


Fig. 6: Output characteristics for 0362x40DC(A) in HSBLOCK mode (with sensor)

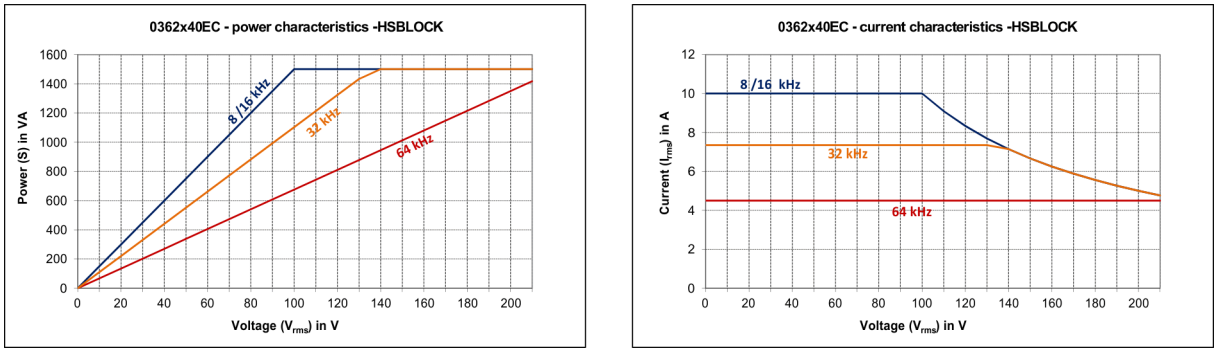


Fig. 7: Output characteristics for 0362x40EC in HSBLOCK mode (with sensor)

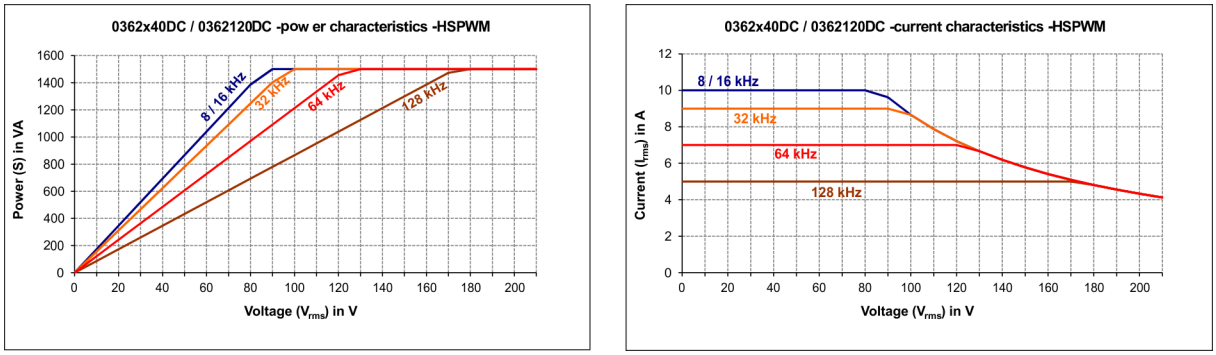


Fig. 8: Output characteristics for 0362x40DC(A) / 0362120DC in HSPWM mode

6.1.2.2 Mains supply 480 V_{AC}

Device variant	0362x40EF					
Continuous phase current of output stage (±3 %)	10 A_p / 7 A_{rms}					
Peak phase current of output stage (±3 %)	40 A_p / 28 A_{rms}					
Max. time for peak current	5 s					
Max. temperature of the output stage	75° C					
Max. output frequency	2000 Hz					
Output frequency stability	≤ 0.2 %					
Mains supply (3-phase)	200 V_{AC} -10 % to 480 V_{AC} +10 % 50 Hz / 60 Hz					
Required mains choke	16 A, article No. 13015801(1)					
Short circuit current rating (SCCR)	1000 A					
Line filter	The internal line filter meets the interference limits of the category C3.(2)					
Mains fuse	16 A e.g. Siemens 5SE1 316, type NEOZED D01(3)					
DC link voltage	280 V_{DC} -10 % to 675 V_{DC} +10 %					
Output power S1	4.3 kVA at 7 A_{rms} / 360 V_{AC}					
Mains phase current at rated power	6.5 A_{rms}					
Drive function(4)	SERVO		SVC; VF-PWM		HSBLOCK (with sensor)	
PWM frequency [kHz]	8	16	8	16	8	16
Rated current S1 [A_{rms}]	7	5	7	5	8.1	5.8
Logic supply(5)	18 to 28 V_{DC} (0.5 A)					
Power loss of logic unit	12 W					
Power loss of power unit	Max. 5 % of the output motor power, at least 20 W					
Min. external ballast resistor	22 Ω / max. 500 W					
Internal ballast resistor	22 Ω / 50 W					
Ballast threshold	800 V_{DC}					
Overvoltage threshold	850 V_{DC}					
Undervoltage threshold	40 V_{DC}					
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C. Derating: 0.5°K/W ballast power (internal ballast resistor)					
IP code	IP20					
Max. weight	3.5 kg					

(1) For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

(2) If the motor lines are longer than 5 m, use an external line filter to comply with the standard EMC Directive 2014/30/EU. You find a list of the line filters available at SIEB & MEYER in the appendix (see page 197).

(3) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(4) For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

(5) The logic supply is necessary to maintain the error messages.

6.1.3 Connectors

Mains supply 230 V_{AC}

The gray-colored connectors are only available on the following device variants:

- X6, X7, X17 (measuring systems): 0362x40xx(A)
- X64, X65 (EtherCAT option): 0362240xx

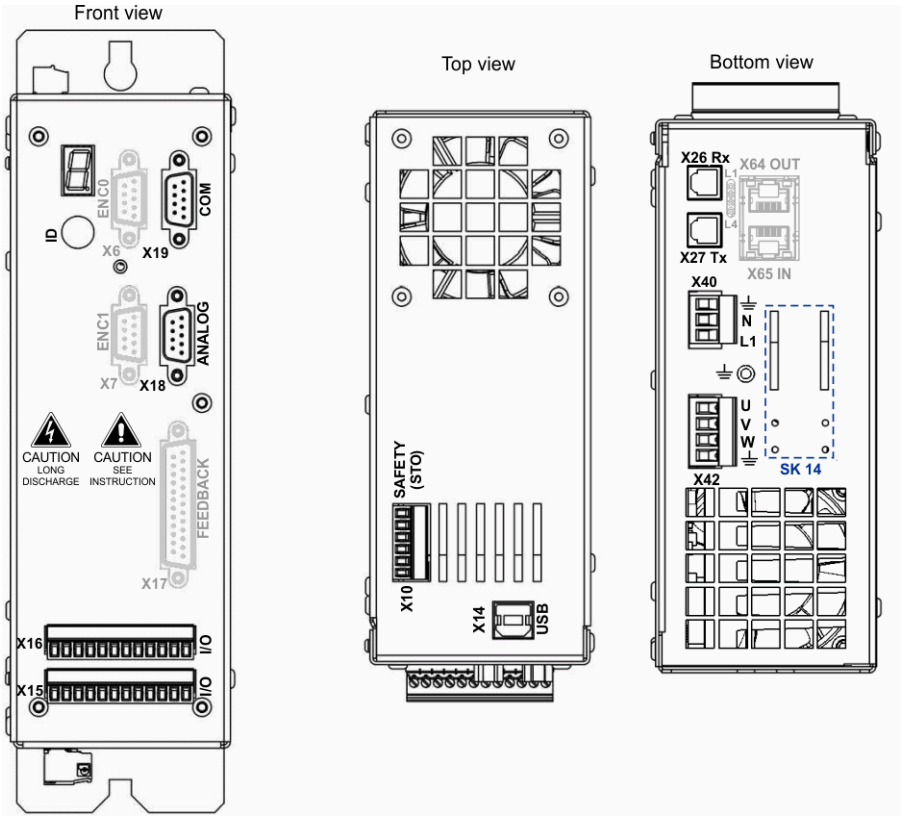


Fig. 9: Connectors of device variant 0362x40xx(A) / 0362120xx (230 V mains supply)

Mains supply 480 V_{AC}

The gray-colored connectors X64 and X65 (EtherCAT option) are only available on device variant 0362240EF:

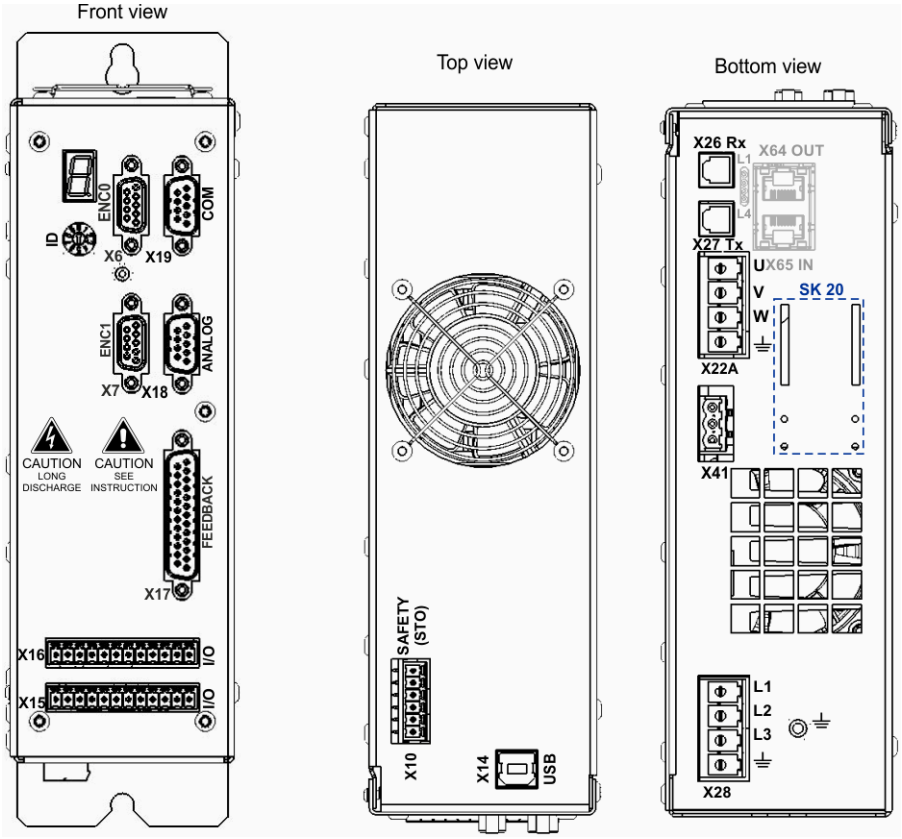


Fig. 10: Connectors of device variant 0362x40EF (480 V mains supply)

Connector table

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X10 Safety (STO)	Safety circuit / restart lock (STO)(1)	page 104
X14 USB	USB interface for parameter setting(1)	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Resolver(2) / sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder / RENISHAW BiSS C	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X22A	Motor connector 0362x40EF (480 V supply)	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X28	Mains supply 0362x40EF (480 V supply)	page 117
X40	Mains supply 0362x40xx/0362120xx (230 V supply)	page 118
X41	External ballast resistor	page 118
X42	Motor connector 0362x40xx/0362120xx (230 V supply)	page 119
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground	page 156

Connector	Meaning	Description
SK 14/20	Mounting holes for shield connection clamp SK 14 or SK 20 by Phoenix (comprised in connector kit)	page 152

(1) This connector is not available on older devices.

(2) Resolver evaluation is not implemented in device variant 0362140DCA.

Note

You can order the appropriate connector kits for the device variants 0362x40xC(A) / 0362120xC (article No. 32299545), 0362x40xA / 0362120xA (article No. 32299548), 0362x40EF (article No. 32299546) at SIEB & MEYER.

6.2 Compact Device 0362x41xx(A) / 0362121xx

Features of SD2S device variant 0362x41xx(A) / 0362121xx:

- integrated power supply unit, 1- or 3-phase power supply
- safety circuit
- designed for high outputs
- 0362x41xx(A): standard design with interfaces for measuring systems
  - 0362141xx = without fieldbus interface
  - 0362141ECA = without fieldbus interface, without resolver evaluation
  - 0362241xx = with EtherCAT interface
  - 0362241ECA = with EtherCAT interface, without resolver evaluation
- 0362121xx: Light design without interfaces for measuring systems

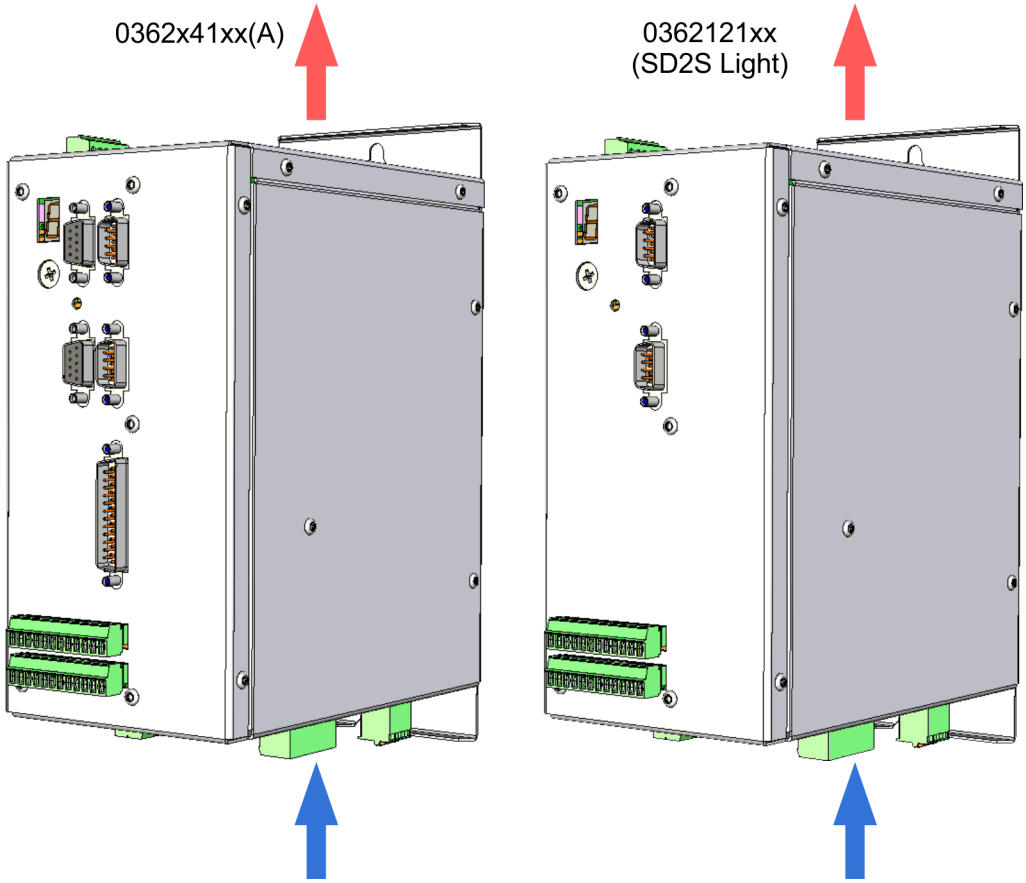


Fig. 11: Device view 0362x41xx(A) / 0362121xx

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.2.1 Dimensions

The gray-colored connectors are only available on device variant 0362x41xx(A):

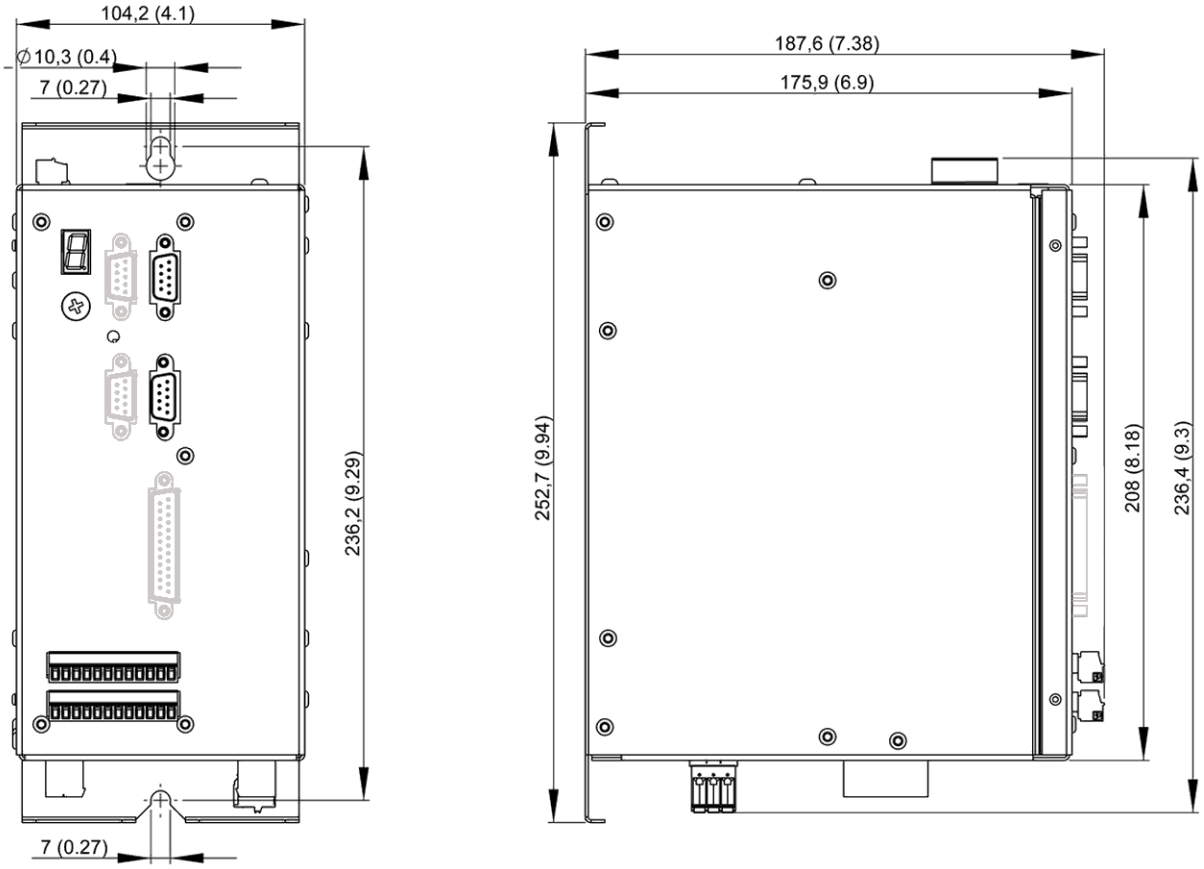


Fig. 12: Dimensions of 0362x41xx(A) / 0362121xx in mm (inch)

6.2.2 Technical Data

6.2.2.1 Mains supply 230 V_{AC}

Device variant	0362x41xC(A) / 0362121xC	
Performance range	**IC**	**EC / ECA**
Continuous phase current of output stage (±3 %)	28 A_p / 20 A_{rms}	
Peak phase current of output stage (±3 %)	80 A_p / 56 A_{rms}	40 A_p / 28 A_{rms}
Max. time for peak current	2 s	5 s
Max. temperature of the output stage	75° C	
Max. output frequency	8000 Hz	
Output frequency stability	≤ 0.2 %	
Mains supply (1- or 3-phase)	115 V_{AC} -10 % to 230 V_{AC} +10 % 50 Hz / 60 Hz	
Required mains choke	25 A, article No. 13015802(1)	
Short circuit current rating (SCCR)	3000 A	
Line filter	The internal line filter meets the interference limits of the category C3.(2)	
Mains fuse	20 A e.g. Siemens 5SD4 30, type DIAZED DII(3)	
DC link voltage	160 V_{DC} -10 % to 325 V_{DC} +10 %	
Output power S1 (1-phase)	1.9 kVA at 11 A_{rms} / 100 V_{AC} 3.8 kVA at 11 A_{rms} / 200 V_{AC}	
Output power S1 (3-phase)	6.9 kVA at 20 A_{rms} / 200 V_{AC}	
Mains phase current at rated power	19 A (1-phase) 20 A (3-phase)	
Logic supply (4)	18 to 28 V_{DC} (0.5 A)	
Power loss of logic unit	12 W	
Power loss of power unit	Max. 5 % of the output motor power, at least 20 W	
Min. external ballast resistor	10 Ω	
Internal ballast resistor	22 Ω / 50 W	
Ballast threshold	380 V_{DC}	
Overvoltage threshold	410 V_{DC}	
Undervoltage threshold	40 V_{DC}	
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.	
IP code	IP20	
Max. weight	3.5 kg	

(1) For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

(2) If the motor lines are longer than 5 m, use an external line filter to comply with the standard EMC Directive 2014/30/EU. You find a list of the line filters available at SIEB & MEYER in the appendix (see page 197).

(3) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(4) The logic supply is necessary to maintain the error messages.

Rated current derating

Drive function[1]	SERVO		SVC; VF-PWM		HSBLOCK (with sensor)				HSPWM				
PWM frequency [kHz]	**8**	**16**	**8**	**16**	**8**	**16**	**32**	**64**	**8**	**16**	**32**	**64**	**128**
0362121IC rated current S1 [A_{rms}]	–	–	20	14	–	–	–	–	20	20	20	17	10
0362121EC rated current S1 [A_{rms}]	–	–	20	14	–	–	–	–	20	20	20	17	10
0362x41IC rated current S1 [A_{rms}]	20	14	20	14	23	18.8	14.7	9.8	20	20	20	17	10
0362x41EC(A) rated current S1 [A_{rms}]	20	14	20	14	21.2	18.8	14.7	9.8	20	20	20	17	10

[1] For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

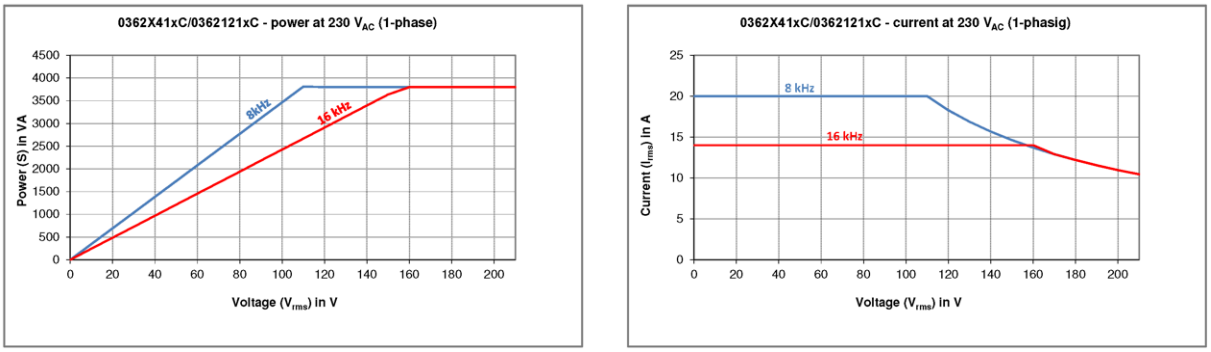


Fig. 13: Output characteristics of 0362x41xC(A) / 0362121xC (1-phase mains supply) in SERVO/SVC or VF-PWM mode

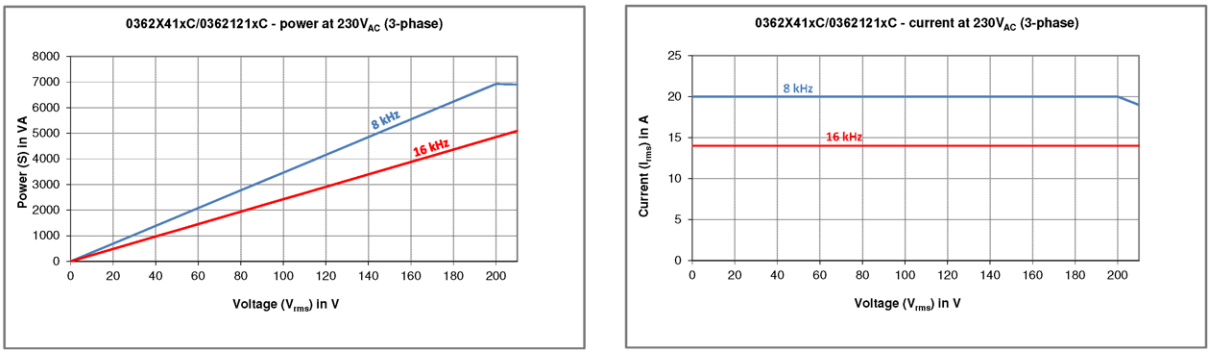


Fig. 14: Output characteristics of 0362x41xC(A) / 0362121xC (3-phase mains supply) in SERVO/SVC or VF-PWM mode

6.2.2.2 Mains supply 480 V_{AC}

Device variant	0362x41xF / 0362121xF	
Performance range	**IF**	**EF**
Continuous phase current of output stage (±3 %)	20 A_p / 14 A_{rms}	
Peak phase current of output stage (±3 %)	80 A_p / 56 A_{rms}	40 A_p / 28 A_{rms}
Max. time for peak current	2 s	5 s / 3 s[1]
Max. temperature of the output stage	75° C	
Max. output frequency	4000 Hz	
Output frequency stability	≤ 0.2 %	
Mains supply (3-phase)	200 V_{AC} -10 % to 480V_{AC} +10 % 50 Hz / 60 Hz	
Required mains choke	25 A, article No. 13015802[2]	
Short circuit current rating (SCCR)	3000 A	
Line filter	The internal line filter meets the interference limits of the category C3.[3]	
Mains fuse	16 A e.g. Siemens 5SE1 316, type NEOZED D01[4]	
DC link voltage	280 V_{DC} -10 % to 675 V_{DC} +10 %	
Output power S1	9.7 kVA at 14 A_{rms} / 400 V_{AC}	
Mains phase current at rated power	16 A	
Logic supply[5]	18 to 28 V_{DC} (0.5 A)	
Power loss of logic unit	12 W	
Power loss of power unit	Max. 5 % of the output motor power, at least 20 W	
Min. external ballast resistor	22 Ω	
Internal ballast resistor	22 Ω / 50 W	
Ballast threshold	800 V_{DC}	
Overvoltage threshold	850 V_{DC}	
Undervoltage threshold	40 V_{DC}	
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.	
IP code	IP20	
Max. weight	3.5 kg	

(1) Device version 3.300 and higher

(2) For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

(3) If the motor lines are longer than 5 m, use an external line filter to comply with the standard EMC Directive 2014/30/EU. You find a list of the line filters available at SIEB & MEYER in the appendix (see page 197).

(4) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(5) The logic supply is necessary to maintain the error messages.

Rated current derating

Drive function[1]	SERVO		SVC; VF-PWM		HSBLOCK (with sensor)		HSPWM			
PWM frequency [kHz]	**8**	**16**	**8**	**16**	**8**	**16**	**8**	**16**	**32**	**64**
0362121IF rated current S1 [A_{rms}]	–	–	14.1	9.9	–	–	20	15.5	10	5
0362121EF rated current S1 [A_{rms}]	–	–	14.1	9.9	–	–	20	15.5	10/ 12[2]	5/ 8.5[2]
0362x41IF rated current S1 [A_{rms}]	14.1	9.9	14.1	9.9	14.7	8.2	20	15.5	10	5
0362x41EF rated current S1 [A_{rms}]	14.1	9.9	14.1	9.9	14.7	9.9	20	15.5	10[122]	5/ 8.5[2]

[1] For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

[2] Device version 3.300 and higher

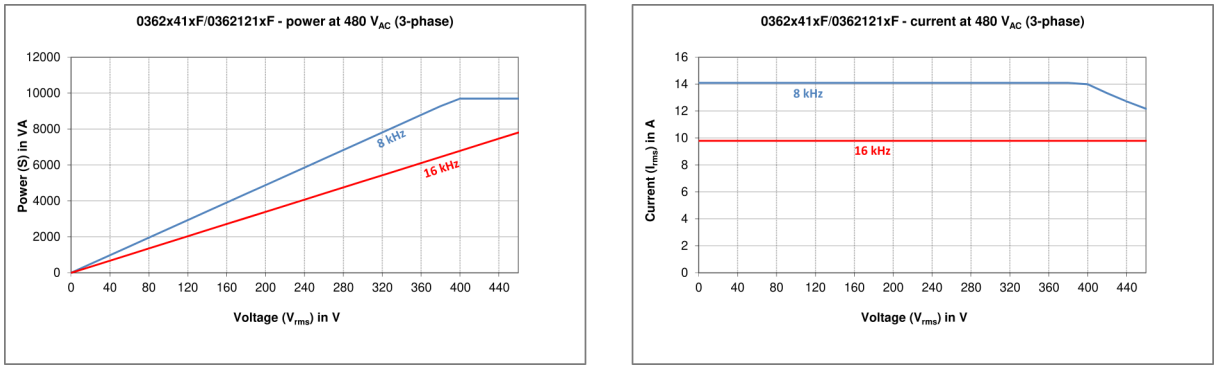


Fig. 15: Output characteristics for 0362x41xF/0362121xF (3-phase mains supply) in SERVO/SVC- or VF-PWM mode

6.2.3 Connectors

The gray-colored connectors are only available on the following device variants:

- X6, X7, X17 (measuring systems): 0362x41xx(A)
- X64, X65 (EtherCAT option): 0362241xx

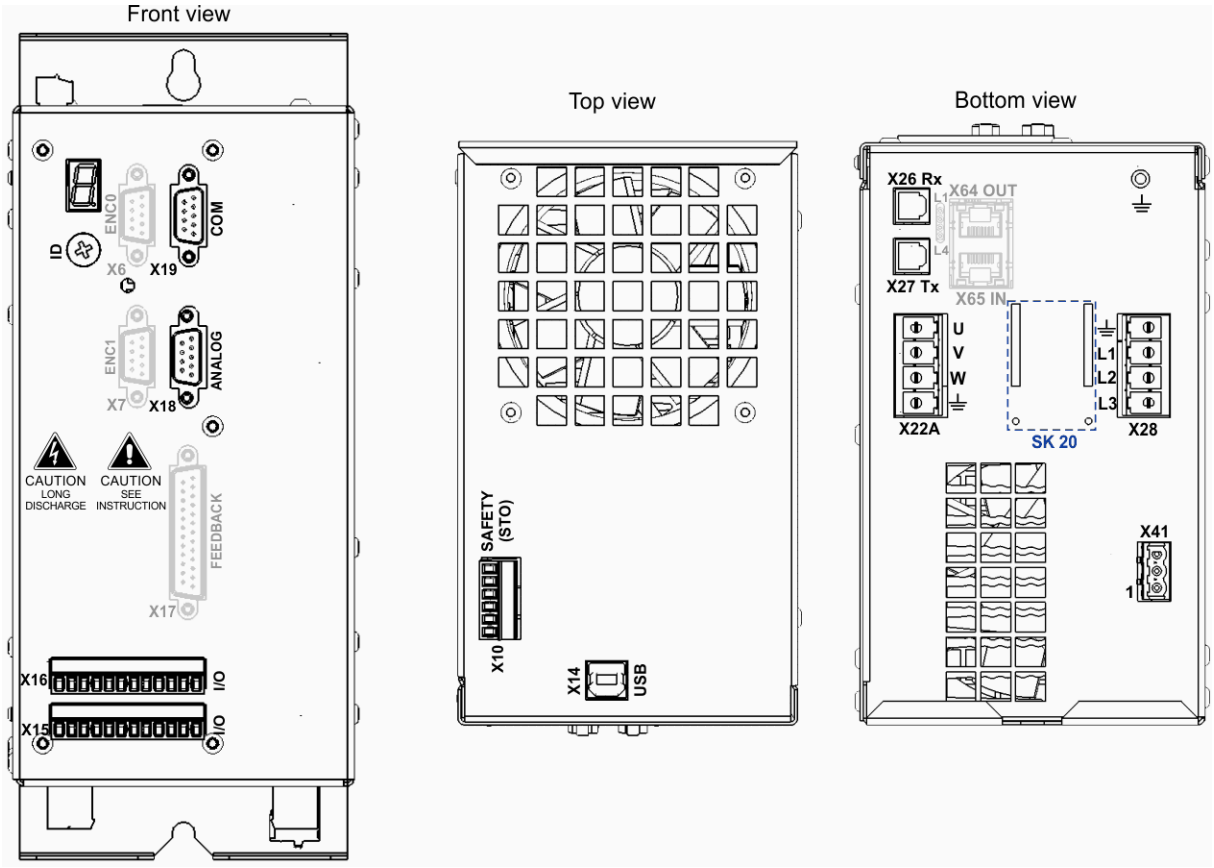


Fig. 16: Connectors on the device variants 0362x41xx(A) / 0362121xx

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X10 Safety (STO)	Safety circuit / restart lock (STO)	page 104
X14 USB	USB interface for parameter setting(1)	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Resolver(2) / sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder / RENISHAW BiSS C	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X22A	Motor connection	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X28	Mains supply	page 117
X41	External ballast resistor	page 118
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground	page 156

Connector	Meaning	Description
SK 20	Mounting holes for shield connection clamp SK 20 by Phoenix (comprised in connector kit)	page 152

(1) This connector is not available on older devices of variant 0362141xx.

(2) Resolver evaluation is not implemented in device variant 0362x41ECA.

Note

You can order the appropriate connector kit for the device variants 0362x41xx(A) and 0362121xx (article No. 32299546) at SIEB & MEYER.

6.3 Compact Device 0362x42DC

Features of SD2S device variant 0362x42DC:

- integrated power supply unit, 1-phase power supply
- controlled DC link voltage 0 – 350 V (can be used to operate low voltage motors without mains transformer)
- sensorless pulse amplitude modulation (FPAM) possible
- fieldbus option:
  - 0362142DC = without fieldbus interface
  - 0362242DC = with EtherCAT interface

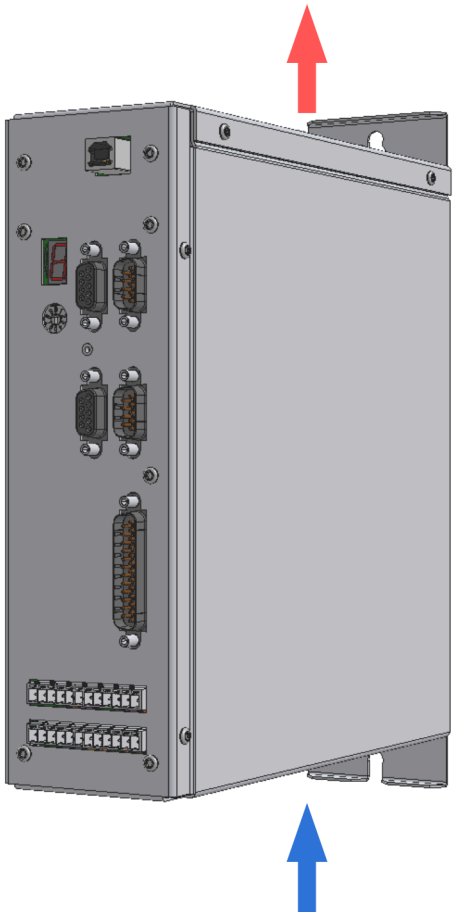


Fig. 17: Device view of 0362x42DC

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.3.1 Dimensions

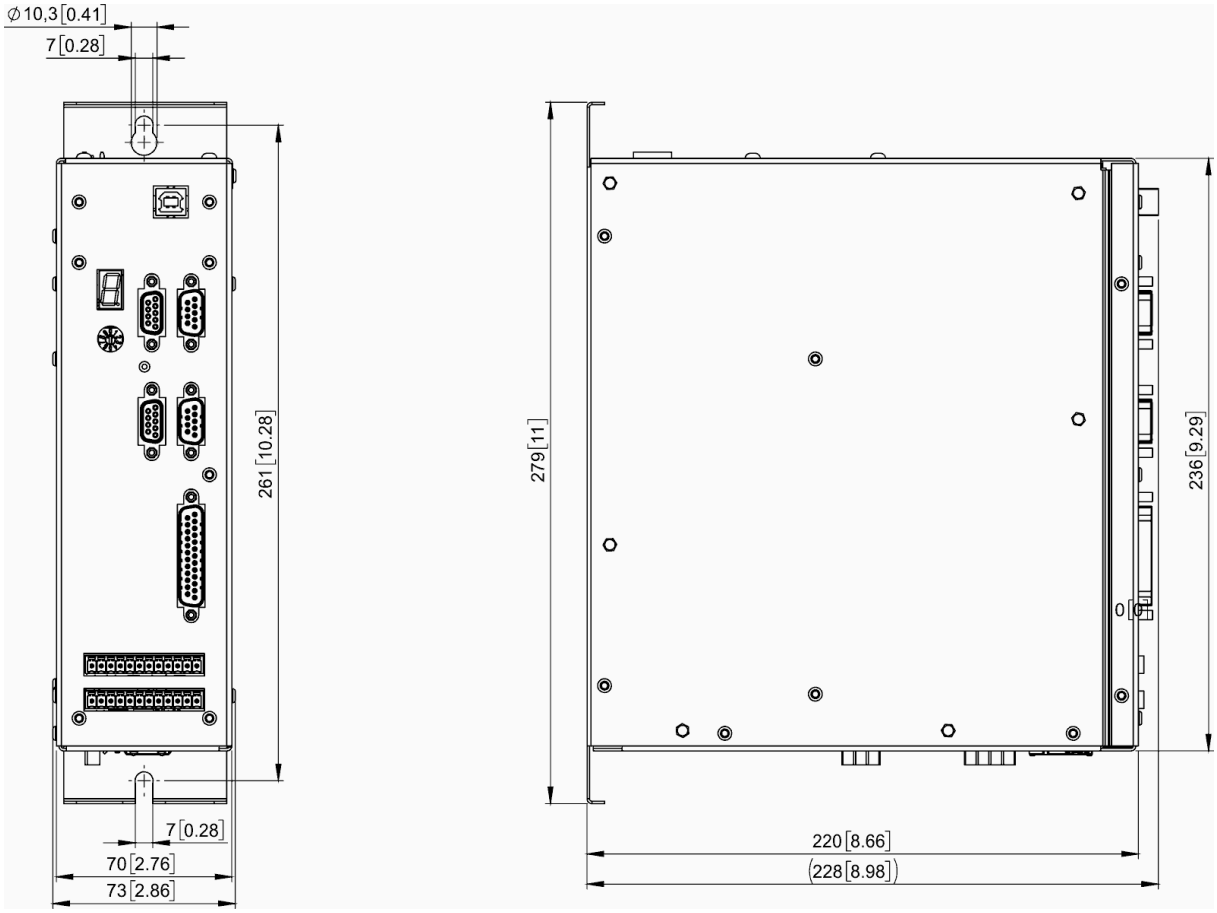


Fig. 18: Dimensions of 0362x42DC in mm [inch]

6.3.2 Technical Data

Device variant	0362x42DC
Continuous phase current of output stage in servo mode (±3 %)	14 A_p / 10 A_{rms} (f_{PWM} = 8 kHz)
Peak phase current of output stage (±3 %)	20 A_p / 14 A_{rms}
Max. time for peak current	2 s
Max. temperature of the output stage	75° C
Max. output frequency	8000 Hz
Output frequency stability	≤ 0.2 %
Mains supply (1-phase)	115 V_{AC} -10 % to 250 V_{AC} +10 % 50 Hz / 60 Hz
Required mains choke	10 A, article No. 13015834(1)
Short circuit current rating (SCCR)	1000 A
Line filter	The internal line filter meets the interference limits of the category C3 up to a motor length of 30 m.
Mains fuse	16 A e.g. Siemens 5SE1 316, type NEOZED D01(2)
DC link voltage	adjustable up to 155 V (at 115 V_{AC}) and up to 350 V (at 250 V_{AC})
Output power S1	1.5 kVA at 220 V_{AC}
Mains phase current at rated power	8 A (1-phase)
Logic supply(3)	18 to 28 V_{DC} (0.5 A)
Power loss of logic unit	12 W
Power loss of power unit	Max. 5 % of the output motor power, at least 20 W
Min. external ballast resistor	22 Ω max. pulse load 8.4 kWs
Internal ballast resistor	22 Ω / 80 W max. pulse load 5 kWs
Ballast threshold	430 V_{DC}
Overvoltage threshold	450 V_{DC}
Undervoltage threshold	40 V_{DC}
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.
IP code	IP20
Max. weight	3.25 kg

(1) For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

(2) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(3) The logic supply is necessary to maintain the error messages.

6.3.3 Connectors

The gray-colored connectors X64 and X65 (EtherCAT option) are only available on device variant 0362242DC:

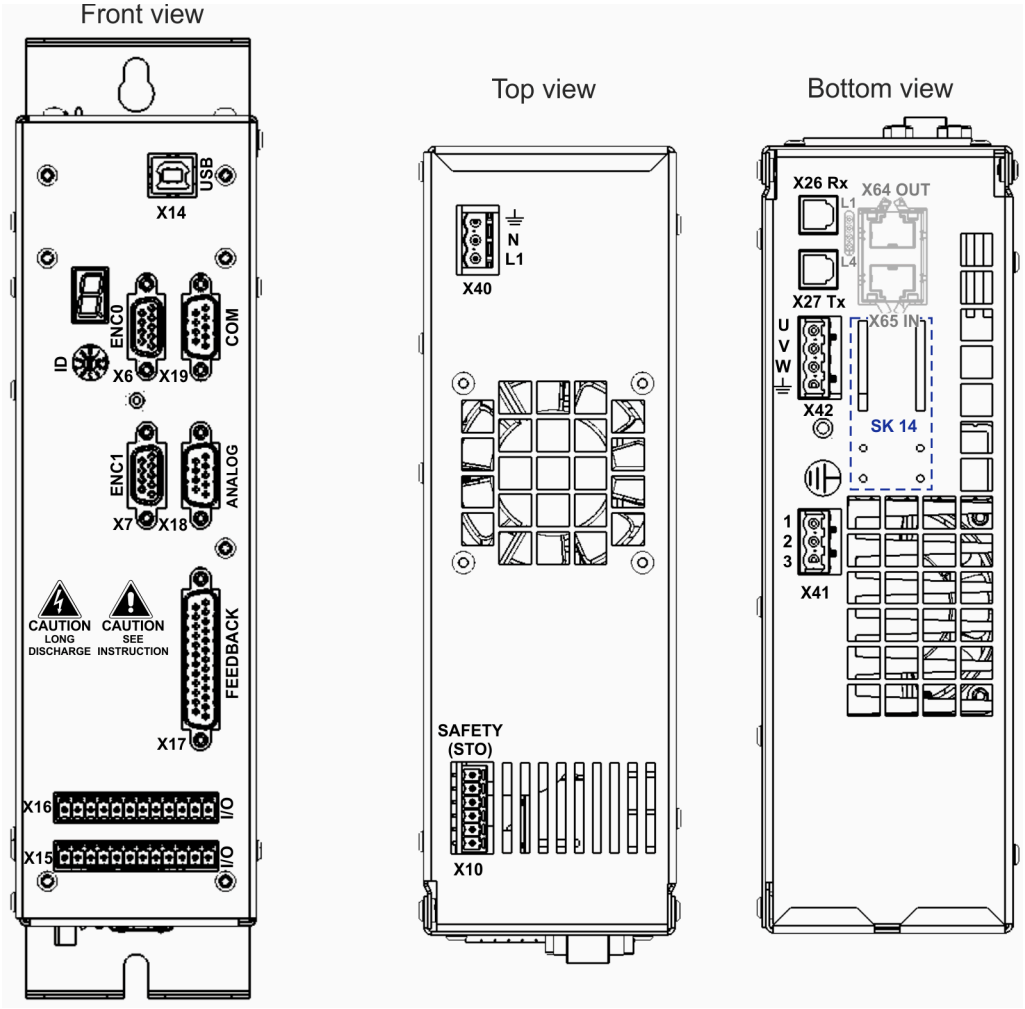


Fig. 19: Connectors of device variant 0362x42DC

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X10 Safety (STO)	Safety circuit / restart lock (STO)	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
16 I/O	Digital inputs	page 108
X17 Feedback	Sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X40	Mains supply	page 118
X41	External ballast resistor	page 118
X42	Motor connection	page 119

Connector	Meaning	Description
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground	page 156
SK 14	Mounting holes for shield connection clamp SK 14 by Phoenix (comprised in connector kit)	page 152

Note

You can order the appropriate connector kit for the device variant 0362x42DC (article No. 32299602) at SIEB & MEYER.

6.4 Compact Device 0362x42EC

Features of SD2S device variant 0362x42EC:

- integrated power supply unit, 1- and 3-phase power supply (In order to comply with the EMC Directive 2014/30/EU an external line filter is necessary.)
- controlled DC link voltage 0 – 310 V (can be used to operate low voltage motors without mains transformer)
- sensorless pulse amplitude modulation (FPAM) possible
- fieldbus option:
  - 0362142EC = without fieldbus interface
  - 0362242EC = with EtherCAT interface

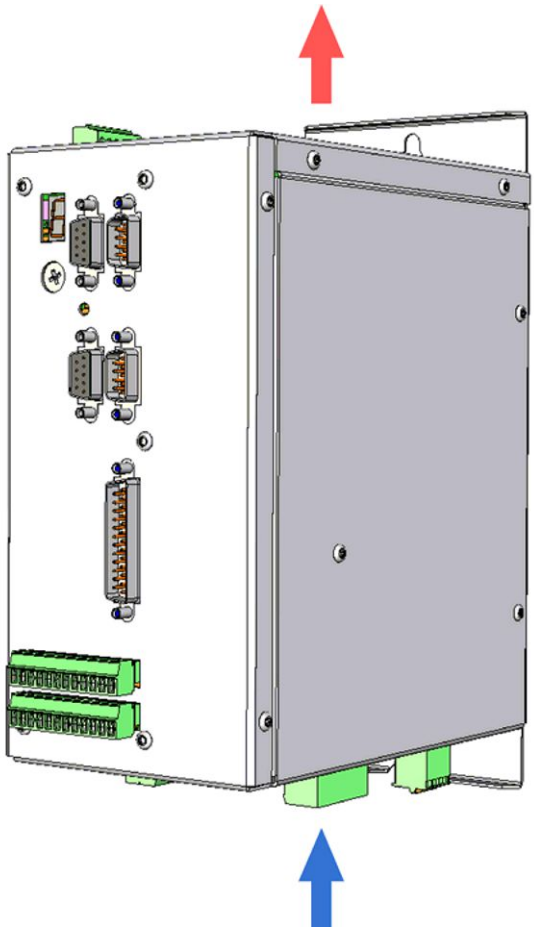


Fig. 20: Device view of 0362x42EC

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.4.1 Dimensions

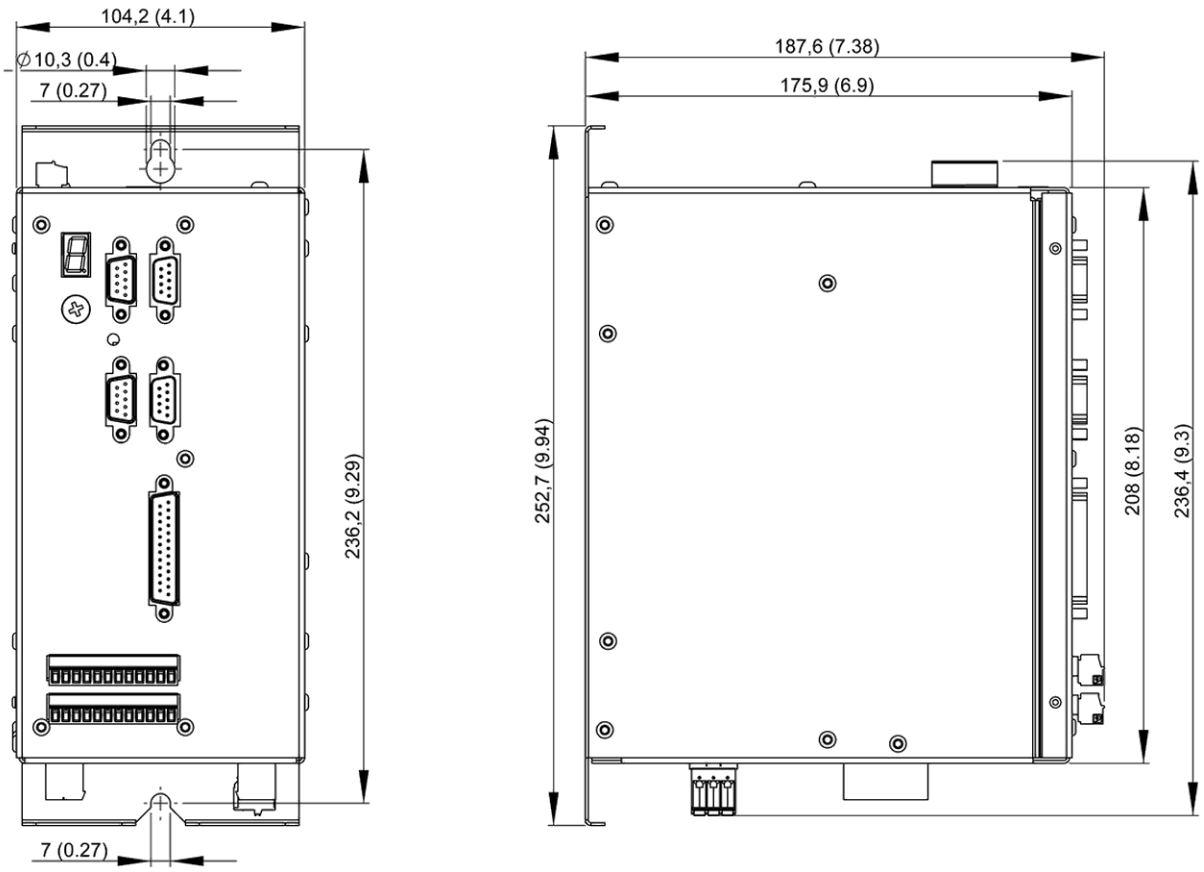


Fig. 21: Dimensions of 0362x42EC in mm (inch)

6.4.2 Technical Data

Device variant		0362x42EC				
Continuous phase current of output stage in servo mode (±3 %)		14 A_p / 10 A_{rms} (f_{PWM} = 8 kHz)				
Peak phase current of output stage (±3 %)		40 A_p / 28 A_{rms}				
Max. time for peak current		2 s				
Max. temperature of the output stage		75° C				
Max. output frequency		8000 Hz				
Output frequency stability		≤ 0.2 %				
Mains supply (1- or 3-phase)		115 V_{AC} -10 % to 230 V_{AC} +10 % 50 Hz / 60 Hz				
Required mains choke (3-phase)		16 A, article No. 13015801[1]				
Short circuit current rating (SCCR)		1000 A				
Line filter	1-phase	20 A, article No. 35063080[2]				
	3-phase	50 A, article No. 35063103[2]				
Mains fuse	1-phase	20 A, e.g. Siemens 5SD4 30, type DIAZED DII[3]				
	3-phase	16 A, e.g. Siemens 5SE1 316, type NEOZED D01[3]				
DC link voltage		adjustable up to 155 V (at 115 V_{AC}) and up to 310 V (at 230 V_{AC})				
Output power S1		1.9 kVA at 11 A_{rms} / 100 V_{AC} 3.8 kVA at 11 A_{rms} / 200 V_{AC}				
Mains phase current at rated power	1-phase	20 A				
	3-phase	12 A				
Drive function[4]		SERVO; SVC		HSBLOCK (with sensor), FPAM (sensorless)		VF-PAM
PWM frequency [kHz]		8	16	16	32	8
Rated current S1 [A_{rms}]		10	10	8.16	6.94	10
Logic supply[5]		18 to 28 V_{DC} (0.5 A)				
Power loss of logic unit		12 W				
Power loss of power unit		Max. 5 % of the output motor power, at least 20 W				
Min. external ballast resistor		10 Ω				
Internal ballast resistor		22 Ω / 50 W				
Ballast threshold		380 V_{DC}				
Overvoltage threshold		410 V_{DC}				
Undervoltage threshold		40 V_{DC}				
Ambient temperature range		5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.				
IP code		IP20				
Max. weight		4 kg				

[1] For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

[2] Use an external line filter to comply with EMC Directive 2014/30/EU. For other line filters available at SIEB & MEYER refer to the appendix (see page 197).

[3] An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

[4] For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

[5] The logic supply is necessary to maintain the error messages.

6.4.3 Connectors

The gray-colored connectors X64 and X65 (EtherCAT option) are only available on device variant 0362242EC.

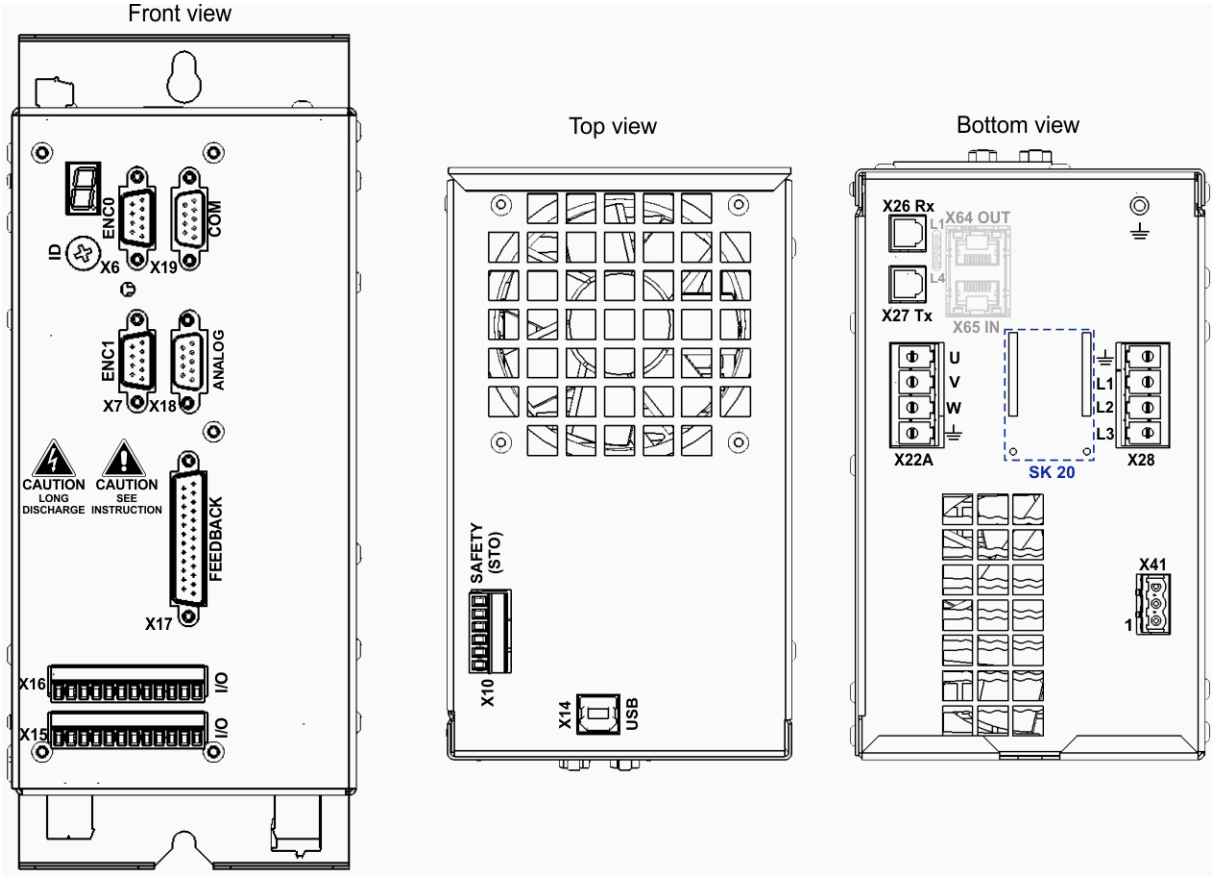


Fig. 22: Connectors of device variant 0362x42EC

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X10 Safety (STO)	Safety circuit / restart lock (STO)	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X22A	Motor connection	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X28	Mains supply	page 117
X41	External ballast resistor	page 118
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground	page 156
SK 20	Mounting holes for shield connection clamp SK 20 by Phoenix (comprised in connector kit)	page 152

Note

You can order the appropriate connector kit for the device variant 0362x42EC (article No. 32299546) at SIEB & MEYER.

6.5 Compact Device 0362x43xx

Features of device variant 0362x43xx (SD2S Light):

- integrated power supply unit, 1- and 3-phase power supply (In order to comply with the EMC Directive 2014/30/EU an external line filter is necessary.)
- controlled DC link voltage 0 – 310 V (can be used to operate low-voltage motors without mains transformer)
- only sensorless drive functions FPAM and VF-PAM available (see chapter 5.4 “Functional Overview of the Device Variants”, page 24)
- safety circuit
- fieldbus option:
  - 0362143xx = without fieldbus interface
  - 0362243xx = with EtherCAT interface

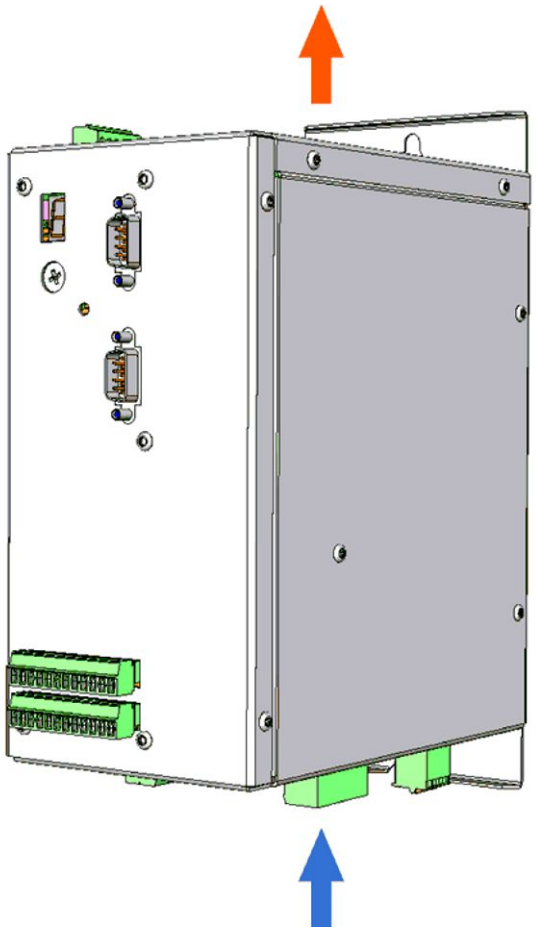


Fig. 23: Device view 0362x43xx

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.5.1 Dimensions

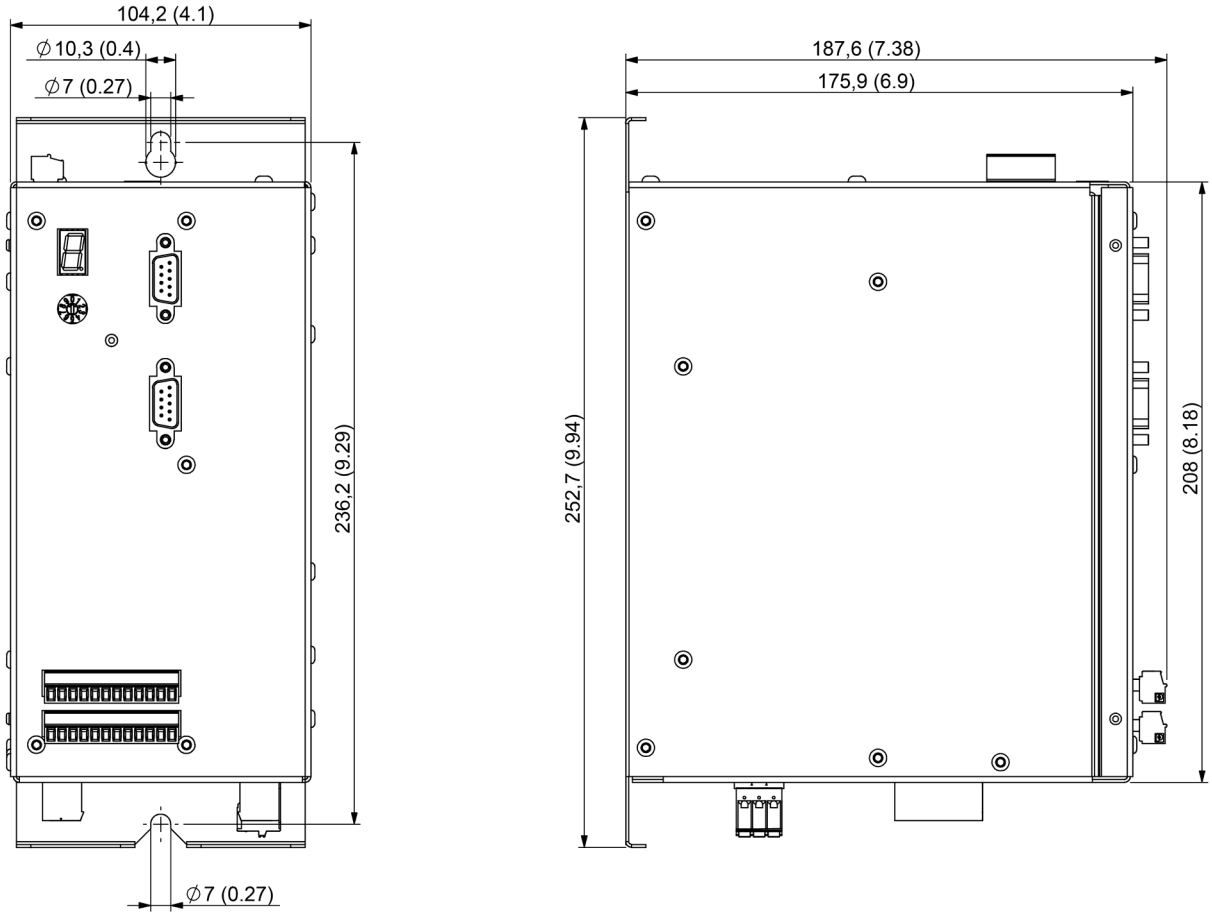


Fig. 24: Dimensions of 0362x43xx in mm (inch)

6.5.2 Technical Data

Device variant		0362x43EC		
Continuous phase current of output stage in servo mode (±3 %)		14 A_p / 10 A_{rms} (f_{PWM} = 8 kHz)		
Peak phase current of output stage (±3 %)		40 A_p / 28 A_{rms}		
Max. time for peak current		2 s		
Max. temperature of the output stage		75° C		
Max. output frequency		8000 Hz		
Output frequency stability		≤ 0.2 %		
Mains supply (1- or 3-phase)		115 V_{AC} -10 % to 230 V_{AC} +10 % 50 Hz / 60 Hz		
Required mains choke (3-phase)		16 A, article No. 13015801(1)		
Short circuit current rating (SCCR)		1000 A		
Line filter	1-phase	20 A, article No. 35063080(2)		
	3-phase	50 A, article No. 35063103(2)		
Mains fuse	1-phase	20 A, e.g. Siemens 5SD4 30, type DIAZED DII(3)		
	3-phase	16 A, e.g. Siemens 5SE1 316, type NEOZED D01(3)		
DC link voltage		adjustable up to 155 V (at 115 V_{AC}) and up to 310 V (at 230 V_{AC})		
Output power S1		1.9 kVA at 11 A_{rms} / 100 V_{AC} 3.8 kVA at 11 A_{rms} / 200 V_{AC}		
Mains phase current at rated power	1-phase	20 A		
	3-phase	12 A		
Drive function(4)		FPAM (sensorless)		VF-PAM
PWM frequency [kHz]		16	32	8
Rated current S1 [A_{rms}]		11.4	11.4	10
Logic supply(5)		18 to 28 V_{DC} (0.5 A)		
Power loss of logic unit		12 W		
Power loss of power unit		Max. 5 % of the output motor power, at least 20 W		
Min. external ballast resistor		10 Ω		
Internal ballast resistor		22 Ω / 50 W		
Ballast threshold		380 V_{DC}		
Overvoltage threshold		410 V_{DC}		
Undervoltage threshold		40 V_{DC}		
Ambient temperature range		5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.		
IP code		IP20		
Max. weight		4 kg		

(1) For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

(2) Use an external line filter to comply with EMC Directive 2014/30/EU. For other line filters available at SIEB & MEYER refer to the appendix (see page 197).

(3) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(4) For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

(5) The logic supply is necessary to maintain the error messages.

6.5.3 Connectors

The gray-colored connectors X64 and X65 (EtherCAT option) are only available on device variant 0362243xx:

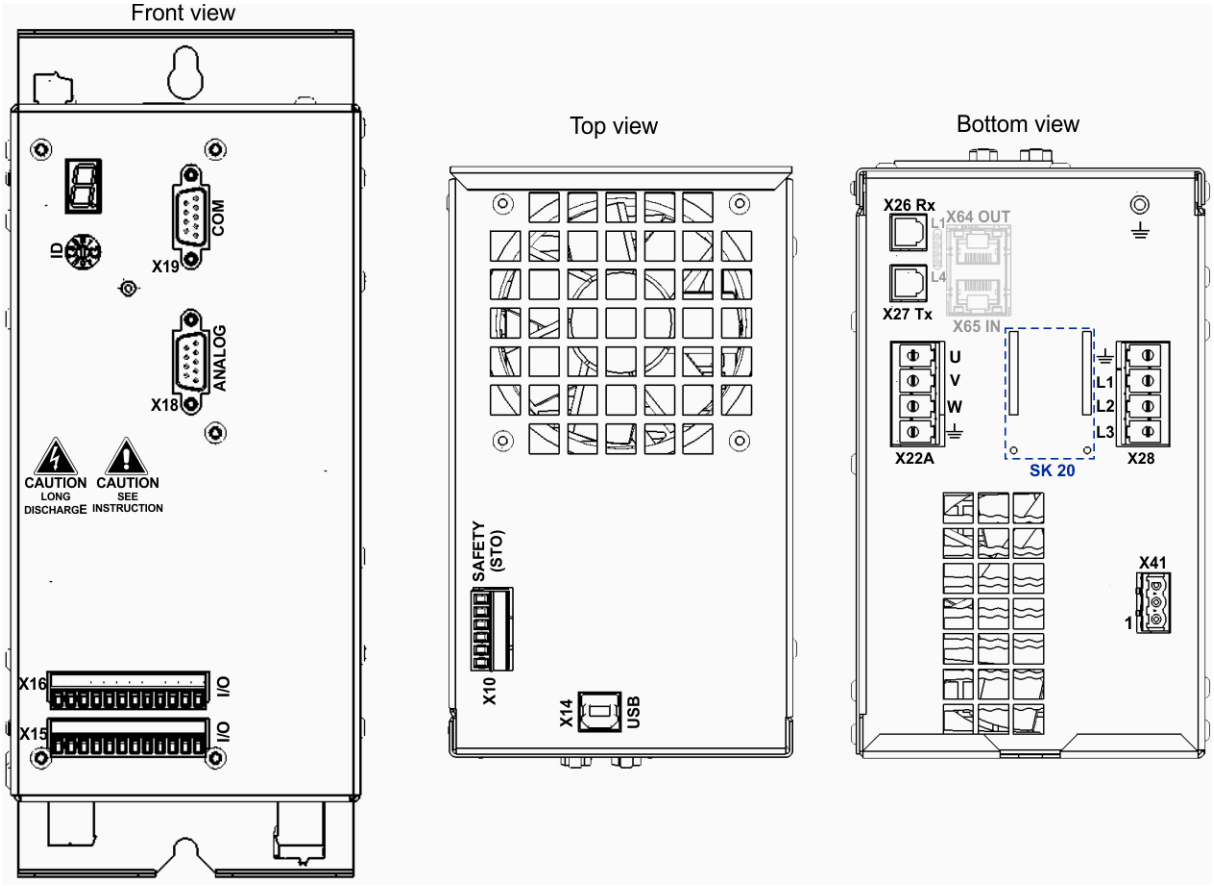


Fig. 25: Connectors of device variant 0362x43xx

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X10 Safety (STO)	Safety circuit / restart lock (STO)	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X22A	Motor connection	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X28	Mains supply	page 117
X41	External ballast resistor	page 118
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground	page 156
SK 20	Mounting holes for shield connection clamp SK 20 by Phoenix (comprised in connector kit)	page 152

Note

You can order the appropriate connector kit for the device variant 0362x43xx (article No. 32299546) at SIEB & MEYER.

6.6 Compact Device 0362144xx

Features of SD2S device variant 0362144xx:

- integrated power supply unit, 3-phase power supply (In order to comply with the EMC Directive 2014/30/EU an external line filter is necessary.)
- controlled DC link voltage 0 – 530 V (can be used to operate low-voltage motors without mains transformer)
- sensorless pulse amplitude modulation (FPAM) possible
- safety circuit

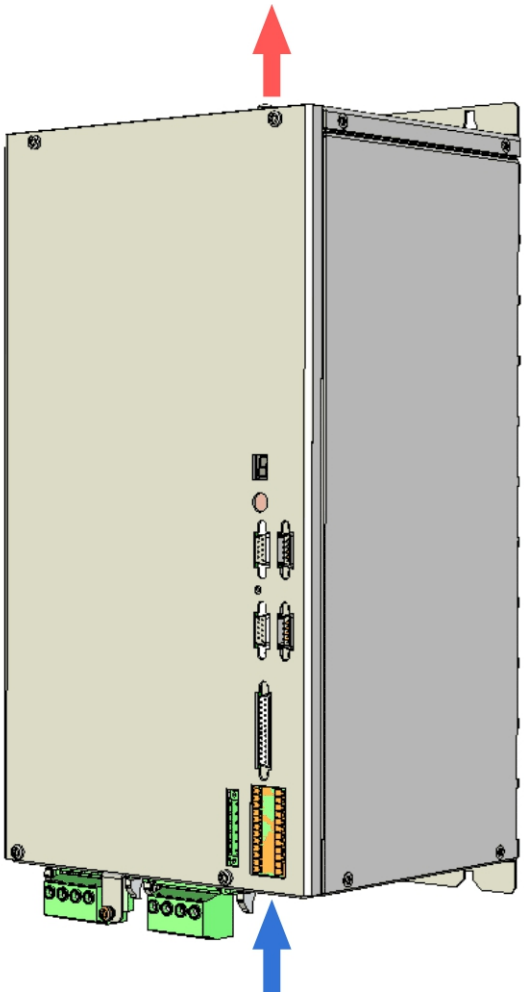


Fig. 26: Device view 0362144xx

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.6.1 Dimensions

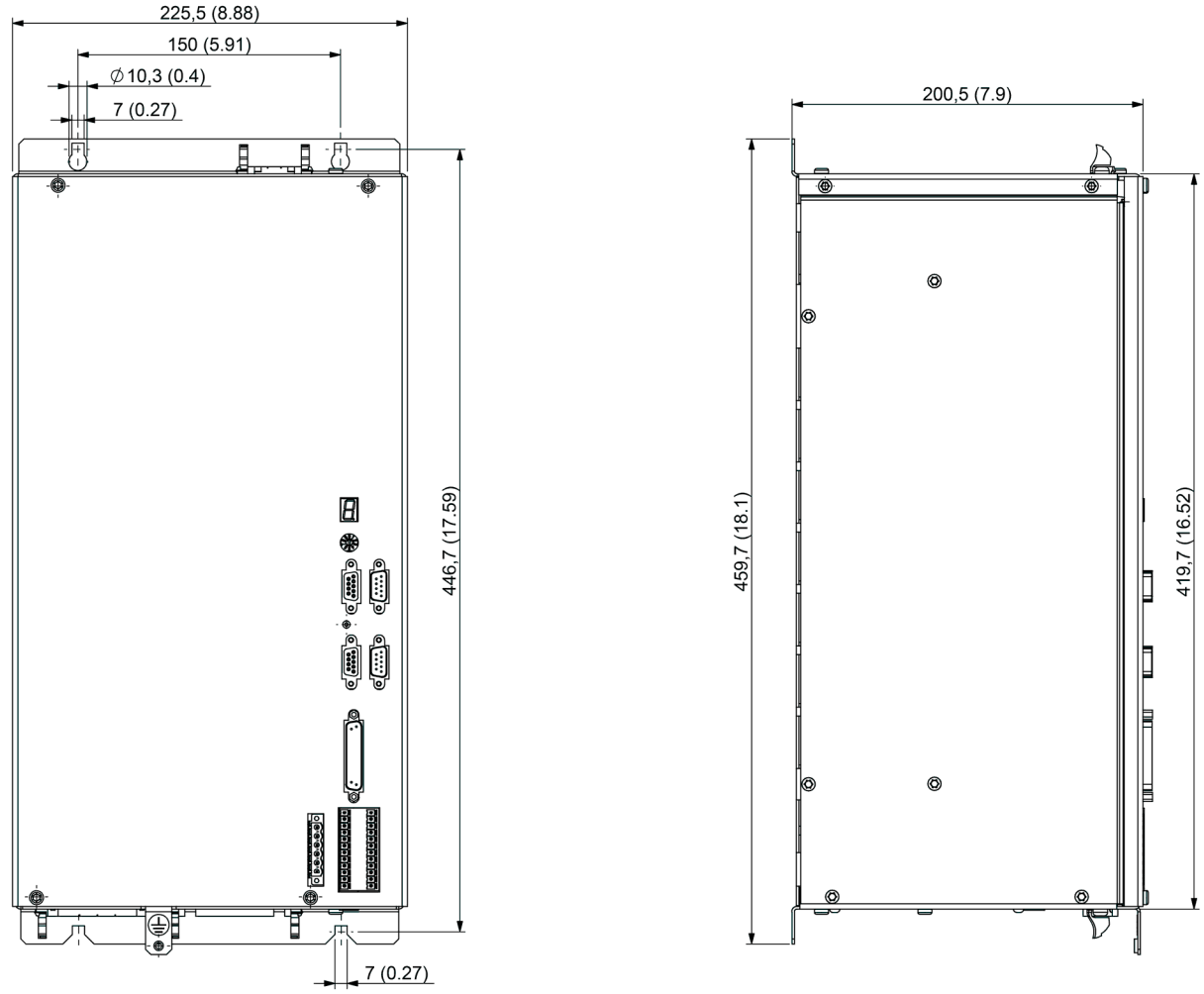


Fig. 27: Dimensions of 0362144xx in mm (inch)

6.6.2 Technical Data

Device variant	0362144EF	
Continuous phase current of output stage (±3 %)	32.5 A_p / 23 A_{rms}	
Peak phase current of output stage (±3 %)	40 A_p / 28.3 A_{rms}	
Max. time for peak current	5 s	
Max. temperature of the output stage	75° C	
Max. output frequency	8000 Hz	
Output frequency stability	≤ 0.2 %	
Mains supply (3-phase)(1)	200 V_{AC} -10 % to 480 V_{AC} +10 % 50 Hz / 60 Hz	
Short circuit current rating (SCCR)	3000 A	
Mains fuse	30 A e.g. Siemens 5SD4 80, type DIAZED DII(2)	
DC link voltage	adjustable up to 325 V (at 230 V_{AC}), up to 565 V (at 400 V_{AC}) and up to 680 V (at 480 V_{AC})	
Output power S1	15.9 kVA at 23 A_{rms} / 400 V_{AC}	
Mains phase current at rated power	26 A	
Drive function(3)	HSBLOCK (with sensor), FPAM (sensorless)	VF-PAM
PWM frequency [kHz]	16	16
Rated current S1 [A_{rms}]	23	23
Logic supply (4)	18 to 28 V_{DC} (2 A)	
Power loss of logic unit	12 W	
Power loss of power unit	Max. 5 % of the output motor power, at least 20 W	
Min. external ballast resistor	22 Ω	
Internal ballast resistor	16.5 Ω / 500 W max. pulse load 36 kWs	
Ballast threshold	800 V_{DC}	
Overvoltage threshold	850 V_{DC}	
Undervoltage threshold	40 V_{DC}	
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.	
IP code	IP20	
Max. weight	18.2	

(1) Use an external line filter to comply with EMC Directive 2014/30/EU. For line filters available at SIEB & MEYER refer to the appendix (see page 197).

(2) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(3) For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

(4) It is essential that the logic is supplied with voltage.

6.6.3 Connectors

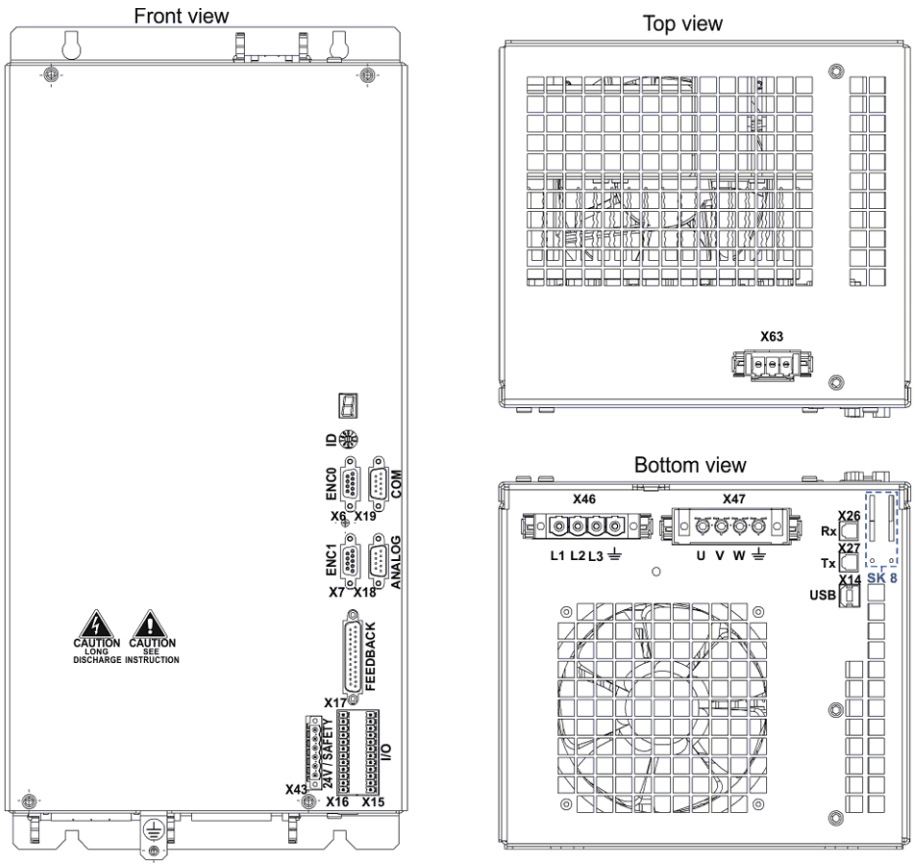


Fig. 28: Connectors of device variant 0362144xx

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X43 Safety	24 V supply; safety circuit / restart lock (STO)	page 120
X46	Mains supply	page 121
X47	Motor connection	page 122
X63	External ballast resistor	page 125
SK 8	Mounting holes for shield connection clamp SK 8 by Phoenix (comprised in connector kit)	page 152

Note

You can order the appropriate connector kit for the device variant 0362144xx (article No.. 32299566) at SIEB & MEYER.

6.7 Compact Device 0362x45xx

Features of the SD2S device variant 0362x45xx:

- integrated power supply unit, 3-phase mains supply (to comply with EMC Directive 2014/30/EU an external line filter is necessary)
- safety circuit
- designed for high outputs
- 0362145xx: standard design without fieldbus interface
  - facelift with device version 4.200 and higher (available since June 2017)
- 0362245xx: design with EtherCAT interface

Fig. 29: Device view 0362145xx (device version < 4.200)

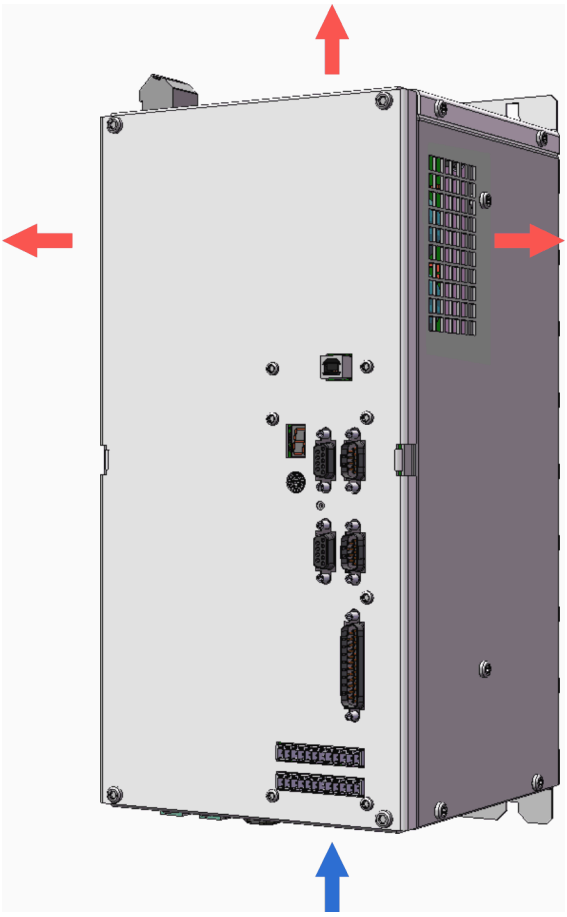


Fig. 30: Device view 0362145xx with facelift (device version ≥ 4.200) and 0362245xx

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.7.1 Dimensions

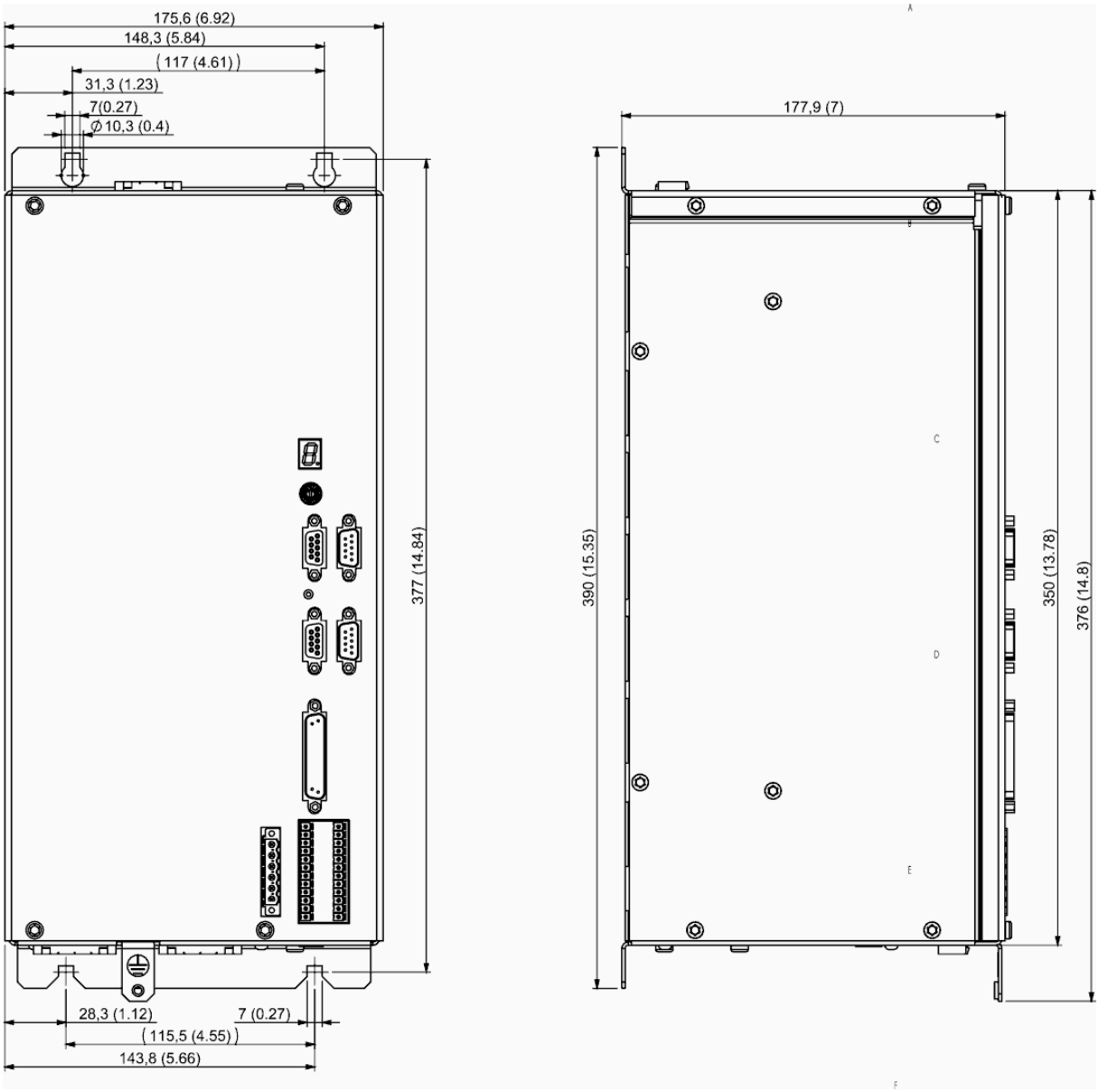


Fig. 31: Dimensions of 0362145xx (device version < 4.200) in mm (inch)

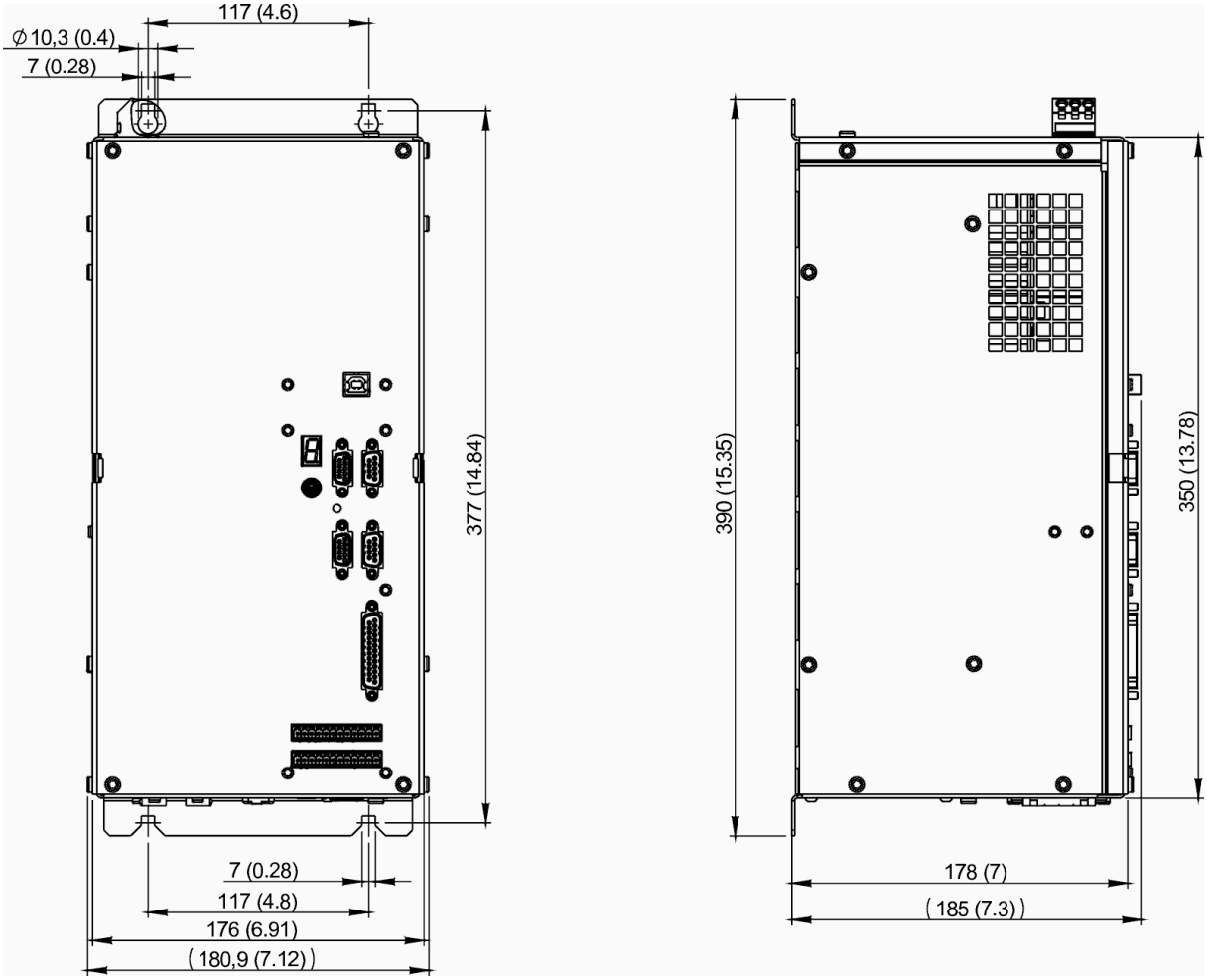


Fig. 32: Dimensions of 0362145xx with facelift (device version ≥ 4.200) and 0362245xx in mm (inch)

6.7.2 Technical Data

Mains supply 480 V_{AC}

Device variant	0362x45EF	0362x45IF
Continuous phase current of output stage (±3 %)	32.5 A_p / 23 A_{rms}	42.4 A_p / 30 A_{rms}
Peak phase current of output stage (±3 %)	40 A_p / 28.3 A_{rms}	80 A_p / 56.6 A_{rms}
Max. time for peak current	5 s	2 s
Max. temperature of the output stage	75° C	
Max. output frequency	4000 Hz	
Output frequency stability	≤ 0.2 %	
Mains supply (3-phase)	200 V_{AC} -10 % to 480 V_{AC} +10 % 50 Hz / 60 Hz	
Required mains choke	35 A, article No. 13015803(1)	
Short circuit current rating (SCCR)	3000 A	
Required line filter	50 A, article No. 35063103(2)	
Mains fuse	30 A e.g. Siemens 5SD4 80, type DIAZED DII(3)	50 A e.g. Siemens 5SD4 60, type DIAZED DIII(3)
DC link voltage	280 V_{DC} -10 % to 675 V_{DC} +10 %	
Output power S1	15.9 kVA at 23 A_{rms} / 400 V_{AC}	20.8 kVA at 30 A_{rms} / 400 V_{AC}
Mains phase current at rated power	26 A	32 A
Logic supply (4)	18 - 28 V_{DC} (0.9 A / 24 V_{DC})	
Power loss of logic unit	22 W	
Power loss of power unit	PWM frequency 8 kHz = 320 W PWM frequency 16 kHz = 430 W	PWM frequency 8 kHz = 450 W PWM frequency 16 kHz = 480 W
Min. external ballast resistor	22 Ω max. pulse load 29 kWs	22 Ω max. pulse load 29 kWs
Internal ballast resistor	33 Ω / 250 W max. pulse load 17 kWs	
Ballast threshold	800 V_{DC}	
Overvoltage threshold	850 V_{DC}	
Undervoltage threshold	40 V_{DC}	
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.	
IP code	IP20	
Max. weight	7.8 kg	

(1) For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

(2) Use an external line filter to comply with EMC Directive 2014/30/EU. For other line filters available at SIEB & MEYER refer to the appendix (see page 197).

(3) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(4) It is essential that the logic is supplied with voltage.

Rated current derating

Drive function(1)	SERVO; SVC; VF-PWM		HSBLOCK (with sensor)				HSPWM			
PWM frequency [kHz]	**8**	**16**	**8**	**16**	**32**	**64**	**8**	**16**	**32**	**64**
0362x45EF rated current S1 [A_{rms}]	23	23	23	21	18	10	23	23	21	17
0362x45IF rated current S1 [A_{rms}]	30	25	–	–	–	–	–	–	–	–

(1) For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

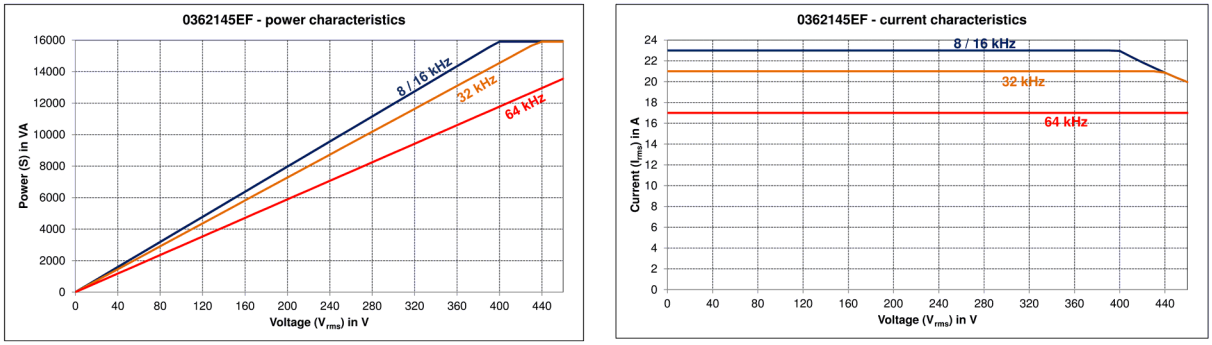


Fig. 33: Output characteristics for 0362x45EF in HSPWM mode

6.7.3 Connectors

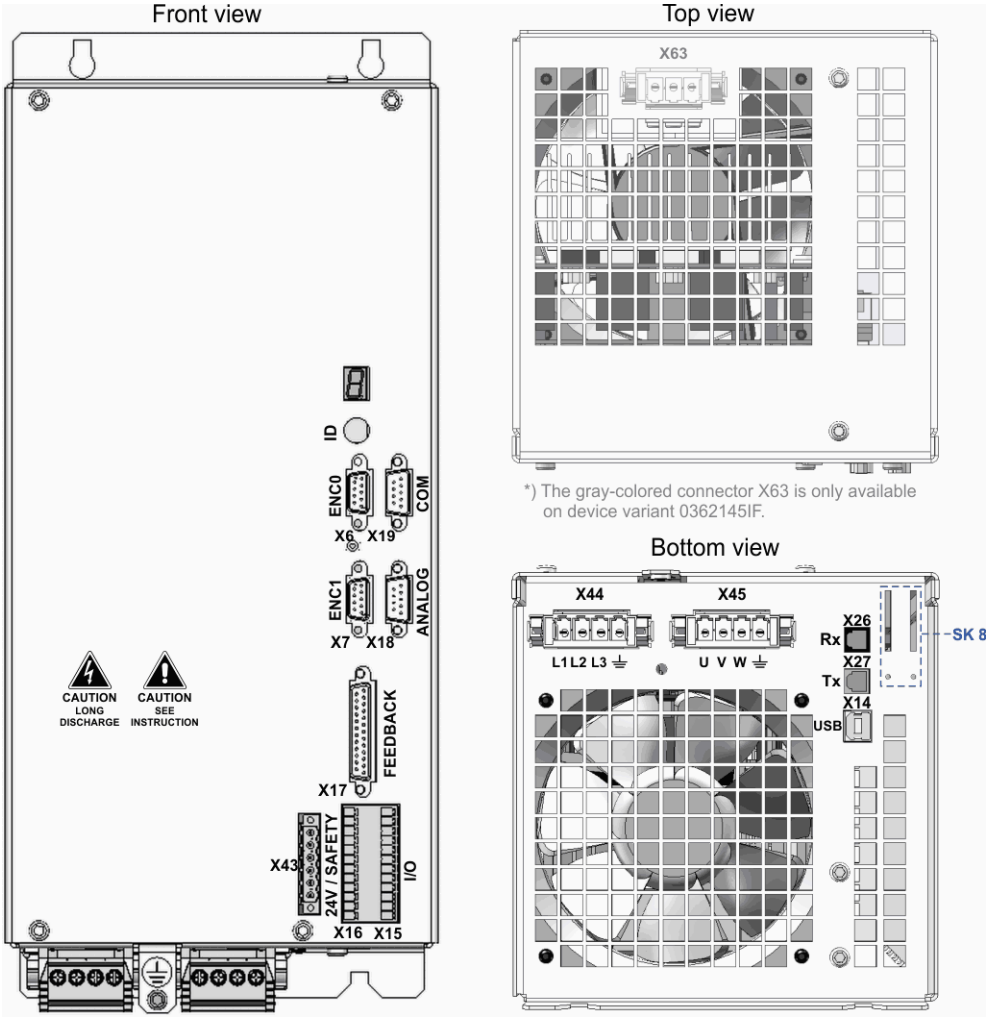


Fig. 34: Connectors of 0362145xx (device version < 4.200)

The gray-colored connectors X64 and X65 (EtherCAT option) are only available on device variant 0362245xx:

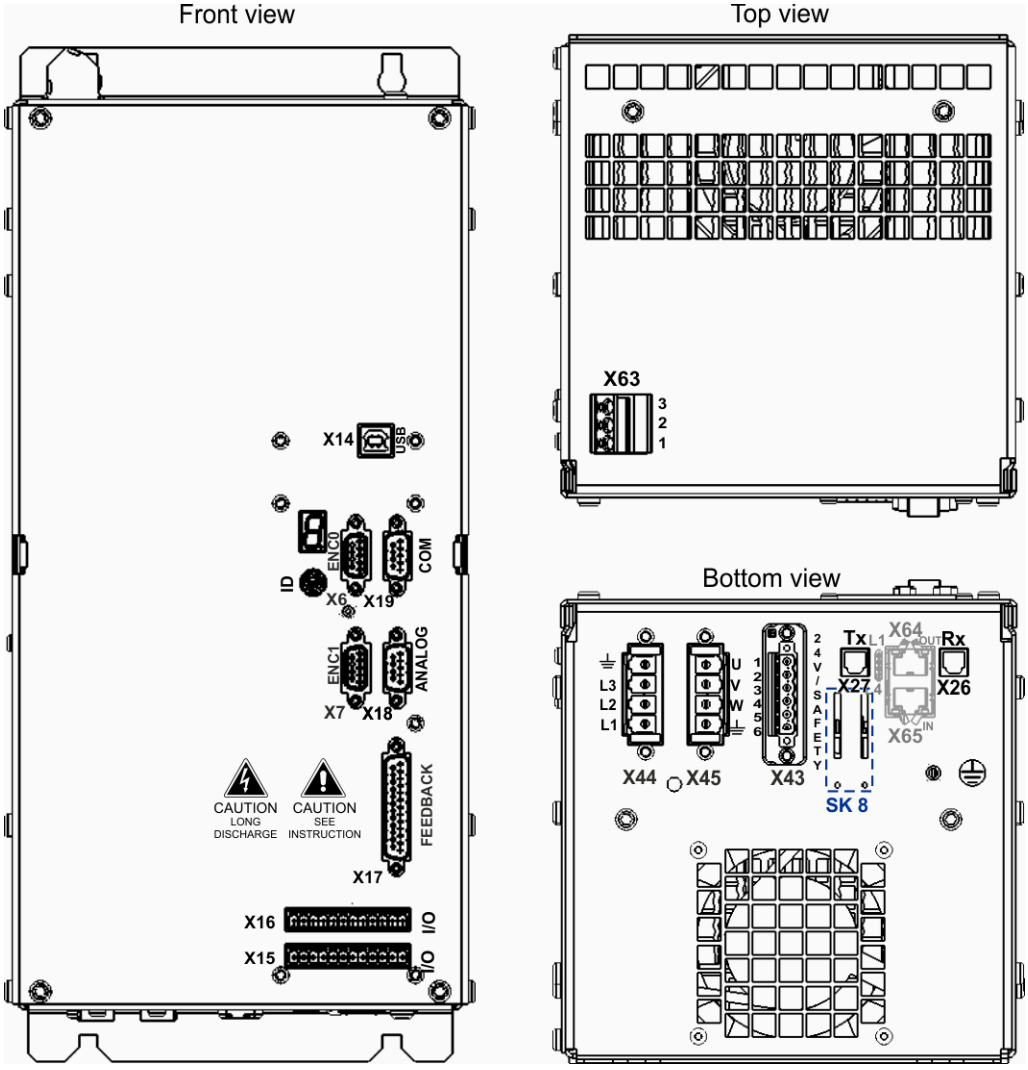


Fig. 35: Connectors 0362145xx with facelift (device version ≥ 4.200) and 0362245xx

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X43 Safety	24 V supply; safety circuit / restart lock (STO)	page 120
X44	Mains supply	page 120
X45	Motor connection	page 121
X63	External ballast resistor (0362x45IF only)	page 125

Connector	Meaning	Description
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground via PE lug (device version < 4.200)	–
	Device housing ground via PE screw at the bottom (after facelift: device version 4.200 and higher)	page 156
SK 8	Mounting holes for shield connection clamp SK 8 by Phoenix (included in connector kit)(1)	page 152

(1) Older devices do not yet provide the mounting holes for the shield connection clamp.

Note

You can order the appropriate connector kit for the device variant 0362x45xx (article No. 32299565) at SIEB & MEYER.

6.8 Compact Device 0362x46xx

Features of the SD2S device variant 0362x46xx:

- integrated power supply unit, 3-phase mains supply (to comply with EMC Directive 2014/30/EU an external line filter is necessary)
- safety circuit
- designed for high outputs
- 0362146xx: standard design without fieldbus interface
  - facelift with device version 4.200 and higher (available since October 2017)
- 0362246xx: design with EtherCAT interface

Fig. 36: Device view 0362146xx (device version < 4.200)

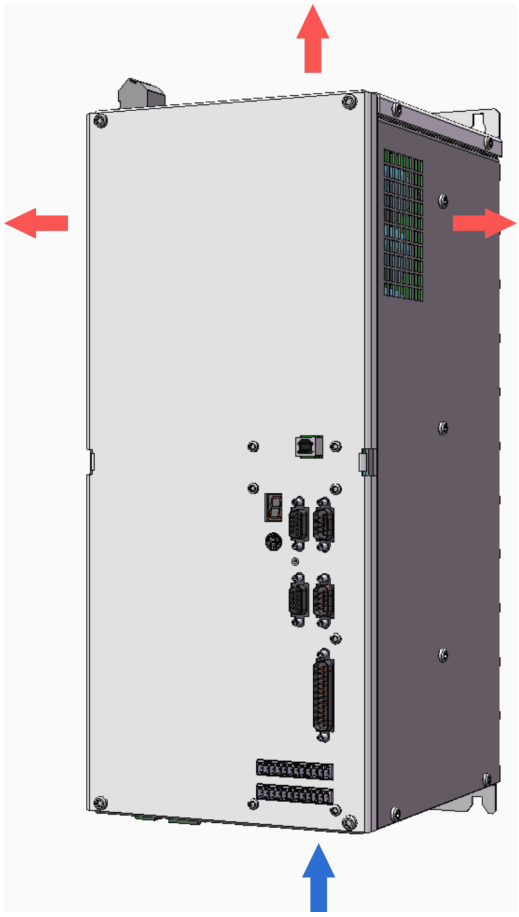


Fig. 37: Device view 0362146xx with facelift (device version ≥ 4.200) and 0362246xx

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.8.1 Dimensions

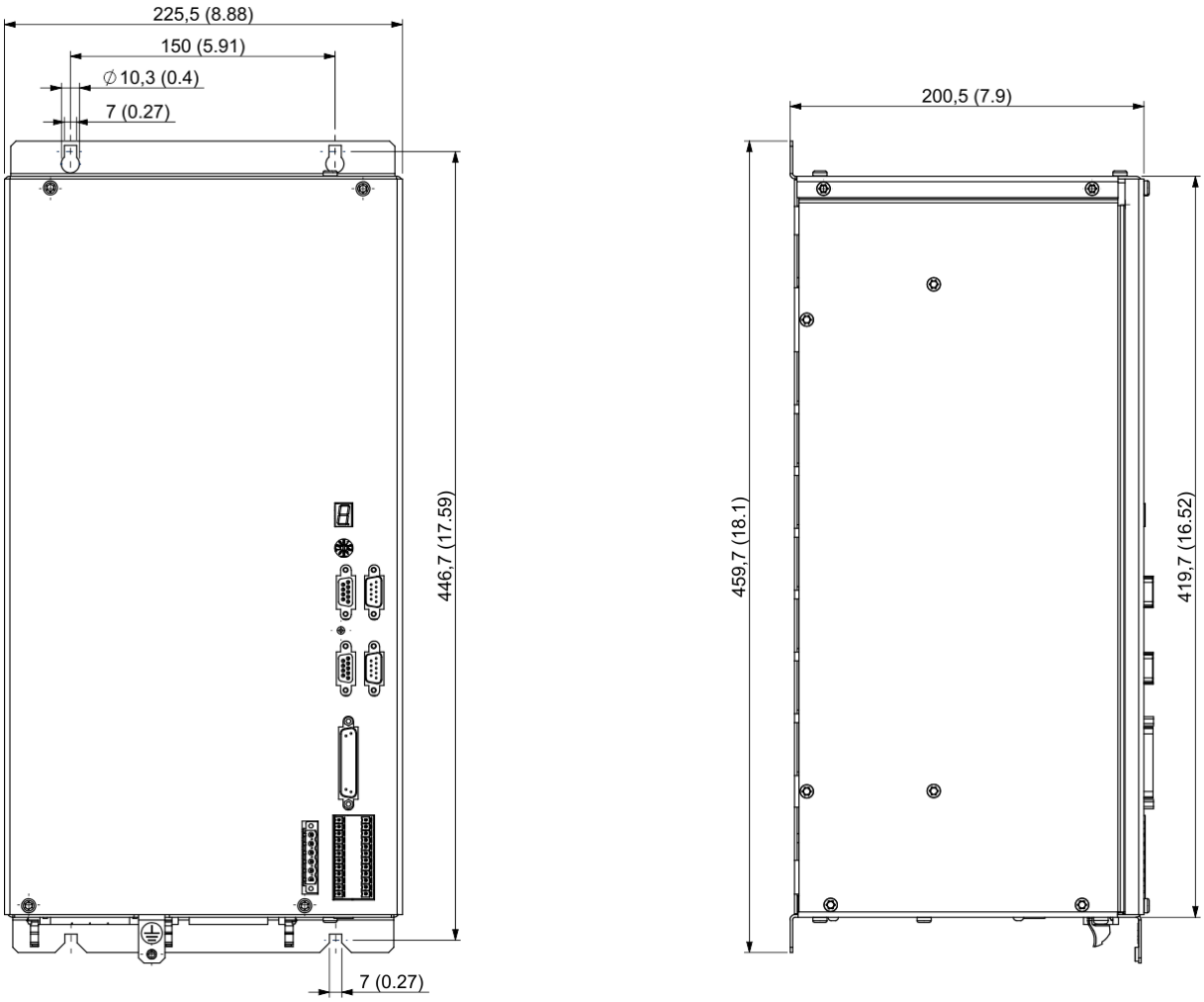


Fig. 38: Dimensions of 0362146xx (device version < 4.200) in mm (inch)

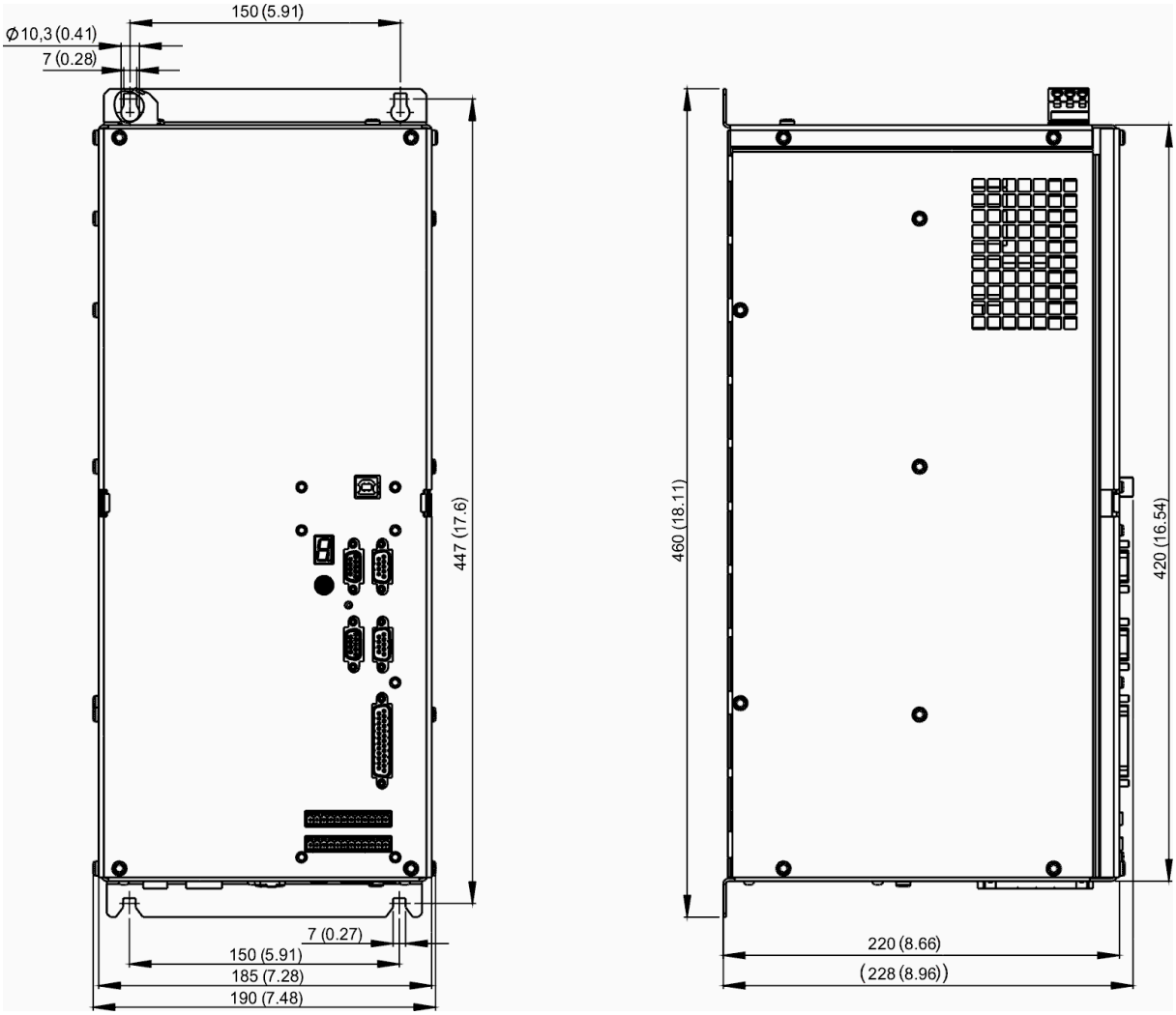


Fig. 39: Dimensions of 0362146xx with facelift (device version ≥ 4.200) and 0362246xx in mm (inch)

6.8.2 Technical Data

Mains supply 480 V_{AC}

Device variant	0362x46IF	0362x46LF
Continuous phase current of output stage (±3 %)	49.5 A_p / 35 A_{rms}	62 A_p / 44 A_{rms}
Peak phase current of output stage (±3 %)	80 A_p / 56.6 A_{rms}	100 A_p / 70.7 A_{rms}
Max. time for peak current	5 s	
Max. temperature of the output stage	75° C	
Max. output frequency	4000 Hz	
Output frequency stability	≤ 0.2 %	
Mains supply (3-phase)	200 V_{AC} -10 % to 480 V_{AC} +10 % 50 Hz / 60 Hz	
Required mains choke	40 A, article No. 13015804(1)	50 A, article No. 13015805(1)
Short circuit current rating (SCCR)	3000 A	
Required line filter	50 A, article No. 35063103(2)	
Mains fuse	50 A e.g. Siemens 5SD4 60, type DIAZED DIII(3)	63 e.g. Siemens 5SD4 70, type DIAZED DIII(3)
DC link voltage	280 V_{DC} -10 % to 675 V_{DC} +10 %	
Output power S1	24.2 kVA at 35 A_{rms} / 400 V_{AC}	30.5 kVA at 44 A_{rms} / 400 V_{AC}
Mains phase current at rated power	39 A	49 A
Logic supply (4)	18 - 28 V_{DC} (1.5 A / 24 V_{DC})	
Power loss of logic unit	36 W	
Power loss of power unit	PWM frequency 8 kHz = 540 W PWM frequency 16 kHz = 690 W	PWM frequency 8 kHz = 645 W PWM frequency 16 kHz = 855 W
Min. external ballast resistor	20 Ω / 2.5 kW max. pulse load 32 kWs	10 Ω / 5 kW max. pulse load 64 kWs
Internal ballast resistor	33 Ω / 250 W max. pulse load 17 kWs	16.5 Ω / 500 W max. pulse load 34 kWs
Ballast threshold	800 V_{DC}	
Overvoltage threshold	850 V_{DC}	
Undervoltage threshold	40 V_{DC}	
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.	
IP code	IP20	
Max. weight	13.7	

(1) For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

(2) Use an external line filter to comply with EMC Directive 2014/30/EU. For other line filters available at SIEB & MEYER refer to the appendix (see page 197).

(3) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(4) It is essential that the logic is supplied with voltage.

Rated current derating

Drive function[1]	SERVO; SVC; VF-PWM		HSBLOCK (with sensor)			HSPWM		
PWM frequency [kHz]	**8**	**16**	**8**	**16**	**32**	**8**	**16**	**32**
0362x46IF rated current S1 [A_{rms}]	35	33	35	35	27	35	35	31
0362x46LF rated current S1 [A_{rms}]	44	44[2]	44	44	33	44	44	35

[1] For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

[2] With a mains supply of 480 V_{AC} the rated current is 34 A_{rms}.

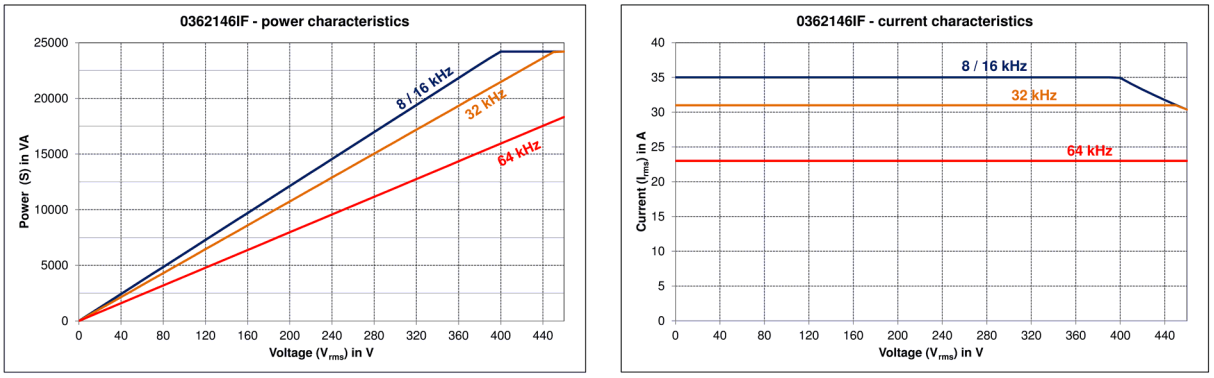


Fig. 40: Output characteristics for 0362x46IF in HSPWM mode

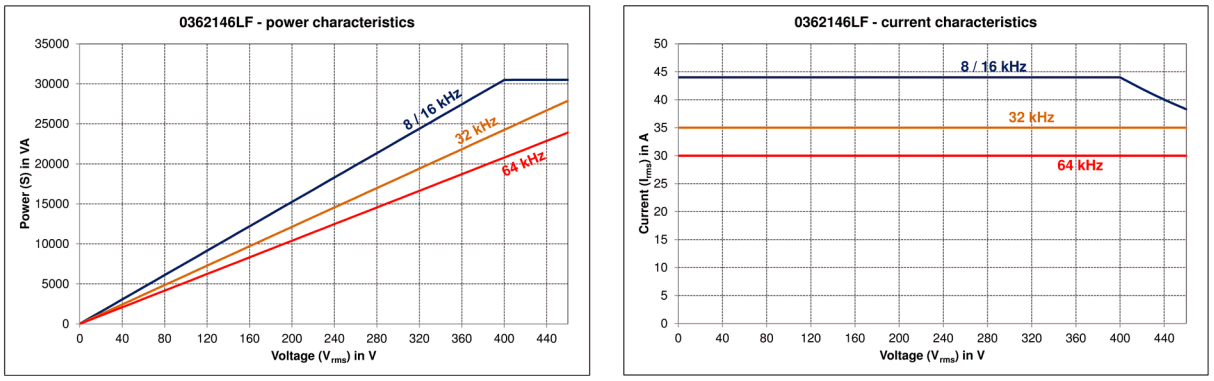


Fig. 41: Output characteristics for 0362x46LF in HSPWM mode

6.8.3 Connectors

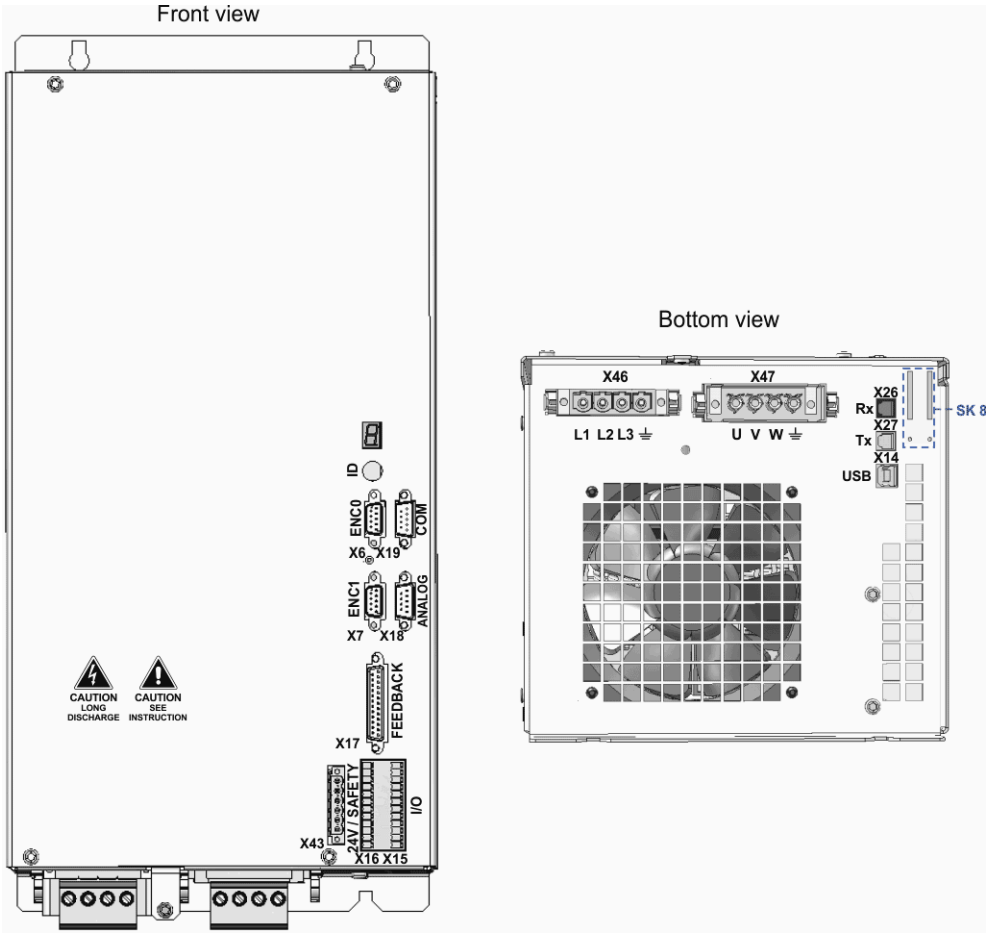


Fig. 42: Connectors of 0362146xx (device version < 4.200)

The gray-colored connectors X64 and X65 (EtherCAT option) are only available on device variant 0362246xx:

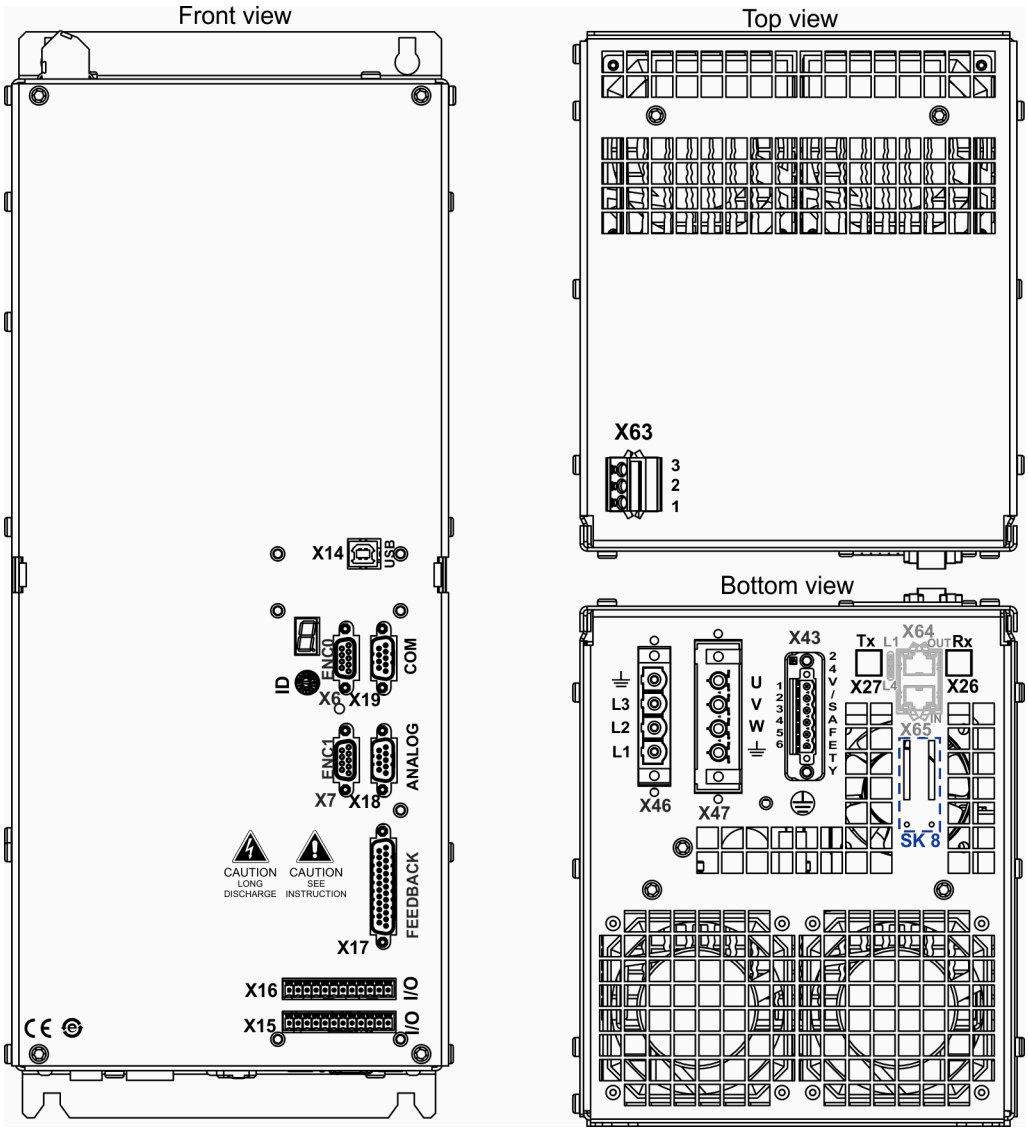


Fig. 43: Connectors of 0362146xx with facelift (device version ≥ 4.200) and 0362246xx

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X43 Safety	24 V supply; safety circuit / restart lock (STO)	page 120
X46	Mains supply	page 121
X47	Motor connection	page 122
X63	External ballast resistor	page 125

Connector	Meaning	Description
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground via PE lug (device version < 4.200)	–
	Device housing ground via PE screw at the bottom (after facelift: device version 4.200 and higher)	page 156
SK 8	Mounting holes for shield connection clamp SK 8 by Phoenix (included in connector kit)[1]	page 152

[1] Older devices do not yet provide the mounting holes for the shield connection clamp.

Note

You can order the appropriate connector kit for the device variant 0362x46xx (article No. 32299606) at SIEB & MEYER.

6.9 Drive Amplifier 0362147xx

Note

The drive amplifier 0362147xx is not produced anymore.

Features of SD2S device variant 0362147xx:

- external power supply unit necessary → DC bus supply
- safety circuit
- designed for high outputs

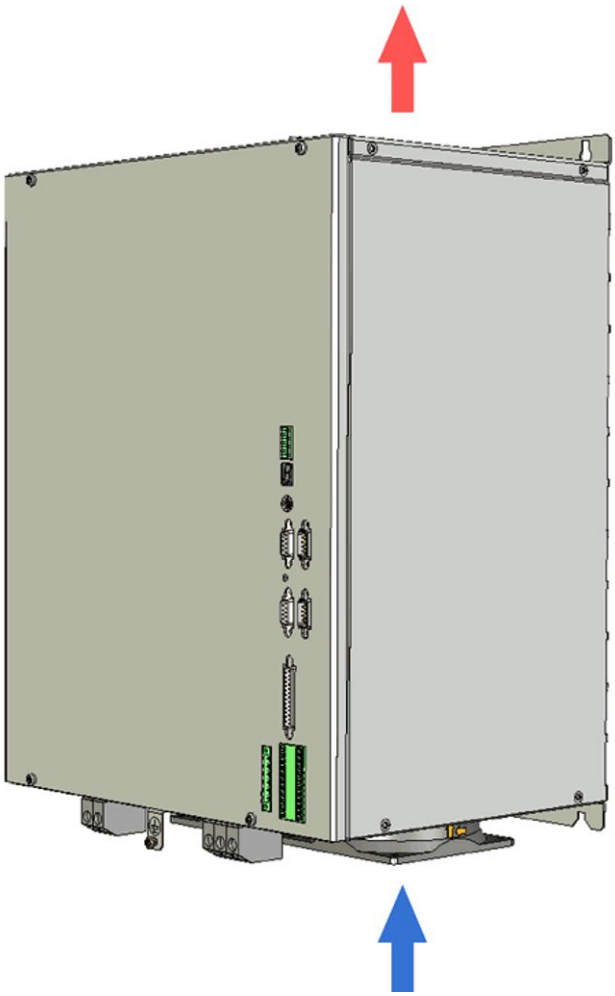


Fig. 44: Device view 0362147xx

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.9.1 Dimensions

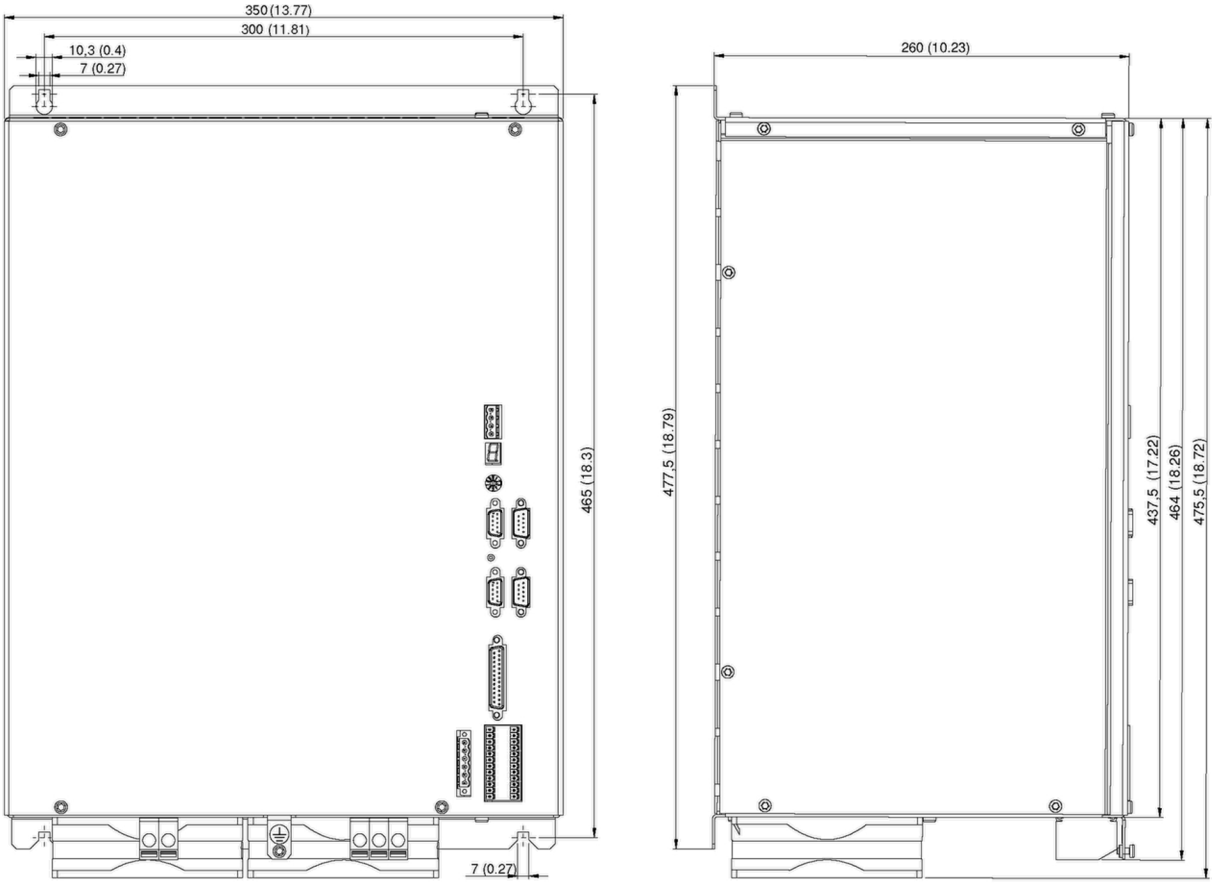


Fig. 45: Dimensions 0362147xx in mm (inch)

6.9.2 Technical Data

Note

For device variant 0362147xx an external DC link power supply unit is required.

Mains supply 480 V_{AC}

Device variant	0362147MF					
Continuous phase current of output stage (±3 %)	113 A_p / 80 A_{rms}					
Peak phase current of output stage (±3 %)	160 A_p / 113 A_{rms}					
Max. time for peak current	5 s					
Max. temperature of the output stage	75° C					
Max. output frequency	4000 Hz					
Output frequency stability	≤ 0.2 %					
DC link voltage	280 V_{DC} -10 % to 675 V_{DC} +10 %					
Output power S1	55.4 kVA at 80 A_{rms} / 400 V_{AC}					
Mains phase current at rated power	89 A					
Drive function[1]	SERVO; SVC; VF-PWM		HSPWM			
PWM frequency [kHz]	8	16	8	16	32	64
Rated current S1 [A_{rms}]	80	80	80	80	80	50
Logic supply[2]	18 to 28 V_{DC} (2.5 A)					
Power loss of logic unit	12 W					
Power loss of power unit	Max. 5 % of the output motor power, at least 20 W					
Overvoltage threshold	850 V_{DC}					
Undervoltage threshold	40 V_{DC}					
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.					
IP code	IP20					
Max. weight	31.5 kg					

[1] For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

[2] It is essential that the logic is supplied with voltage.

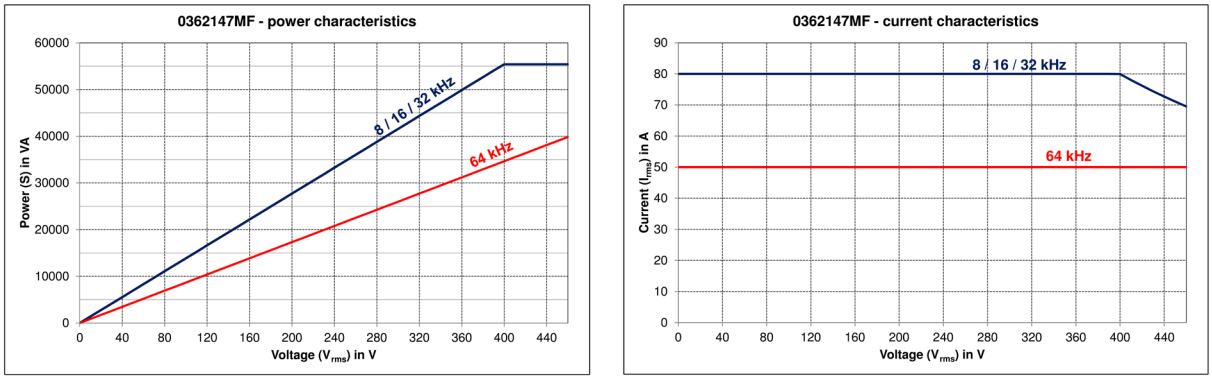


Fig. 46: Output characteristics for 0362147MF in HSPWM mode

Note

Also refer to the information in chapter 12 “Electric Performance Dimensioning”, page 170.

6.9.3 Connectors

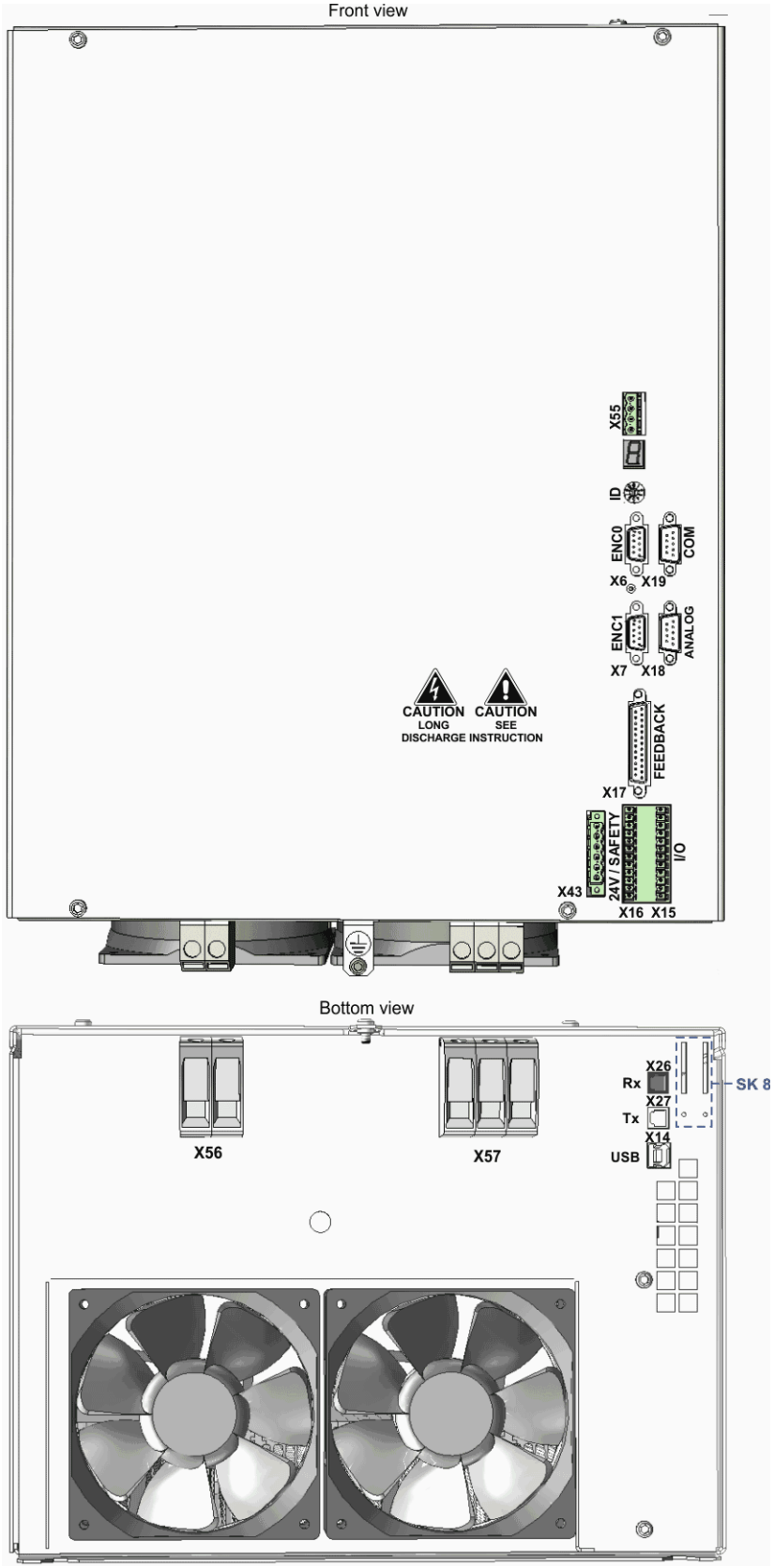


Fig. 47: Connectors of device variant 0362147xx

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X43 Safety	24 V supply; safety circuit / restart lock (STO)	page 120
X55	Error bus	page 124
X56	Mains supply	page 124
X57	Motor connection	page 124
SK 8	Mounting holes for shield connection clamp SK 8 by Phoenix (included in connector kit)(1)	page 152

(1) Older devices do not yet provide the mounting holes for the shield connection clamp.

Note

You can order the appropriate connector kit for the device variant 0362147xx (article No. 32299564) at SIEB & MEYER.

6.10 Compact Device 0362x48xx

Features of the SD2S- device variant 0362x48xx:

- integrated power supply unit, 3-phase mains supply (to comply with EMC Directive 2014/30/EU an external line filter is necessary)
- safety circuit
- designed for high outputs
- air cooling (0362x48MF) or water cooling (p. 100) (0362x48OF)
- 0362148xx: standard design without fieldbus interface
  - 0362148MF: facelift with device version 4.200 and higher (available since June 2017)

    0362148OF: facelift with device version 4.202 and higher (available since June 2018)
- 0362248xx: design with EtherCAT interface

6.10.1 Device Variant 0362x48MF

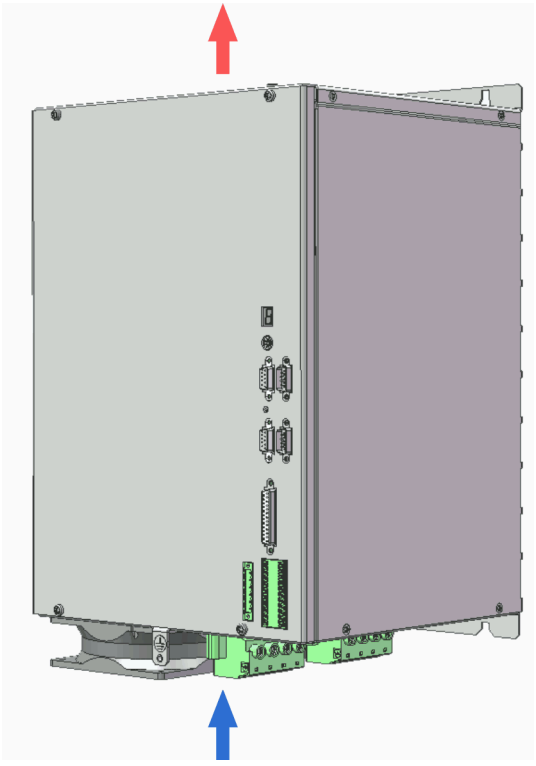


Fig. 48: Device view of 0362148MF (device version < 4.200)

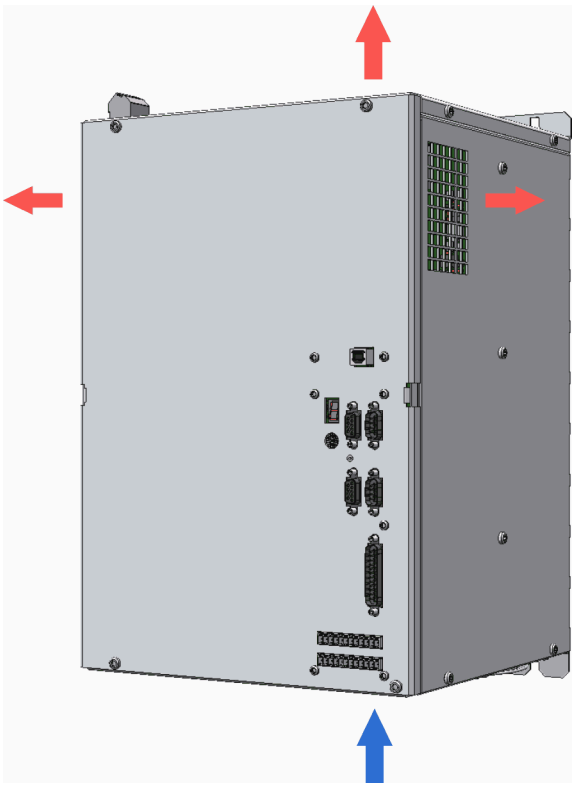


Fig. 49: Device view of 0362148MF with facelift (device version ≥ 4.200) and 0362248MF

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.10.2 Device Variant 0362x48OF

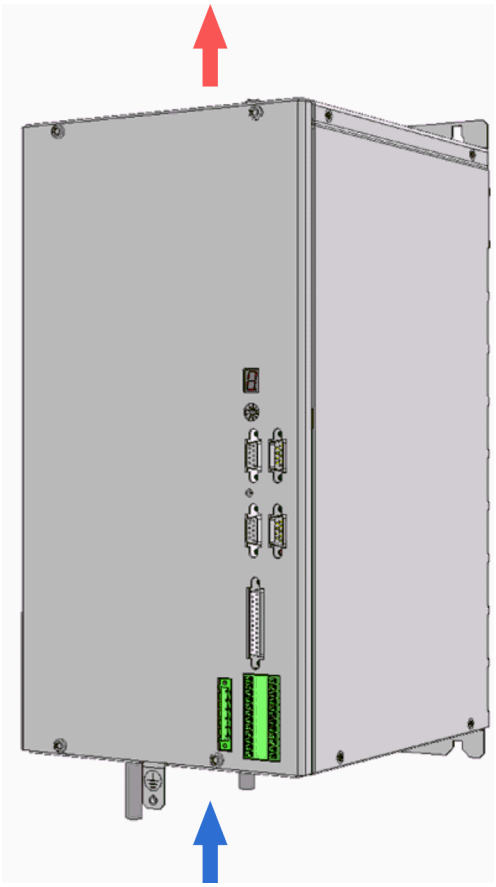


Fig. 50: Device view of 0362148OF (device version < 4.202): water cooling via copper tubes and air cooling of the electronics

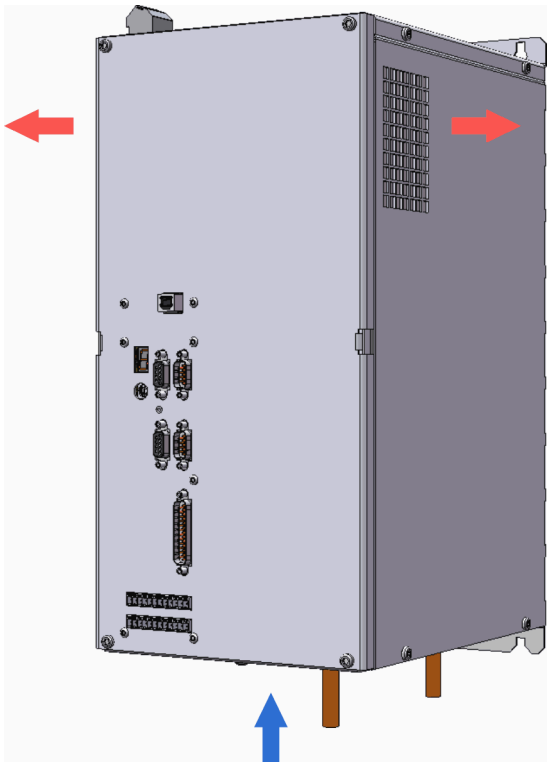


Fig. 51: Device view of 0362148OF with facelift (device version ≥ 4.202) and 0362248OF: water cooling via copper tubes and air cooling of the electronics

NOTICE

Restriction of cooling air flow

If the air flow cooling the device is obstructed, the device could overheat and possibly become damaged.

→ When installing the device, pay attention to the direction of air flow through the internally installed fan **[arrows]**.

→ For sufficient cooling the ventilation inlets and outlets must be kept free by a space of min. 10 cm.

6.10.3 Dimensions

6.10.3.1 Device Variant 0362x48MF

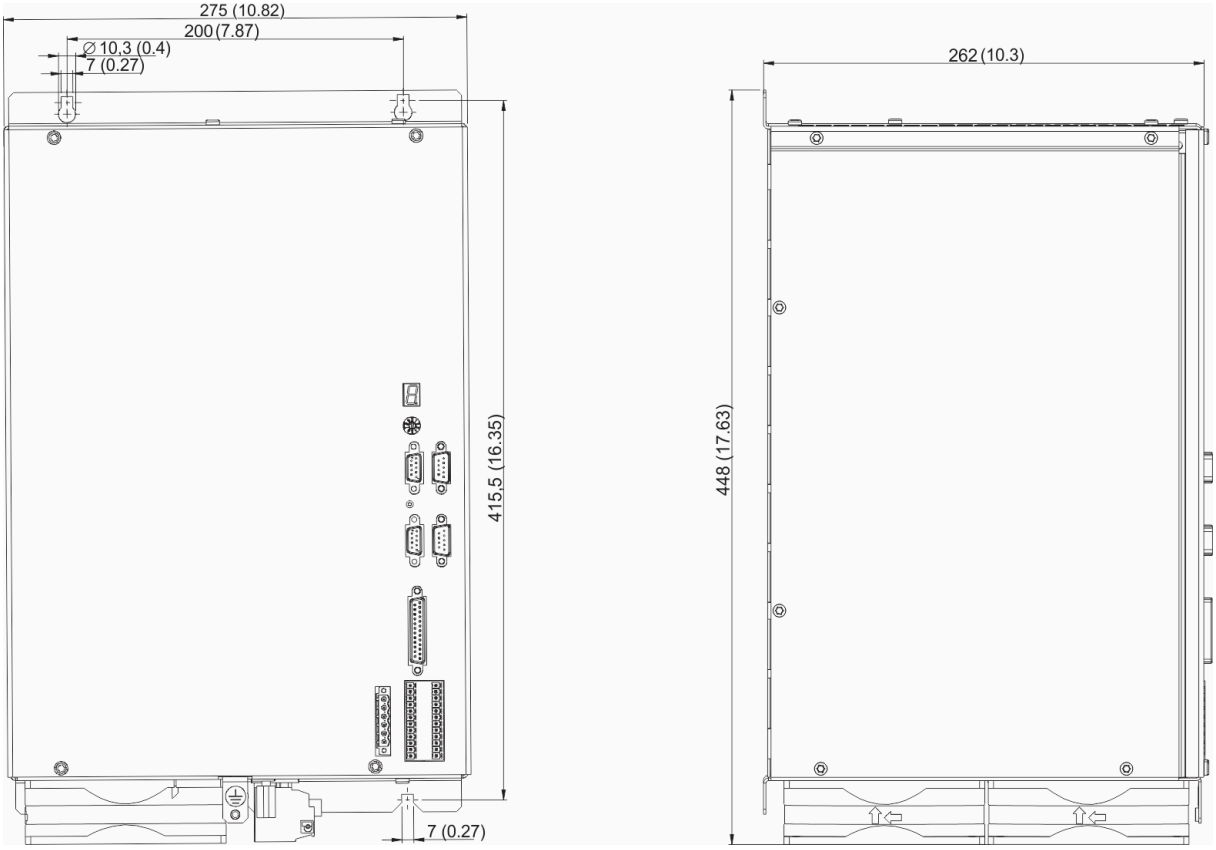


Fig. 52: Dimensions of 0362148MF (device version < 4.200) in mm (inch)

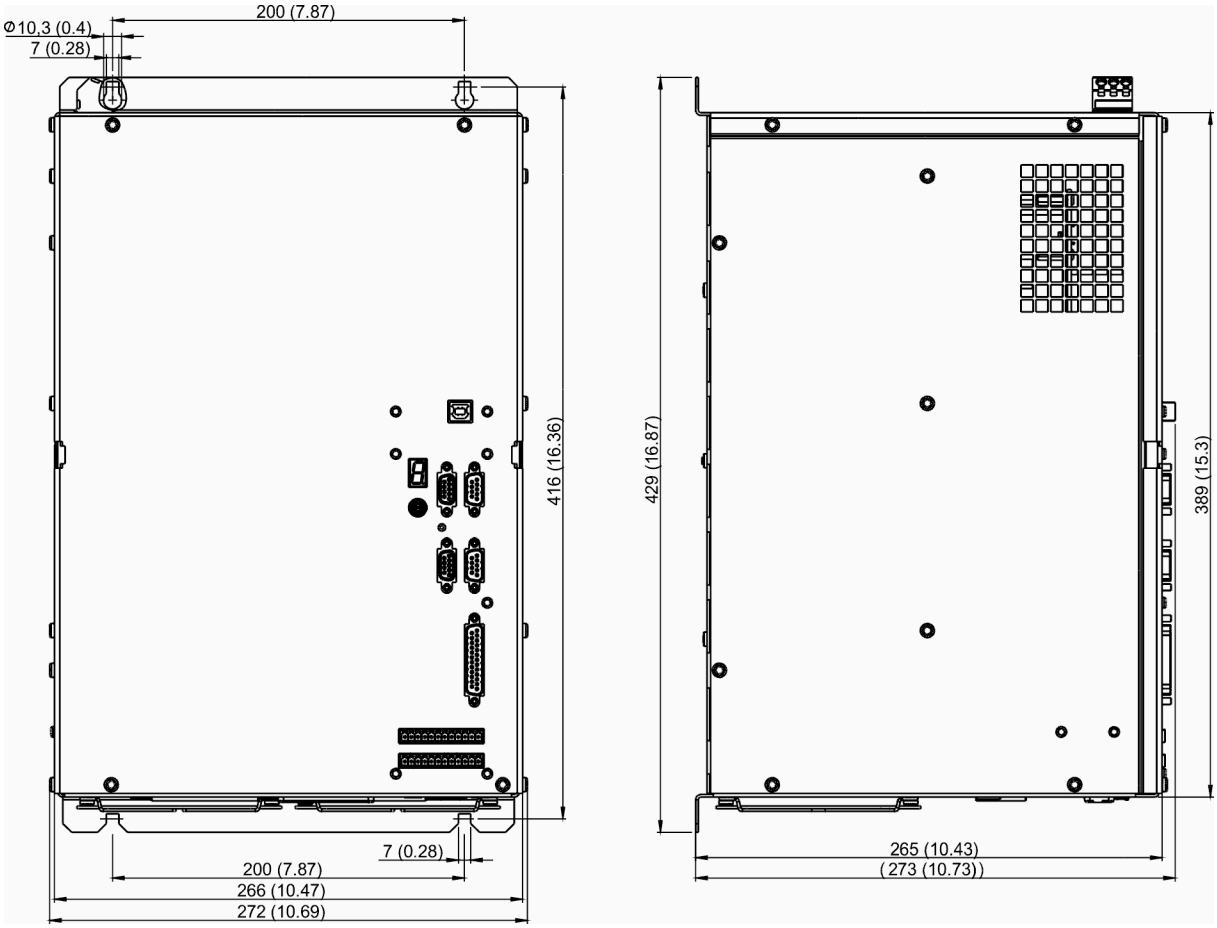


Fig. 53: Dimensions of 0362148MF with facelift (device version ≥ 4.200) and 0362248MF in mm (inch)

6.10.3.2 Device Variant 0362x48OF

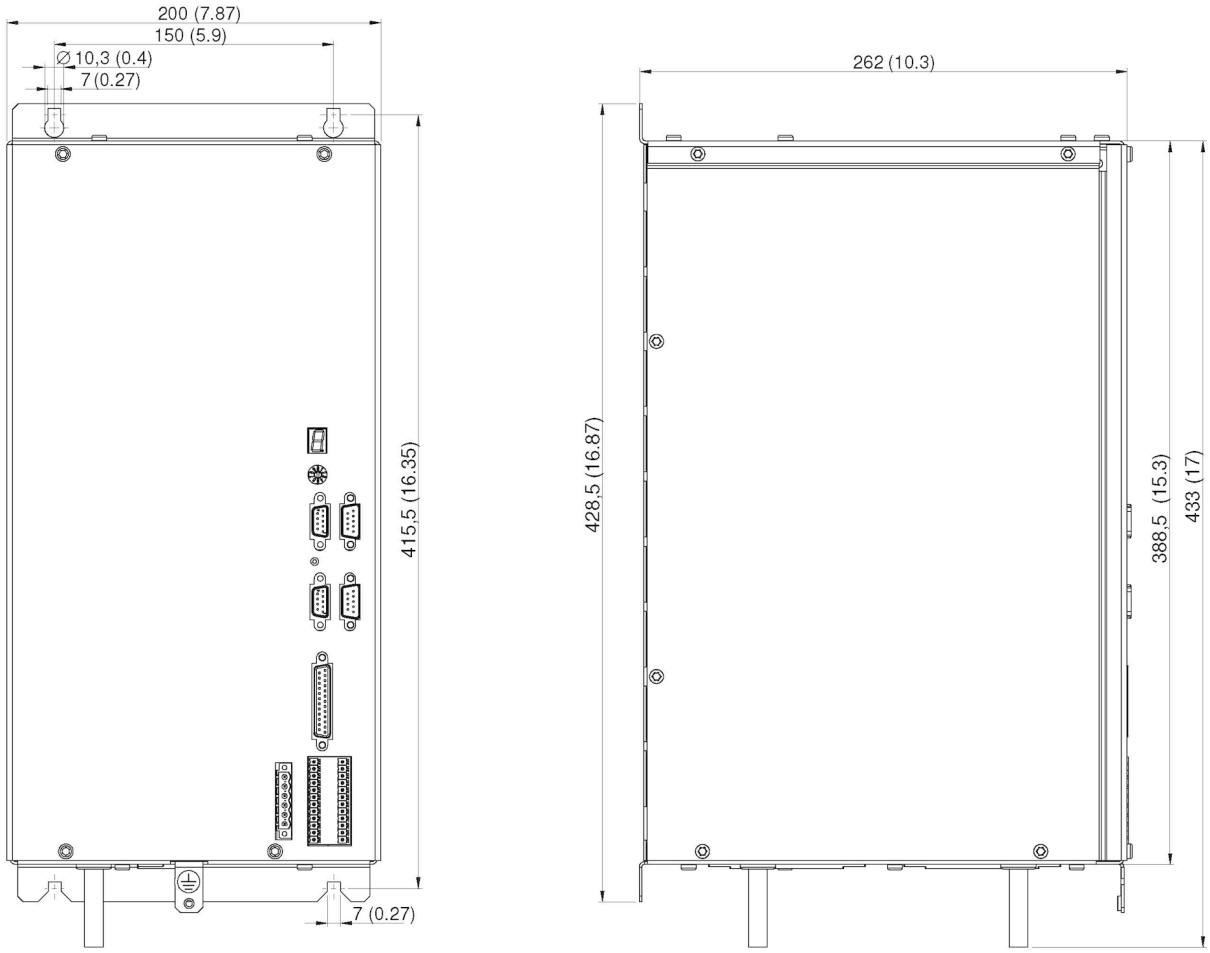


Fig. 54: Dimensions of 0362148MF (device version < 4.202) in mm (inch)

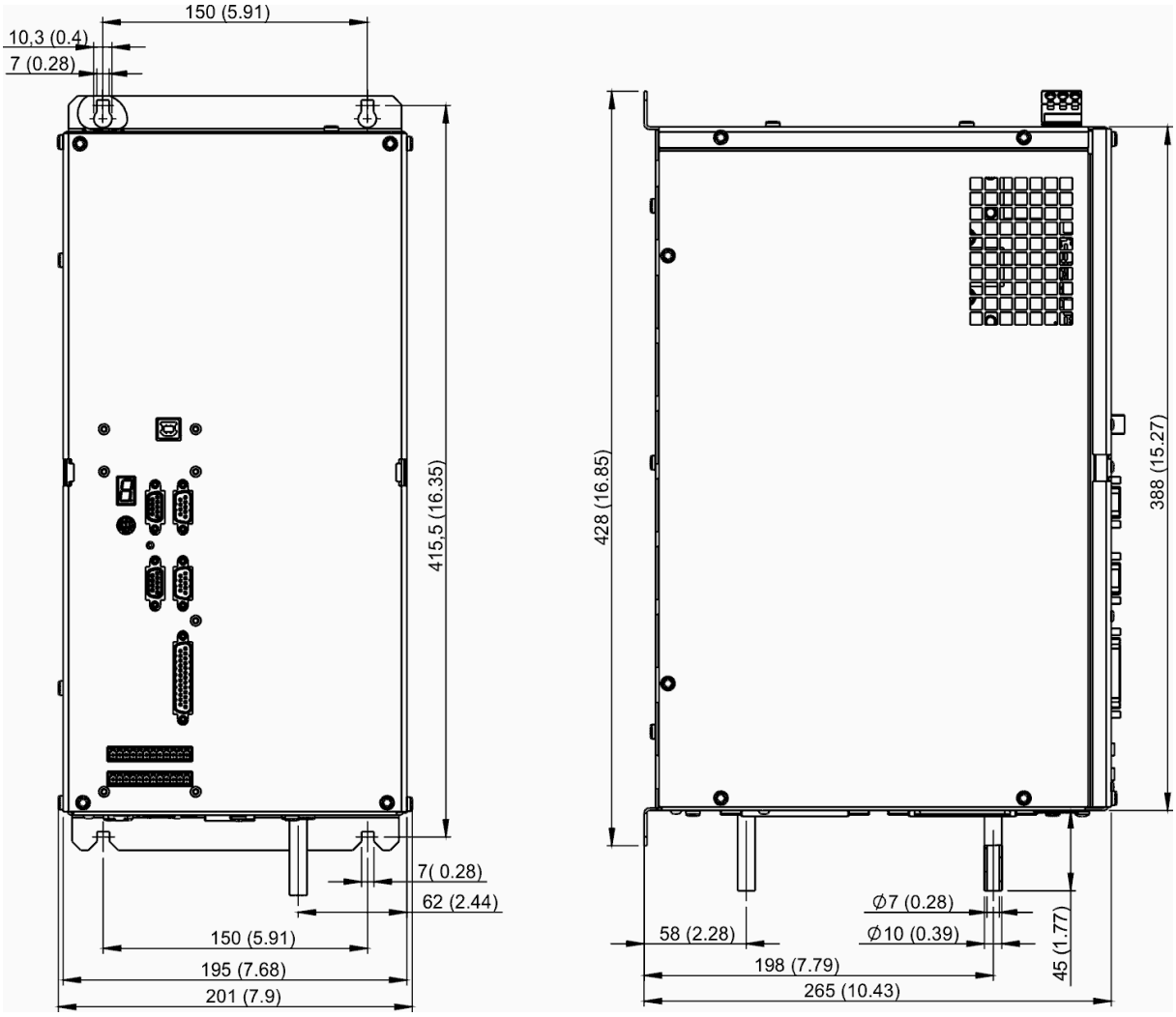


Fig. 55: Dimensions of 0362148OF with facelift (device version ≥ 4.202) and 0362248OF in mm (inch)

6.10.4 Technical Data

Mains supply 480 V_{AC}

Device variant	0362x48MF	0362x48OF
Continuous phase current of output stage (±3 %)	113 A_p / 80 A_{rms}	
Peak phase current of output stage (±3 %)	160 A_p / 113 A_{rms}	
Max. time for peak current	3 s	
Max. temperature of the output stage	100 °C	
Max. output frequency	4000 Hz	
Output frequency stability	≤ 0.2 %	
Mains supply (3-phase)	200 V_{AC} -10 % to 480 V_{AC} +10 % 50 Hz / 60 Hz	
Required mains choke	90 A, article No. 13015810(1)	
Short circuit current rating (SCCR)	5000 A	
Required line filter	90 A, article No. 35063106(2)	
Mains fuse	100 A e.g. Siemens 5SD5 20, type DIAZED DIV(3)	
DC link voltage	280 V_{DC} -10 % to 675 V_{DC} +10 %	
Output power S1	55.4 kVA at 80 A_{rms} / 400 V_{AC}	
Mains phase current at rated power	89 A	
Logic supply (4)	18 - 28 V_{DC} (2.5 A / 24 V_{DC})	18 - 28 V_{DC} (1 A / V_{DC})
Power loss of logic unit	60 W	24 W
Power loss of power unit	PWM frequency 8 kHz = 1.5 kW PWM frequency 16 kHz = 2.15 kW	
Min. external ballast resistor	12 Ω max. pulse load 53 kWs	
Internal ballast resistor	16.5 Ω / 500 W max. pulse load 34 kWs	
Ballast threshold	800 V_{DC}	
Overvoltage threshold	850 V_{DC}	
Undervoltage threshold	40 V_{DC}	
Ambient temperature range	5 °C to 60 °C at a maximum relative humidity of 85 % (without moisture condensation) 100 % rated current up to max. 40 °C. At higher temperatures the power must be reduced by 1.5 % per 1 °C.	
IP code	IP20	
Max. weight	19	15

(1) For other mains chokes available at SIEB & MEYER refer to the appendix (see page 197).

(2) Use an external line filter to comply with EMC Directive 2014/30/EU. For other line filters available at SIEB & MEYER refer to the appendix (see page 197).

(3) An overview of all mains fuses suitable for the SD2S series you can find in the appendix (see page 195).

(4) It is essential that the logic is supplied with voltage.

Water Cooling 0362x48OF	
Heat sink	Aluminum heat sink with 2 copper tubes(1)
Outer tube diameter	10 mm
Max. cooling water temperature	40 °C
Min. flow rate	4 l/min

(1) Stainless steel tubes are available on request.

Rated current derating

Drive function[1]	SERVO; SVC; VF-PWM		HSPWM			
PWM frequency [kHz]	**8**	**16**	**8**	**16**	**32**	**64**
0362x48MF Rated current S1 [A_{rms}]	80	80	80	80	60	33
0362x48OF Rated current S1 [A_{rms}]	80	80	80	80	80	70

[1] For more information on the possible drive functions of your device, refer to chapter 5.4 “Functional Overview of the Device Variants”, page 24.

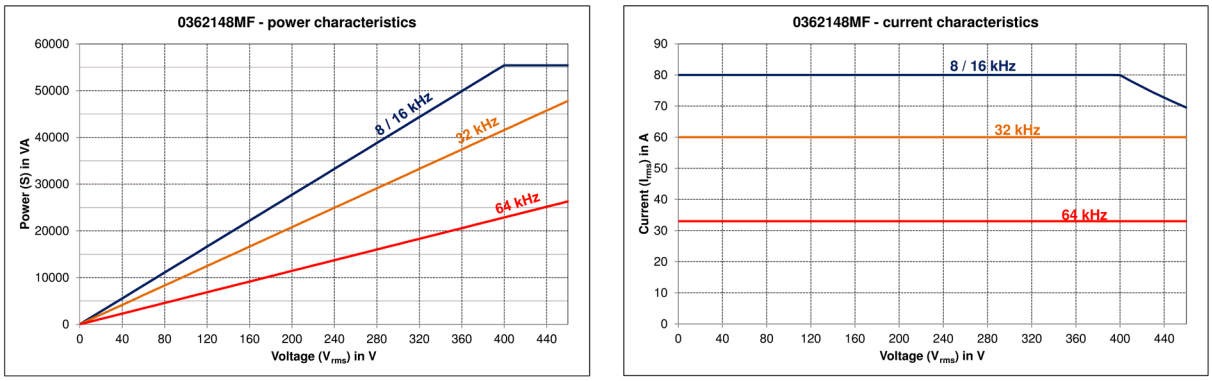


Fig. 56: Output characteristics for 0362x48MF in HSPWM mode

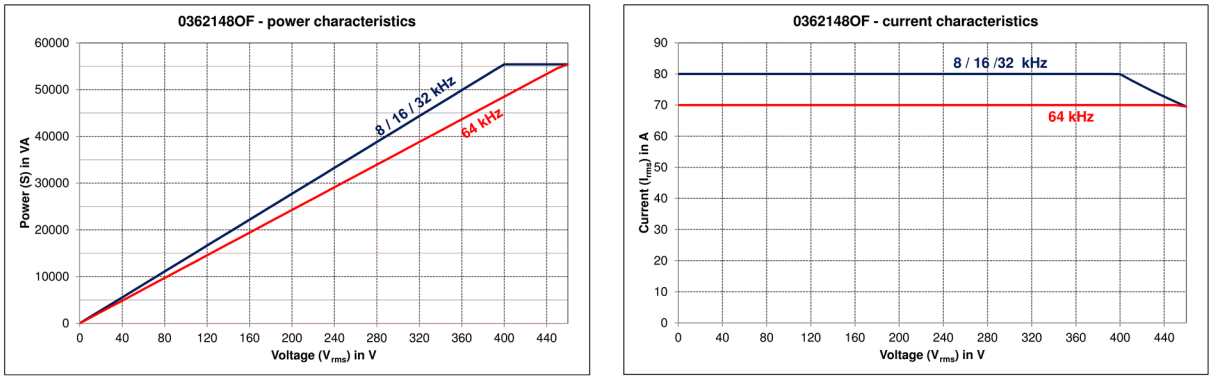


Fig. 57: Output characteristics for 0362x48OF in HSPWM mode

6.10.5 Connectors

6.10.5.1 Device Variant 0362x48MF

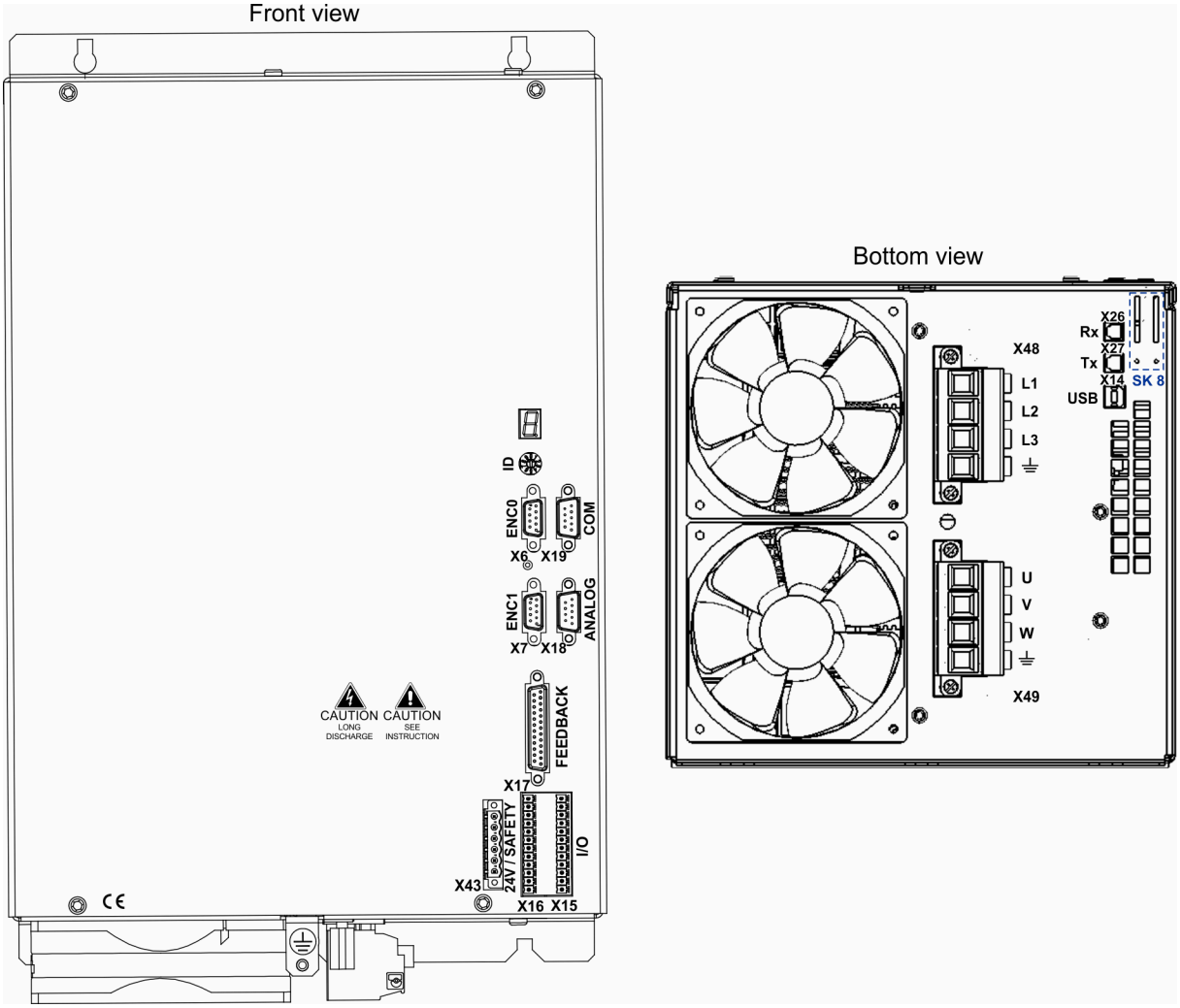


Fig. 58: Connectors of 0362148MF (device version < 4.200)

The gray-colored connectors X64 and X65 (EtherCAT option) are only available on device variant 0362248MF.

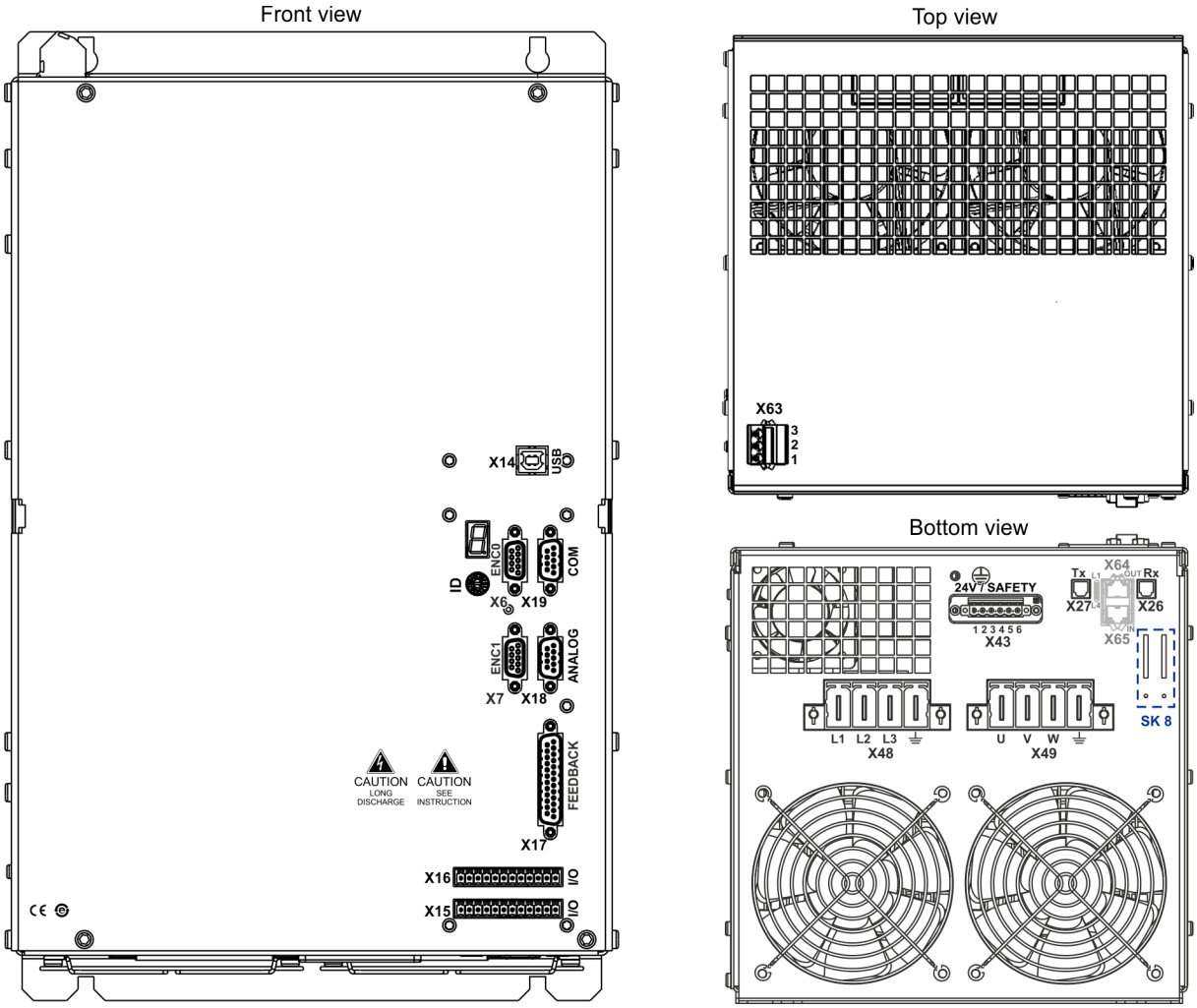


Fig. 59: Connectors of 0362148MF with facelift (device version ≥ 4.200) and 0362248MF

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X43 Safety	24 V supply; safety circuit / restart lock (STO)	page 120
X48	Mains supply	page 123
X49	Motor connection	page 123
X63	External ballast resistor	page 125

Connector	Meaning	Description
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground via PE lug (device version < 4.200)	–
	Device housing ground via PE screw at the bottom (after facelift: device version 4.200 and higher)	page 156
SK 8	Mounting holes for shield connection clamp SK 8 by Phoenix (included in connector kit)(1)	page 152

(1) Older devices do not yet provide the mounting holes for the shield connection clamp.

Note

You can order the appropriate connector kit for the device variant 0362x48MF (article No. 32299563) at SIEB & MEYER.

6.10.5.2 Device Variant 0362x48OF

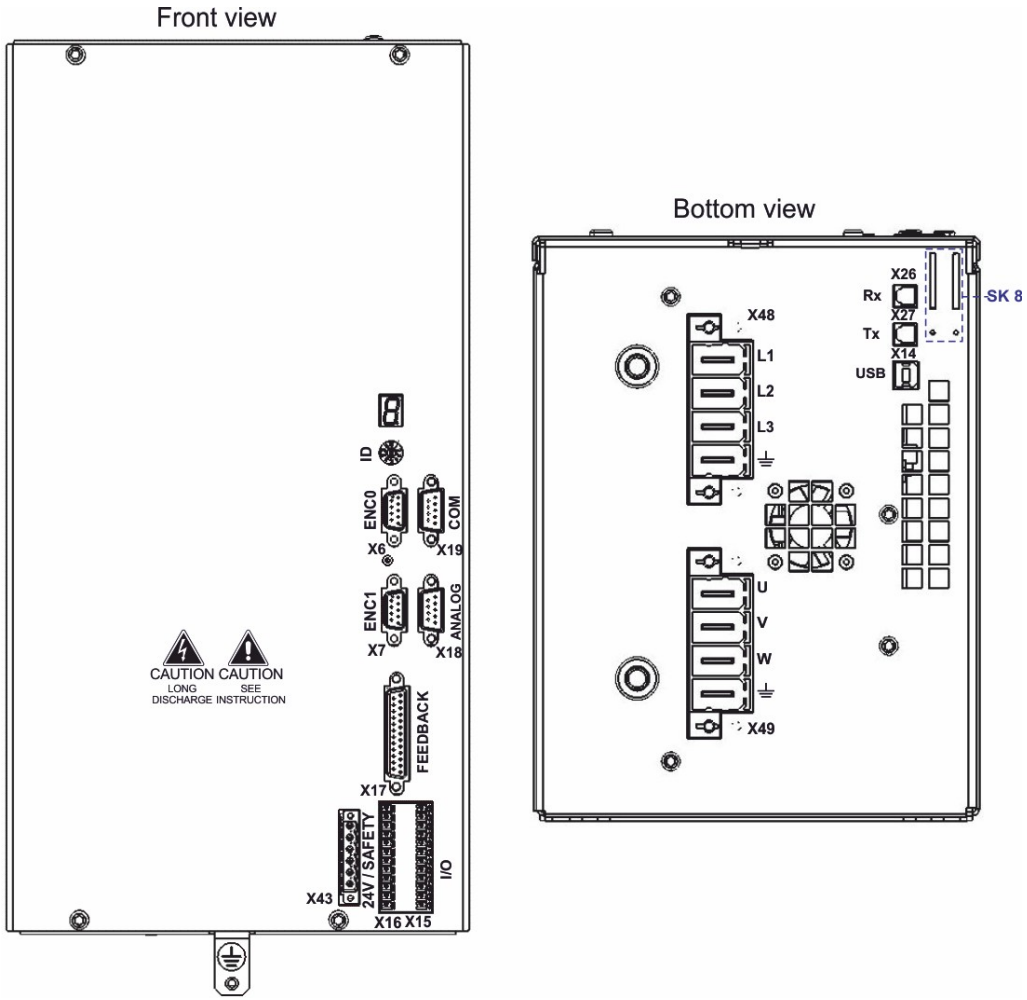


Fig. 60: Connectors of 0362148OF (device version < 4.202)

The gray-colored connectors X64 and X65 (EtherCAT option) are only available on device variant 0362248OF:

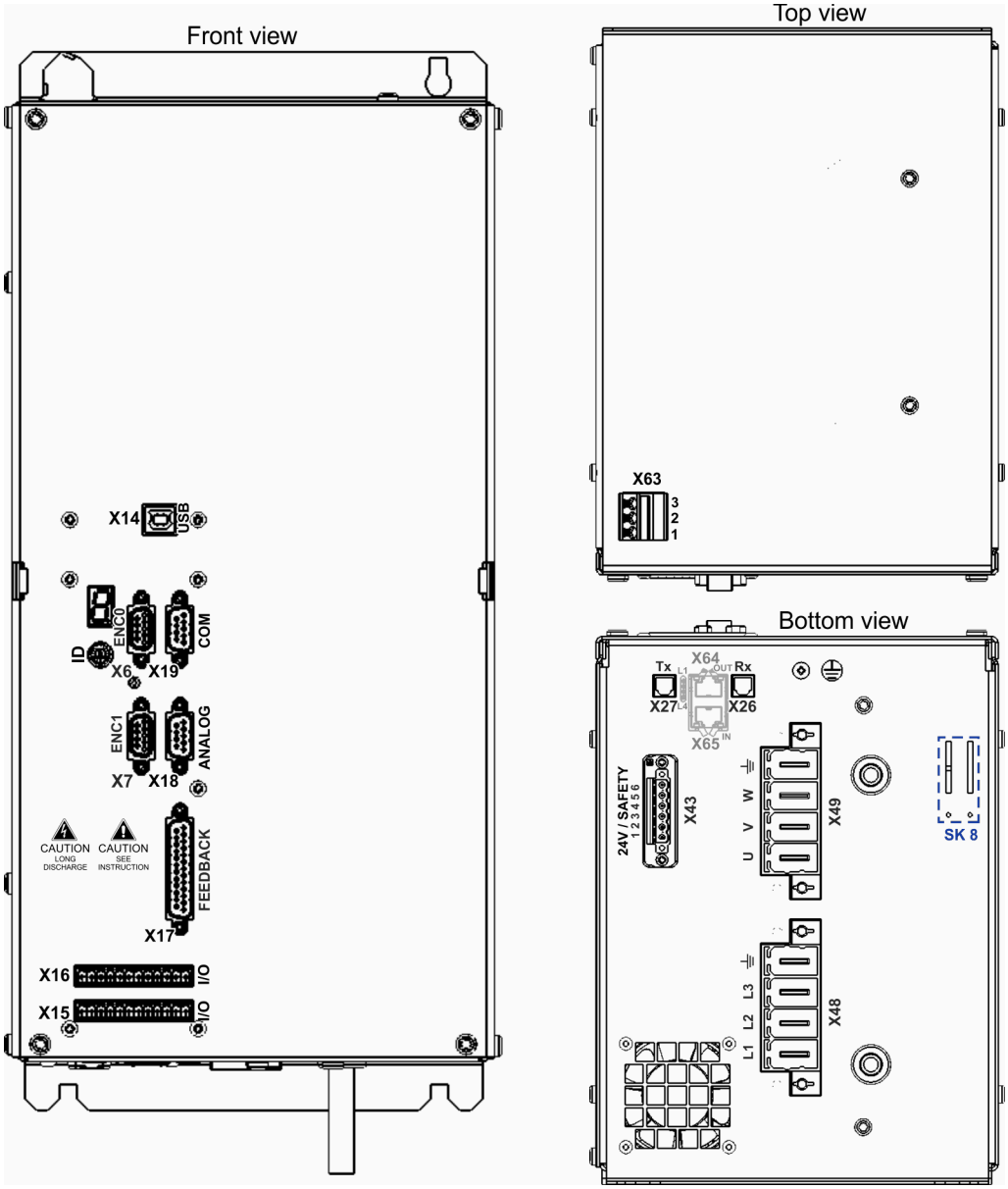


Fig. 61: Connectors of 0362148OF with facelift (device version ≥ 4.202) and 0362248OF

Connector	Meaning	Description
ID	Address selection switch of device	page 103
X6 ENC0	Encoder 0 input	page 103
X7 ENC1	Encoder 1 input / output	page 104
X14 USB	USB interface for parameter setting	page 105
X15 I/O	Digital outputs	page 105
X16 I/O	Digital inputs	page 108
X17 Feedback	Sine cosine encoder / incremental encoder TTL / Hall encoder / linear Hall encoder / field plate sensor / EnDat encoder / Hiperface encoder	page 111
X18 Analog	Analog signals	page 113
X19 COM	COM interface	page 114
X26 Rx	SERVOLINK 4 optical input	page 115
X27 Tx	SERVOLINK 4 optical output	page 115
X43 Safety	24 V supply; safety circuit / restart lock (STO)	page 120
X48	Mains supply	page 123

Connector	Meaning	Description
X49	Motor connection	page 123
X63	External ballast resistor	page 125
X64 OUT	EtherCAT slave output	page 126
X65 IN	EtherCAT slave input	
⏚	Device housing ground via PE lug (device version < 4.202)	–
	Device housing ground via PE screw at the bottom (after facelift: device version 4.202 and higher)	page 156
SK 8	Mounting holes for shield connection clamp SK 8 by Phoenix (included in connector kit)(1)	page 152

(1) Older devices do not yet provide the mounting holes for the shield connection clamp.

Note

You can order the appropriate connector kit for the device variant 0362x48OF (article No. 32299563) at SIEB & MEYER.

7 Mounting

7.1 Rear Panel Mounting

Note

SD2S devices must be installed in a switch cabinet.

The device is designed for vertical rear panel mounting. Other setup positions are possible but you must consult SIEB & MEYER before.

Suitable fastening screws: M6x12 according to ISO 4762

- strength class: 8.8
- washers: M6 according to ISO 7091 (use is recommended)
- minimum engagement depth in the mounting plate: 8 mm for steel plate, 15 mm for aluminum plate

Note

The rear panel of the device must fit flat against the mounting plate. If you use locking threads, make sure that these do not protrude beyond the mounting plate.

7.2 Water Cooling (0362x48OF)

⚠ CAUTION

Risks when handling cooling liquids

→ Cooling liquids can cause damage to health and environment: Avoid skin and eye contact. Dispose cooling liquids in an environmentally acceptable way according to the local regulations.

→ Cooling liquids can heat up to a temperature of 70 °C and might be under high pressure: Use collection containers for liquid leakage.

Pay attention to the following notes about liquid coolants:

- The coolant must be based on water and it must contain corrosion inhibitor.
- Anti-fungal agents can prevent clogging of the cooling pipes.
- The coolant must be cleaned.
- No solid objects must be carried along.
- The system monitoring should check the following parameters:
  - temperature
  - maximum pressure
  - pressure loss (system leakage)
  - flow rate
- The coolant must be chemically neutral.
- The operating pressure must not exceed 6 bar.
- Bedewing at the heat sink and the connected cooling pipes must be prevented. (Bedewing is caused especially, when the coolant temperature is low and high humidity in connection with high temperatures is present.)

7.2.1 Connection of the cooling unit

The device heat sink must be connected to a cooling unit for heat dissipation.

⚠ DANGER

High voltages in connection with cooling liquids

→ Before you carry out any works at the cooling circuit, you must switch off all electric equipment located in the danger area (e.g. switch cabinet). Wait until the respective discharge times of the electric equipment are passed.

→ Check that the cooling system is watertight before you connect any electric equipment located in the danger area (e.g. switch cabinet) to the mains supply.

NOTICE

Low coolant flow rate

If the coolant flow rate is too low, the drive and the connected components may overheat.

→ After filling the complete cooling circuit must be vented. We strongly recommend the use of flow rate sensors.

Devices with cooling water tubes

The form of connection to the cooling unit depends on the conditions in the overall system. One possibility is to use cutting rings with suitable fittings. The following companies, for example, provide the connection elements:

- EMB – Eifeler Maschinenbau GmbH: http://www.emb-eifel.de/
- RO-FI Edelstahlhandel GmbH: http://www.rofi.de

Devices with threads

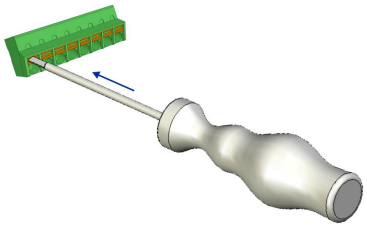
The device comes with a connection area with internal screw threads at the bottom. The form of connection to the cooling unit depends on the conditions in the overall system. One possibility is to use straight compression fittings.

8 Connector Pin Assignment

8.1 Operation of the Terminal Connectors

8.1.1 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.

8.1.2 Click & Lock System (STCL Connectors)

Plugging the connector **[A]**

- Plug the connector as shown in the figure on the housing and ensure that the connector locks in place (**1.**).

  Note: Both side guides must be fully pushed back to ensure that the connector locks firmly in place and to prevent unwanted loosening of the connector (e.g. in case of vibrations).

Removing the connector **[B]**

- Move the two side guides of the connector as shown in the figure toward the device (**1.**) and unplug the connector (**2.**).

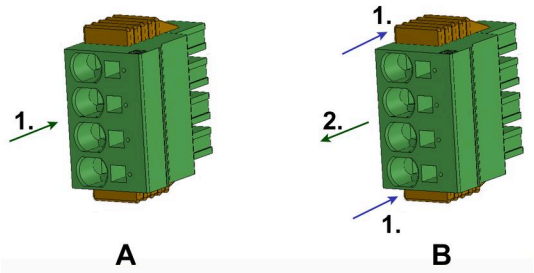
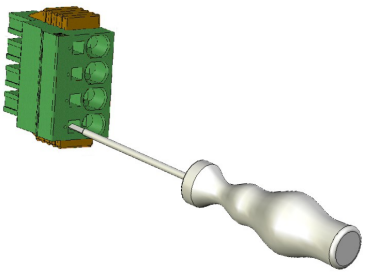


Fig. 62: Plug [A] and unplug the connector [B]

8.1.3 Push-in technology

Terminals using the push-in connection technology (PIT) 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.



- When the cable is inserted into the clamping unit the spring opens automatically.
- To open the clamp and loosen the cable use a screw driver.

8.2 ID Switch (Address Selection Switch)

⇨ Set the address for the module by means of the address selection switch. 16 adresses are available: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. (When the device is connected via SERVOLINK 4 only 12 addresses are available (0 to B).)

Note

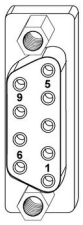
The addresses of several devices in a system must be different from each other to ensure that they can be identified by the software.

8.3 X6 – Encoder 0

Encoder 0 input, e.g. for length measuring systems

This connector is not integrated in SD2S Light (036212xxx, 0362x43xx).

9-pole female D-sub connector

X6	Pin	I/O	Name	Meaning
	1	I	UA+	Track A+
	2	I	UA−	Track A−
	3	I	UN+	Zero pulse+
	4	I	UN−	Zero pulse−
	5	I/O	GND	Ground
	6	I	UB+	Track B+
	7	I	UB−	Track B−
	8	O	VCC_ENC	5.3 V supply voltage
	9	I	ERR	Measuring system error

Stud bolt flange: max. tightening torque = 0.7 Nm

Related topics

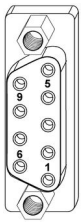
X6, X7 – Incremental Encoders with TTL Signals, page 128

8.4 X7 – Encoder 1 / Encoder Emulation

Encoder 1 input and encoder emulation output e.g. for depth measuring systems

This connector is not integrated in SD2S Light (036212xxx, 0362x43xx).

9-pole female D-sub connector

X7	Pin	I/O	Name	Meaning
	1	I/O	UA+	Track A+
	2	I/O	UA-	Track A-
	3	I/O	UN+	Zero pulse+
	4	I/O	UN-	Zero pulse-
	5	I/O	GND	Ground
	6	I/O	UB+	Track B+
	7	I/O	UB-	Track B-
	8	O	VCC_ENC	5.3 V supply voltage
	9	I	ERR	Measuring system error

Stud bolt flange: max. tightening torque = 0.7 Nm

Related topics

X6, X7 – Incremental Encoders with TTL Signals, page 128

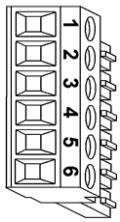
X7 – Encoder Emulation, page 129

8.5 X10 – Safety (STO)

Safety circuit and restart lock (STO)

The safety circuit is not integrated in older devices of variant 0362140xx.

6-pole Mini-Combicon connector, suitable for mating connector MC 1.5/ 6-ST-3.81 (Phoenix)

Mating connector X10	Pin	I/O	Name	Meaning
	1	I	SAFEA / 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.
	2	–	GND	Reference potential
	3	I	SAFEB / OSSD2	Enable of the safety circuit ▸ Permanent load approx. 15 mA/24 V ▸ Startup peak current is negligible under normal conditions.
	4		n.c.	
	5		n.c.	
	6	O	24 V(1)	Logic voltage 18 to 28 volts (uncontrolled)

(1) 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. If the safety function (STO) is not required, this voltage is only used to bridge the pins 1 and 3.

Specification of terminal connections

- Conductor cross-section solid/stranded: 0.14 to 1.5 mm²
- Tightening torque: 0.22 to 0.25 Nm

Note

The power supply unit is only activated when SAFEA and SAFEB are connected. If the safety function (STO) is not required, pin 1 and pin 3 must be bridged to pin 6.

Related topics

X10/ X43 – Safety Circuit (STO), page 130

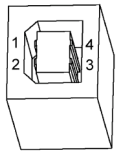
Safety Circuit / Restart Lock (STO), page 174

Connection Diagram, page 190

8.6 X14 – USB

Communication interface to the connected PC

4-pole female USB connector, type B

X14	Pin	I/O	Name	Description
	1	–	VCC	5 V voltage supply for USB
	2	I/O	DN	Data−
	3	I/O	DP	Data+
	4	I/O	GND	Ground

Compatibility with USB 3.0

The following table indicates the device version from which the USB interface of the individual device is compatible with USB 3.0:

Device variant	Device version
0362x40xx, 0362120xx	4.032
0362x41xx, 0362121xx	4.035
0362x42xx	4.132
0362x43xx	4.132
0362144xx	–
0362x45xx	4.201
0362x46xx	4.201
0362147xx	–
0362x48xx	4.201

Related topics

chapter C “Connection Diagram”, page 190

8.7 X15 – Digital Outputs

Note

If you want to make use of the digital inputs and outputs, connect pin 9 to 24 V. You can either bridge 24 V from pin 10 of X15 (max. 0.3 A) or you supply 24 V from an external voltage source.

In order to display the error status still after deliberately disconnecting the mains supply, you can maintain the logic supply by connecting pin 8 to 24 V (0.5 A).

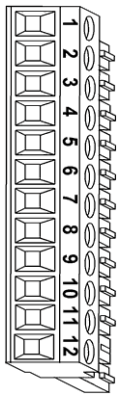
The available functions of the digital outputs are different depending on the drive function. You can set the desired function in the software *drivemaster2*.

Note

Some functions of the inputs/outputs are not available with older hardware or software versions.

8.7.1 Digital Outputs – SERVO / VECTOR

12-pole Mini-Combicon connector, suitable for mating connector MC 1,5/ 12-ST-3,81 (Phoenix)

Mating connector X15	Pin	I/O	Name	Configurable functions	
	1	O	OUT0	▸ Ready type 1 (with power supply okay) ▸ Ready type 2 (without power supply okay)	▸ No function ▸ M01 – Message power output stage ready ▸ M02 – Message operation enabled ▸ M03 – Message drive error ▸ M10 – Ref. value reached ▸ M11 – Torque reached ▸ W04 – Power output stage load ▸ W05 – Motor load ▸ W07 – Motor temperature ▸ W09 – Undervoltage power output stage ▸ W11 – Tracking error ▸ W12 – Speed error ▸ W17 – No commutation ▸ W24 – Warning threshold 'current' ▸ W26 – Warning threshold 'overload current'
	2	O	OUT1	▸ Signal motor holding brake ▸ M12 – Speed zero	
	3	O	OUT2	▸ M12 – Speed zero	
	4	O	OUT3	▸ M12 – Speed zero	
	5	O	OUT4	▸ M12 – Speed zero	
	6	I	IN8	▸ No function ▸ Speed direction ▸ P-controller ▸ Error reset ▸ External hardware OK ▸ Low gain Kpn ▸ Docking function ▸ Teach no-load current ▸ Parameter set Bit 5 ▸ MOP up ▸ MOP down ▸ Reset commutation	
	7	O	PULSE OUT	Speed pulses	
	8	I	VCC EXT[1]	24 V logic supply in the event of an AC power failure (0.5 A)	
	9	I	VCC IO	24 V supply for the outputs	
	10	O	VCC OUT[2]	24 V auxiliary voltage for the outputs (24 V ±10 %, uncontrolled, max. 0.25 A)	
	11	I/O	GND	Ground	**(pin coded)**
	12	I/O	GND	Ground	

[1] Do not connect for the device variants 0362144xx to 0362x48xx: 24 V is supplied via connector X43 (see chapter 8.18 “X43 – 24 V / Safety (STO)”, page 120).

[2] Parallel operation with other SD2S drive amplifiers or external components is not possible.

Specification of terminal connections

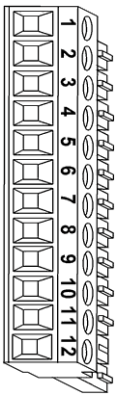
- Conductor cross-section solid/stranded: 0.14 to 1.5 mm²
- Tightening torque: 0.22 to 0.25 Nm

Related topics

chapter 9.4.1 “Digital Outputs”, page 131

8.7.2 Digital Outputs – HSPWM, HSBLOCK / FPAM, HSPAM / UF

12-pole Mini-Combicon connector, suitable for mating connector MC 1,5/ 12-ST-3,81 (Phoenix)

Mating connector X15	Pin	I/O	Name	Configurable functions	
	1	O	OUT0	▸ Ready type 1 (with power supply okay) ▸ Ready type 2 (without power supply okay)	▸ No function ▸ M01 – Message power output stage ready ▸ M02 – Message operation enabled ▸ M03 – Message drive error ▸ M10 – Ref. value reached ▸ M11 – Current limit reached ▸ M12 – Speed zero ▸ W04 – Power output stage load ▸ W05 – Motor load ▸ W07 – Motor temperature ▸ W09 – Undervoltage power output stage ▸ W12 – Speed error ▸ W24 – Warning threshold ’current' ▸ W26 – Warning threshold ’overload current'
	2	O	OUT1		
	3	O	OUT2		
	4	O	OUT3		
	5	O	OUT4		
	6	I	IN8 / PULSE IN	▸ No function ▸ Error reset ▸ External hardware OK ▸ Speed direction ▸ Teach no-load current ▸ Parameter set Bit 5 ▸ MOP up ▸ MOP down ▸ NAMUR sensor[1]; displayed, when motor feedback = NAMUR sensor ▸ Pulse generator 24 V; displayed, when motor feedback = Pulse generator 24 V ▸ Digital field plate / GMR[2]; displayed, when motor feedback = Digital field plate / GMR	
	7	O	PULSE OUT	Speed pulses	
	8	I	VCC EXT[3]	24 V logic supply in the event of an AC power failure (0.5 A)	
	9	I	VCC IO	24 V supply for the outputs	
	10	O	VCC OUT[4]	24 V auxiliary voltage for the outputs (24 V ±10 %, uncontrolled, max. 0.25 A)	
	11	I/O	GND	Ground **(pin coded)**	
	12	I/O	GND	Ground	

[1] The function NAMUR is supported from device version 3.201. For device variant 0362x41xx this applies from device version 3.301.

[2] The function “Digital field plate / GMR” is supported from *drivemaster2* version 1.9 Build 080 onwards.

[3] Do not connect for the device variants 0362144xx to 0362x48xx: 24 V is supplied via connector X43 (see chapter 8.18 “X43 – 24 V / Safety (STO)”, page 120).

[4] Parallel operation with other SD2S drive amplifiers or external components is not possible.

Specification of terminal connections

- Conductor cross-section solid/stranded: 0.14 to 1.5 mm²
- Tightening torque: 0.22 to 0.25 Nm

Related topics

Digital Outputs, page 131

NAMUR sensor, page 131

PULSE IN 24 V, page 132

Digital field plate / GMR, page 132

8.8 X16 – Digital Inputs

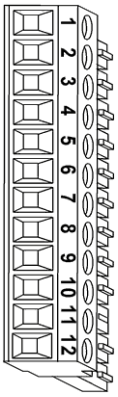
The available functions of the digital inputs are different depending on the drive function. You can set the desired function in the software *drivemaster2*.

Note

Some functions of the inputs/outputs are not available with older hardware or software versions.

8.8.1 Digital Inputs – SERVO / VECTOR

12-pole Mini-Combicon connector, suitable for mating connector MC 1,5/ 12-ST-3,81 (Phoenix)

Mating connector X16	Pin	I/O	Name	Configurable functions	
	1	I	IN0	▸ No function ▸ Switch on type 1 (without edge evaluation) ▸ Switch on type 2 (with positive edge)	
	2	I	IN1	▸ No function ▸ Quick stop type 1 (with slow down ramp) ▸ Quick stop type 2 (with quick stop ramp) ▸ Quick stop type 3 (at current limit) ▸ Quick stop type 4 (speed enable) ▸ Quick stop type 5 (with slow down ramp and controller off) ▸ Quick stop type 6 (with quick stop ramp and controller off) ▸ Quick stop type 7 (with slow down ramp and reset) ▸ Quick stop type 8 (with quick stop ramp and reset) ▸ Operation enable ▸ Operation enabled with error reset ▸ MOP up ▸ MOP down ▸ Reducing current limitation / Imax	
	3	I	IN2(1)	▸ No function ▸ Neg. limit switch type 1 (speed contr. as p-contr.) ▸ Neg. limit switch type 2 (speed contr. as pi-contr.) ▸ Operation enable ▸ Operation enabled with error reset ▸ Error reset ▸ External hardware OK ▸ Speed direction ▸ MOP up ▸ MOP down ▸ Reducing current limitation / Imax	
	4	I	IN3(1)	▸ No function ▸ Pos. limit switch type 1 (speed contr. as p-contr) ▸ Pos. limit switch type 2 (speed contr. as pi-contr) ▸ Parameter set Bit 0 ▸ MOP up ▸ MOP down	
	5	I	IN4(1)	▸ Enable difference measuring system ▸ Parameter set Bit 1 ▸ Internal target value Bit 3	▸ No function ▸ Speed direction ▸ P-controller ▸ Error reset ▸ External hardware OK ▸ Low gain Kpn ▸ Docking function ▸ Teach no-load current ▸ MOP up ▸ MOP down ▸ Reset commutation
	6	I	IN5	▸ Parameter set Bit 2 ▸ Internal target value Bit 2	
	7	I	IN6	▸ Parameter set Bit 3 ▸ Internal target value Bit 1	
	8	I	IN7	▸ Parameter set Bit 4 ▸ Internal target value Bit 0	
	9	I	TEMP	Motor temperature sensor (towards GND)	
	10	I	AIN0+(2)	Reference speed value (reference to ground)	**(pin coded)**
	11	I/O	GND	Ground	
	12	I/O	GND	Ground	

(1) See also X17.

(2) In order to use this analog input, make the following setting in the software *drivemaster2*: Activate the parameter “Single-ended” for “Analog-In 0”. This applies for the following device versions:

- 0362x40xx / 0362120xx, 0362x41xx / 0362121xx: device version 4.030 and higher
- 0362x42xx, 0362x43xx: device version 4.130 and higher
- 0362144xx: device version 4.201 and higher
- 0362145xx, 0362148xx: device version 4.003 and higher
- 0362146xx: device version 4.006 and higher

With older device versions you must possibly install a bridge at connector X18 between pin 4 and pin 7.
Single-ended means that there is no differential signal, i.e. there is no negative signal but the reference potential ist GND. => more prone to faults (unbalanced)

Specification of terminal connections

- Conductor cross-section solid/stranded: 0.14 to 1.5 mm²
- Tightening torque: 0.22 to 0.25 Nm

Related topics

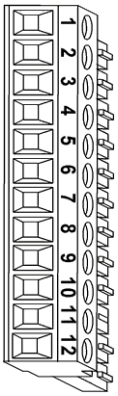
X16/17 – Digital Inputs, page 134

Temperature Sensor of the Motor, page 147

8.8.2 Digital Inputs – HSPWM, HSBLOCK / FPAM, HSPAM / UF

If more than 8 parameter sets are used, not all functions can be assigned freely anymore. If more than 32 parameter sets are used, the measuring system NAMUR can not be used anymore.

12-pole Mini-Combicon connector, suitable for mating connector MC 1,5/ 12-ST-3,81 (Phoenix)

Mating connector X16	Pin	I/O	Name	Configurable functions
	1	I	IN0	▸ No function ▸ Switch on type 1 (without edge evaluation) ▸ Switch on type 2 (with positive edge)
	2	I	IN1	▸ No function ▸ Quick stop type 5 (with slow down ramp and controller off) ▸ Quick stop type 6 (with quick stop ramp and controller off) ▸ Quick stop type 7 (with slow down ramp and reset) ▸ Quick stop type 8 (with quick stop ramp and reset) ▸ Operation enable ▸ Operation enabled with error reset ▸ MOP up ▸ MOP down
	3	I	IN2(1)	▸ No function ▸ Operation enable ▸ Operation enabled with error reset ▸ Error reset ▸ External hardware OK ▸ Speed direction ▸ MOP up ▸ MOP down
	4	I	IN3(1)	▸ No function ▸ Parameter set Bit 0 ▸ MOP up ▸ MOP down
	5	I	IN4(1)	▸ No function ▸ Parameter set Bit 1 ▸ Internal target value Bit 3 ▸ MOP up ▸ MOP down

Mating connector X16	Pin	I/O	Name	Configurable functions
	6	I	IN5	▸ No function ▸ Parameter set Bit 2 ▸ Internal target value Bit 2 ▸ MOP up ▸ MOP down
	7	I	IN6	▸ No function ▸ Error reset ▸ External hardware OK ▸ Speed direction ▸ Teach no-load current ▸ Parameter set Bit 3 ▸ Internal target value Bit 1 ▸ MOP up ▸ MOP down
	8	I	IN7	▸ No function ▸ Error reset ▸ External hardware OK ▸ Speed direction ▸ Teach no-load current ▸ Parameter set Bit 4 ▸ Internal target value Bit 0 ▸ MOP up ▸ MOP down
	9	I	TEMP	Motor temperature sensor (towards GND)
	10	I	AIN0+[2]	Reference speed value (reference to ground) **(pin coded)**
	11	I/O	GND	Ground
	12	I/O	GND	Ground

[1] See also X17.

[2] In order to use this analog input, make the following setting in the software *drivemaster2*: Activate the parameter “Single-ended” for “Analog-In 0”. This applies for the following device versions:
- 0362x40xx/0362120xx, 0362x41xx/0362121xx: device version 4.030 and higher
- 0362x42xx, 0362x43xx: device version 4.130 and higher
- 0362144xx: device version 4.201 and higher
- 0362145xx, 0362148xx: device version 4.003 and higher
- 0362146xx: device version 4.006 and higher

With older device versions you must possibly install a bridge at connector X18 between pin 4 and pin 7.

Specification of terminal connections
- Conductor cross-section solid/stranded: 0.14 to 1.5 mm²
- Tightening torque: 0.22 to 0.25 Nm

Related topics

X16/17 – Digital Inputs, page 134

Temperature Sensor of the Motor, page 147

8.9 X17 – Motor Feedback

For all main measuring systems

This connector is not integrated in SD2S Light (036212xxx, 0362x43xx).

Available measuring systems: resolver (not implemented in 0362140DCA and 0362x41ECA), sine cosine encoder, incremental encoder TTL (5.3 V), incremental encoder 12 V, Hall encoder (5.3 V or 12 V) , linear Hall encoder, field plate sensor, Heidenhain EnDat encoder, Hiperface encoder, encoder, RENISHAW BiSS C interface

A NAMUR sensor is connected to X15/pin 6.

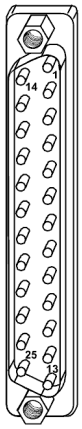
NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

25-pole male D-sub connector

X17	Pin	I/O	Name	Meaning
	1	I	S2	Resolver S2
	2	I	S1	Resolver S1
	3	O	R3	Resolver R3
	4	O	R1	Resolver R1
	5	I	S4	Resolver S4
	6	I	S3	Resolver S3
	7	I	COS-	SinCos/linear Hall Cosine-
	8	I	COS+	SinCos/linear Hall Cosine+
	9	I	SIN-	SinCos/linear Hall Sine-
	10	I	SIN+	SinCos/linear Hall Sine+
	11	I	HALL_C / IN4(1)	Hall sensor 12 V track C / digital 5 V input 4
	12	I	HALL_B / IN3(1)	Hall sensor 12 V track B / digital 5 V input 3
	13	I	HALL_A / IN2(1)	Hall sensor 12 V track A / digital 5 V input 2
	14	I/O	GND	Ground
	15	I/O	GND	Ground
	16	I	TEMP	Motor temperature (to be connected towards GND)
	17	I	FP_IN	Field plate sensor
	18	I/O	UB−/DATA−/SLO−	Encoder B− / Hall sensor 5 V differential $\overline{B}$ / BiSS C slave−
	19	I/O	UB+/DATA+/SLO+	Encoder B+ / Hall sensor 5 V differential B / BiSS C slave+
	20	I/O	UA−/Clk−/MA−	Encoder A− / Hall sensor 5 V differential $\overline{A}$ / BiSS C master−
	21	I/O	UA+/Clk+/MA+	Encoder A+ / Hall sensor 5 V differential A / BiSS C master+
	22	I	UN-	Encoder ZP− / SinCos encoder zero pulse - / Hall sensor 5 V differential $\overline{C}$
	23	I	UN+	Encoder ZP+ / SinCos encoder zero pulse + / Hall sensor 5 V differential C
	24	O	VCC_FB	Measuring system supply 5.3 V / 12 V (max. 4 W)(2)
	25	I	ERR / PULSE IN(3)	Measuring system error

(1) With the following devices you can use the physical inputs HALL A to C also as configurable digital 5 V inputs (IN2 to IN4):
- 0362x40xx, 0362x41xx: device version 4.030 and higher
- 0362x42xx: device version 4.130 and higher

(2) Refer to the connection examples for the allowed voltage that is set by the software depending on the selected measuring system.

(3) PULSE IN 5 V is supported from: firmware F04004v03011/fpga, logic L04002v03021, *drivemaster2* version 1.8 Build 111

Stud bolt flange: max. tightening torque = 0.7 Nm

Related topics

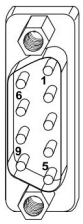
X17 – Motor Feedback, page 135

X16/17 – Digital Inputs, page 134

8.10 X18– Analog Interface

The available functions of the analog inputs and outputs are different depending on the drive function. You can set the desired function in the software *drivemaster2*.

9-pole male D-sub connector

X18	Pin	I/O	Name	Configurable functions	
				SERVO / VECTOR (SVC)	HSPWM, HSBLOCK / FPAM, HS-PAM / UF
	1	I	AIN1-	Reference point of AIN1+ (pin 2)	
	2	I	AIN1+	▸ No function ▸ Speed reference value ▸ Current reference value ▸ Current limitation ▸ W24 – Warning threshold 'current'	▸ No function ▸ Speed reference value ▸ Current limitation ▸ W24 – Warning threshold 'current'
	3	I	AIN0+(1)		
	4	I/O	GND	Ground	
	5		n.c.		
	6	O	AOUT1	▸ No function ▸ Target speed ▸ Speed reference value ▸ Speed actual value ▸ Speed error ▸ Current reference value ▸ Current actual value ▸ Motor temperature ▸ Power output stage temperature ▸ Motor load ▸ Power output stage load ▸ Voltage of the bus ▸ Active power ▸ DC link current Idc	▸ No function ▸ Target speed ▸ Speed reference value ▸ Speed actual value ▸ Speed error ▸ Current reference value ▸ Current actual value ▸ Motor temperature ▸ Power output stage temperature ▸ Motor load ▸ Power output stage load ▸ Voltage of the bus ▸ Active power ▸ DC link current Idc
	7	I	AIN0-	Reference point for AIN0+ (pin 3)	
	8	O	AOUT0	▸ No function ▸ Target speed ▸ Speed reference value ▸ Speed actual value ▸ Speed error ▸ Current reference value ▸ Current actual value ▸ Motor temperature ▸ Power output stage temperature ▸ Motor load ▸ Power output stage load ▸ Voltage of the bus ▸ Active power ▸ DC link current Idc	▸ No function ▸ Target speed ▸ Speed reference value ▸ Speed actual value ▸ Speed error ▸ Current reference value ▸ Current actual value ▸ Motor temperature ▸ Power output stage temperature ▸ Motor load ▸ Power output stage load ▸ Voltage of the bus ▸ Active power ▸ DC link current Idc
	9	O	VCC_10	10 V supply voltage	

(1) With the following devices/device versions the analog input AIN0+ (reference to ground) is also provided at connector X16/ pin 10:
- 0362x40xx/0362120xx, 0362x41xx/0362121xx: device version 4.030 and higher
- 0362140DCA, 0362x41ECA
- 0362x42xx, 0362x43xx: device version 4.130 and higher

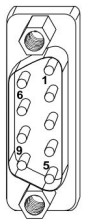
Stud bolt flange: max. tightening torque = 0.7 Nm

Related topics

X18 – Analog Inputs/Outputs, page 148

8.11 X19 – COM1/Operating Terminal

9-pole male D-sub connector

X19	Pin	I/O	Name	Meaning
	1	O	VCC	5.3 V (power supply for optional operating terminal, short-circuit proof)
	2	I	RX	RS232 interface 1
	3	O	TX	RS232 interface 1
	4	I/O	CAN_L[1]	CAN_L
	5	I/O	GND	Ground
	6	I	RX2	RS232 Interface 2
	7	O	TX2	RS232 Interface 2
	8	I/O	CAN_H[1]	CAN_H
	9	I/O	GND	Ground

[1] SD2S Light devices provide the CAN interface with the following device versions:
- 0362120xx: device version 4.002 and higher
- 0362121xx: device version 4.003 and higher
- 0362x43xx: device version 4.103 and higher

Note

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

Stud bolt flange: max. tightening torque = 0.7 Nm

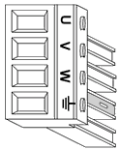
Related topics

X19 – Bus Connection, page 149

8.12 X22A – Motor Connection

Device variants: 0362x40EF, 0362x41xx(A) to 0362x43xx, 0362121xx

4-pole Power-Combicon connector, suitable for mating connector PC 4/ 4-ST-7,62 (Phoenix)

Mating connector X22A	Name	Coding	Meaning
	U	-	Motor phase U
	V	-	Motor phase V
	W	Coded	Motor phase W
	PE	-	Protective conductor

Specification of terminal connections:
- Conductor cross-section solid/stranded:
  - 0362x40EF, 0362x42/43xx: 1.5 to 4 mm²
  - 0362121xF / 0362x41xF (480 V): 2.5 to 4 mm²
  - 0362121xC / 0362x41xC(A) (230 V): 4 mm²
- Tightening torque: 0.5 to 0.6 Nm

Note

0362x40EF only: If you use a shielded motor cable longer than 5 m, the cable requires an additional interference suppression: The motor cable could be filtered, for example, with 11 windings through a ferrite core (ferrite core: R 63/38/25, Al = 15150 nH; article No. 13163110). The maximum permissible length of a shielded motor cable is 25 m.

Related topics

X22A/ X42/ X45/ X47/ X49/ X57 – Motor Phases, page 151

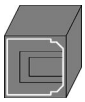
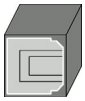
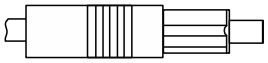
Shielding of the Motor Cable, page 152

Motor Cable, page 167

8.13 X26/ X27 – SERVOLINK 4

SERVOLINK 4: optical input (X26) and optical output (X27)

The fiber optic connectors for SERVOLINK 4 are located at the bottom side of the device.

Connector		SIEB & MEYER article number
	Inputs (black)	12540102
		12540103
	Outputs (gray or white)	12540202
		12540203
	Cable connector (TOSLINK F05)	32022900

NOTICE

Risk of cable damage

If you pull the optical fiber cable with its connector too fast out of the connector, the cable may be damaged.

→ When unplugging the cable, hold the fiber optic connector and pull the cable carefully out of the connector.

Related topics

X26/X27 – SERVOLINK, page 153

Connection Diagram, page 190

8.13.1 Preparation of Optical Fiber Cables with Connector

Every optical fiber connector requires an optical fiber cable with a male connector. The following information applies for connectors used in applications with 1 mm standard plastic optical fibers (POF).

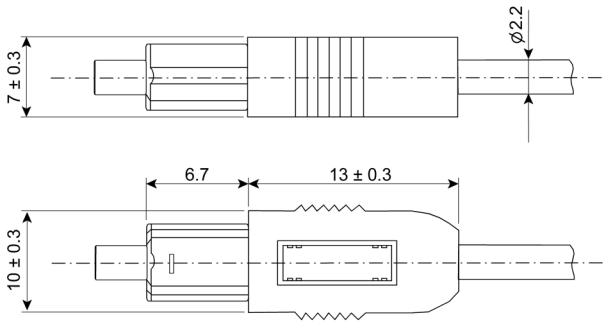
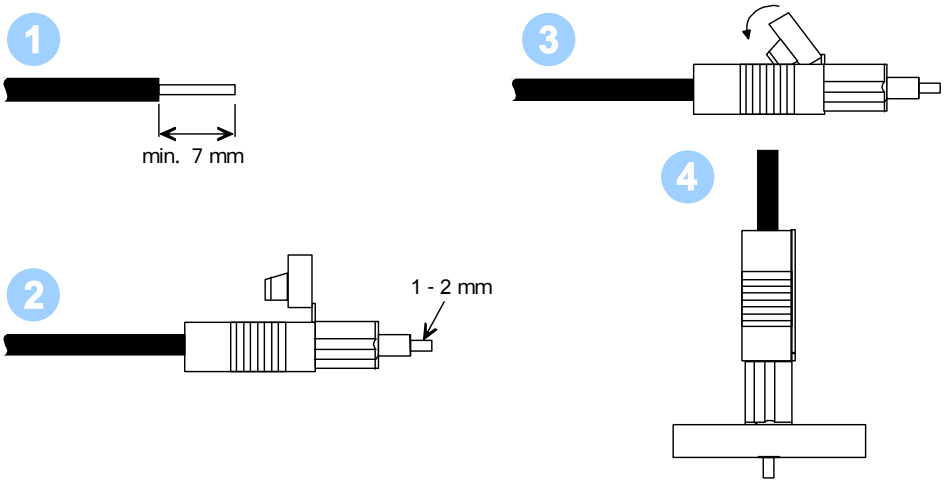


Fig. 63: Dimensions of optical fiber connector in mm

Technical data		Rated value
Storage temperature		-40 to 70 °C
Operating temperature		-20 to 70 °C
Tensile stress	Between optical fiber cable and connector	19.6 N
	Optical fiber cable	49 N
Bending radius When bending the optical fiber cable to install it, note that the recommended bending radius is 6 to 10 times greater than the minimum bending radius.		Min. 25 mm

Procedure

1. Remove at least 7 mm of the optical fiber cable's plastic sheat (diameter 2.2 mm); see figure, [1]). Take care that the dismantled end of the optical fiber cable is not contaminated. If necessary, clean it gently with a dry tissue paper.
2. Insert the dismantled optical fiber cable carefully as shown in the figure into the connector. The polymer fiber of 1 mm should stand out from the connector about 1 to 2 mm (see figure, [2]).
3. Press the clip of connector so that the polymer fiber is hold in the connector. The connector and the clip must interlock audibly (see figure, [3]).
4. Insert the connector with the optical fiber cable into a polishing disk and grind the outstanding end of the fiber by means of a polishing sheet on an even surface (e.g. glass sheet), see figure, [4]). Remove grinding residues.



You can order the following materials at SIEB & MEYER:

Article	SIEB & MEYER article number
Polishing disk for optical fiber cables	47000001

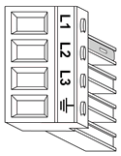
Article	SIEB & MEYER article number
Dismantling tool for optical fiber cables	47000002
Grinding paper	47000003

8.14 X28 – Mains Supply

Device variants:

0362x...	21xC	21xF	40EF	41xC(A)	41xF	42EC	43EC
1-phase mains supply	✓	–	–	✓	–	✓	✓
3-phase mains supply	✓	✓	✓	✓	✓	✓	✓

4-pole Power Combicon connector, suitable for mating connector PC 4/ 4-ST-7,62 (Phoenix)

Mating connector X28	Pin	Coding	1-phase mains supply		3-phase mains supply	
			Name	Meaning	Name	Meaning
	1	Coded	L	Main supply	L1	Main supply
	2	–	N	Neutral conductor	L2	Main supply
	3	–	–	n.c.	L3	Main supply
	4	–	PE	Protective conductor	PE	Protective conductor

NOTICE

3-phase mains supply of the device variants 0362121xC / 0362x41xC(A) / 0362x42xx / 0362x43xx

Die The devices must be supplied with max. 3 × 230 V_{AC}. Higher voltages can destroy the devices.

→ Use a suitable mains transformer for 3-phase supply to the devices 0362x42xx / 0362x43xx / 0362121xC / 0362x41xC(A) (see connection examples page 154).

Specification of terminal connections:

- Conductor cross-section solid/stranded:
  - 0362x40EF, 0362x42/43xx (3-phase mains supply): 1.5 to 4 mm²
  - 0362121xF / 0362x41xF (480 V): 2.5 to 4 mm²
  - 0362121xC / 0362x41xC(A) (230 V): 4 mm²
  - 0362x42/43xx (1-phase mains supply): 4 mm²
- Tightening torque: 0.5 to 0.6 Nm

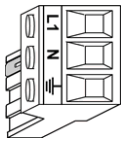
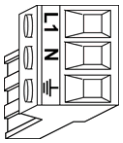
Note

Consider that the conductor cross-section to be used for your application depends on the total load of the power supply unit.

8.15 X40 – Mains Supply

Device variants: 0362120xx, 0362x40xx, 0362242DC

3-pole Combicon connector, suitable for mating connector MSTB 2,5/ 3-ST-5,08 (Phoenix)

0362120xC / 0362x40xC / 0362242DC			0362120xA / 0362x40xA			Name	Meaning
Mating connector X40	Pin	Coding	Mating connector X40	Pin	Coding		
	1	Coded		1	-	L1	Phase
	2	-		2	-	N	N-conductor
	3	-		3	-	PE	Protective conductor

Specification of terminal connections

- Conductor cross-section solid/stranded: 1 to 2.5 mm²
- Tightening torque: 0.5 to 0.6 Nm

Note

Consider that the conductor cross-section to be used for your application depends on the total load of the power supply unit.

8.16 X41 – External Ballast Resistor

⚠ DANGER

High voltages in the intermediate circuit

Note that even after the device unit has been switched off high voltages may occur in the intermediate circuit of the complete system that can cause serious injuries.

→ Wait until the intermediate circuit is fully discharged before cutting the connections of the external ballast resistor ("capacitor discharge").

→ Take the following steps **before** working on the device or on the intermediate circuit:

→ Disconnect the device definitely from the mains supply.

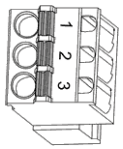
→ Wait until the discharge time of the of the DC link capacities has expired. It is longer than 4 minutes.

→ Ensure by measuring that the intermediate circuit is fully discharged.

→ Disconnect the connections of the external ballast resistor from the power supply.

→ Also consider general safety instructions before you continue working on the device.

3-pole Combicon connector, suitable for mating connector FKIC 2,5/ 3-ST-5,08 (Phoenix)

Mating connector X41	Pin	Name	Meaning
	1	Rextern	External ballast resistor / chopper connection
	2	Rintern	Internal ballast resistor
	3	UB+	Positive DC link connection ϟ

Specification of terminal connections

- Conductor cross-section solid/stranded: 1 to 2.5 mm²
- Connection method: spring-cage connection (handling: see page 102)

Note

An external ballast resistor is connected between pin 1 and pin 3. When the internal ballast resistor is to be used, pin 1 and pin 2 of connector X41 must be bridged with protection against accidental contact.

Related topics

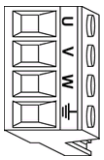
X41/X63 – External Ballast Resistor, page 155

Connection Diagram, page 190

8.17 X42 – Motor Connection

Device variants: 0362120xx, 0362x40xx, 0362242DC

4-pole Combicon connector, suitable for mating connector IC 2,5/ 4-ST-5,08 (Phoenix)

Mating connector X42	Pin	Name	Meaning
	1	U	Motor phase U
	2	V	Motor phase V
	3	W	Motor phase W
	4	PE	Protective conductor

Specification of terminal connections

- Conductor cross-section solid/stranded: 1 to 2.5 mm²
- Tightening torque: 0.5 to 0.6 Nm

Note

If you use a shielded motor cable longer than 5 m, the cable requires an additional interference suppression: The motor cable could be filtered, for example, with 11 windings through a ferrite core (ferrite core: R 63/38/25, Al = 15150 nH; article No. 13163110). The maximum permissible length of a shielded motor cable is 25 m.

Related topics

X22A/ X42/ X45/ X47/ X49/ X57 – Motor Phases, page 151

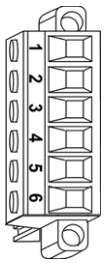
Shielding of the Motor Cable, page 152

Motor Cable, page 167

8.18 X43 – 24 V / Safety (STO)

24 V logic supply; safety circuit and restart lock (STO)

6-pole Mini-Combicon connector, suitable for mating connector MSTB 2,5/ 6-STF-5,08 (Phoenix)

Mating connector X43	Pin	I/O	Name	Meaning
	1	I	SAFEA / 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.
	2	I/O	GND	Reference potential
	3	I	SAFEB / OSSD2	Enable of the safety circuit ▸ Permanent load approx. 15 mA/24 V ▸ Startup peak current is negligible under normal conditions.
	4	I/O	GND	Reference potential
	5	O	24 V internal[1]	Logic voltage 18 to 28 V (uncontrolled)
	6	I	24 V Logic Input	Logic supply 24 V[2]

[1] 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. If the safety function (STO) is not required, this voltage is only used to bridge the pins 1 and 3.

[2] For the devices 0362x45xx to 0362x48xx the logic must always be supplied via X43 / pin 6.

Specification of terminal connections

- Conductor cross-section solid/stranded: 0.14 to 1.5 mm²
- Tightening torque: 0.22 to 0.25 Nm

Note

The power supply unit is only activated when SAFEA and SAFEB are connected. If the safety function (STO) is not required, pin 1 and pin 3 must be bridged to pin 5.

Related topics

X10/ X43 – Safety Circuit (STO), page 130

Safety Circuit / Restart Lock (STO), page 174

Wiring Example 0362144xx to 0362x48xx, page 194

8.19 X44 – Mains Supply

Device variant: 0362x45xx

4-pole Power-Combicon connector, suitable for mating connector PC 5/ 4-STCL-7,62 (Phoenix) with Click & Lock system (see STCL (p. 102))

Mating connector X44	Pin	Coding	Name	Meaning
	1	Coded	L1	Main supply
	2	-	L2	Main supply
	3	-	L3	Main supply
	4	-	PE	Protective conductor

Specification of terminal connections:

- Conductor cross-section solid: 6 to 10 mm²
- Conductor cross-section stranded: 6 mm²
- Tightening torque: 0.7 to 0.8 Nm

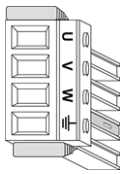
Note

Consider that the conductor cross-section to be used for your application depends on the total load of the power supply unit.

8.20 X45 – Motor Connection

Device variant: 0362x45xx

4-pole Power-Combicon connector, suitable for mating connector PC 5/ 4-STCL-7,62 (Phoenix) with Click & Lock system (see STCL (p. 102))

Mating connector X45	Name	Coding	Meaning
	U	-	Motor phase U
	V	-	Motor phase V
	W	Coded	Motor phase W
	PE	-	Protective conductor

Specification of terminal connections:

- Conductor cross-section solid: 4 to 10 mm²
- Conductor cross-section stranded: 4 to 6 mm²
- Tightening torque: 0.7 to 0.8 Nm

Related topics

X22A/ X42/ X45/ X47/ X49/ X57 – Motor Phases, page 151

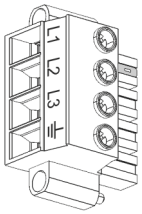
Shielding of the Motor Cable, page 152

Motor Cable, page 167

8.21 X46 – Mains Supply

Device variants: 0362144xx, 0362x46xx

4-pole Power-Combicon connector, suitable for mating connector PC 16/ 4-STF-10,16 (Phoenix)

Mating connector X46	Pin	Coding	Name	Meaning
	1	Coded	L1	Main supply
	2	-	L2	Main supply
	3	-	L3	Main supply
	4	-	PE	Protective conductor

Specification of terminal connections:

- Conductor cross-section solid/stranded:
  - 0362144xx: 6 to 16 mm²
  - 0362x46IF: 10 to 16 mm²
  - 0362x46LF: 16 mm²
- Tightening torque: 1.7 to 1.8 Nm

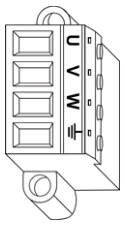
Note

Consider that the conductor cross-section to be used for your application depends on the total load of the power supply unit.

8.22 X47 – Motor Connection

Device variants: 0362144xx, 0362x46xx

4-pole Power-Combicon connector, suitable for mating connector IPC 16/ 4-STF-10,16 (Phoenix)

Mating connector X47	Name	Coding	Meaning
	U	-	Motor phase U
	V	-	Motor phase V
	W	Coded	Motor phase W
	PE	-	Protective conductor

Specification of terminal connections:

- Conductor cross-section solid/stranded:
  - 0362144xx: 4 to 16 mm²
  - 0362x46IF: 10 to 16 mm²
  - 0362x46LF: 16 mm²
- Tightening torque: 1.7 to 1.8 Nm

Related topics

X22A/ X42/ X45/ X47/ X49/ X57 – Motor Phases, page 151

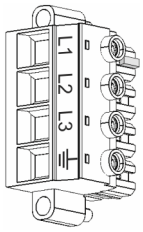
Shielding of the Motor Cable, page 152

Motor Cable, page 167

8.23 X48 – Mains Supply

Device variant: 0362x48xx

4-pole Power-Combicon connector, suitable for mating connector PC 35/ 4-STF-15,00 (Phoenix)

Mating connector X48	Pin	Coding	Name	Meaning
	1	Coded	L1	Main supply
	2	-	L2	Main supply
	3	-	L3	Main supply
	4	-	PE	Protective conductor

Specification of terminal connections:

- Conductor cross-section solid/stranded: 35 mm²
- Tightening torque: 2.5 to 4.5 Nm

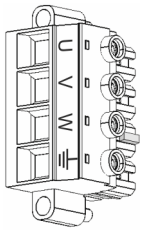
Note

Consider that the conductor cross-section to be used for your application depends on the total load of the power supply unit.

8.24 X49 – Motor Connection

Device variant: 0362x48xx

4-pole Power-Combicon connector, suitable for mating connector PC 35/ 4-STF-15,00 (Phoenix)

Mating connector X49	Name	Coding	Meaning
	U	-	Motor phase U
	V	-	Motor phase V
	W	Coded	Motor phase W
	PE	-	Protective conductor

Specification of terminal connections:

- Conductor cross-section solid/stranded: 35 mm²
- Tightening torque: 2.5 to 4.5 Nm

Related topics

X22A/ X42/ X45/ X47/ X49/ X57 – Motor Phases, page 151

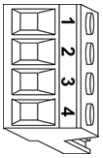
Shielding of the Motor Cable, page 152

Motor Cable, page 167

8.25 X55 – Error Bus

24 V inputs for the evaluation of the status messages received from the power supply unit

4-pole Power-Combicon connector, suitable for mating connector MSTB 2,5/ 4-ST-5,08 (Phoenix)

Mating connector X55	Pin	I/O	Name	Meaning
	1	O	24 V	24 V output for error generation of power supply unit (max. 0.5 A)
	2	I/O	GND	Ground
	3	I	PERR0	Error code 0 of power supply unit
	4	I	PERR1	Error code 1 of power supply unit

Specification of terminal connections

- Conductor cross-section solid/stranded: 0.2 to 2.5 mm²
- Tightening torque: 0.5 to 0.6 Nm

Related topics

X55 – Error Bus, page 155

8.26 X56 – DC Link

Device variant: 0362147xx

Connect the device to ground via the grounding screw at the bottom of the device.

2 lead-through terminals, type HDFK 16 A or UW 25/S (Phoenix)

Name	Meaning
UB+	DC link +
UB-	DC link -

Specification of terminal connections

- Lead-through terminal HDFK 16 A
  - Conductor cross-section solid: 25 mm²
  - Conductor cross-section stranded: 16 mm²
  - Tightening torque: 2 to 2.3 Nm
- Lead-through terminal UW 25/S
  - Conductor cross-section solid: 35 mm²
  - Conductor cross-section stranded: 25 mm²
  - Tightening torque: 4 to 4.5 Nm

8.27 X57 – Motor Connection

Device variant: 0362147xx

Connect the device to ground via the grounding screw at the bottom of the device.

3 lead-through terminals, type HDFK 16 A or UW 25/S (Phoenix)

Name	Meaning
U	Motor phase U
V	Motor phase V
W	Motor phase W

Specification of terminal connections

- Lead-through terminal HDFK 16 A
  - Conductor cross-section solid: 25 mm²
  - Conductor cross-section stranded: 16 mm²
  - Tightening torque: 2 to 2.3 Nm
- Lead-through terminal UW 25/S
  - Conductor cross-section solid: 35 mm²
  - Conductor cross-section stranded: 25 mm²
  - Tightening torque: 4 to 4.5 Nm

Related topics

X22A/ X42/ X45/ X47/ X49/ X57 – Motor Phases, page 151

Shielding of the Motor Cable, page 152

Motor Cable, page 167

8.28 X63 – External Ballast Resistor

⚠ DANGER

High voltages in the DC link

Note that even after the device unit has been switched off high voltages may occur in the intermediate circuit of the complete system that can cause serious injuries.

→ Wait until the intermediate circuit is fully discharged before cutting the connections of the external ballast resistor ("capacitor discharge").

→ Take the following steps **before** working on the device or on the intermediate circuit:

→ Disconnect the device securely from the mains supply.

→ Wait until the discharge time of the intermediate circuit capacities has expired. It is longer than 4 minutes.

→ Ensure by measuring that the intermediate circuit is fully discharged.

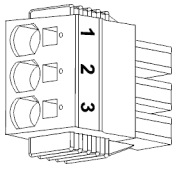
→ Disconnect the connections of the external ballast resistor from the device.

→ Also consider general safety instructions before you continue working on the device.

SPC5 connector (Phoenix)

Device variants: 0362144xx, 0362145IF before facelift (device version < 4.200)

3-pole Power-Combicon connector, suitable for mating connector SPC 5/ 3-STCL-7,62 (Phoenix) with Click & Lock system (see STCL (p. 102))

Mating connector X63	Pin	Name	Meaning
	1	Rextern	External ballast resistor / chopper connection
	2	Rintern	Internal ballast resistor
	3	UB+	Positive DC link connection ϟ

Specification of terminal connections:

- Conductor cross-section solid: 2 to 10 mm²
- Conductor cross-section stranded: 2 to 6 mm²
- Connection method: spring-cage connection with push-in technology (handling: see page 103)

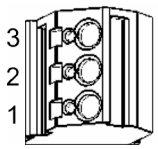
Note

An external ballast resistor is connected between pin 1 and pin 3. When the internal ballast resistor is to be used, pin 1 and pin 2 of connector X63 must be bridged with protection against accidental contact.

Terminal block (Wago)

Device variants: 0362x45xx/ 46xx/ 48MF (device version 4.200 and higher), 0362x48OF (device version 4.202 and higher)

3-pole terminal block with lead-through terminals, pin spacing 7 mm (WAGO)

X63	Pin	Name	Meaning
	1	Rextern	External ballast resistor / chopper connection
	2	Rintern	Internal ballast resistor
	3	UB+	Positive DC link connection ϟ

Specification of terminal connections:

- Conductor cross-section solid/stranded: 2 to 4 mm²
- CAGE CLAMP connection method (screwdriver-actuated)

Note

An external ballast resistor is connected between pin 1 and pin 3. When the internal ballast resistor is to be used, pin 1 and pin 2 of connector X63 must be bridged with protection against accidental contact.

Related topics

X41/X63 – External Ballast Resistor, page 155

Connection Diagram, page 190

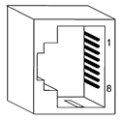
8.29 X64/X65 – EtherCAT

EtherCAT slave interfaces X64 (output) and X65 (input) for connection to a higher-ranking control

Note

Currently, the EtherCAT interface is only available with the following device variants: 0362**2**4xxx.

2 × 8-pole female RJ45 connector

X64/X65	Pin	I/O	Name	Description
	1	O	TX+	Transmit data +
	2	O	TX−	Transmit data −
	3	I	RX+	Receive data +
	4		n.c.	
	5		n.c.	
	6	I	RX−	Receive data −
	7		n.c.	
	8		n.c.	

Related topics

X64/X65 – EtherCAT, page 156

LED Status Display: EtherCAT Connection, page 157

9 Connection Examples

The following sections provide connection examples for the individual connectors of the device.

Wiring examples for the device connection can be found in the Appendix (p. 190).

9.1 X6, X7 – Incremental Encoders with TTL Signals

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

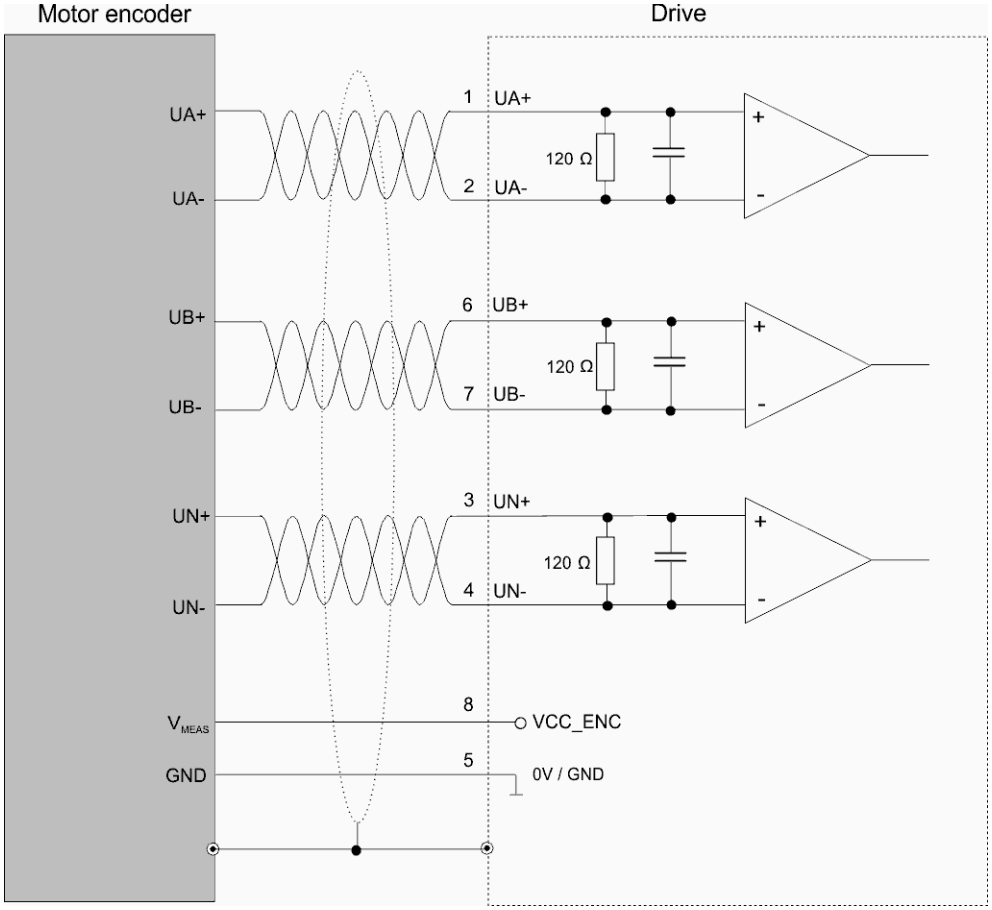


Fig. 64: Incremental Encoder with TTL Signals

Encoder signals: 5 V

9.2 X7 – Encoder Emulation

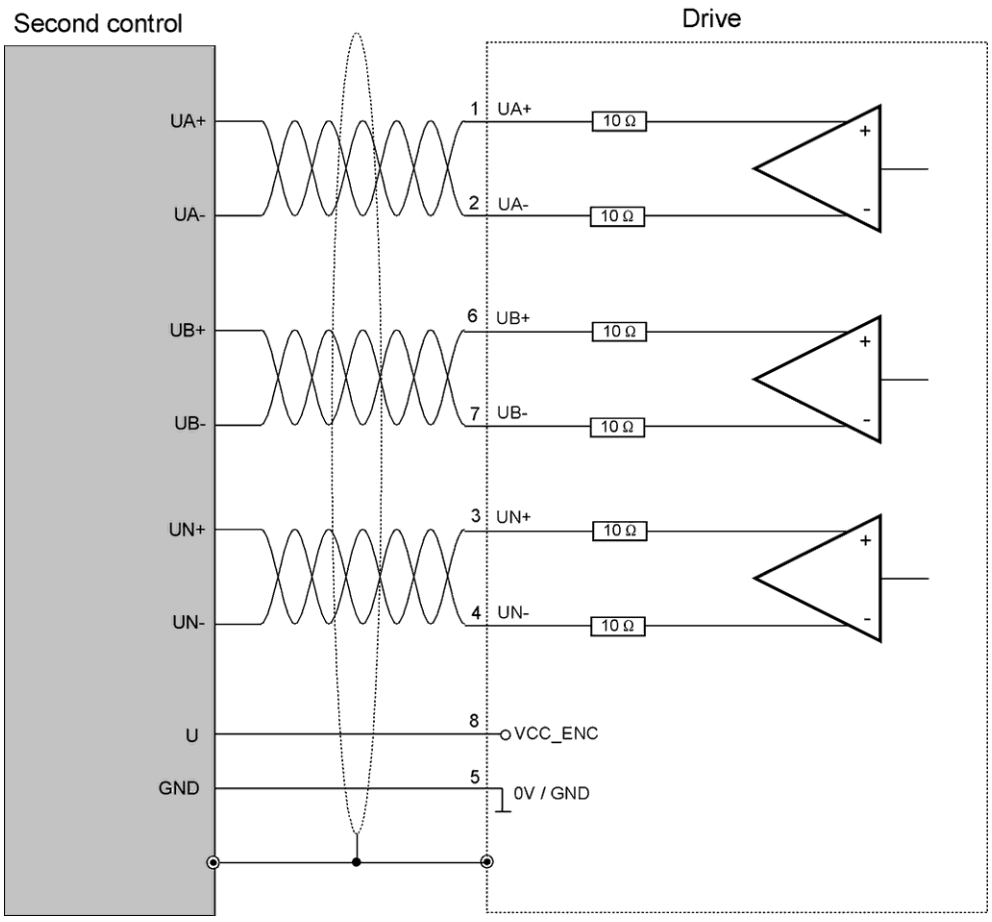


Fig. 65: Encoder Emulation

The transmission meets the requirements of the standard TIA/EIA-422-B with a voltage differential of at least. ±0.9 V.

9.3 X10/ X43 – Safety Circuit (STO)

The safety circuit is not available on older devices of variant 0362140xx.

Note

See also chapter 13 “Safety Circuit / Restart Lock (STO)”, page 174.

9.3.1 Wiring with OSSD

OSSD = output signal switching device

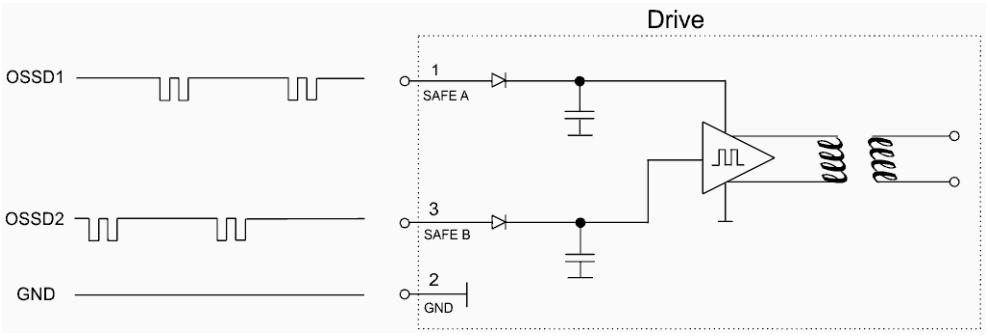


Fig. 66: Safety circuit (STO) - wiring with OSSD

9.3.2 Wiring without OSSD

OSSD = output signal switching device

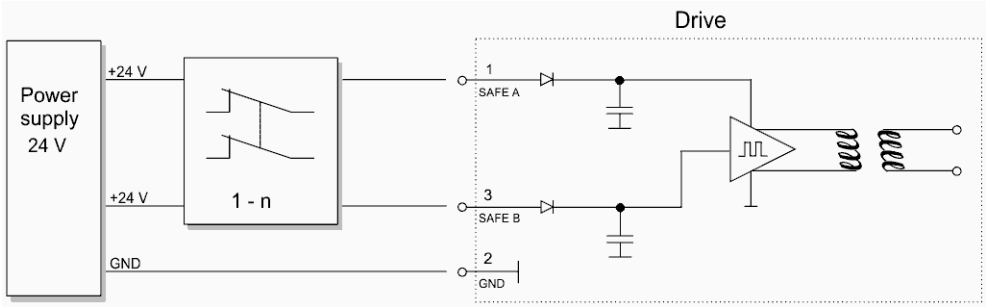


Fig. 67: Safety circuit (STO) - wiring without OSSD

9.4 X15 – Digital Outputs / NAMUR sensor / PULSE IN / Digital field plate / GMR

9.4.1 Digital Outputs

The meanings of the digital outputs can be defined by parameters. Every output can be loaded with 100 mA.

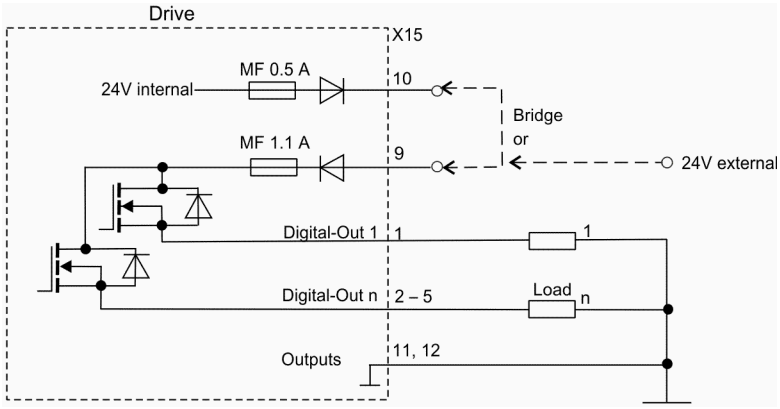


Fig. 68: Digital Outputs

9.4.2 NAMUR sensor

The function NAMUR is supported from device version 3.201. For device variant 0362x41xx this applies from device version 3.301.

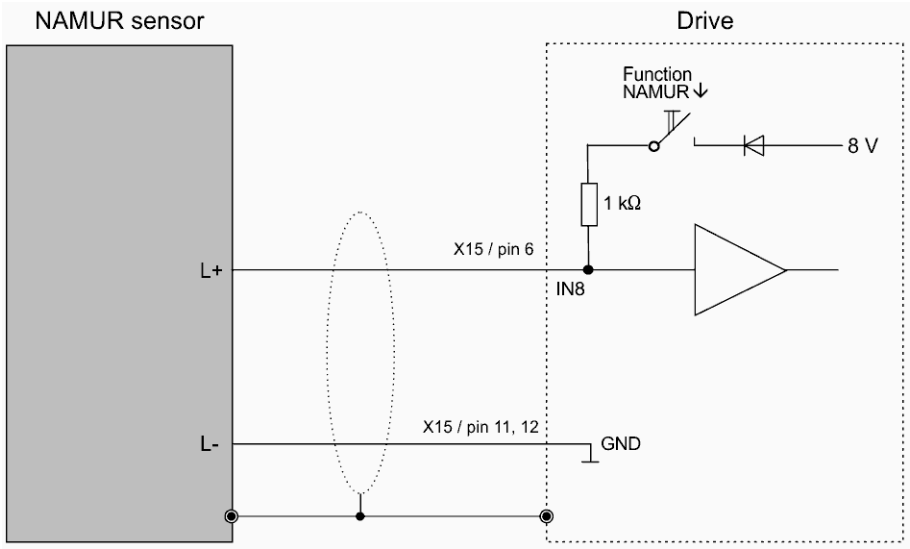


Fig. 69: NAMUR sensor

Note

As required by the NAMUR standard the switching threshold for the input is 2.5 mA.

9.4.3 PULSE IN 24 V

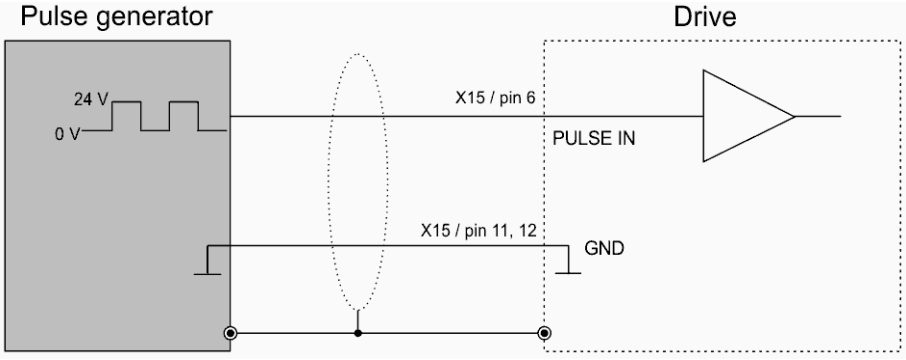


Fig. 70: PULSE IN 24 V

Note

A pulse generator for 5 V is to be connected to X17 (pin 25), see connection example chapter 9.6.11 “PULSE IN 5 V”, page 145.

9.4.4 Digital field plate / GMR

The switching thresholds of the converter input IN8 are 5.4 V for active-low signals and 5.9 V for active-high signals. Therefore the switching thresholds of the used sensor must be adapted to the input by offsetting the middle voltage.

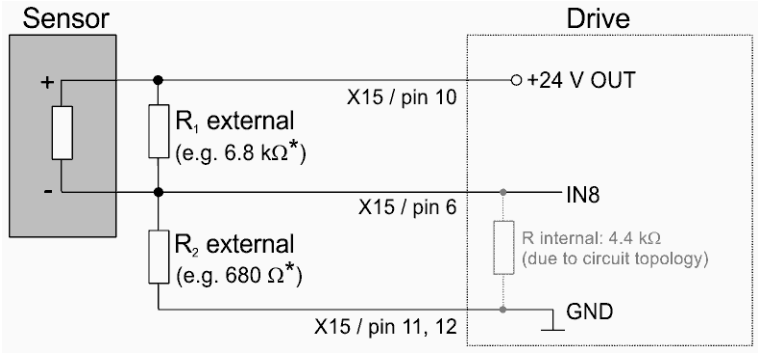


Fig. 71: Digital field plate / GMR

[*] The resistors R_1 and R_2 depend on the used sensor.

Sample calculation of the resistors R_1 and R_2

The resistance is calculated by means of the spindle data.

Specifications taken from the data sheet of the spindle manufacturer:

- Sensor off: 4 mA (signal is not available)
- Sensor on: 8 mA (signal is available)
- Voltage U: 3 V (amplitude with 24 V supply and a resistance (R_2) of 680 Ω)

The resistance Rinternal (4.4 kΩ) results from the circuit topology and must be included in the calculation.

The spindle data make the following voltage levels at the input:

Sensor off: $I \times \frac{1}{\left(1/R_{2ext} + 1/R_{int}\right)} = 4\ mA \times \frac{1}{\left(1/680\ \Omega + 1/4400\ \Omega\right)} = 2.36\ V$

Sensor on: $I \times \frac{1}{(1/R_{2ext} + 1/R_{int})} = 8\ mA \times \frac{1}{(1/680\ \Omega + 1/4400\ \Omega)} = 4.71\ V$

Middle voltage of the sensor: (4.71 V + 2.36 V) / 2 = 3.54 V

Middle voltage of the input IN8 at the SD2S: (5.9 V + 5.4 V) / 2 = 5.65 V

The voltage level must be increased according to the difference between the middle voltages. This is done by a boost voltage at R_1.

Boost voltage R_1: 5.65 V - 3.54 V = 2.11 V

Resistance R_1: (24 V / 2.11 V) × 588 Ω = 6.688 kΩ → 6.8 kΩ

(588 Ω results from the resistances of R_2external and Rinternal.)

Note

If you use other sensors, please pay attention to the input switching thresholds of the sensor and the data sheet provided by the spindle manufacturer.

9.4.5 PULSE (Speed Pulses)

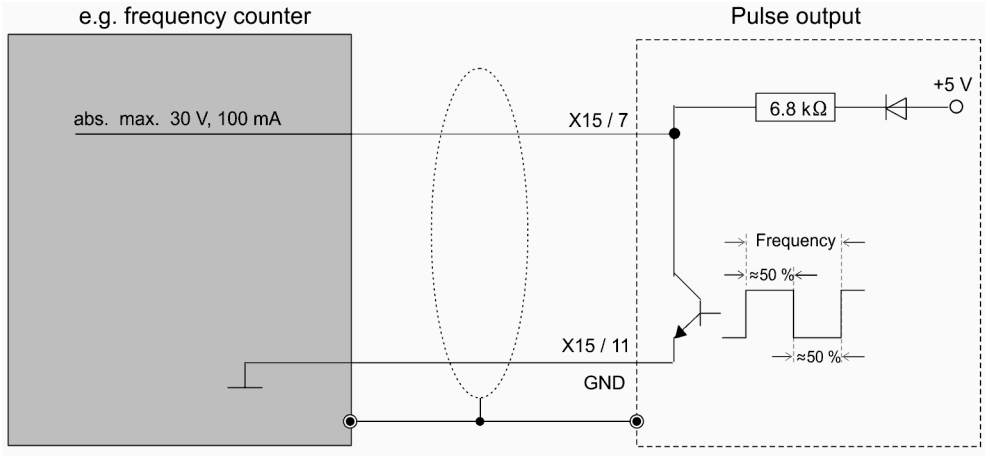


Fig. 72: PULSE − speed pulses

9.5 X16/17 – Digital Inputs

Digital inputs at X16

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

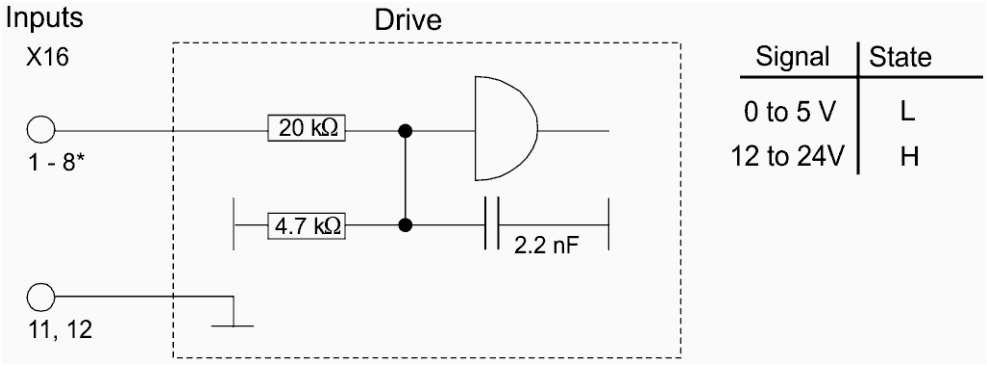


Fig. 73: Digital inputs at X16

[*] Yet another digital input is located at the connector X15 (pin 6).

Digital inputs (5 V) at X17

The following figure is a wiring example for a 5 V limit switch:

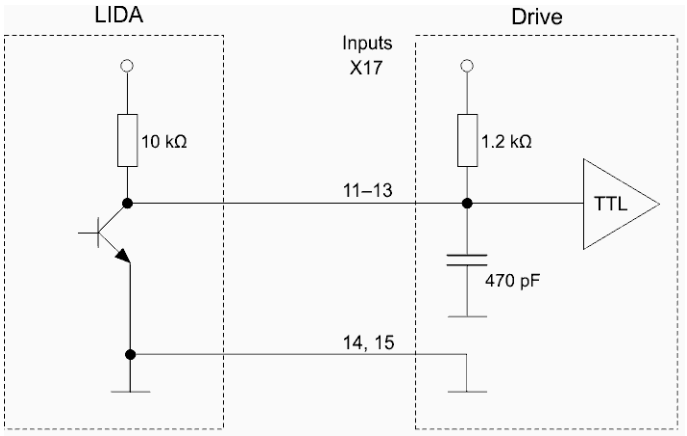


Fig. 74: Digital inputs at X17

9.6 X17 – Motor Feedback

9.6.1 Resolver

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

A shielded cable with 3 twisted pairs must be used. Twist mode: sine/sine, cosine/cosine, rotor/rotor; designation of the cable, e.g. LIYCY 3 × 2 × 0.14.

If the thermal motor protection is evaluated, use a shielded cable with 4 twisted pairs of wires.

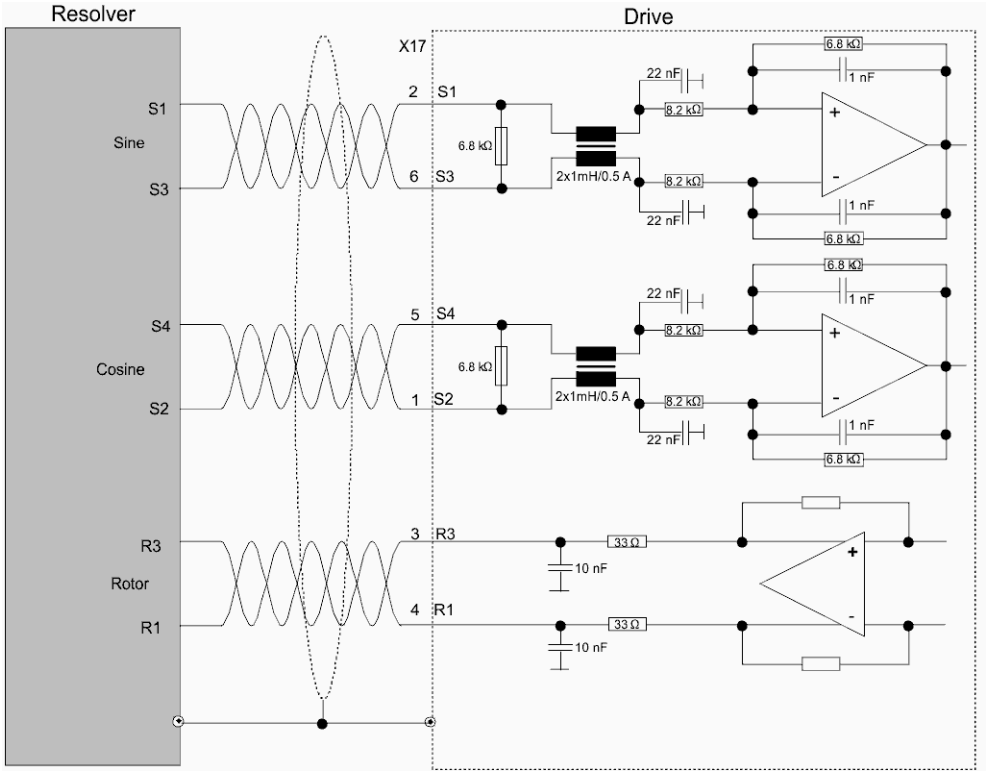


Fig. 75: Resolver

When this meysuring system is parameterized VCC_FB is switched to 5.3 V.

9.6.2 Incremental Encoder with Sine Signals (1 V_{pp})

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

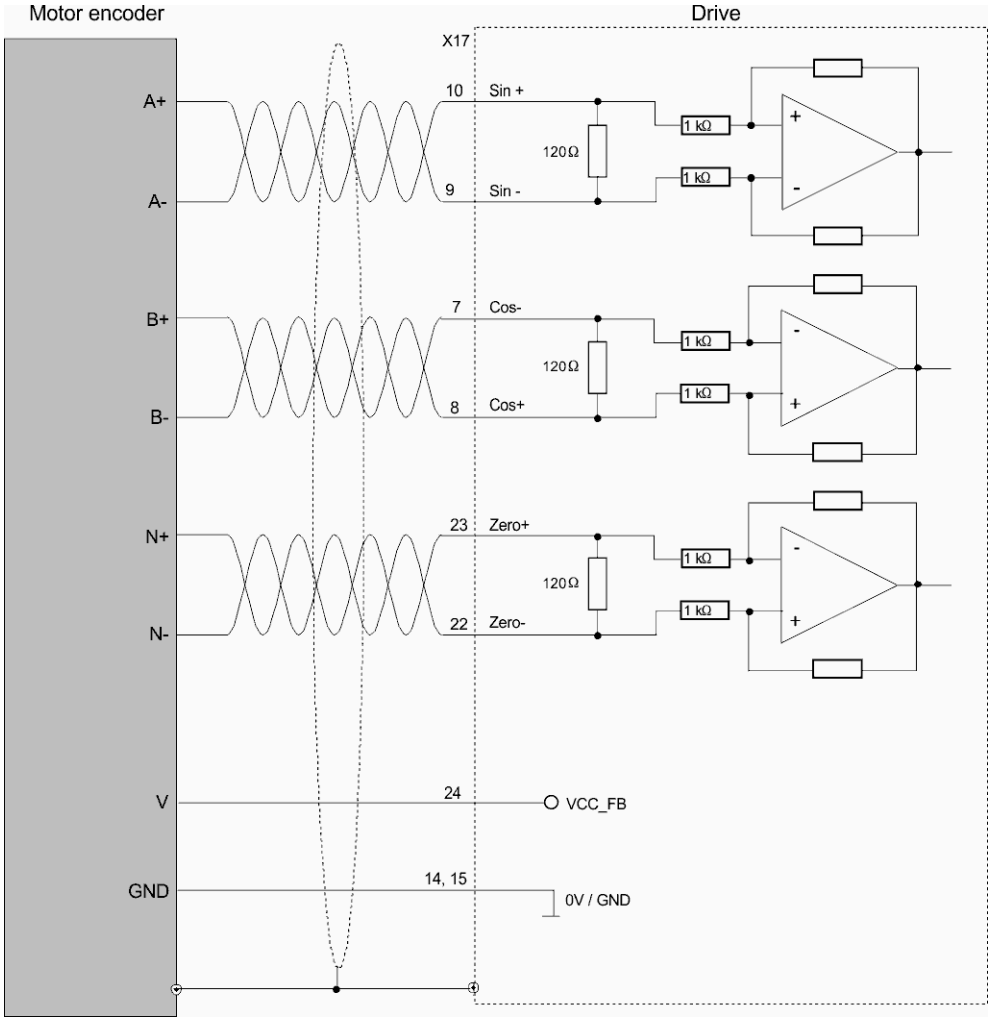


Fig. 76: Incremental Encoder with Sine Signals

When this meysuring system is parameterized VCC_FB is switched to 5.3 V.

9.6.3 Linear Hall Encoder (1 V_{pp})

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

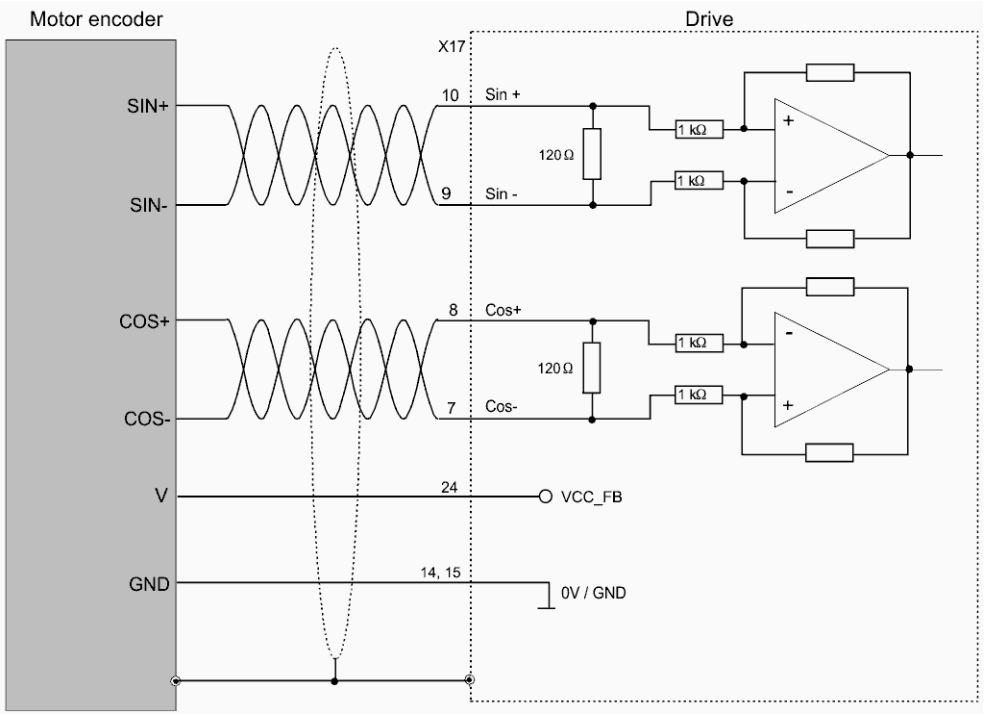


Fig. 77: Linear Hall encoder

When this meysuring system is parameterized VCC_FB is switched to 12 V.

9.6.4 EnDat 2.1 with Sine Signals (1 V_{pp})

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

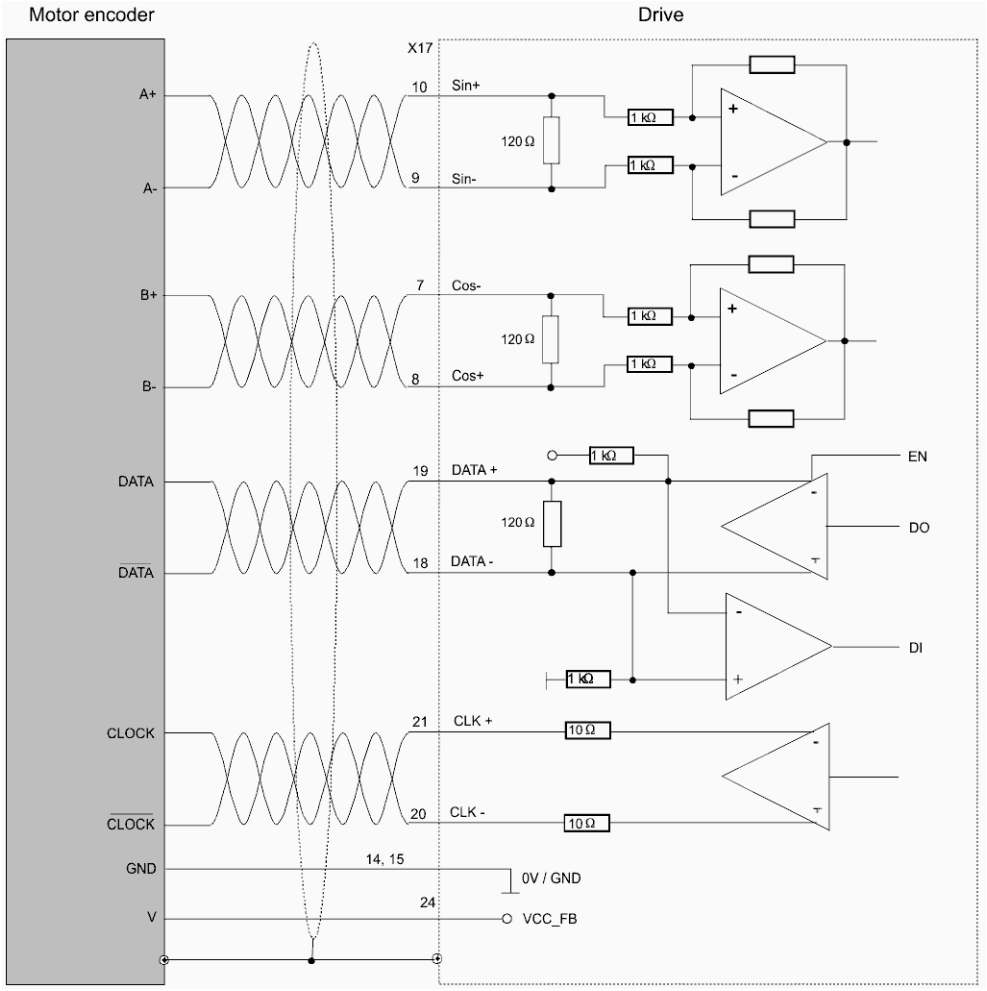


Fig. 78: EnDat 2.1 with sine signals

When this meysuring system is parameterized VCC_FB is switched to 5.3 V.

9.6.5 Hiperface with Sine Signals

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

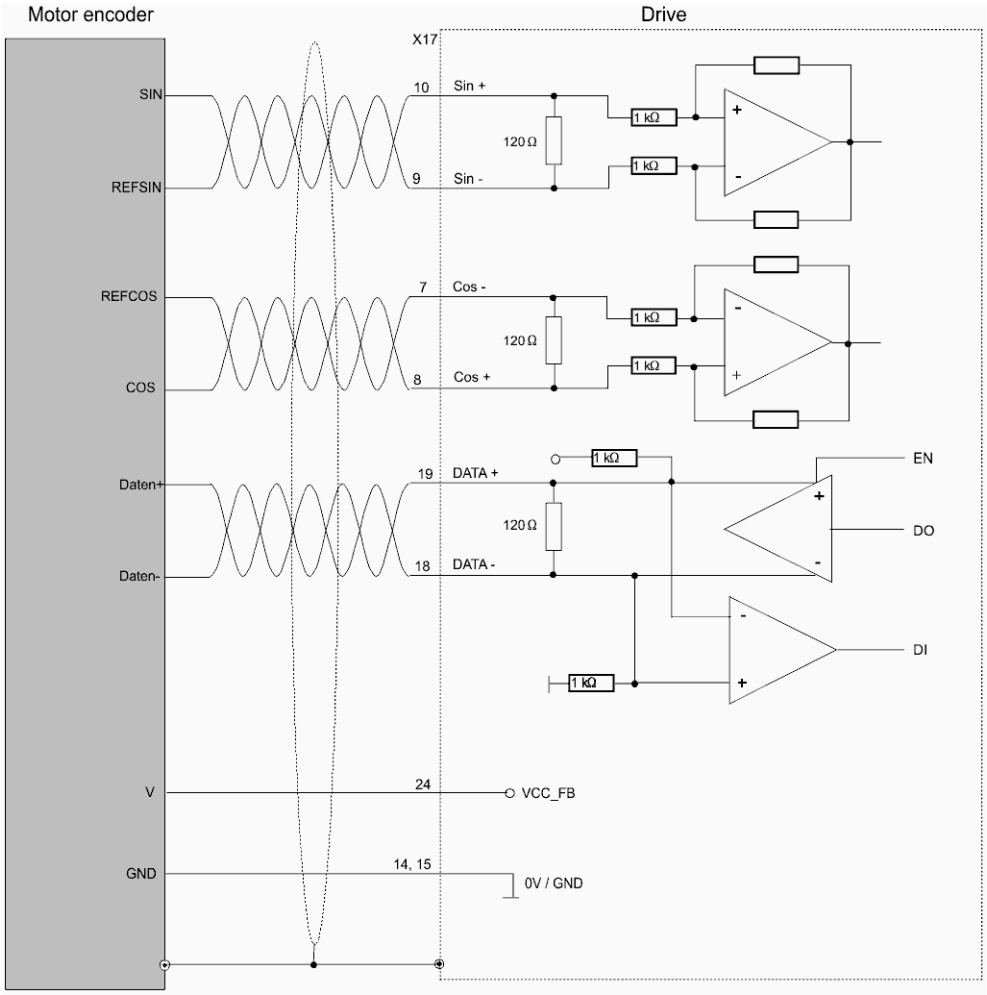


Fig. 79: Hiperface with Sine Signals

When this meysuring system is parameterized VCC_FB is switched to 12 V.

9.6.6 Hall Sensor 12 V

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

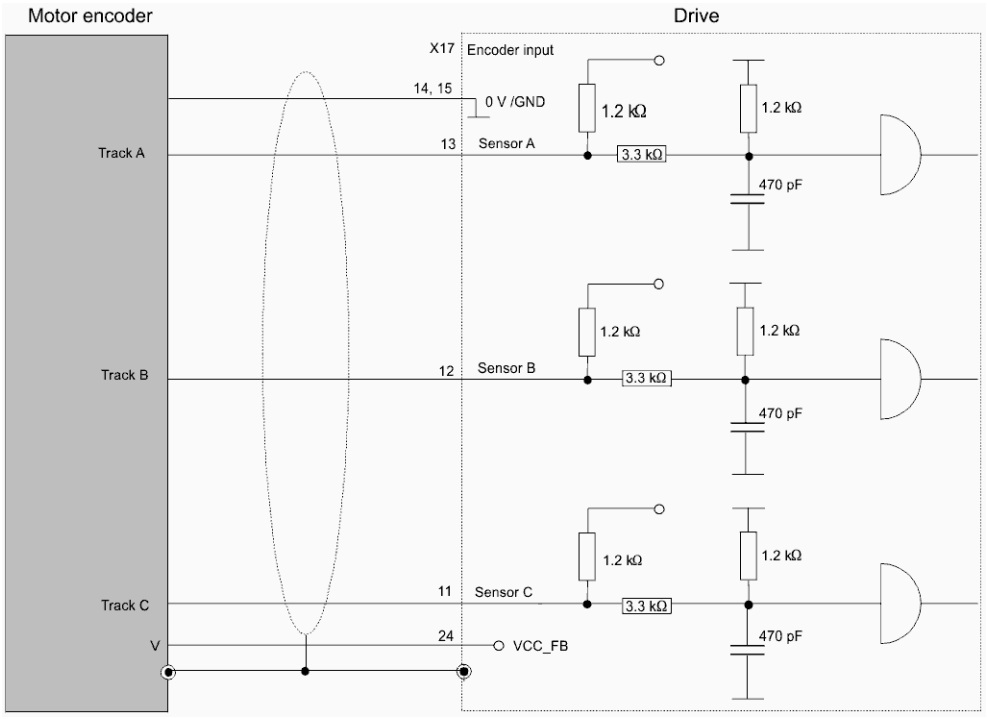


Fig. 80: Hall Sensor 12 V

When this meysuring system is parameterized VCC_FB is switched to 12 V.

9.6.7 Hall Sensor 5.3 V

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

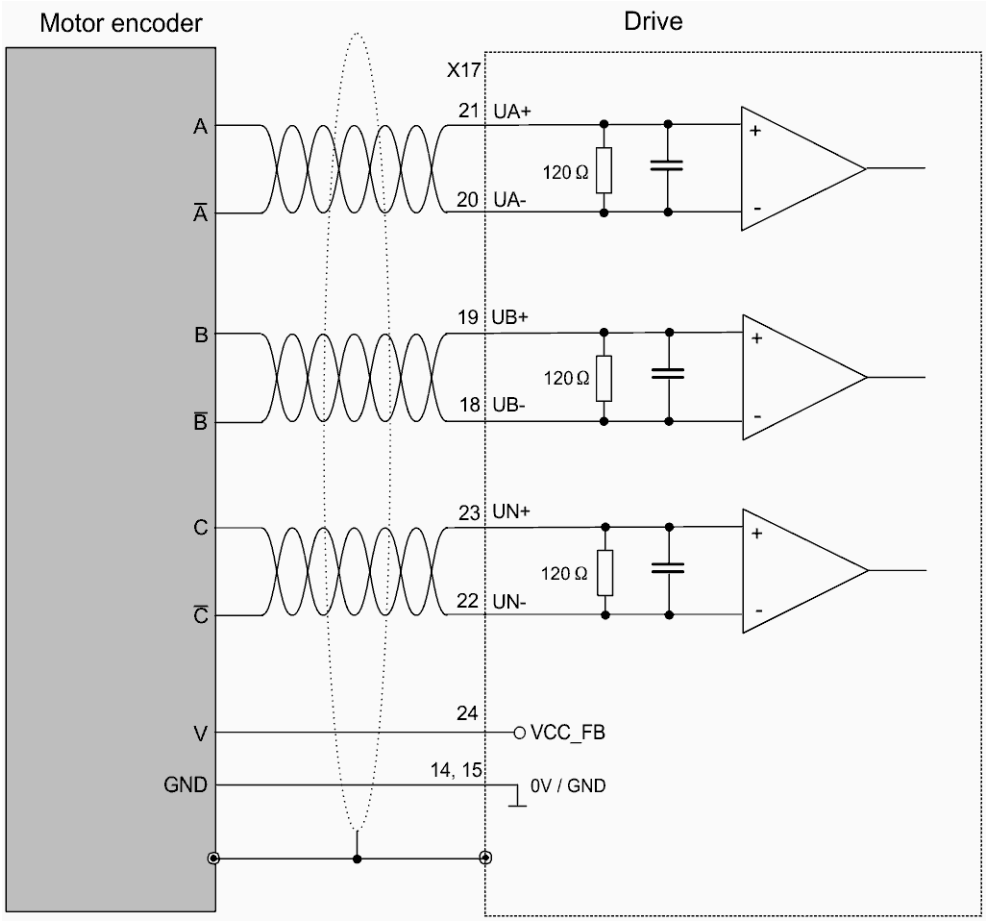


Fig. 81: Hall sensor 5.3 V

When this meysuring system is parameterized VCC_FB is switched to 5.3 V.

9.6.8 Field Plate

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

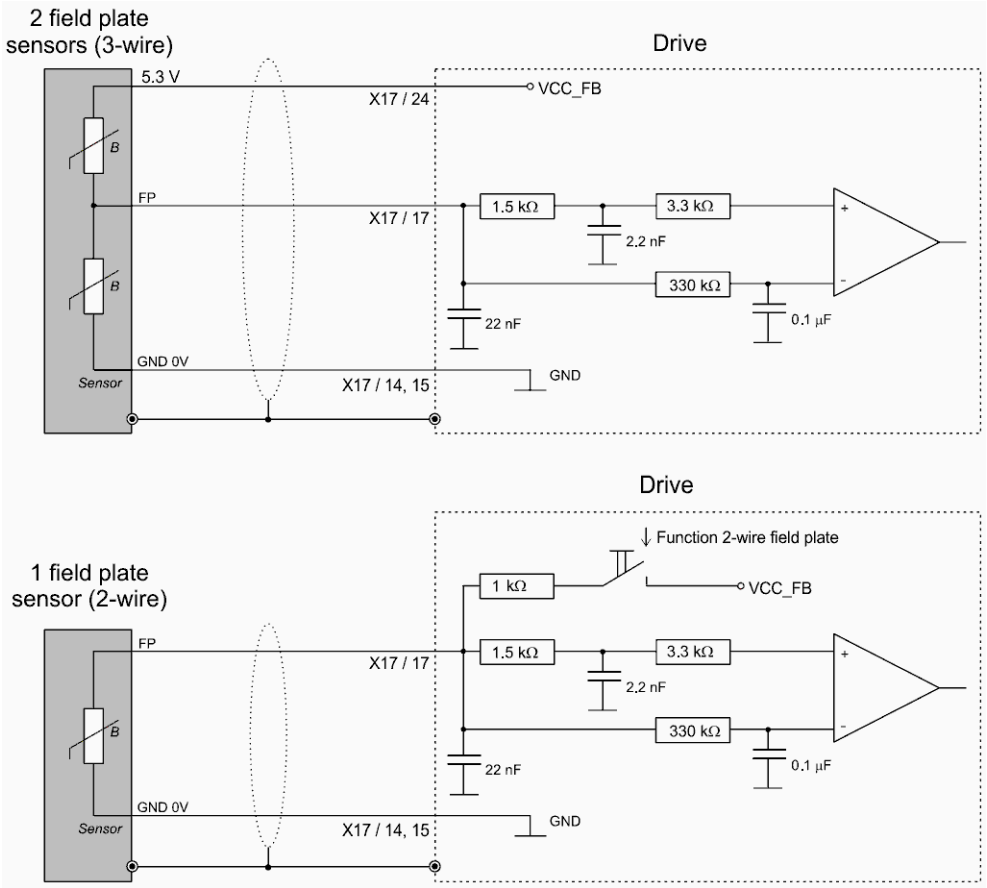


Fig. 82: Field plate − 2-wire and 3-wire

When this meysuring system is parameterized VCC_FB is switched to 5.3 V.

Note

A digital field plate (e.g. GMR sensor) is connected to X15 (pin 6), see connection example page 132.

9.6.9 Incremental Encoder with TTL Signals (5.3 V)

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

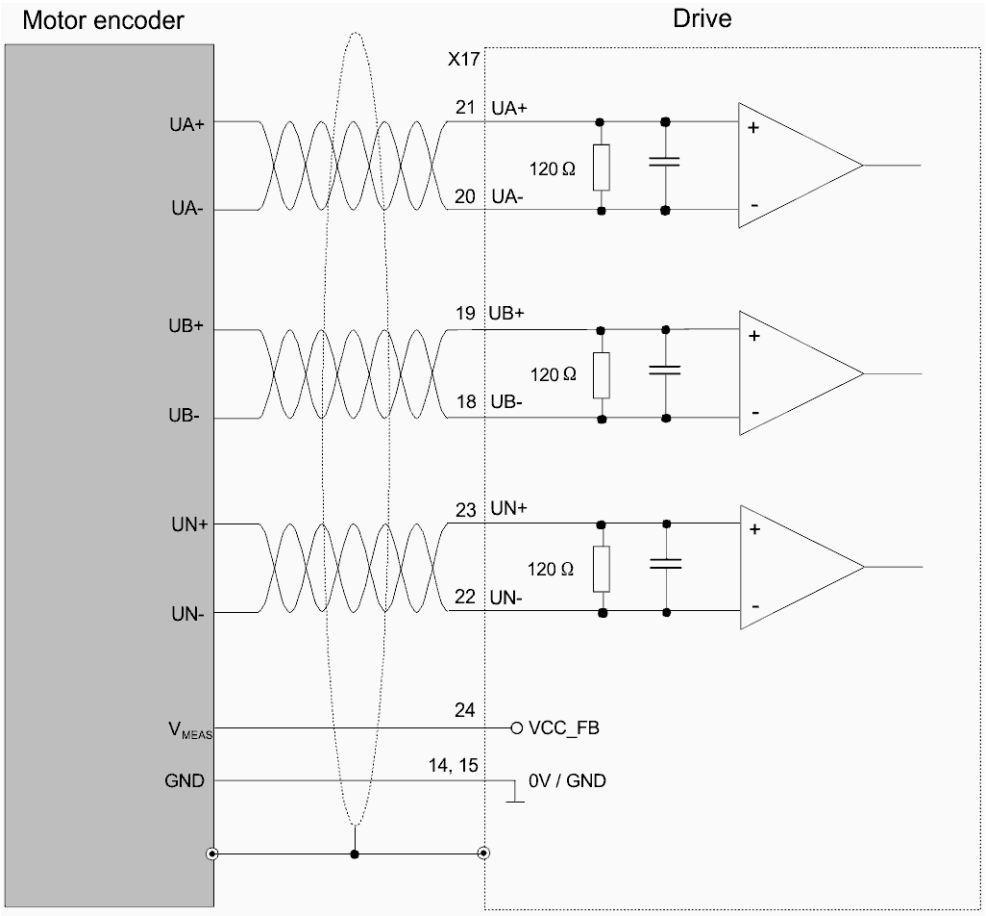


Fig. 83: Incremental Encoder with TTL Signals

When this meysuring system is parameterized VCC_FB is switched to 5.3 V.

9.6.10 Incremental Encoder 12 V

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

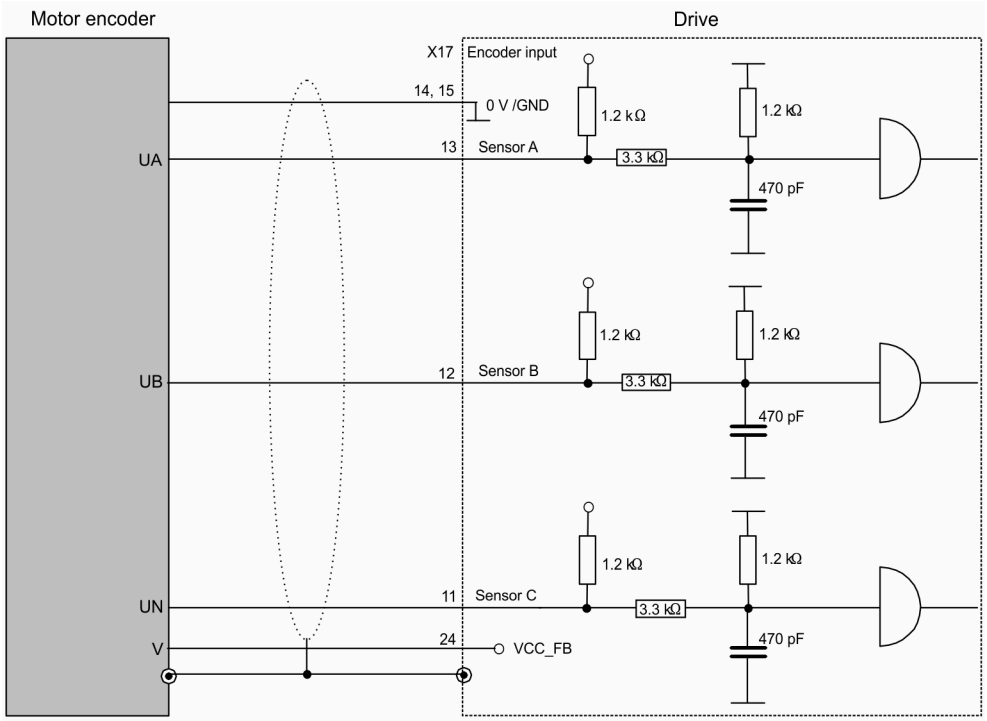


Fig. 84: Incremental encoder 12 V

Encoder failure monitoring is not possible with this measuring system.

When this meysuring system is parameterized VCC_FB is switched to 12 V.

9.6.11 PULSE IN 5 V

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

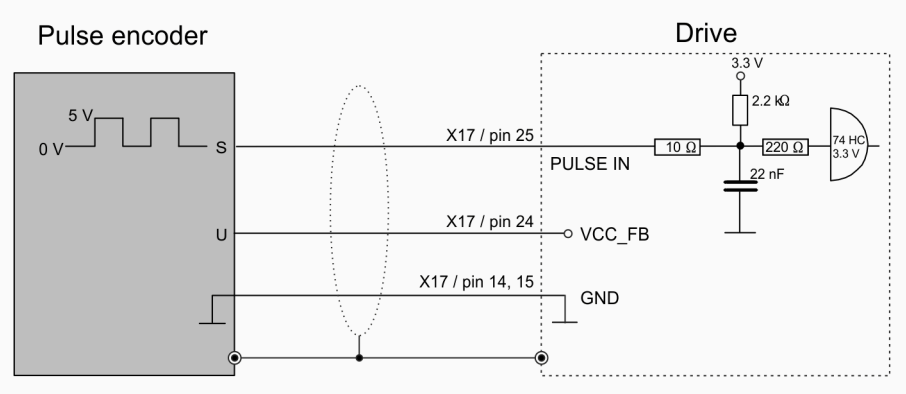


Fig. 85: PULSE IN 5 V

When this meysuring system is parameterized VCC_FB is switched to 5.3 V.

Note

A pulse generator for 24 V is to be connected to X15 (pin 6), see connection example chapter 9.4.3 “PULSE IN 24 V”, page 132.

9.6.12 RENISHAW BiSS C Mode (Unidirectional)

NOTICE

Voltage (VCC) varies depending on the set measuring system

When the connected measuring system is operated under a wrong voltage, it can be damaged.

→ Check that you have chosen the right measuring system in the software **before connecting**.

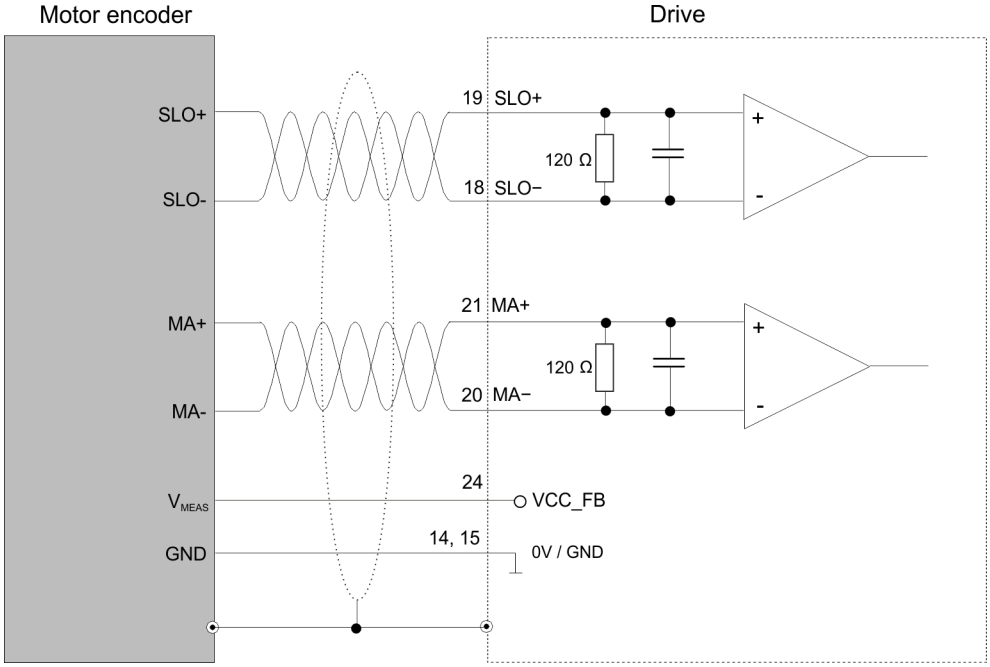


Fig. 86: RENISHAW BiSS C Mode (Unidirectional)

When this meysuring system is parameterized VCC_FB is switched to 5.3 V.

Requirements

- device version 4.xxx and higher
- firmware f04011v04017 and higher, logic l04004v04019 and higher
- *drivemaster2* V1.20 Build 75-17.7.2020 and higher

9.6.13 Temperature Sensor of the Motor

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

The drive amplifier 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.

You can configure “None”, “PTC / Thermo switch”, “NTC”, “KTY84/130”, “KTY83/122” and “PT1000”.

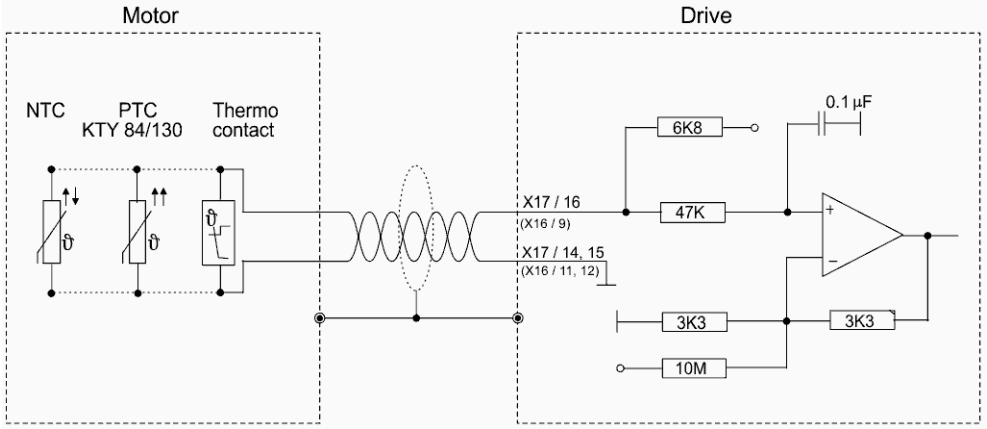


Fig. 87: Temperature Sensor of the Motor

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

Note

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

9.7 X18 – Analog Inputs/Outputs

9.7.1 Analog outputs

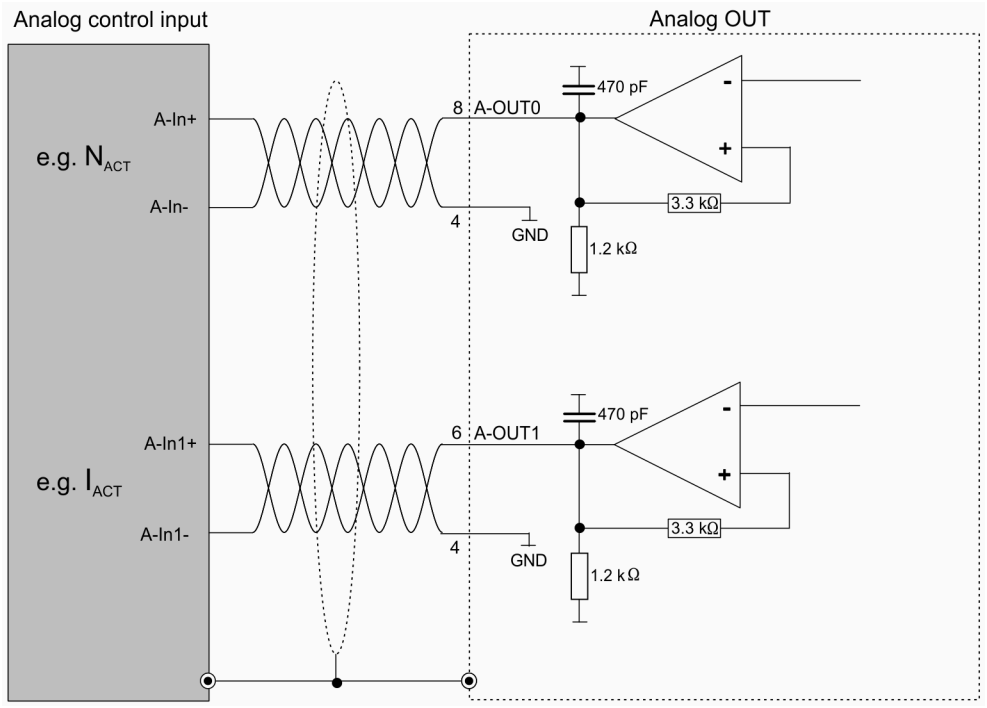


Fig. 88: Analog outputs

Configurable output voltage: 0 to +10 V, max. 1 mA

9.7.2 Analog inputs

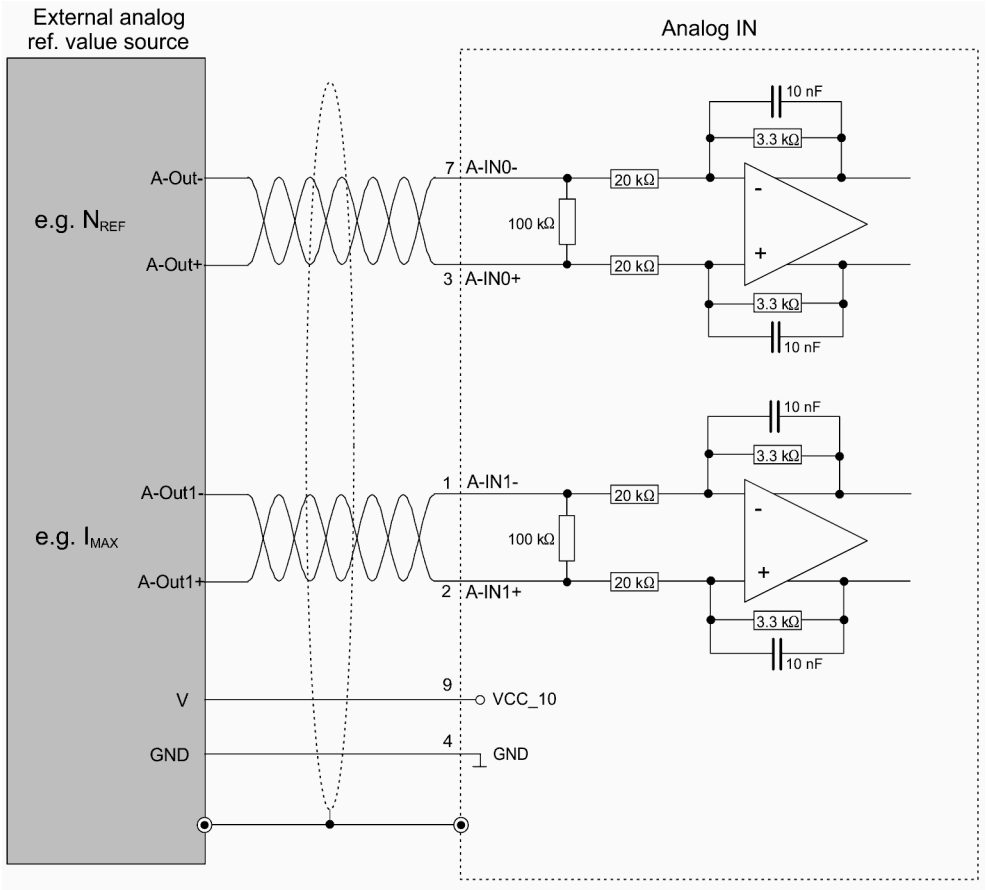


Fig. 89: Analog inputs

Voltage interface with input voltage range: ±10 V

Can also be connected to potentiometer (500 Ω - 5 kΩ)

9.8 X19 – Bus Connection

9.8.1 COM1 – RS232 Interface

COM1 - RS232 interface 1

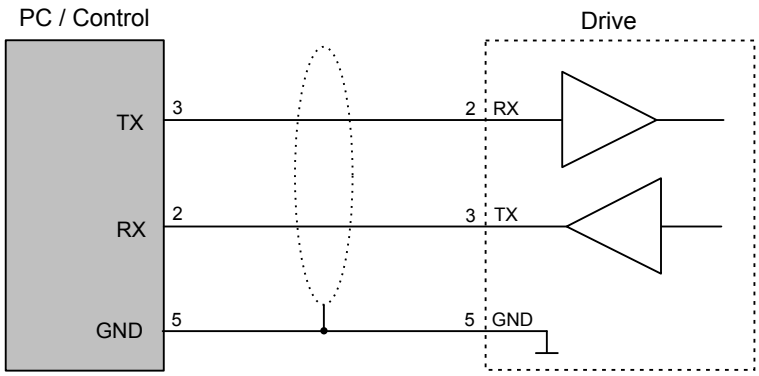


Fig. 90: RS232 interface (X19)

If you connect X19 to a standard RS232 interface of a PC (9-pole male D-sub connector), the used cable must be constructed as follows:

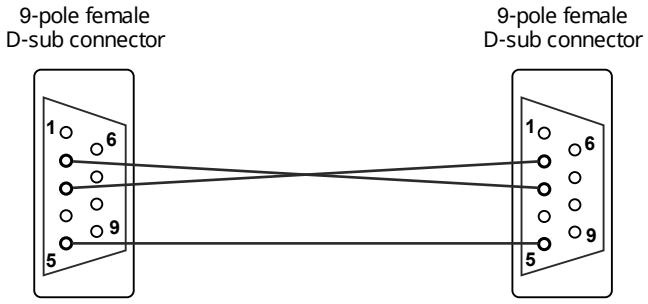


Fig. 91: RS232 cable

COM1 - RS232 Interface 2

Additional RS232 connection available:

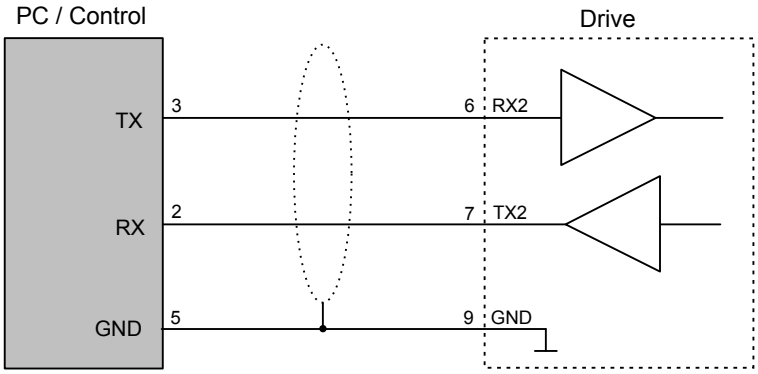


Fig. 92: RS232 interface 2 (X19)

9.8.2 CAN Bus

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 Ohm. The signal lines are connected to a terminating resistor (120 Ohm) at both ends of the bus cable (see figure).

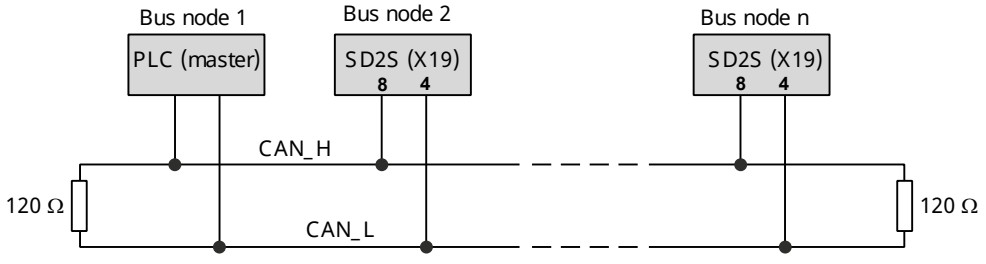


Fig. 93: CAN interface

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

Baud rate	Max. bus length
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 e. V.

9.9 X22A/ X42/ X45/ X47/ X49/ X57 – Motor Phases

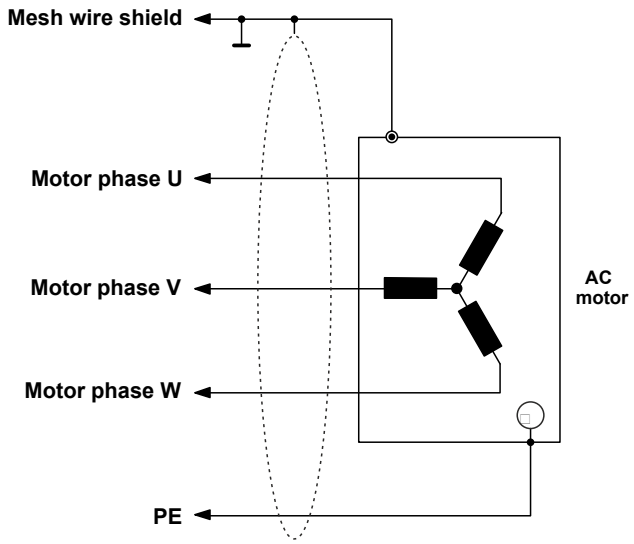


Fig. 94: Connection of the motor phases

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.

Note

Voice coil motors are generally connected via the motor phases U and W. The current parameters of voice coil motors can only be indicated as sine peak amplitudes (A_p), not as RMS values (A_{rms}).

Related topics

Motor Cable, page 167

9.10 Shielding of the Motor Cable

For the operation of SD2S the motor cable needs to be shielded. Depending on the device and application more shielding measures might be required.

The following examples explain how to connect the motor cable shield using a shield connection clamp by Phoenix (see Manufacturers (p. 199)):

- Example 1 explains how to connect the motor cable shield to the bottom side of the device.

  This option is reserved for the devices 0362x40xx(A) to 0362x43xx as well as 0362120xx and 0362121xx.

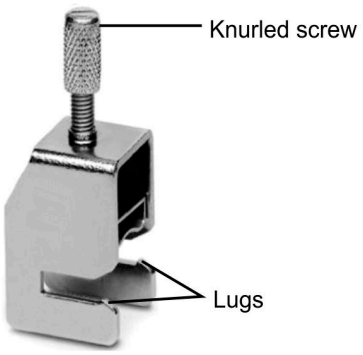
  With the devices 0362144xx to 0362x48xx you can connect the shield of smaller cables, e.g. measuring system cable, to the device housing in this way. (This opportunity is not yet available with older device versions.)
- Example 2 explains how to connect the motor cable shield to a top hat rail.

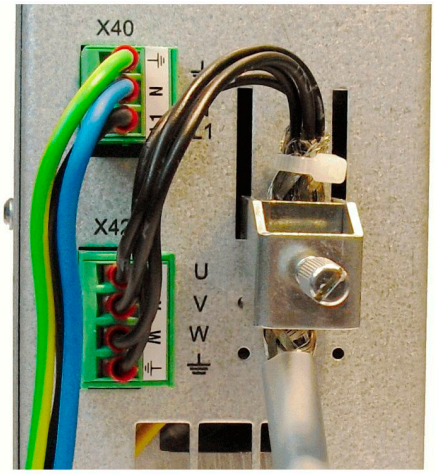
  This option can be used alternatively to example 1 and in case the shield connection clamp is too small for the used cable.

Example 1: Shielding at the device

The following procedure describes connecting the cable shield to the device housing. The motor cable of 0362140xx is used in this example.

1. Remove the insulation of the motor cable on a length of approximately 30 mm in the place it will be fixed in the terminal.
2. Place the motor cable between the slot holes at the bottom of the device.
3. Put the clamp over the cable into the slot holes.
4. Push the clamp to the back so that the lugs lock in the circular holes.
5. Fix the cable using the knurled screw.
   - SK 8: max. tightening torque = 0.6 Nm
   - SK 14: max. tightening torque = 0.8 Nm
   - SK 20: max. tightening torque = 0.8 Nm

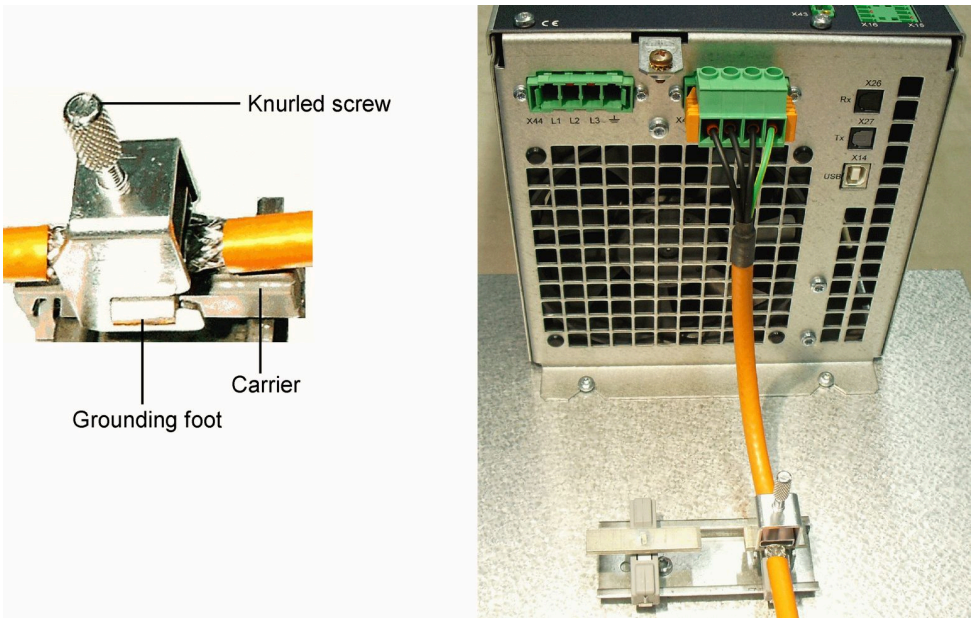




Example 2: Shielding on a top hat rail

The following procedure describes connecting the cable shield to a top hat rail. The motor cable of 0362145xx is used in this example.

1. Mount a top hat rail with a carrier for the terminal (e.g. “carrier with grounding foot ” by WAGO, see Manufacturers (p. 200)) below the device.
2. Remove the insulation of the motor cable on a length of approximately 30 mm in the place it will be fixed in the terminal.
3. Place the motor cable on the carrier.
4. Push the terminal over the cable into the grounding foot of the carrier.
5. Fix the cable using the knurled screw.
   - SK 8: max. tightening torque = 0.6 Nm
   - SK 14: max. tightening torque = 0.8 Nm
   - SK 20: max. tightening torque = 0.8 Nm
   - SK 35: tightening torque = 1.5 to 1.8 Nm



9.11 X26/X27 – SERVOLINK

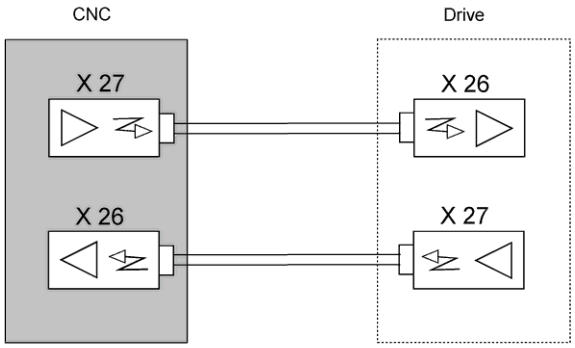


Fig. 95: SERVOLINK 4

9.12 X28 – Mains Supply 0362121xC/ 0362x41xC(A)/ 0362x42xx/ 0362x43xx

1-phase mains supply

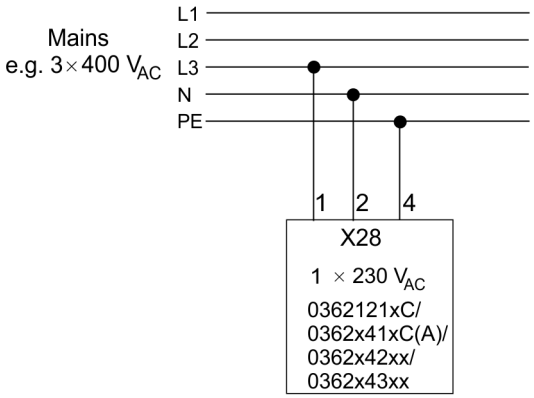


Fig. 96: Mains connection 0362121xC/ 0362x41xC(A)/ 0362x42xx/ 0362x43xx (1-phase)

3-phase mains supply

3-phase power greater than 3 × 230 V_{AC} is only possible with a mains transformer:

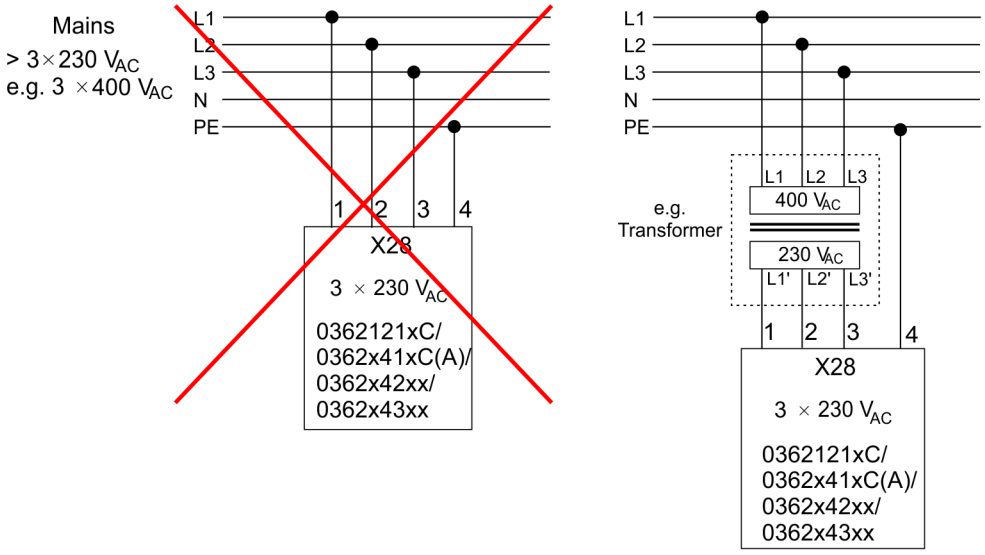


Fig. 97: Mains connection 0362121xC/ 0362x41xC(A)/ 0362x42xx/ 0362x43xx (3-phase) with mains transformer

9.13 X41/X63 – External Ballast Resistor

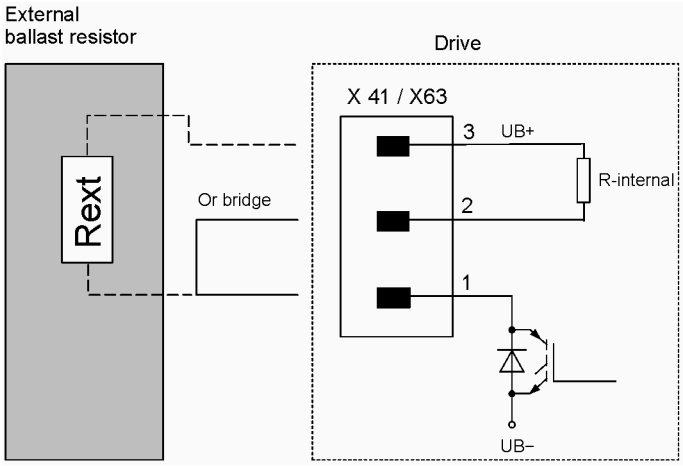
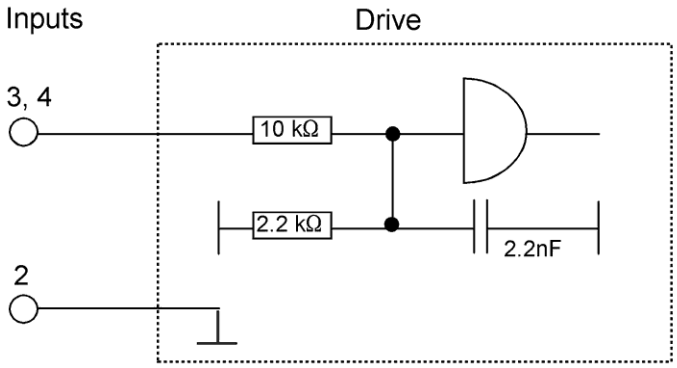


Fig. 98: External ballast resistor

9.14 X55 – Error Bus



Signal	State
0 to 5V	L
12 to 24V	H

Fig. 99: Error bus

Hardware Status Signals PERR0/PERR1

ERR0	ERR1	Meaning
0	0	External power supply unit is switched off.
1	0	Overvoltage or undervoltage occurred.
0	1	External power supply unit is switched on, but the power supply is missing.
1	1	External power supply unit is switched on.

Note

If the external power supply unit only provides a status signal “Power OK”, this signal must be connected to pin 3 **and** pin 4.

9.15 X64/X65 – EtherCAT

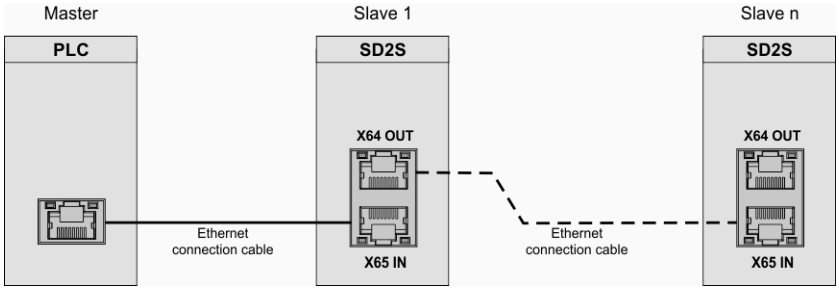


Fig. 100: EtherCAT connection

Ethernet connection cable: To connect EtherCAT devices use only Ethernet cables of Category 5 (Class D) or higher. You can either use patch cables (1:1) or crossover cables (TX crosslinked to RX) because the receiver ports (PHY) support automatic cable recognition (auto crossover feature).

9.16 Housing Ground

If required, you can ground the device at the housing. For this purpose a press nut labeled ⏚ is provided.

Use an M4 screw (max. length 8 mm) and a spring washer for grounding.

10 Status Display and Error Messages

10.1 LED Status Display: EtherCAT Connection

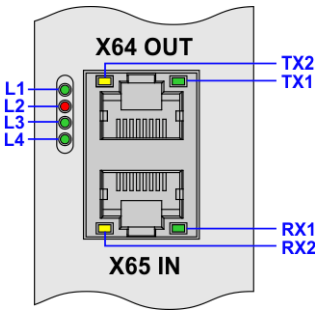
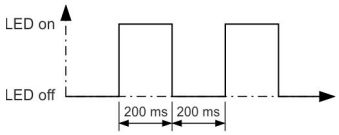
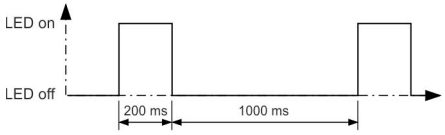


Fig. 101: EtherCAT LEDs (device bottom side)

LED	Color	Status	Meaning
TX1	Green	●	Data transmission (TX) active
TX2	Yellow	●	Speed = 100 MBit
RX1	Green	●	Data reception (RX) active
RX2	Yellow	●	Speed = 100 MBit

LED	Color	Status	Meaning
L1 – status	Green	○	Init: Communication between master and slave (drive) is not possible
		☼ (fast)	Pre-operational: Only SDO communication is possible. No process data are transmitted. The LED flashes at the following intervals: 
		☼ (slow)	Safe-operational: As process data only actual values are transmitted from the slave (drive) to the master. SDO communication is possible. The LED flashes at the following intervals: 
		●	Operational: The complete data channel is active.
L2 – error	Red	●	Communication error
L3 – processor	Green	☼	Processor watchdog: Processor is active. (L3 and L4 flash alternately.)
L4 – processor	Green	☼	

10.2 7-segment Display

The 7-segment display shows status and error messages.

A status message is made up of 1 to 5 digits and displayed as sequence. All messages end with dot behind the last digit. When the first digit is 'E.', there is a permanent error. If the cause of an error can be specified, the display indicates the actual error code followed by a hyphen and a one-digit sub error code.

Note

Devices with older firmware do not feature the sub error code.

Examples:

1. 

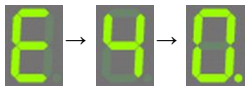
   Permanent display 0
   - Controller is switched off.
   - No error.

2. 

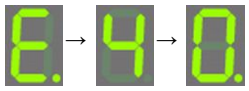
   Permanent display 1
   - Controller is switched on.
   - No error.

3. 

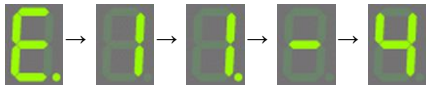
   Permanent display 1.
   - Controller is switched on.
   - No error.
   - Dot calls additional attention to PI limit.

4. 

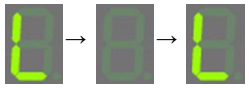
   Sequential display
   - Controller is switched off due to error E40.
   - The error is not present anymore.

5. 

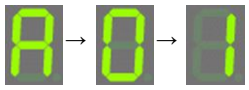
   Sequential display
   - Controller is switched off due to error E40.
   - The error is still present (indicated by the dot behind 'E').

6. 

   Sequential display
   - Controller is switched off due to error E11.
   - The error is still present (indicated by the dot behind 'E').
   - Sub error code 4 is indicated as cause.

7. 

   Sequential display
   - Controller is in boot loader mode: Display appears short-time when the device is booted and when the system software is loaded.

8. 

   Sequential display
   - Drive address: During booting of the devices the set address of the drive is displayed short-time (here A01)

10.2.1 List of the Operating States

Code	Description
0	Ready to switch on
1	Controller active
1.	Controller active, controller is limited / PI limit
2	Mains 'Ready for operation' not present yet
L	Boot loader active (during boot / software load)

10.2.2 List of Drive Error Messages

Note

The following messages apply to the entire SD2x drive series. According to the device type or operating mode, certain messages may not appear.

Code	Error message		Error reaction	Possible reason	
E03 (0x103) (259*d*)	Interpolation error (interpolated position control)		Motor is stopped by quick stop ramp and drive is disabled (controlled standstill).	▸ Faulty motion profile of the higher-ranking control	
	1	Acceleration limit exceeded			
	2	Speed limit exceeded			
	3	Index error			
E05 (0x105) (261*d*)	Error caused by warning		Motor is stopped by quick stop ramp and drive is disabled (controlled standstill).	▸ Parameter-driven monitoring stopped the drive.	
E06 (0x106) (262*d*)	Digital Input 'External Hardware'		Motor is stopped by parameter-driven ramp and drive is disabled (controlled standstill).	Monitoring of external hardware:	
	0	Digital input		0	Digital input “External Hardware OK” is not connected to 24 V.
	1	Analog input 0: broken cable		1	Minimum current monitoring of analog input 0 has triggered.
	2	Analog input 1: broken cable		2	Minimum current monitoring of analog input 1 has triggered.
	3	Analog input 0 and 1: broken cable		3	Minimum current monitorings of analog inputs 0 and 1 have triggered.
E07 (0x107) (263*d*)	Error in internal hardware		Motor is stopped by quick stop ramp and drive is disabled (controlled standstill).	▸ Overload in digital outputs	
E09 (0x109) (265*d*)	Hiperface / EnDat OEM data incorrect		No "Ready" for startup	▸ Number of motor pole pairs in EnDat/Hiperface encoder does not match the parameter set.	
E10 (0x10A) (266*d*)	drive-setup-tool heartbeat		Motor is stopped by quick stop ramp and drive is disabled (controlled standstill).	▸ *drive-setup-tool* was not able to communicate with the drive in the parameterized monitoring time.	
E11 (0x10B) (267*d*)	Communication / bus system error ▸ [1] SERVOLINK 4 ▸ [2] DNC 8 Byte ▸ [3] CAN bus ▸ [4] EtherCAT		Motor is stopped by parameter-driven ramp and drive is disabled (controlled standstill).	Monitoring of bus communication led to switch-off:	
	1	Faulty telegram ID [1]		1	Faulty reference value telegram
	2	Zero data telegram [1]		2	Higher-ranking control not active
	3	CRC error [1]		3	Check sum error, interferences during transmission
	4	Synchronization error [1, 4]		4	Drive telegram not synchronized
	5	Configuration error [4]		5	Faulty configuration of mailbox, PDO, watchdog or synchronization
	6	NMT error [2, 3, 4]		6	Control channel of bus system was not active during switch-on (pre-operational)
	7	Addressing error [4]		7	Faulty drive address
	8	Node Guarding [3]		8	Communication node monitoring: monitoring time expired (configurable)
	9	EEPROM error [4]		9	Error in EtherCAT EEPROM
	10	Heartbeat / Watchdog [2, 3, 4]		10	Heartbeat monitoring: monitoring time expired (configurable)
E12 (0x10C) (268*d*)	Mains 'Ready for operation' is missing		Motor is stopped by parameter-driven ramp and drive is disabled (controlled standstill).	▸ Power output stage was switched on, when mains supply was disconnected/interrupted.	
E15 (0x10F) (271*d*)	Endat / Hiperface communication faulty		Motor is stopped by quick stop ramp and drive is disabled (controlled standstill).	▸ Communication of EnDat/Hiperface is faulty.	
E17 (0x311) (785*d*)	FPGA power output stage shutdown		Motor is stopped immediately.	▸ Overload in power supply unit	

Code	Error message	Error reaction	Possible reason
E17 (0x311) (785*d*)	Zero voltage control DC link (only SD2M)	Motor is stopped immediately. Mains thyristors are no longer controlled.	▸ Window range of the zero voltage control has been exceeded. ▸ Unbalanced load Please contact SIEB & MEYER.
E18 (0x312) (786*d*)	Error in spindle selection	Motor is stopped immediately.	▸ Spindle selection was not valid at “Switch on”
E25 (0x319) (793*d*)	Power supply load too high	Drive is stopped by limitation of motor torque.	▸ Output power of drive is greater than rated power of power supply unit, since the dimensioning of drive and motor are not compatible.
E26 (0x31A) (794*d*)	Motor temperature too high	Motor is stopped by error ramp and current limitation.	▸ Wrong parameters entered for the motor or wrong dimensioning of the motor
E27 (0x31B) (795*d*)	Ambient temperature too high	Motor is stopped by error ramp and current limitation.	▸ Insufficient device cooling
E28 (0x31C) (796*d*)	Power output stage temperature too high	Motor is stopped by error ramp and current limitation.	▸ Insufficient cooling of power output stage (heat sink)
E29 (0x31D) (797*d*)	Motor load too high (Motor I²t)	Motor is stopped by error ramp and current limitation.(1)	▸ Average motor load is too high due to mechanical problems ▸ Wrong dimensioning of the motor
E30 (0x31E) (798*d*)	Power output stage load too high (I²t)	Motor is stopped by error ramp and current limitation.(1)	▸ Average load of output stage is too high due to mechanical problems ▸ Wrong dimensioning of the drive
E31 (0x31F) (799*d*)	Speed error or slip too high	SERVO / VECTOR: Drive is limited by current monitoring via short-circuit of the motor phases.(1) HSPWM: Drive is stopped by error ramp and current limitation.	▸ Motor is not able to comply with the set speed (e.g. defective motor, mechanical problems, wrong parameters), failure of the measuring system
E33 (0x521) (1313*d*)	Power supply load monitoring -> mains voltage too high	Power supply unit will be disconnected from mains.	▸ Parameterized mains voltage does not match the connected voltage ▸ Device connected incorrectly ▸ Heavy fluctuation of the power supply towards overvoltage
E34 (0x522) (1314*d*)	Power supply charge monitoring -> mains voltage too low	Power supply unit will be disconnected from mains.	▸ DC link was not precharged to the minimum voltage level in the set time period; mains voltage is connected to the short-circuited DC link
E35 (0x523) (1315*d*)	Error in external power supply unit	Drive is immediately disabled, motor coasts to standstill.	▸ Error message from external power supply unit; power supply is switched off.
E36 (0x524) (1316*d*)	Encoder 0 monitoring	Motor is stopped by current monitoring via short-circuit of the motor phases.	▸ Connection of encoder 0 is faulty ▸ Broken cable
E37 (0x525) (1317*d*)	Ballast circuit load (I²t ballast resistor)	Drive is immediately disabled, motor coasts to standstill.	Ballast circuit load due to:
	1 I²t		1 Wrong dimensioning, too much energy supplied to $R_{Ballast}$, broken cable, no bridge at $R_{Ballast}$ (int./ext.)
	2 (VCE) desaturation detection or: DC/DC converter overload *(only 0362144xx)*		2 Bridge at $R_{Ballast}$ is not correct, short circuit of insulation etc. Or: internal hardware fault *(only 0362144xx)*
E37 (0x525) (1317*d*)	DC converter overload *(only 0362161xx)*	Power supply unit will be disconnected from mains.	▸ Overload at voltage converter of DC link
E38 (0x526) (1318*d*)	Actual speed value greater than overspeed threshold	Motor is stopped by current monitoring via short-circuit of the motor phases.(1)	▸ Wrong parameters ▸ Motor connected incorrectly

Code	Error message	Error reaction	Possible reason
E39 (0x527) (1319*d*)	Tracking error monitoring and motor slowdown	Motor is stopped by current monitoring via short-circuit of the motor phases.(1)	▸ Wrong parameters ▸ Motor connected incorrectly ▸ Mechanical problems
E40 (0x528) (1320*d*)	Motor feedback	Motor is stopped by current monitoring via short-circuit of the motor phases.(1)	▸ Connection of motor feedback faulty ▸ Broken cable
E41 (0x529) (1321*d*)	Motor phase lost 1 No motor connected 2 Wrong motor connected	Motor is stopped by current monitoring via short-circuit of the motor phases.(1)	Motor connection/configuration is faulty: 1 No motor connected / incorrect wiring, broken cable 2 Wrong parameters
E42 (0x52A) (1322*d*)	Overvoltage in DC link	Drive is immediately disabled, motor coasts to standstill.	▸ No ballast resistor is connected or ballast resistor is dimensioned too small, i.e. X41/X63 not connected
E43 (0x52B) (1323*d*)	Undervoltage in DC link	Drive is immediately disabled, motor coasts to standstill.	▸ DC link not connected

Code	Error message		Error reaction	Possible reason	
E44 (0x52C) (1324*d*)	Commutation lost The following list of error messages includes a note for which drive function the error might appear. ► [1] HSBLOCK ► [2] FPAM ► [3] SVC ► [4] HSPWM ► [5] VF		Drive is immediately disabled, motor coasts to standstill.	► The error E44 is triggered in case of wrong current feed of the motor during operation without sensor. ► Faulty parameters entered for the motor or faulty dimensioning of the motor. The error depends on the drive function. For details refer to the corresponding setup instructions.	
	1	EMF monitoring[1, 2, 3 4]			
	2	Flux monitoring[4]			
	3	Overload current monitoring[4]			
	4	Under flux monitoring[4]			
	5	Minimum speed monitoring[1, 2, 3]			
	6	Error during alignment[1, 2]			
	7	Current limitation V/f oscillates[5]			
E45 (0x52D) (1325*d*)	Short circuit in power output stage		Drive is immediately disabled, motor coasts to standstill.	Short circuit of the power output stage due to:	
	1	Internal short circuit		1	Faulty drive control
	2	(VCE) desaturation detection		2	Wrong parameters, output stage defective, broken cable, short circuit etc.
	3	Short to ground		3	Short to ground of a motor phase
	4	Current measuring range		4	Wrong parameters, output stage defective, broken cable, short circuit etc.
	5	Overload motor		5	Drive function V/f: incorrect parameter setting of “Flying restart”
E46 (0x52E) (1326*d*)	1	Safety circuit (Safety X10)	Drive is immediately disabled, motor coasts to standstill without control.	1	Safety circuit STO is activated when the output stage is active; input SAFE A and/or input SAFE B were triggered.
	2	Initialization error: internal hardware of safety controller		2	Safety function SFM/SLOF: error in according hardware components of the safety controller
	3	Incorrect data/parameters in process sequence		3	Safety function SFM/SLOF: faulty PLC telegrams
	4	Error in function parameters for a functional part		4	Safety function SFM/SLOF: parameter is out of limits
	5	Timeout of monitoring functions		5	Safety function SFM/SLOF: error in according hardware components
	6	Monitoring of OSSD signals and output stage enable		6	Safety function SFM/SLOF: ► wrong OSSD signals ► defective OSSD relay ► defective multiplexer
	7	Monitoring of motor phases		7	Safety function SFM/SLOF: defective motor cable (broken cable)
	8	Frequency exceeded		8	Safety function SFM/SLOF: ► set reference speed value is too high ► limit value for Safe Limited Output Frequency is parameterized incorrectly ► OSSD signals are set incorrectly

Code	Error message	Error reaction	Possible reason
	9 Communication error between DSP and safety controller		9 Safety function SFM/SLOF: communication between DSP and safety controller is disturbed
E47 (0x52F) (1327*d*)	Drive parameters not activated	Power output stage can not be activated.	▸ Drive start is not acknowledged by master yet (configurable by parameters in software).
E55 (0x737) (1847*d*)	Firmware stopped by ESC	Device stops in BIOS.	▸ During boot-up, the device received an ESC sequence at the serial interface.
E56 (0x738) (1848*d*)	Device configuration	Device stops in BIOS.	▸ During boot-up the device detected that hardware, firmware parameters and logic are not consistent;. A detailed error description is received by a parameter download.
E57 (0x739) (1849*d*)	Faulty or no firmware	Device stops in BIOS.	▸ During boot-up the device detected no firmware or a faulty firmware.
E58 (0x73A) (1850*d*)	FPGA watchdog triggered	Device stops in BIOS.	▸ FPGA process monitoring has been triggered;. Please contact SIEB & MEYER.
E59 (0x73B) (1851*d*)	No drive parameters loaded	Device stops in BIOS.	▸ Device is not parameterized (status of delivery).
E60 (0x73C) (1852*d*)	Drive parameters incorrect	Device stops in BIOS.	▸ Parameter set of the device is not valid (CRC error).
E61 (0x73D) (1853*d*)	Logic coding missing or incorrect	Device stops in BIOS.	▸ Logic programming of the device is not valid.
E62 (0x73E) (1854*d*)	Error in electronic type plate	Device stops in BIOS.	▸ Type plate is not programmed or faulty. Please contact SIEB & MEYER.

(1) For servo motors with commutation via an incremental motor measuring system, the warning W17 “Unknown commutation angle” is signaled. After a restart of the device the phasing of the motor measuring system starts automatically (magnetic alignment).

10.2.3 List of the Warning Messages

Warning messages are not displayed on the device display. They can only be seen in the software *drivemaster2* via “Diagnosis → Errors and warnings”.

Code	Description
W00	Digital input 'Quick stop' active
W01	Digital input 'Positive limit switch' active
W02	Digital input 'Negative limit switch' active
W03	Voltage of mains supply not OK
W04	Power output stage load greater than parameterized warning threshold W04 (power output stage I²t)
W05	Motor load greater than parameterized warning threshold W05 (motor I²t)
W06	Power output stage temperature greater than parameterized warning threshold W06
W07	Motor temperature greater than parameterized warning threshold W07
W08	DC link voltage greater than parameterized warning threshold W08
W09	DC link voltage less than parameterized warning threshold W09
W10	Speed controller in current limitation / PI limit
W11	Position/tracking error greater than parameterized warning threshold W11
W12	Speed error greater than parameterized warning threshold W12
W13	Tracking error of the current too great
W14	Ambient temperature greater than parameterized warning threshold W14

Code	Description
W15	Ballast resistor load greater than parameterized warning threshold W15 (ballast resistor I^2t)
W16	Safety circuit is active
W17	Unknown commutation angle
W18	Hiperface / EnDat OEM data not valid
W19	Dirt signal encoder input 0
W20	Dirt signal encoder input 1
W21	Dirt signal encoder input 2
W22	Power supply unit load greater than 90% of the rated power
W23	Reserved
W24	Current or current rise greater than warning threshold W24 (warning current)
W25	Reference speed less than minimum motor speed
W26	Current greater than warning threshold W26 (warning overload current)
W27	Reserved
W28	Reserved
W29	Reserved
W30	Reserved
W31	Reserved

10.2.4 Messages of the Quick Stop Functions

Code	Description
H01	Digital input "Switch on" waits for positive edge to switch the drive on (This function is only active when the input is set as "Switch on type 2 (with positive edge)".)
H03	Software function "Quick stop"
H04	Digital input "Quick stop"
H07	Software positioning error "Negative limit"
H08	Software positioning error "Positive limit"
H09	Bus system "Quick stop" (The quick stop bit is set to 0)
H11	Digital input "Negative limit switch"
H12	Digital input "Positive limit switch"
H13	Digital input "Speed Enable"
H14	Magnetic bearing calibration active

11 General Information Regarding the Wiring

11.1 Mains Connection

NOTICE

Property damage due to incorrect mains connection

Direct connection to **ungrounded / asymmetrically grounded mains** (IT mains with start point / IT delta mains) can destroy the devices.

Connecting the device to this mains type is only possible with isolating transformer.

→ Also consider the manual "Unit Assembly Complying to EMC", chapter "Connection to Different Supply System Types".

11.1.1 Power Chokes

Mains chokes limit low-frequency mains repercussions and discharge the semiconductors and the DC link capacitors of drive amplifiers.

For S1 operation of a SIEB & MEYER drive system you require a mains choke (see chapter E.1.5 “Mains Chokes”, page 197).

11.2 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 & MEYERcables 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]		
	Wiring type B2(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

Tab. 2: Current carrying capacity according to DIN EN 60204-1

(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 × cable diameter to the wall (multicore or sheathed cables)

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

ISO cross-section [mm²]	AWG/MCM	
	Value	Equivalent cross-section [mm²]
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
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.

11.2.1 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 ⏚ 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.

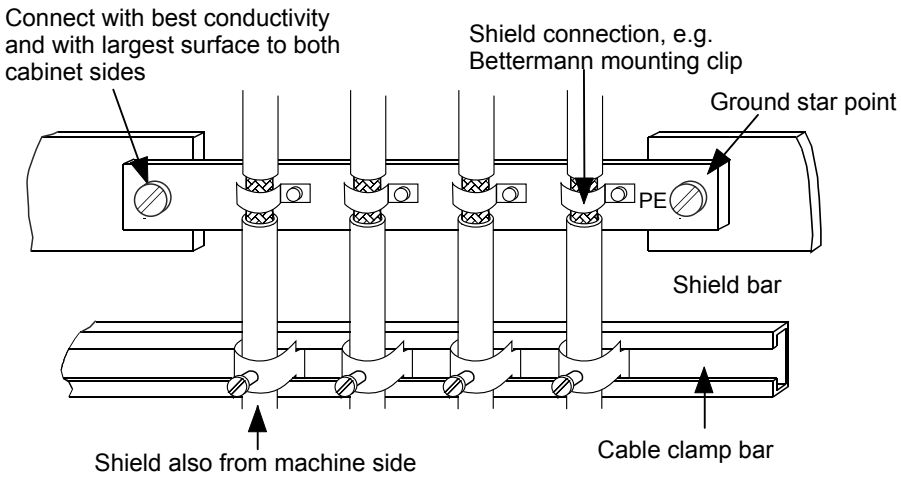


Fig. 102: Motor connection

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.

11.2.2 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.

USB

The USB cable must have a maximum length of 5 m according to the USB regulations. We recommend high-quality cables with integrated ferrite cores (available at SIEB & MEYER).

Note

Trouble-free USB communication is also highly dependent on the quality of the USB interface at the used PC/laptop.

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.

11.2.3 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.

Examples for the use of conductors:

- **Motors with resolver**
  LIYCY 3 x 2 x 0.14 or 4 x 2 x 0.14 for motors with integrated thermal contact. Conductors: shielded, twisted in pairs. Twist mode: sine/sine, cosine/cosine, rotor/rotor and, if necessary, thermal contact/thermal contact.
  For delicate applications we recommend additional shielding of the separate pairs.
- **Motors with incremental encoder**
  LIYCY 5 x 0.14 or 7 x 0.14 for motors with integrated thermal contact.
- **Motors with Hall sensors and tachometer generator**
  LIYCY 9 x 0.14 or 12 x 0.14 for motors with integrated thermal contact.

11.2.4 Cables for the External Ballast Resistor

The cables of the external ballast resistor of R_{EX} and +UB must be twisted. If the cable is longer than 20 cm a shielded cable must be used.

12 Electric Performance Dimensioning

Experience shows that questions arise during the dimensioning of a drive when selecting output stages and power supplies. This chapter shall make clear the physical background and shall help to dimension correctly the electronic components.

12.1 Components

The following sections provide information on the electric performance dimensioning of the drive components (output stage, power supply unit and motor).

12.1.1 Output Stage

The output stage of a drive amplifier is specified by the following details:

Voltage range

The maximum DC link voltage is limited by the used transistors and capacitors and the minimum space between the strip conductors.

When an output stage with a maximum admissible DC link voltage of 325 V_{DC} (class C) is used, i.e. with an AC power supply of 230 V_{AC}, the components will have an electric strength of 600 V_{DC}. The reserve is necessary in order to prevent damage in the case of voltage peaks and the DC link voltages during the deceleration.

Current range

The current range specifies the maximum admissible currents. Distinction is made between peak and rated current:

- The **peak current** is only admissible for a short time (mostly 5 seconds) and depends on the used transistors and their number.
- The **rated current** can be provided continuously by the output stage. Its value depends on the cooling of the transistors, that means: the capacity of the used heat sink and its ventilation.
- Due to the higher load of the power semiconductors in the output stage during a static rotating field or low rotating field frequencies ($f \leq 5$ Hz) the rated current will be reduced by the factor $\sqrt{2}$ within this frequency range for the SIEB & MEYER devices of the series SD2, SD2S and SD2T.

12.1.2 Power Supply

The power supply is specified by the following details:

Voltage range

The maximum supply voltage is limited by the used transistors, diodes and capacitors and the minimum space between the strip conductors.

Current range

The current range specifies the maximum admissible currents. Distinction is made between peak and rated current:

- The **peak current** is only admissible for a short time (mostly 1 second) and depends on the used diodes and their number.
- The **rated current** can be provided continuously by the power supply unit. Its value depends on the cooling of the diodes, that means: the capacity of the used heat sink and its ventilation.

Power

In practice, a maximum permanent power is specified for power supply units, since the supply voltage is assumed to be constant. As the limitation in the power supply unit is determined by the load carrying capacity of the diodes, the maximum permanent power depends on the supply voltage and the type of supply.

Examples:

- Power supply 230 V_{AC}, 2 phases, max. permanent current of the diodes 6 A
  230 V_{AC} × 2 × 6 A = 2.76 kW
- Power supply 400 V_{AC}, 3 phases, max. permanent current of the diodes 6 A
  400 V_{AC} × 3 × 6 A = 7.20 kW

The maximum peak current depends on the type of diode used.

The protection is calculated as follows:

$$\frac{\text{Power}}{\text{Input voltage}} = \frac{2.76\,\text{kW}}{230\,V_{AC}} = 12\,A_{rms}$$

12.1.3 Motor

The motor is specified by the following details:

Peak current

The peak current defines the max. allowed motor current. The peak current is only allowed for a short period of time (between 1 and 30 Sekunden) and depends on the used magnetic material and the thickness of the windings. Normally, the motor manufacturer defines the peak current applying during downtimes and during a rotating field. Generally, the values given on the motor data sheet are RMS values. SIEB & MEYER specifies currents as sine peak amplitudes.

The RMS values are calculated by dividing these values by the factor √2.

Rated current

The rated current can be applied permanently to the motor. The value depends on the cooling of the motor, the windings and the max. allowed motor temperature. Normally, the motor manufacturer defines the rated current applying during downtimes and during a rotating field. Generally, the values given on the motor data sheet are RMS values. SIEB & MEYER specifies currents as sine peak amplitudes.

The RMS values are calculated by dividing these values by the factor √2.

The current version of the software drivemaster2 allows switching between the RMS value and the sine peak amplitude (see “Settings → Program settings → View”). When switching the view, the existing values are automatically converted into the new unit. The default setting is the RMS value.

Motor voltage

The motor voltage is the voltage directly available at the motor. The value of the motor voltage depends on the used electric components. In case of a three-phase power supply with power choke, controlled drive amplifier and a motor choke, voltage drops of approx. 4 %, 8 % and 1 % of the mains voltage will result. Additional voltage losses of approx. 2 % can be observed in a soft net.

Example

The following example uses a controlled drive amplifier with a mains choke at a mains voltage of 400 V. The following motor voltage will result:

U_{Motor} = 400 V − (400 V * 12 %) = 352 V

Voltage constant

Due to its inductance the motor generates a countervoltage which is opposite to the supplied voltage. This voltage is proportional to the speed and defined in 'volt per 1000 revolutions'. Generally, the values are RMS values measured between the connection pins.

Example

- DC link voltage: 325 V
- e.m.f.: 1000 mV/min

A voltage of only 225 V is available to control the motor at 1000 rpm. The theoretical max. speed of the motor is 3250 rpm. At this speed no torque will be available anymore, since no current can be applied anymore.

Torque constant

The torque constant specifies the relation between the motor current and the motor torque (Nm/A). The torque constant results from the required max. speed, dynamic characteristics, efficiency and the quality of the magnetic material.

Inductive winding resistance

The inductive winding resistance (ωL) is the result of the individual number of windings of the total winding. During period of downtimes the resistance is zero. It increases with the frequency.

Ohmic winding resistance

The ohmic winding resistance R is the results from the length and the thickness of wire. During periods of downtimes it specifies the winding resistance alone.

Electric time constant

The elctric time constant is the quotient of the inductive and ohmic resistance (τ = L/R).

Motors for tightening systems

Generally, motors for tightening systems are high-dynamic motors characterized by high maximum speeds, high peak torque values, low inertia of masses and small rated torque values. This results in a small voltage constant, small inductance values, thin windings and low rotor diameters. Due to the low inductance value motors in tightening systems are operated at a high pulse with modulation frequency (PWM frequency 16 kHz) to keep the current ripple as small as possible.

12.2 Power Consumption of a Drive

If a constant torque is taken from the drive, the power consumption will depend on the current speed.

Examples:

- Preset torque: 30 Nm
- DC link voltage: 300 V
- Voltage constant: 50 mV / min (50 V / 1000 rpm)
- Coil resistance: 1 Ω
- Torque constant: 1 Nm / A

From this results a motor current of:

$$I = \frac{30\,Nm}{1\,Nm\ /\ A} = 30\,A$$

The motor requires a voltage of V = 1 Ω × 30 A = 30 V

0 rpm, standstill

From this results a power of P = 30 V × 30 A = 0.9 kW.

At a DC link voltage of 300 V an input current results from the supply voltage of I = P / 300 V = 3 A.

Thus, considerably less current flows in the power supply unit than in the motor. This calculation is very important especially for nut setting applications, since the high torques and thus currents are only required for low speeds.

2000 rpm

At 2000 rpm the motor requires a voltage of V = R × I + e.m.f. × n = 1 Ω × 30 A + 50 V / (1000 rpm) × (2000 rpm) = 130 V.

From this results a power of P = 130 V × 30 A = 3.9 kW.

At a DC link voltage of 300 V an input current results from the supply voltage of I = P / 300 V = 13 A.

Thus, a considerable higher current flows in the power supply at a speed of 2000 rpm than at standstill.

5400 rpm

At 5400 rpm the motor requires a voltage of V = R × I + e.m.f. × n = 1 Ω × 30 A + 50 V / (1000 rpm) × (5400 rpm) = 300 V.

From this results a power of P = 300 V × 30 A = 9 kW.

At a DC link voltage of 300 V an input current results from the supply voltage of I = P / 300 V = 30 A.

Thus, the same current flows in the power supply unit and in the motor at a speed of 5400 rpm. It must be considered that the currents flowing in the motor phases are lower by factor √3 than the currents calculated above.

The examples clearly show that the expected motion profile must be considered when dimensioning the power supply unit. An exact dimensioning can only be achieved by integrating the motion profile.

The same applies for conceiving the output stage and the motor.

13 Safety Circuit / Restart Lock (STO)

- *according to EN ISO 13849-1:2008-12, DIN EN 62061:2005 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 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 drives 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 EN ISO 13849-1 and/or DIN EN 62061 – 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.

13.1 Functional Description of the Restart Lock

The restart lock disables the respective drive of an installation. All other drive modules (servo amplifiers / frequency converters) remain ready for operation.

A TÜV approved safety circuit accesses relevant control units of the output stage transistors of the drive to be locked 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.

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 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).

≥

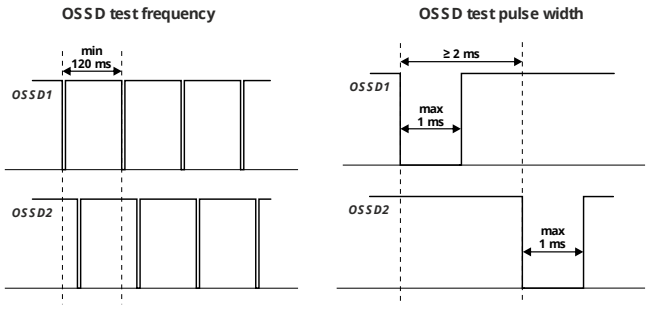


Fig. 103: OSSD Signals

The safety circuit is controlled by the OSSD1+2 signal or via one or several emergency stop switch devices. see also chapter 13.2 “Wiring Example”, page 176.

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.

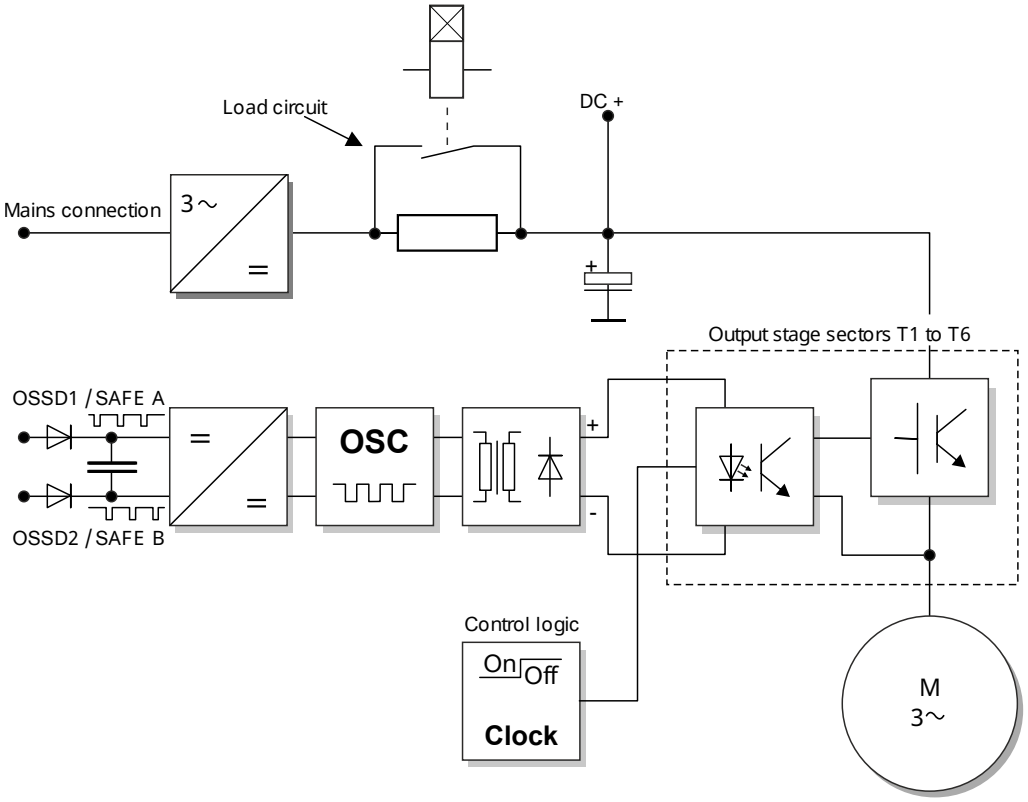


Fig. 104: Safety circuit control

⚠ 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.

13.2 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 (EN ISO 13849-1). This circuit allows connecting several emergency stop devices in parallel, which are permanently monitored.

Circuit with OSSD (SIL 3)

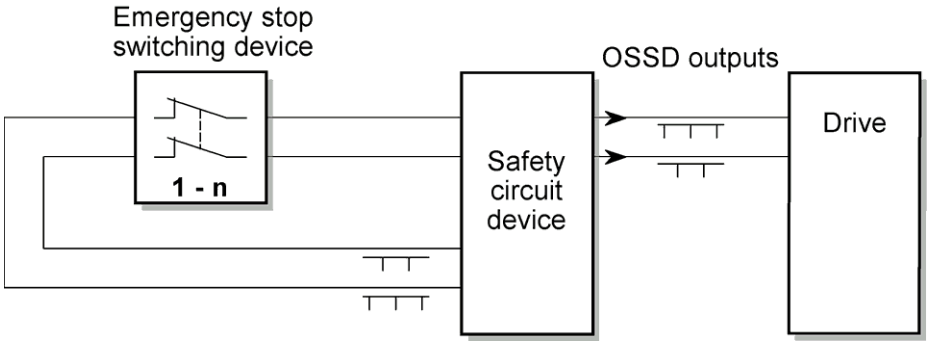


Fig. 105: Wiring with OSSD

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 EN ISO 13849-1) is achieved. It is also possible to cascade several different safe emergency stop devices, position switches or door locks to one safety circuit.

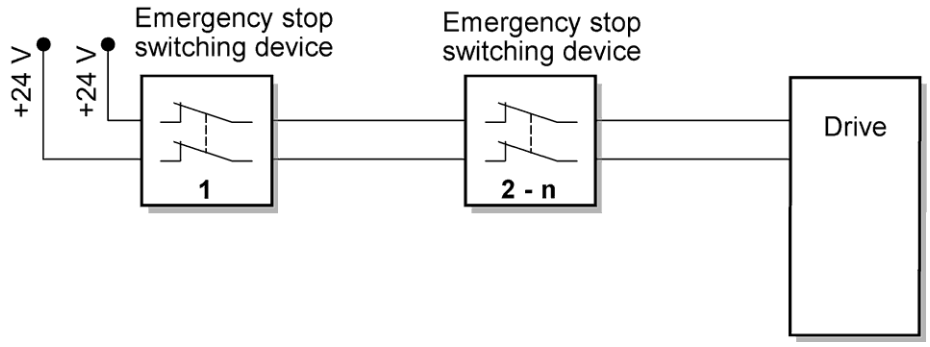


Fig. 106: Wiring without OSSD

Note

The safety relay as well as the emergency stop device have to be certificated as safety devices of at least level SIL 3 to obtain safety level SIL 3 according to EN ISO 13849-1.

Note

In order to obtain the safety level SIL 3 according to EN ISO 13849-1, the circuit and the layout have been dimensioned according to IEC 60664-1:2008-01. Supporting material according to IEC 60249 covered by a nonaging protective coat of lacquer according to IEC 60664-3:2003-09 have been used. The conformity of standard have been tested and approved by the TÜV-Nord CERT.

13.3 Requirements and Standards

The following parameters are achieved according to the safety case:

- according to EN ISO 13849-1:2008-12
  - MTTFd: >100 years
  - DC = 99%
  - Category 4
  - Performance Level e
- according to EN 61508-1:2010 and EN 61800-5-2:2014-06
  - PFH = 0
  - SFF = 100 % (if there are PFH values, then SFF<100%)
  - HFT = 0

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

Requirements according to DIN EN 61800-5-2:2014-06

When connected appropriately, the safety concept K1 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.

13.4 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

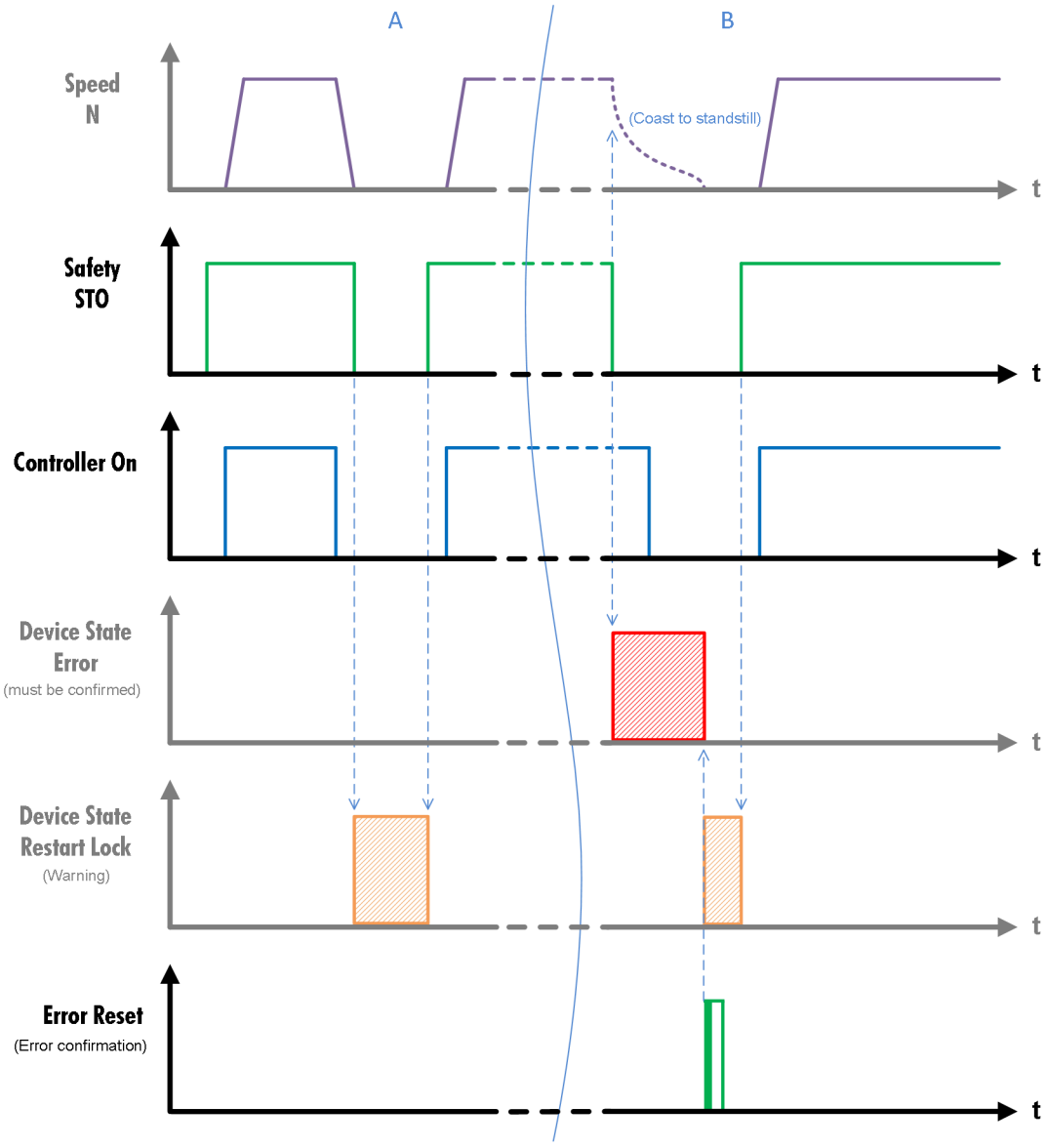


Fig. 107: Behavior STO / restart lock - timing and required actions

Use case A If an STO contact is interrupted during “Switch off”, the device status “Switch on disabled” is triggered. As soon as the STO contact is closed again, the drive can restart with the next “Switch on”.

Use case B If an STO contact is interrupted during “Switch on”, the device status “Error” is triggered. The error must be confirmed via an error reset to continue operation.

14 Appendix

A Specification of Drive Functions

Devices of the series SD2S can operate with different drive functions depending on the loaded drive software. The different drive functions support different motors and motor measuring systems.

Note

The available drive functions depend on the device type and device version.

- **SERVO / VECTOR**

  For linear and rotary synchronous and asynchronous motors:
  - mean speeds (< 120,000 rpm)
  - high resolution measuring systems
  - high performance speed control
  - full control at low speeds and standstill
  - special feature SVC (sensorless vector control): sensorless operation (up to 120,000 rpm)
- **HSPWM** (high-speed pulse-width modulation)

  For rotary synchronous and asynchronous motors:
  - high speeds (up to 480,000 rpm)
  - low losses in the drive
  - sensorless operation

    (Optionally a measuring system for speed monitoring can be used to signal the states “speed zero” and “reference value reached”.)
- **HSBLOCK / FPAM** (high-speed block commutation / flux pulse amplitude modulation)

  For rotary synchronous motor:
  - operation with Hall sensors or sensorless
  - Hall sensors: mean speeds (up to 360,000 rpm)

    sensorless: high speeds (up to 480,000 rpm)
  - high performance speed control
- **HSPAM / UF** (high-speed pulse amplitude modulation / V/f control system)

  For rotary asynchronous motor:
  - V/f PWM available for devices with fix DC link voltage
  - HSPAM (V/f PAM) available for devices with controlled DC link voltage
  - PWM: mean speeds (up to 120,000 rpm)
  - PAM: high speeds (up to 480,000 rpm)
  - V/f characteristic curve for asynchronous motors
  - simple parameterization and unproblematic operation of motors
  - sensorless operation

    (Optionally a measuring system for speed monitoring can be used to signal the states “speed zero” and “reference value reached”.)

The following figure shows the speed ranges of the different drive functions:

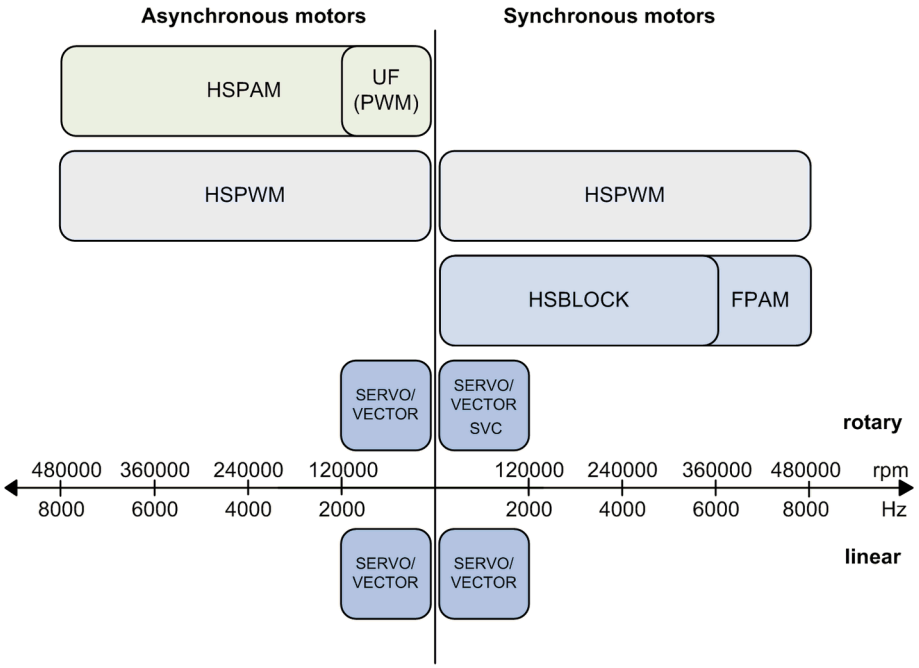


Fig. 108: Speed ranges of drive functionsSD2S

Motor

Drive function	SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Motors	▸ Synchronous rotative ▸ Asynchronous rotative ▸ Synchronous linear ▸ Voice coil ▸ Up to 2000 Hz rotating field frequency	▸ Synchronous rotative ▸ Asynchronous rotative ▸ Up to 8000 Hz rotating field frequency at 320 V_{DC} ▸ Up to 5333 Hz rotating field frequency at 560 V_{DC}	HSBLOCK ▸ Synchronous rotative ▸ Up to 6000 Hz rotating field frequency	V/f PAM ▸ Asynchronous rotative ▸ Up to 8000 Hz rotating field frequency
	SVC: ▸ Synchronous rotative ▸ Up to 2000 Hz rotating field frequency		FPAM ▸ Synchronous rotative ▸ Up to 8000 Hz rotating field frequency	V/f PWM ▸ Asynchronous rotative ▸ Up to 2000 Hz rotating field frequency

Software

Drive function	SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Software packages[1]	L04001**1**Vxxxxx & F04001**1**Vxxxxx ▸ special function: **EnDat 2.1**	L04002Vxxxxx & F04004Vxxxxx	L04003Vxxxxx & F04007Vxxxxx ▸ special function: **Hall measuring system**	L09005Vxxxxx & F09005Vxxxxx
	L04001Vxxxxx & F04003Vxxxxx ▸ special function: **Hiperface**	L04002Vxxxxx & F04013Vxxxxx ▸ (including V/f)	L09003Vxxxxx & F09007Vxxxxx ▸ special function: **sensorless**	L04002Vxxxxx & F04013Vxxxxx ▸ (HSPWM included)
	L04001Vxxxxx & F04006Vxxxxx ▸ special function: **electronic gear**			L04002Vxxxxx & F04012Vxxxxx ▸ (SVC included)
	L04002Vxxxxx & F04012Vxxxxx ▸ special function: **SVC** ▸ (including V/f)			

[1] After the firmware and logic software have been detected, the SD2S software packages can be identified by the numbers '4' or '9' (devices with controlled DC link voltage) contained in the software designation (e.g. logic software = **L**x**4**xxx, firmware = **F**x**4**xxx).

Measuring system

Drive function	SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Measuring systems	**L04001 / F04001** ▸ Resolver (up to 666 Hz) ▸ Incremental encoder TTL with magnetic alignment (5 V / max. 2.5 MHz[1]) ▸ Sine/cosine encoder with magnetic alignment (1 V_{pp} / max. 230 kHz[1]) ▸ Sine/cosine encoder with EnDat 2.1 (1 V_{pp} / max. 230 kHz[1]) ▸ Linear Hall encoder	**L04002 / F04004** ▸ Sensorless ▸ Hall sensor (12 V) ▸ Sine/cosine encoder (1 V_{pp} / max. 230 kHz[1]) ▸ Field plate 2-wire ▸ Field plate 3-wire ▸ Pulse generator NAMUR ▸ Pulse generator Hall A ▸ Pulse generator 24 V ▸ Pulse generator 5 V ▸ Digital field plate / GMR	**L04003 / F04007** ▸ Hall sensor (12 V) ▸ Hall sensor (5 V)	**L09005 / F09005** ▸ Sensorless ▸ Sine/cosine encoder (1 V_{pp} / max. 230 kHz[1]) ▸ Field plate 2-wire ▸ Field plate 3-wire ▸ Pulse generator NAMUR ▸ Pulse generator Hall A ▸ Pulse generator 24 V ▸ Pulse generator 5 V
	L04001 / F04003 ▸ Resolver (up to 666 Hz) ▸ Incremental encoder TTL with magnetic alignment (5 V / max. 2.5 MHz[1]) ▸ Sine/cosine encoder with magnetic alignment (1 V_{pp} / max. 230 kHz[1]) ▸ Sine/cosine encoder with Hiperface (1 V_{pp} / max. 230 kHz[1]) ▸ Linear Hall encoder	**L04002 / F04013** ▸ Sensorless ▸ Field plate 2-wire ▸ Field plate 3-wire ▸ Pulse generator NAMUR ▸ Pulse generator 24 V ▸ Pulse generator 5 V ▸ Digital field plate / GMR	**L04003 / F09007** ▸ EMF Measuring ▸ Hall sensor (12 V) ▸ Hall sensor (5 V)	**L04002 / F04013** ▸ Sensorless ▸ Field plate 2-wire ▸ Field plate 3-wire ▸ Pulse generator NAMUR ▸ Pulse generator 24 V ▸ Pulse generator 5 V ▸ Digital field plate / GMR
	L04001 / F04006 ▸ Resolver (up to 666 Hz) ▸ Incremental encoder TTL with magnetic alignment (5 V / max. 2.5 MHz[1]) ▸ Sine/cosine encoder with magnetic alignment (1 V_{pp} / max. 230 kHz[1]) ▸ Linear Hall encoder			**L04002 / F04012** ▸ Sensorless ▸ Field plate 2-wire ▸ Field plate 3-wire ▸ Pulse generator NAMUR ▸ Pulse generator 24 V ▸ Pulse generator 5 V ▸ Digital field plate / GMR
	L04002 / F04012 ▸ Sensorless Vector Control (SVC)			

[1] This specification applies per track.

Operating mode

Drive function	SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Operating modes	▸ Speed Mode ▸ Current reference value ▸ Profile Velocity Mode ▸ Interpolated position control ▸ Electronic gear	▸ Speed Mode	▸ Speed Mode	▸ Speed Mode

Software Connection

Drive function	SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Parameterization in software *drivemaster2*	▸ USB connection ▸ RS232 connection ▸ SERVOLINK 4 (only optical fibers)			

Communication channels

Drive function	SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Control channel	▸ Digital inputs ▸ SERVOLINK 4 ▸ Serial interface / RS485 / USB ▸ CAN Bus ▸ DNC 8 Byte Telegram			
Setpoint channel	▸ Analog inputs ▸ SERVOLINK 4 ▸ CAN Bus ▸ DNC 8 Byte Telegram ▸ Serial interface / RS485 / USB ▸ Internal setpoints ▸ Encoder 0 (only with software package L04001 / F04006)	▸ Analog inputs ▸ SERVOLINK 4 ▸ CAN Bus ▸ DNC 8 Byte Telegram ▸ Serial interface / RS485 / USB ▸ Internal setpoints		

Control

Drive function	SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Operating frequency	8 / 16 kHz	8 / 16 / 32 / 64 / 128 kHz	8[(1)] / 16 / 32 / 64[(1)] kHz	8 / 16 kHz[(1)]
All-digital current control	16 kHz	16 / 32 / 64 / 128 / 256 kHz	16[(1)] / 32 / 64 / 128[(1)] kHz	8 / 16 kHz[(1)]
All-digital speed control	16 kHz (62.5 µs)			
All-digital position control	4 kHz (250 µs)[2]	-		

[(1)] Only for device with fix DC link.

[(2)] Only with interpolated position control and electronic gear.

Interfaces

Drive function		SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Digital inputs		▸ 9 inputs 24 V incl. 1 input (latch function 250 kHz (4 µs) sampling) ▸ 12 – 24 V high / 0 – 5 V low ▸ Sampling 4 kHz (250 µs) ▸ Function to be configured via software			
Digital Outputs		▸ 5 outputs 24 V (max. 100 mA per output) ▸ Sampling 4 kHz (250 µs) ▸ Function to be configured via software			
Analog inputs		▸ 2 differential signal inputs ▸ Operating range ±10 V ▸ Maximum range ±12 V ▸ Resolution internal 14 Bit ▸ Sampling 4 kHz (250 µs) ▸ Function to be configured via software			
Analog outputs		▸ 2 outputs ▸ Operating range 0 – 10 V ▸ Maximum range 0 – 10 V ▸ Resolution internal 14 Bit ▸ Sampling 4 kHz (250 µs) ▸ Function to be configured via software			
Encoder	ENC0	▸ Input ▸ Signal A Quad B, pulse/direction, CW/CCW ▸ Maximum input frequency 2.5 MHz per track ▸ Level RS422			
	ENC1/ EMU	**ENC1/EMU as input** ▸ Signal A Quad B ▸ Maximum input/output frequency 2.5 MHz per track ▸ Level RS422 **ENC1/EMU as output** ▸ Signal A Quad B / pulse output ▸ Maximum input/output frequency 2.5 MHz per track ▸ Level RS422 (3.3 V)			

Monitorings

Drive function	SERVO / VECTOR	HSPWM	HSBLOCK / FPAM	HSPAM / VF
Monitoring functions	▸ Measuring systems ▸ Power supply unit: load ▸ Power supply unit: charge monitoring overvoltage ▸ Power supply unit: charge monitoring undervoltage ▸ Power output stage: load (I^2t) ▸ Power output stage: temperature ▸ Power output stage: short circuit (U, V, W, PE) ▸ Power output stage: safety circuit ▸ Motor: load (I^2t) ▸ Motor: temperature (PTC, NTC, KTY84/130) ▸ Motor: motor phase missing ▸ DC link: overvoltage ▸ DC link: undervoltage ▸ Ballast circuit: load ▸ Ambient temperature ▸ Speed: error / slip ▸ Speed: overspeed ▸ Position: tracking error (only with interpolated position control and electronic gear)			

B Specification of Device Firmware

The following firmware variants are available for the drive amplifiers of the series SD2S.

Note

Please consider that some device variants do not provide all connections specified in the firmware.

B.1 Firmware for SD2S with Fix DC Link

Firmware SD2S with fix DC link (without version number vxxxxx)	**F04001 SERVO_STD**	**F04003 SERVO_HIPERFACE**	**F04004 HSPWM**	**F04006 SERVO_GEAR**	**F04007 HSBLOCK**	**F04012 UF_SVC**	**F04013 UF_HSPWM**	**F04017 UF_SVC_CAN**	**F04018 SERVO_ASYNCHRON**	**F04021 SERVO_ETHERCAT**	**F04022 SERVO_ASYNCHRON_CAN**	**F04024 UF_SVC_ETHERCAT**	**F04025 SERVO_ASYNCHRON_ETHERCAT**
SERVO / VECTOR	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
Sensorless vector control (SVC), synchronous						✓		✓				✓	
Resolver	✓	✓		✓	✓				✓	✓	✓		✓
Incremental encoder AB 5 V	✓	✓		✓	✓				✓	✓	✓		✓
Incremental encoder AB 12 V					✓					✓			
Sine/cosine encoder 1 V_{pp}	✓	✓		✓					✓	✓	✓		✓
Linear Hall Encoder 1 V_{pp}	✓	✓		✓	✓					✓			
EnDat 2.1	✓												
Hiperface		✓											
HSPAM / VF, asynchronous rotary						✓	✓	✓					
Sensorless						✓	✓	✓					
Field plate 2-wire						✓	✓	✓					
Field plate 3-wire						✓	✓	✓					
Pulse generator NAMUR						✓	✓	✓					
Pulse generator 24 V						✓	✓	✓					
Pulse generator 5 V						✓	✓	✓					
Digital field plate / GMR						✓	✓	✓					
Flying Restart						✓	✓	✓					
Current-controlled startup						✓	✓	✓					
HSBLOCK / FPAM, synchronous rotary					✓								
Hall ABC 12 V					✓								
Hall ABC 5 V					✓								
Phase Voltage Measurement													
HSPWM, synchronous/asynchronous rotary			✓				✓						
Sensorless			✓				✓						
Field plate 2-wire			✓				✓						

Firmware SD2S with fix DC link (without version number vxxxxx)	F04001 SERVO_STD	F04003 SERVO_HIPERFACE	F04004 HSPWM	F04006 SERVO_GEAR	F04007 HSBLOCK	F04012 UF_SVC	F04013 UF_HSPWM	F04017 UF_SVC_CAN	F04018 SERVO_ASYNCHRON	F04021 SERVO_ETHERCAT	F04022 SERVO_ASYNCHRON_CAN	F04024 UF_SVC_ETHERCAT	F04025 SERVO_ASYNCHRON_ETHERCAT
Field plate 3-wire			✓				✓						
Pulse generator NAMUR			✓				✓						
Pulse generator 24 V			✓				✓						
Pulse generator 5 V			✓				✓						
Digital field plate / GMR			✓				✓						
Hall ABC 12 V			✓				✓						
Hall A 12 V			✓				✓						
Sine/cosine encoder 1 V_{pp}			✓				✓						
Operating modes													
Current control	✓	✓		✓	✓				✓	✓	✓		✓
Velocity mode 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Profile Velocity Mode	✓	✓		✓									
Interpolated position control	✓	✓								✓			
Electronic gear				✓									
Control and setpoint channels													
Analog + digital inputs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Serial interface / RS485 / USB	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SERVOLINK 4	✓	✓	✓		✓	✓	✓		✓				
CAN bus			✓	✓	✓			✓			✓		
DNC 8 Byte			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
EtherCAT										✓		✓	✓
Internal setpoints			✓		✓	✓	✓	✓	✓		✓	✓	✓
Motor potentiometer			✓		✓	✓	✓	✓	✓			✓	
Encoder 0 / pulse direction input				✓									
Encoder Emulation													
AB quadrature signals	✓	✓		✓	✓				✓	✓	✓		✓
Speed pulses			✓			✓	✓	✓					
Others													
Multi parameter sets			✓		✓	✓	✓	✓	✓		✓	✓	✓
Winding Detection						✓		✓				✓	
Field weakening synchronous						✓		✓	✓	✓	✓	✓	✓
Current controlled ramps[(1)]						✓	✓	✓	✓		✓	✓	✓
Evaluation of difference measuring system	✓	✓											

[(1)] Not available with drive function HSPWM

B.2 Firmware for SD2S with Controlled DC Link

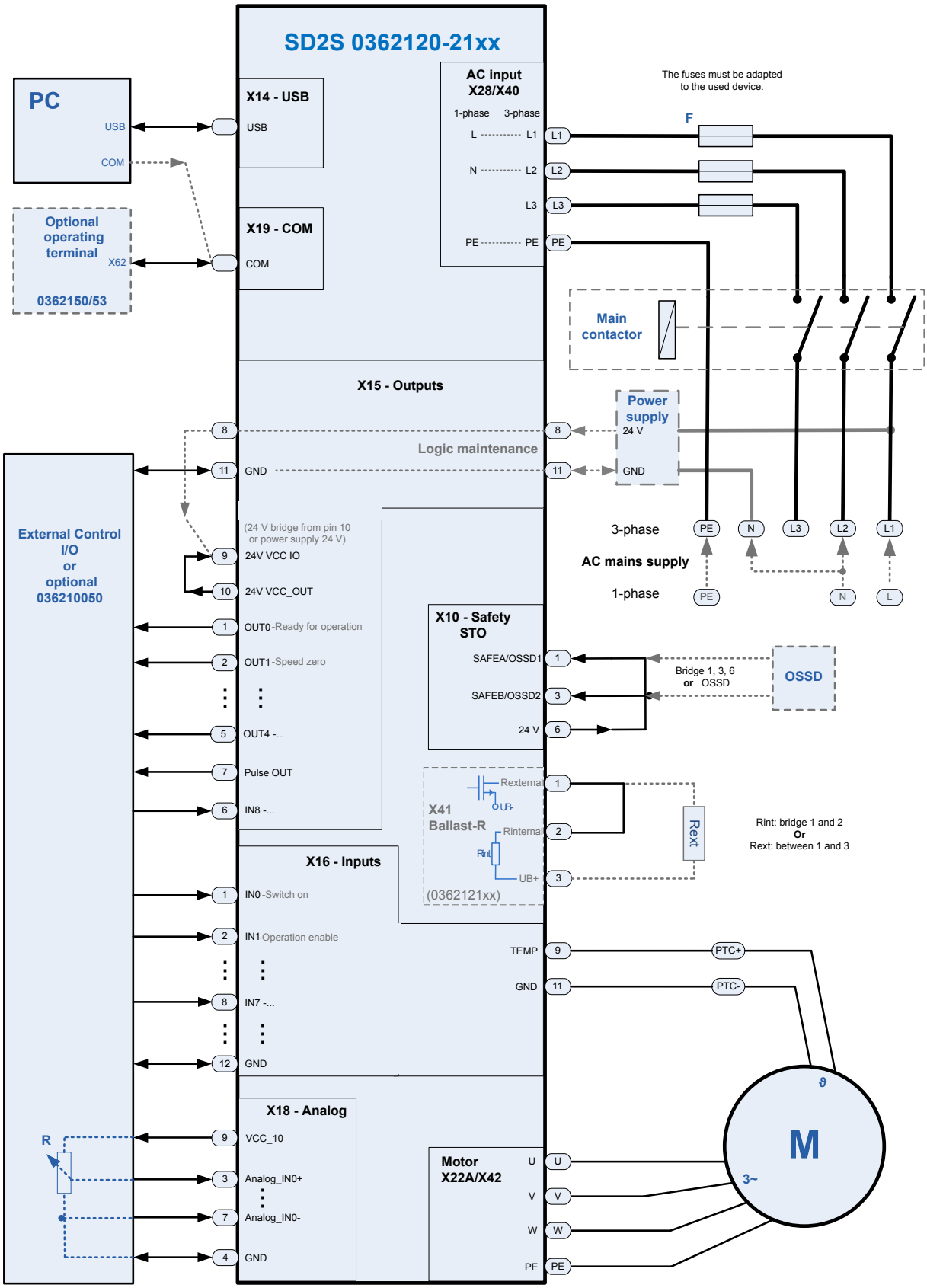
Firmware SD2S with controlled DC link (without version number vxxxxx)	F09005 UF	F09006 SERVO_CAN	F09008 UF_SVC	F09009 UF_HSBLOCK_FPAM	F09010 UF_SVC_CAN	F09011 UF_HSBLOCK_FPAM_CAN	F09012 UF_HSBLOCK_FPAM_ETHERCAT
SERVO / VECTOR		✓	✓		✓		
Sensorless vector control (SVC), synchronous			✓		✓		
Resolver		✓					
Incremental encoder AB 5 V		✓					
Incremental encoder AB 12 V							
Sine/cosine encoder 1 V_{pp}		✓					
Linear Hall Encoder 1 V_{pp}		✓					
EnDat 2.1							
Hiperface							
HSPAM / UF, asynchronous rotary	✓		✓	✓	✓	✓	✓
Sensorless	✓		✓	✓	✓	✓	✓
Field plate 2-wire	✓		✓	✓	✓	✓	✓
Field plate 3-wire	✓		✓	✓	✓	✓	✓
Pulse generator NAMUR	✓		✓	✓	✓	✓	✓
Pulse generator 24 V	✓		✓	✓	✓	✓	✓
Pulse generator 5 V	✓		✓	✓	✓	✓	✓
Digital field plate / GMR	✓		✓	✓	✓	✓	✓
Flying Restart							
Current-controlled startup							
HSBLOCK / FPAM, synchronous rotary				✓		✓	✓
Hall ABC 12 V				✓		✓	✓
Hall ABC 5 V				✓		✓	✓
Phase Voltage Measurement				✓		✓	✓
Operating modes							
Current control		✓					
Velocity mode 1	✓	✓	✓	✓	✓	✓	✓
Profile Velocity Mode							
Interpolated position control							
Electronic gear							
Control and setpoint channels							
Analog + digital inputs	✓	✓	✓	✓	✓	✓	✓
Serial interface / RS485 / USB	✓	✓	✓	✓	✓	✓	✓
SERVOLINK 4	✓	✓	✓	✓			
CAN bus		✓			✓	✓	
DNC 8 Byte	✓	✓	✓	✓	✓	✓	✓
EtherCAT							✓

Firmware SD2S with controlled DC link (without version number vxxxxx)	F09005 UF	F09006 SERVO_CAN	F09008 UF_SVC	F09009 UF_HSBLOCK_FPAM	F09010 UF_SVC_CAN	F09011 UF_HSBLOCK_FPAM_CAN	F09012 UF_HSBLOCK_FPAM_ETHERCAT
Internal setpoints	✓	✓	✓	✓	✓	✓	✓
Motor potentiometer	✓	✓	✓	✓	✓	✓	✓
Encoder 0 / pulse direction input							
Encoder Emulation							
AB quadrature signals		✓		✓		✓	✓
Speed pulses	✓		✓	✓	✓	✓	✓
Others							
Multi parameter sets	✓		✓	✓	✓	✓	✓
Winding Detection			✓		✓		
Field weakening synchronous			✓		✓		
Current controlled ramps			✓	✓	✓	✓	✓
Evaluation of difference measuring system							

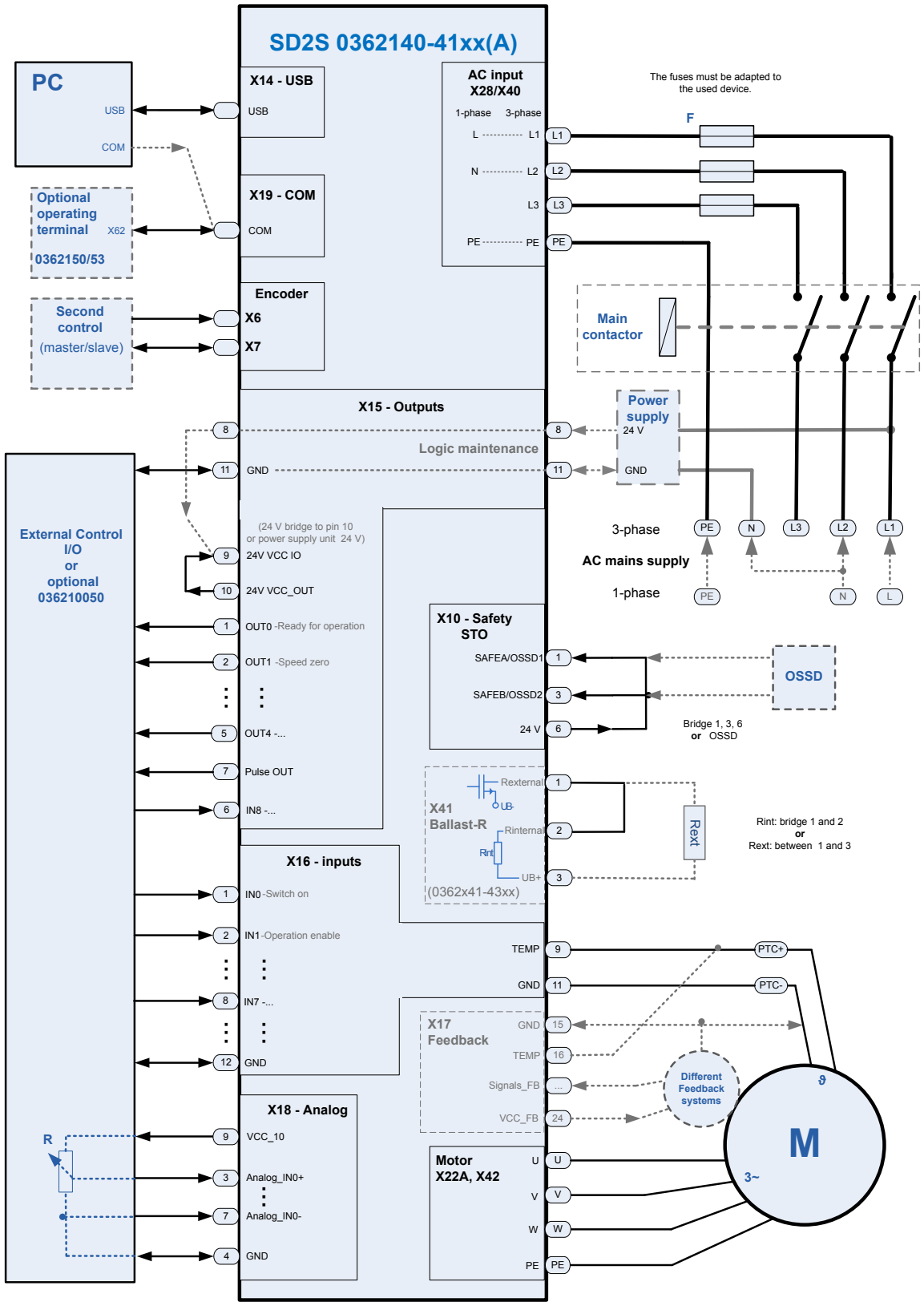
C Connection Diagram

The following connection diagrams are examples for the device wiring.

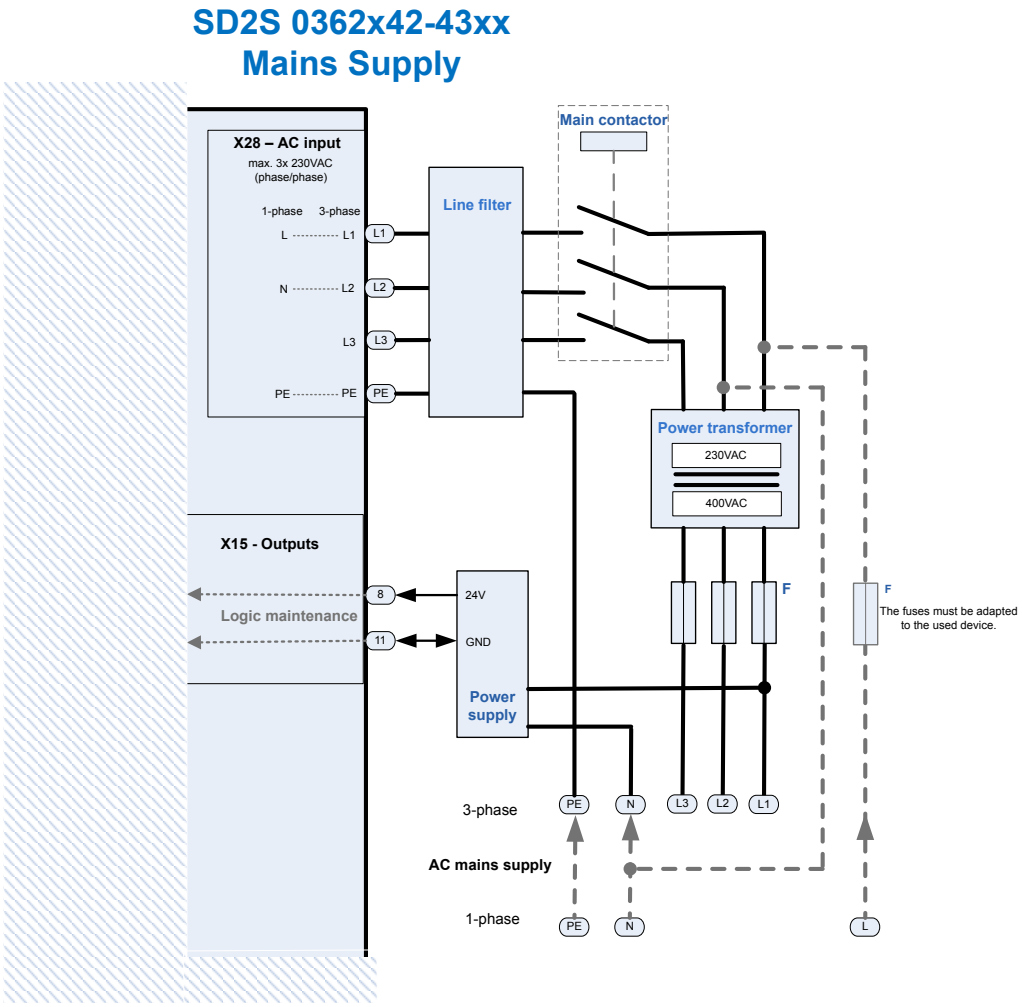
C.1 Wiring Example 0362120xx, 0362121xx



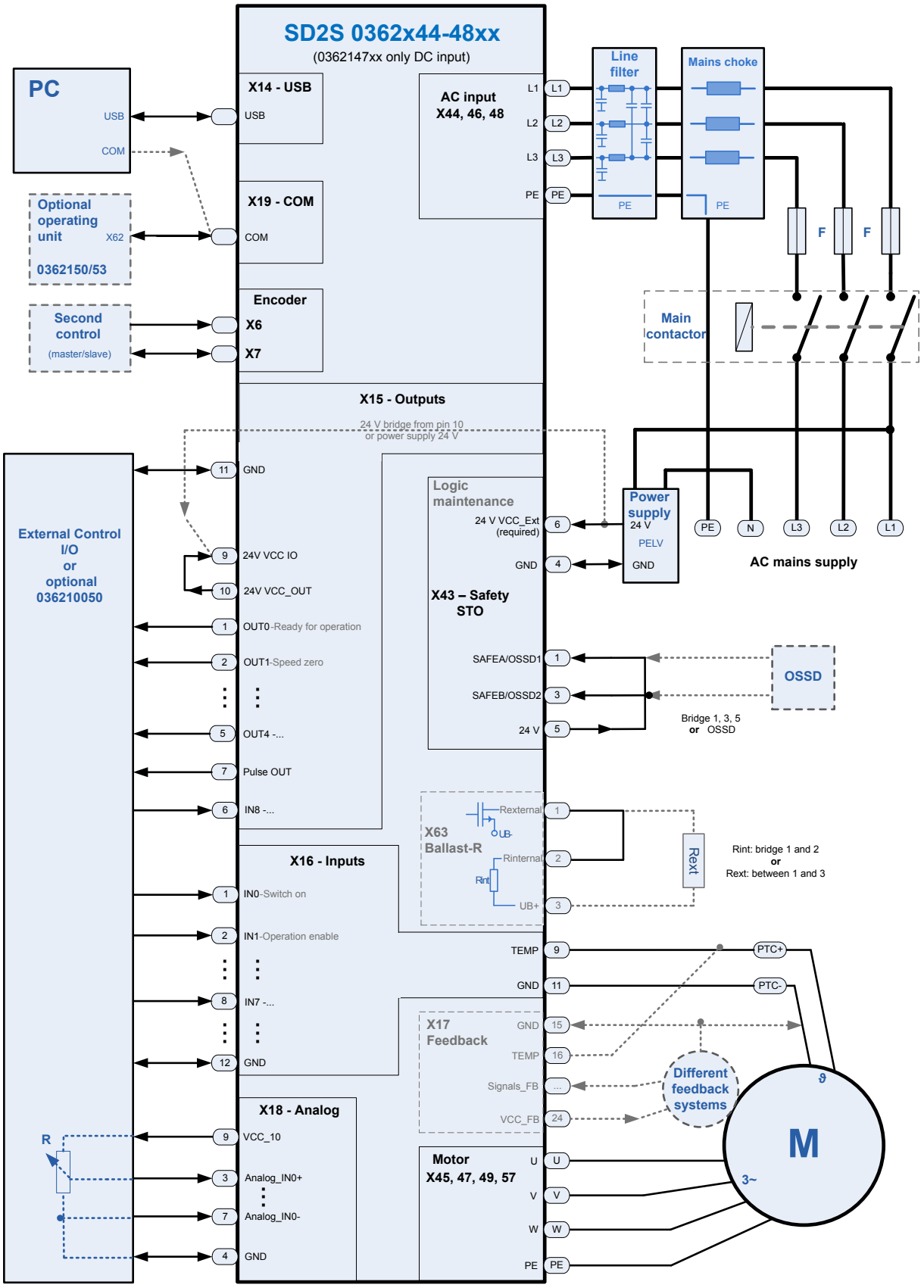
C.2 Wiring Example 0362x40xx(A), 0362x41xx(A)



C.3 Wiring Example 0362x42xx, 0362x43xx (Specifics of the Mains Supply)



C.4 Wiring Example 0362144xx to 0362x48xx



D Mains Fuse Protection

Depending on the device variant and supply you need to use different mains fuses to protect your SD2S device. The following table indicates suitable mains fuses for example by Siemens:

Device type	Mains supply	I_{rated} fuse	Suitable fuse	
			Siemens SITOR	Design
0362120DA	1-phase	16 A	5SE1 316	NEOZED D01
0362120DC	1-phase	16 A	5SE1 316	NEOZED D01
0362120EC	1-phase	16 A	5SE1 316	NEOZED D01
0362x40DA	1-phase	16 A	5SE1 316	NEOZED D01
0362x40DC(A)	1-phase	16 A	5SE1 316	NEOZED D01
0362x40EC	1-phase	16 A	5SE1 316	NEOZED D01
0362x40EF	3-phase	16 A	5SE1 316	NEOZED D01
0362121EC	1/3-phase	20 A	5SD4 30	DIAZED DII
0362121IC	1/3-phase	20 A	5SD4 30	DIAZED DII
0362121EF	3-phase	16 A	5SE1 316	NEOZED D01
0362121IF	3-phase	16 A	5SE1 316	NEOZED D01
0362x41EC(A)	1/3-phase	20 A	5SD4 30	DIAZED DII
0362x41IC	1/3-phase	20 A	5SD4 30	DIAZED DII
0362x41EF	3-phase	16 A	5SE1 316	NEOZED D01
0362x41IF	3-phase	16 A	5SE1 316	NEOZED D01
0362x42DC	1-phase	16 A	5SE1 316	NEOZED D01
0362x42EC	1-phase	20 A	5SD4 30	DIAZED DII
0362x42EC	3-phase	16 A	5SE1 316	NEOZED D01
0362x43EC	1-phase	20 A	5SD4 30	DIAZED DII
0362x43EC	3-phase	16 A	5SE1 316	NEOZED D01
0362144EF	3-phase	30 A	5SD4 80	DIAZED DII
0362x45EF	3-phase	30 A	5SD4 80	DIAZED DII
0362x45IF	3-phase	50 A	5SD4 60	DIAZED DIII
0362x46IF	3-phase	50 A	5SD4 60	DIAZED DIII
0362x46LF	3-phase	63 A	5SD4 70	DIAZED DIII
0362x48MF	3-phase	100 A	5SD5 20	DIAZED DIV
0362x48OF	3-phase	100 A	5SD5 20	DIAZED DIV

E Manufacturers

E.1 SIEB & MEYER Accessories

In the following you find all accessories for SD2S that you can order at SIEB & MEYER.

Note

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

E.1.1 Connectors of the Series SD2S

Connector/cable kits

SIEB & MEYER article number	Device variant
32299545	0362120xC, 0362x40xC(A)
32299548	0362120xA, 0362x40xA (low voltage devices)
32299546	0362x40EF, 0362121xx, 0362x41xx(A), 0362x42EC, 0362x43xx
32299602	0362242DC
32299566	0362144xx
32299565	0362x45xx
32299606	0362x46xx
32299564	0362147xx
32299563	0362x48xx

A connector kit contains mating connectors for motor connection, mains supply, ballast resistor (if available), I/O contacts and safety as well as a suitable shield connection clamp. All items are manufactured by Phoenix Contact.

Note

The connector kits do not include D-sub mating connectors for connecting the used measuring systems.

Fiber optic connectors

SIEB & MEYER article number	Description
12540102	Female connector, input (black)
12540202	Female connector, output (gray)
32022900	Cable connector (Toslink F05)
47000001	Polishing disk for optical fiber cables
47000002	Dismantling tool for optical fiber cables
47000003	Grinding paper

E.1.2 Operating Terminal

SIEB & MEYERarticle number	Description
0362150	Plug-on operating terminal
0362153	Operating terminal for switch cabinet installation
32299567	Switch cabinet kit for operating terminal 0362150

E.1.3 Ferrite Core for Motor Cable

SIEB & MEYER article number	Description
13163110	R 63/38/25, Al = 15150 nH

E.1.4 Line Filters for Frequency Converter/Power Electronics

Line Filters by TDK & EPCOS Group

- 1-phase and 3-phase line filters
- high attenuation
- partial RCD compatibility

Note

The maximum current (I_{max}) must be adapted to the back-up fuses of the device.

Note

When such a line filter is used, very high leakage currents occur because of Cy > 1.5 µF. For this reason the line filter is only to a limited extent usable with an RCD (residual current protective device).

You can order appropriate line filters by TDK & EPCOS Group at SIEB & MEYER. The following table lists the article numbers:

SIEB & MEYER article number	Rated current (I_{rated})	Leakage current (I_{leak})
35063080 (1-phase)	20 A	7.9 mA
35063103 (3-phase)	50 A	15 mA
35063106 (3-phase)	90 A	18 mA
35063107 (3-phase)	120 A	18 mA
35063115 (3-phase)	220 A	17 mA

E.1.5 Mains Chokes

Note

Choose the mains choke according to the expected continuous current per mains phase.

The following mains chokes by the company Block are available from SIEB & MEYER:

SIEB & MEYERarticle number	Description
13015833	Mains choke: 1 × 6 A
13015834	Mains choke: 1 × 10 A
13015835	Mains choke: 1 ×16 A
13015801	Mains choke: 3 × 16 A, uk = 3 %
13015802	Mains choke: 3 × 25 A, uk = 3 %
13015803	Mains choke: 3 × 35 A, uk = 3 %
13015804	Mains choke: 3 × 40 A, uk = 3 %
13015805	Mains choke: 3 × 50 A, uk = 3 %
13015808	Mains choke: 3 × 80 A, uk = 3 %
13015810	Mains choke: 3 × 90 A, uk = 3 %
13015811	Mains choke: 3 × 100 A, uk = 3 %
13015812	Mains choke: 3 × 180 A, uk = 3 %
13015814	Mains choke: 3 × 250 A, uk = 3 %
13015823	Mains choke: 3 × 300 A, uk = 3 %
13015825	Mains choke: 3 × 500 A, uk = 3 %

SIEB & MEYERarticle number	Description
13015826	Mains choke: 3 × 630 A, uk = 3 %

Manufacturers of mains chokes:

- http://www.block.eu
- http://www.enerdoor.de

E.1.6 USB>RS232/485 Converter 050201

The USB>RS232/485 Converter can be ordered at SIEB & MEYER as an optional accessory for device configuration. This converter is developed especially for the amplifier series SD2x. Via the converter the devices can communicate with a PC without RS232 or RS485 interface.

A short USB cable is supplied with the converter. The connection cable to the drive amplifiers must be ordered additionally or built by yourself with suitable length.

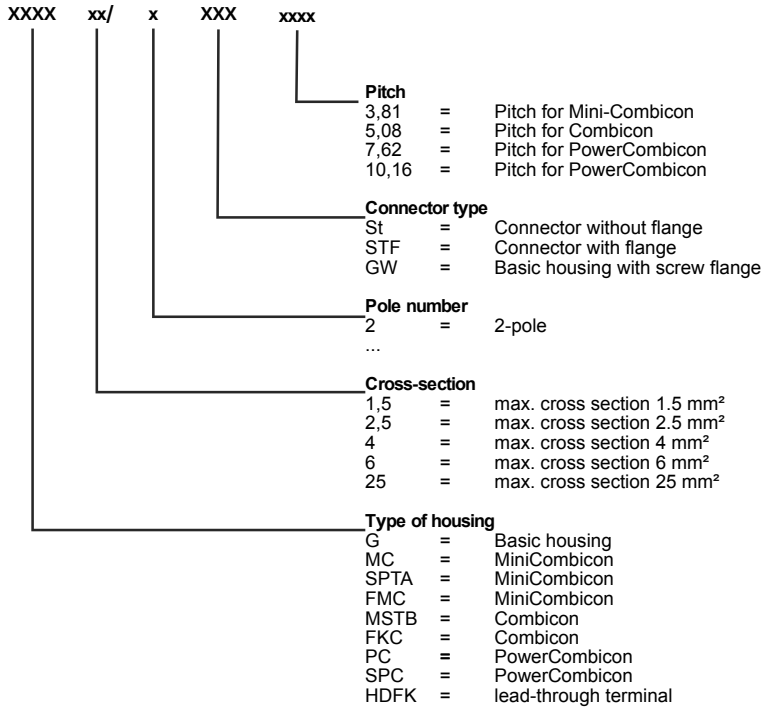
SIEB & MEYER article number	Description
050201	USB>RS232/485 converter
K362103xxxR01 (xxx = cable length in dm)	RS232 device connection cable to the converter 050201

For further information, refer to the document “050201 – USB>RS232/485 Converter”.

E.2 Phoenix Contact

http://www.phoenixcontact.com

Order key for Phoenix connectors



Note

Labeled connectors can be ordered at SIEB & MEYER.

E.2.1 Surge Arrestor FLASHTRAB

Phoenix article number	Description
2905469	Type 1+2 special combined lightning current and surge arrester FLT-SEC-T1+T2-3C-350/25-FM: for devices with 3-phase mains supply, with combined PE and N installed in one conductor (L1, L2, L3, PEN)
2905470	Type 1+2 special combined lightning current and surge arrester- FLT-SEC-T1+T2-3S-350/25-FM: for devices with 3-phase mains supply, with separate PE and N (L1, L2, L3, PE, N)
2907928	Type 3 surge protection device PLT-SEC-T3-230-FM-PT: for devices with 1-phase mains supply, rated voltage 230 V AC/DC

E.2.2 Shield Connection Clamps

Shield connection clamps for EMC busbar and for motor/power or measuring system connection of the devices

Phoenix article number	Name	Connection method	Tightening torque	SD2S with mounting holes at device housing
3025163	SK 8	Screw connection (M4)	max. 0.6 Nm	0362144xx to 0362x48xx(1)
3025176	SK 14	Screw connection (M4)	max. 0.8 Nm	0362120xx, 0362x40xx(A)
3025189	SK 20	Screw connection (M4)	max. 0.8 Nm	0362121xx, 0362x41xx(A) to 0362x43xx

Phoenix article number	Name	Connection method	Tightening torque	SD2S with mounting holes at device housing
3026463	SK 35	Screw connection (M5)	1.5 to 1.8 Nm	–

(1) Older devices of the series 0362145xx to 0362148xx do not yet provide the mounting holes for the shield connection clamp.

Alternatively you can use WAGO terminals (see WAGO Shield Connection Clamps (p. 200)).

E.3 TOSHIBA - Fiber Optic Connectors

http://www.toshiba.com

E.4 WAGO Innovative Connections

http://www.wago.com

E.4.1 Shield Connection Clamps

Shield connection clamps for EMC busbar and for motor/power connection of the devices

WAGO article number	Description
791-111	Diameter of connectable conductor; 5 to 11 mm; height max. 47 mm; 17 mm wide (corresponds to SK 14 by Phoenix Contact)
791-117	Diameter of connectable conductor; 10 to 17 mm; height max. 63 mm; 23 mm wide (corresponds to SK 20 by Phoenix Contact)

For an alternative solution see Phoenix Shield Connection Clamps (p. 199)

E.4.2 Carrier with Grounding Foot

WAGO article number	Description
790-112	Carrier with grounding foot parallel to carrier rail (25 mm long)
790-114	Carrier with grounding foot parallel to carrier rail (45 mm long)

15 Index

Special characters

A

B

C

D

E

F

G

I

L

M

O

P

Q

R

S

T

U

W

X