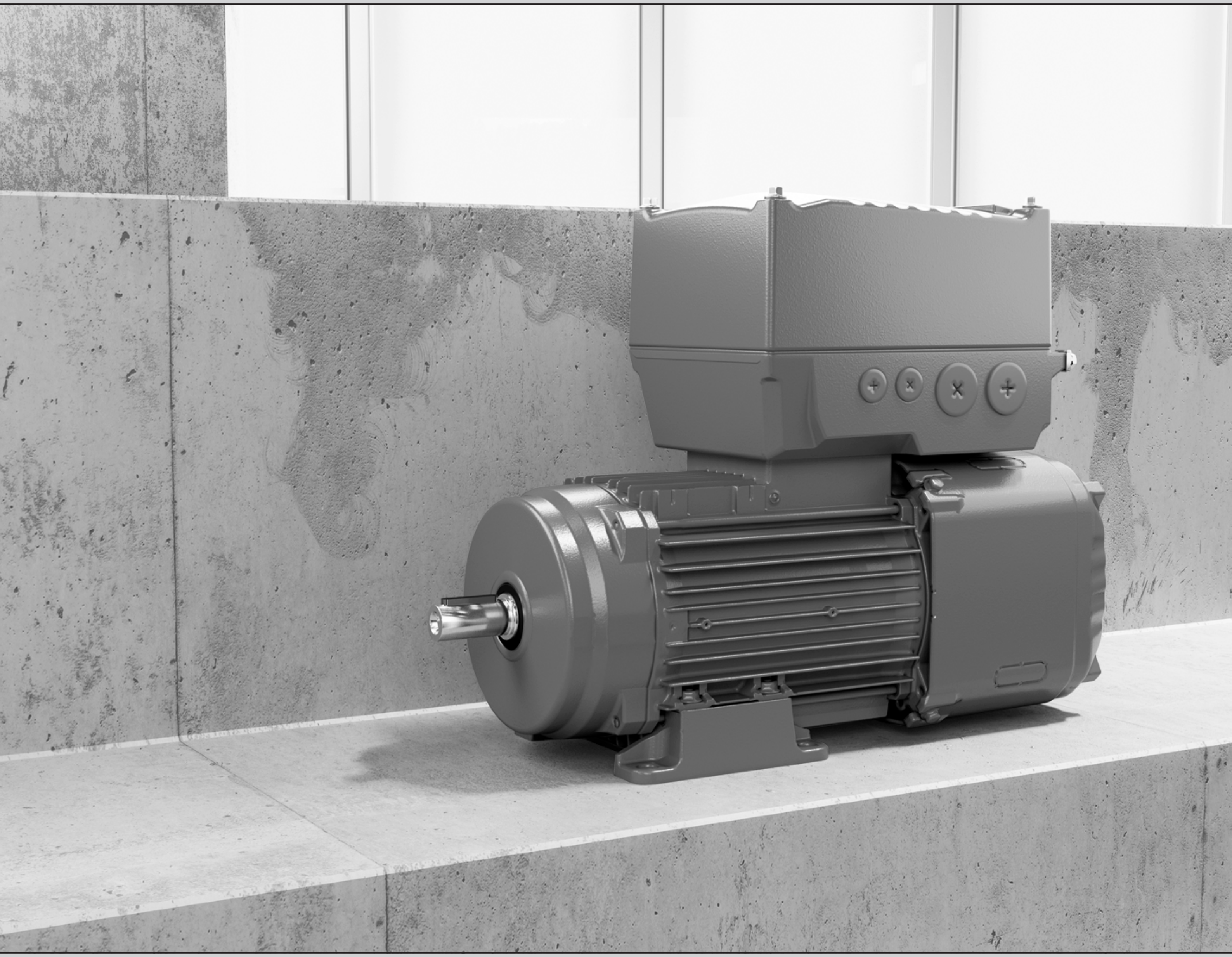
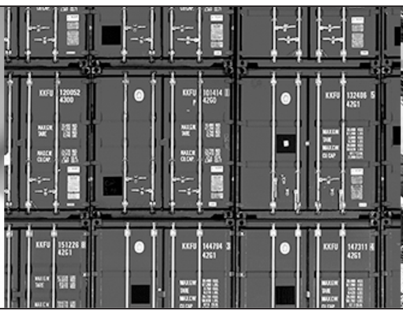
Operating Instructions



Mechatronic Drive Unit
MOVIMOT® advanced
DRN..DAC.. (AS-Interface)

Edition 05/2020

25892339/EN



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1 General information

1.1 About this documentation

The documentation at hand is the original.

This documentation is an integral part of the product. The documentation is intended for all employees who perform work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, contact SEW-EURODRIVE.

1.2 Other applicable documentation

Refer to the corresponding documentation for all other components.

Always use the latest edition of the documentation and the software.

The SEW-EURODRIVE website (www.sew-eurodrive.com) provides a wide selection of documents for download in various languages. If required, you can also order printed and bound copies of the documentation from SEW-EURODRIVE.

1.3 Structure of the safety notes

1.3.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent hazard	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

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1.3.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning about suspended load
	Warning of automatic restart

1.3.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD!** Type and source of hazard. Possible consequence(s) if disregarded. Measure(s) to prevent the hazard.

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1.4 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

1.5 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

1.6 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.7 Copyright notice

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2 Safety notes for MOVIMOT® advanced

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Duties of the user

As the user, you must ensure that the basic safety notes are observed and complied with. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it.

As the user, you must ensure that all of the work listed in the following is carried out only by qualified specialists:

- Setup and installation
- Installation and connection
- Startup
- Maintenance and repairs
- Shutdown
- Disassembly

Ensure that the persons who work on the product pay attention to the following regulations, conditions, documentation, and information:

- National and regional safety and accident prevention regulations
- Warning and safety signs on the product
- All other relevant project planning documents, installation and startup instructions, and wiring diagrams
- Do not assemble, install or operate damaged products
- All system-specific specifications and conditions

Ensure that systems in which the product is installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical work equipment and accident prevention regulations.

2.3 Target group

Specialist for mechanical work

Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualifications in the field of mechanics in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrotechnical work

Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualifications in the field of electrical engineering in accordance with the national regulations
- Familiarity with this documentation

Additional qualifications

In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation.

The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the training is to give persons the ability to perform the required tasks and work steps in a safe and correct manner.

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2.4 Designated use

The product is intended for installation in electrical plants or machines.

In case of installation in electrical systems or machines, startup of the product is prohibited until it is determined that the machine meets the requirements stipulated in the local laws and directives. For Europe, Machinery Directive 2006/42/EC as well as the EMC Directive 2014/30/EU apply. Observe EN 60204-1 (Safety of machinery - electrical equipment of machines). The product meets the requirements stipulated in the Low Voltage Directive 2014/35/EU.

The standards given in the declaration of conformity apply to the product.

Technical data and information on the connection conditions are provided on the nameplate and in chapter "Technical data" in the documentation. Always comply with the data and conditions.

Unintended or improper use of the product may result in severe injury to persons and damage to property.

Do not use the product as a climbing aid.

2.4.1 Restrictions under the European WEEE Directive 2012/19/EU

You may use options and accessories from SEW-EURODRIVE exclusively in connection with products from SEW-EURODRIVE.

2.4.2 Hoist applications

To avoid danger of fatal injury by falling hoists, observe the following points when using the product in lifting applications:

- The product is not designed for use as a safety device in lifting applications.
- Use additional monitoring systems or mechanical protection devices.

2.5 Functional safety technology

The product must not perform any safety functions without a higher-level safety system, unless explicitly allowed by the documentation.

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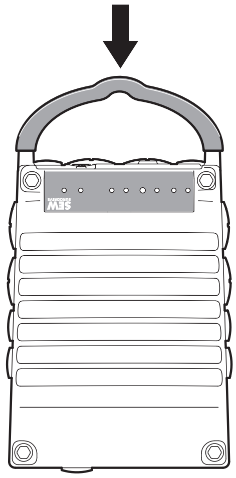
2.6 Transportation

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product is damaged, it must not be assembled, installed or started up.

The lifting eye is designed to carry only the mass of the motor without gear unit. Tighten the retaining screws of the lifting eye. Mounted gear units have separate suspension attachments, which must be used according to the gear unit operating instructions when lifting the gearmotor. Do not mount any additional loads.

The following figure depicts the position of the lifting eye of the motor without gear unit.



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Remove the lifting eye before connecting the PE cable, see chapter "Electrical installation" > "Installation instructions".

Store the lifting eye for future service work, see chapter "Service" > "Device replacement".

Observe the following notes when transporting the device:

- Always use all attachment points if available. The attachment points are designed to carry only the mass of the product. Severe or fatal injuries. Do not apply any additional loads.
- Ensure that the product is not subject to mechanical impact.

If necessary, use suitable, sufficiently dimensioned handling equipment.

Do not transport or store the product on the fan guard.

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2.7 Installation/assembly

Ensure that the product is installed and cooled in accordance with the regulations in the documentation.

Protect the product from excessive mechanical strain. The product and its mounted components must not protrude into the path of persons or vehicles. Ensure that no components are deformed or no insulation spaces are modified, particularly during transportation. Electrical components must not be mechanically damaged or destroyed.

Observe the notes in chapter Mechanical installation in the documentation.

2.7.1 Restrictions of use

The following applications are prohibited unless the device is explicitly designed for such use:

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 61800-5-1
- Use at an elevation of more than 3800 m above sea level

The product can be used at altitudes above 1000 m above sea level up to 3800 m above sea level under the following conditions:

- The reduction of the nominal output current and/or the line voltage is considered according to the data in chapter Technical data in the documentation.
- Above 2000 m above sea level, the air and creeping distances are only sufficient for overvoltage class II according to EN 60664. At altitudes above 2000 m above sea level, limiting measures must be taken which reduce the line side overvoltage from category III to category II for the entire system.
- If a protective electrical separation (in accordance with EN 61800-5-1 and EN 60204-1) is required, then implement this outside the product at altitudes of more than 2000 m above sea level.

2.8 Protective separation

The product meets all requirements for protective separation of power and electronics connections in accordance with EN 61800-5-1. The connected signal circuits must meet requirements according to SELV (**S**afety **E**xtra **L**ow **V**oltage) or PELV (**P**rotective **E**xtra **L**ow **V**oltage) to ensure protective separation. The installation must meet the requirements for protective separation.

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2.9 Electrical installation

Ensure that all of the required covers are correctly attached after carrying out the electrical installation.

Make sure that preventive measures and protection devices comply with the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

2.9.1 Stationary application

Necessary preventive measure for the product is:

Type of energy transfer	Preventive measure
Direct power supply	• Ground connection

2.9.2 Regenerative operation

The drive is operated as a generator due to the kinetic energy of the system/machine. Before opening the connection box, secure the output shaft against rotation.

2.10 Startup/operation

Observe the safety notes in chapters Startup and Operation in this documentation.

Make sure the connection boxes are closed and screwed before connecting the supply voltage.

Depending on the degree of protection, products may have live, uninsulated, and sometimes moving or rotating parts, as well as hot surfaces during operation.

When the device is switched on, dangerous voltages are present at all power connections as well as at any connected cables and terminals. This also applies even when the product is inhibited and the motor is at standstill.

Do not separate the connection to the product during operation. This may result in dangerous electric arcs damaging the product.

If you disconnect the product from the voltage supply, do not touch any live components or power connections because capacitors might still be charged. Observe the following minimum switch-off time:

5 minutes.

Observe the corresponding information signs on the product.

The fact that the operation LED and other display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically. If, for safety reasons, this is not permitted for the drive-controlled machine, first disconnect the product from the supply system and then start troubleshooting.

Risk of burns: The surface temperature of the product can exceed 60 °C during operation. Do not touch the product during operation. Let the product cool down before touching it.

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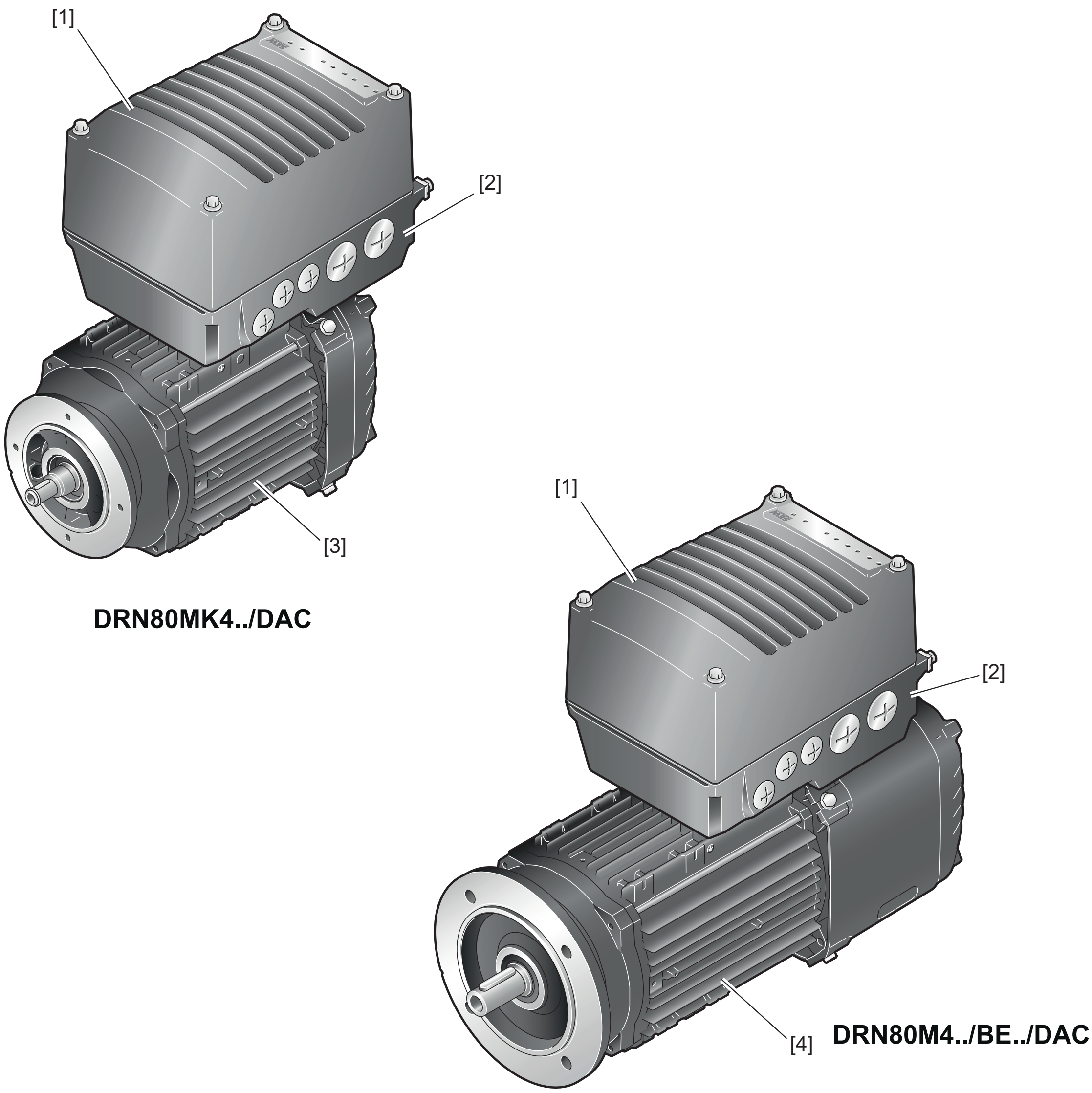
3 Device structure

3.1 MOVIMOT® advanced drive unit

The following figure shows an example of the MOVIMOT® advanced drive units:



32537401611

[1] Electronics cover
[2] Connection box for cable glands
[3] AC asynchronous motor
[4] AC asynchronous motor with brake

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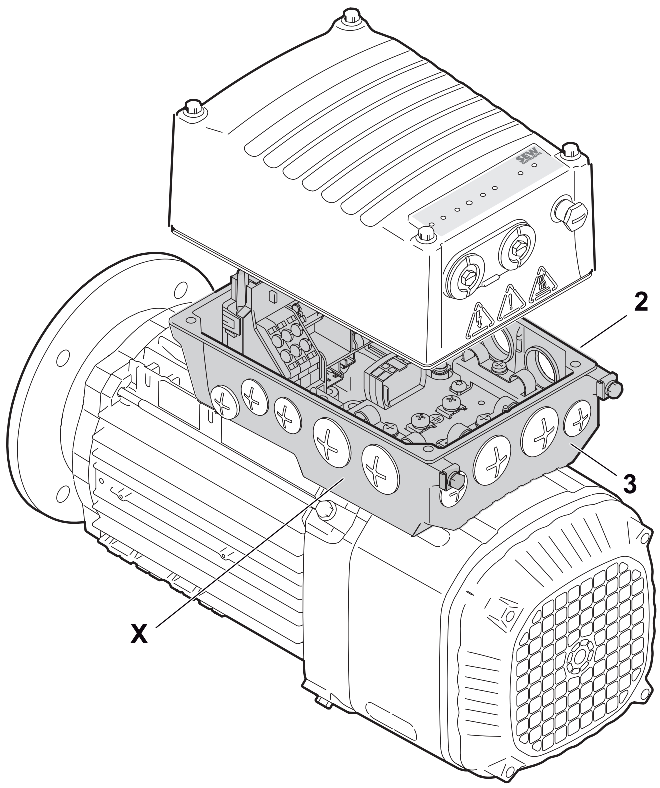
3.2 Cable entry position

The device is equipped with the following cable entries:

- Position X + 2 + 3
  - X: 2 x M25 x 1.5 + 2 x M16 x 1.5 + 1 x M16 x 1.5 (only for option /PE)
  - 2: 2 x M25 x 1.5 + 2 x M16 x 1.5 + 1 x M16 x 1.5 (only for option /PE)
  - 3: 2 × M25 × 1.5 + 2 × M16 × 1.5

3.2.1 Overview

The following figure shows the possible cable entries of MOVIMOT® advanced:



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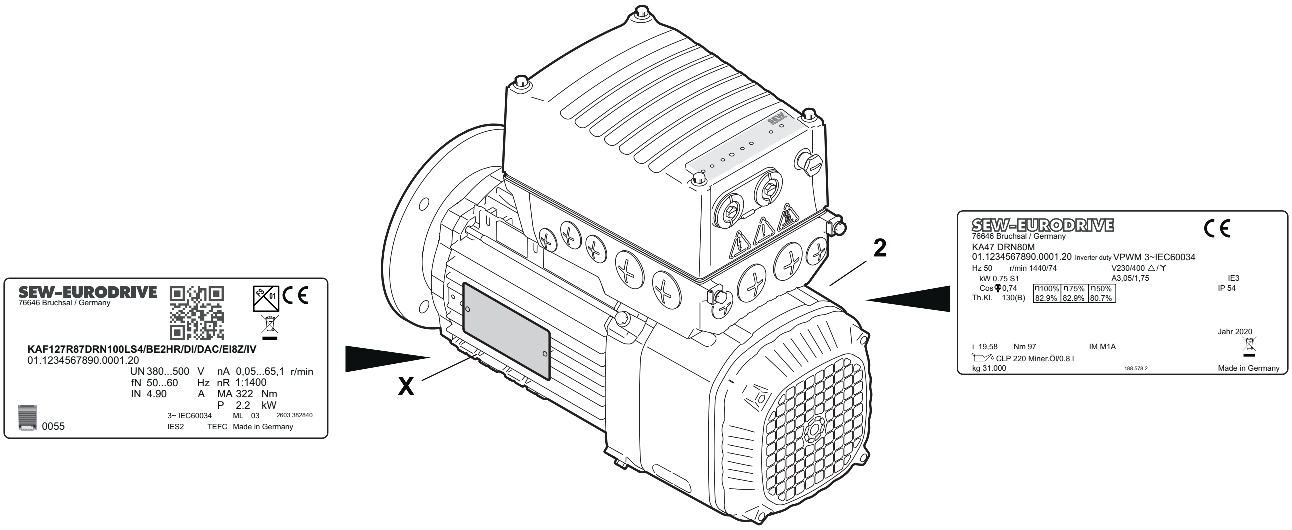
3.3 Nameplate positions

The 2 nameplates for MOVIMOT® advanced can be found on positions X and 2.

3.3.1 Overview

The following figure shows the positions of the nameplates:



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3.4 Example nameplate and type designation of the drive unit

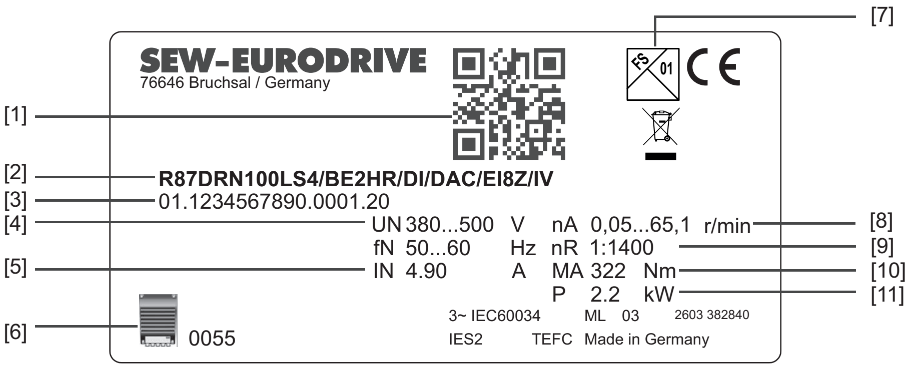
3.4.1 Nameplates

The MOVIMOT® advanced drive unit is always equipped with 2 nameplates:

- Nameplate 1: Data of the drive unit.
- Nameplate 2: Data of the motor.

The following figures show examples of the nameplates of the drive unit and the motor. For the structure of the type designation, refer to chapter "Type designation".

Nameplate of the drive unit



32420513931

[1]	2D QR Code. Includes the serial number and a link to the drive unit data on the SEW-EURODRIVE website (IoT Label).
[2]	Type designation of the drive unit
[3]	Serial number
[4]	Nominal input voltage of the drive unit
[5]	Nominal input current of the drive unit
[6]	Nominal output current of the assigned electronics cover (inverter) 0055 = 5.5 A
[7]	FS logo
[8]	Output speed range of the drive unit
[9]	Speed setting range
[10]	Nominal torque of the drive unit
[11]	Nominal power of the drive unit

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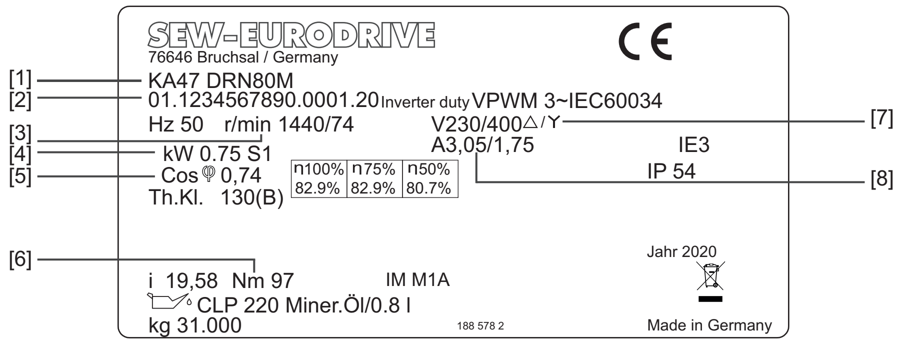
Nameplate of the motor



32420610315

[1] Motor type designation
[2] Serial number
[3] Nominal speed of the motor/output shaft at nominal frequency
[4] Nominal power of the motor
[5] Power factor of the motor (power factor of the drive unit = 0.99)
[6] Nominal torque of the motor
[7] Nominal voltage of the motor (depending on connection type)
[8] Nominal current of the motor (depending on connection type)

FS logo description

The FS logo on the nameplate is based on the combination of safety-related components that is installed.

The following FS logo variants are possible:

Device with STO connection via terminals or plug connectors.

3.4.2 Type designation

The following table shows the type designation of the drive unit:

R	**Gear unit series**[1]. R = Primary gear unit
87	**Gear unit size**[2].
DRN	**Product family** DRN = Asynchronous motor of the DRN.. series
80	**Sizes 71 | 80 | 90 | 100**
S	**Length** S = Short M = medium L = Long MK = Medium (short version) LS = Long (short version)

4	**Number of poles** 4 = 4-pole motor
/	
BE1	**Brake** BE03 = BE03 brake BE05 = BE05 brake BE1 = BE1 brake BE2 = BE2 brake BE5 = BE5 brake
HF	**Brake options** HF = Manual brake release, lockable HR = Manual brake release, automatic disengaging function
/	
DI	**Digital motor integration** DI = Digital interface
/	
DAC	**Communication variant** DFC = Direct Fieldbus Communication DSI = Direct System Bus Installation DAC = Direct AS-Interface Communication DBC = Direct Binary Communication
EI8Z	**Option** EI8Z = Single-turn encoder with DDI connection IV = Plug connector TF = Motor protection D11 = Switch disconnector with feedback contact BW1 = Integrated BW1 braking resistor PE = Pressure compensation fitting electronics AL = Metal fan C = Canopy RI = Reinforced winding insulation 2W = Shaft end on the motor/brakemotor

1) You can find more gear unit series in the gearmotor catalog
2) You can find more gear unit sizes in the gearmotor catalog

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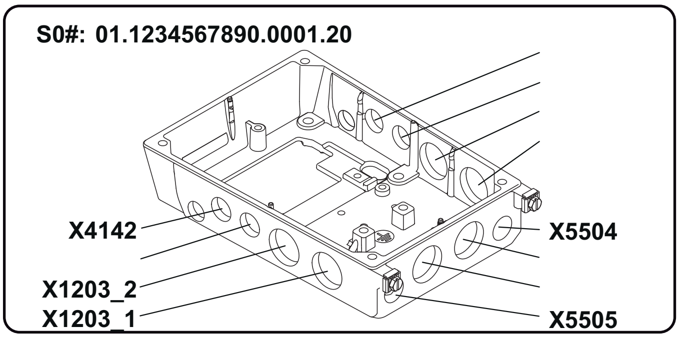
3.5 Examples for the optional nameplate "Electrical regulations UL/CE" (in preparation)

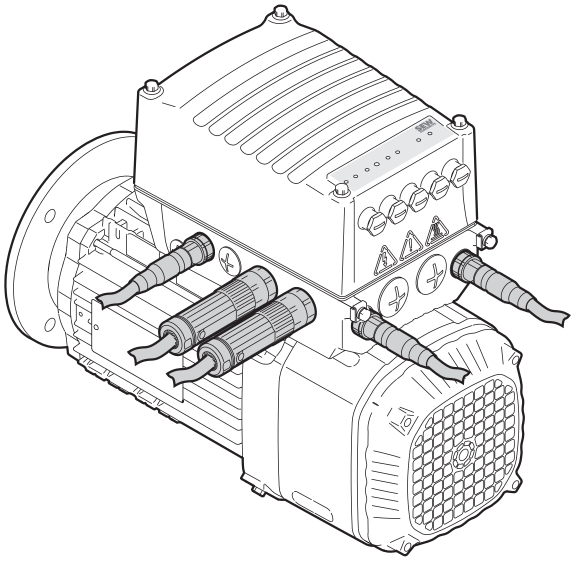
3.6 Examples for the optional nameplate "Plug connector positions"

The nameplate is not attached to the device. If the nameplate "Plug connector positions" has been ordered, a nameplate is included in the delivery.

The following figure shows an example of the optional nameplate "Plug connector positions":



32166306571



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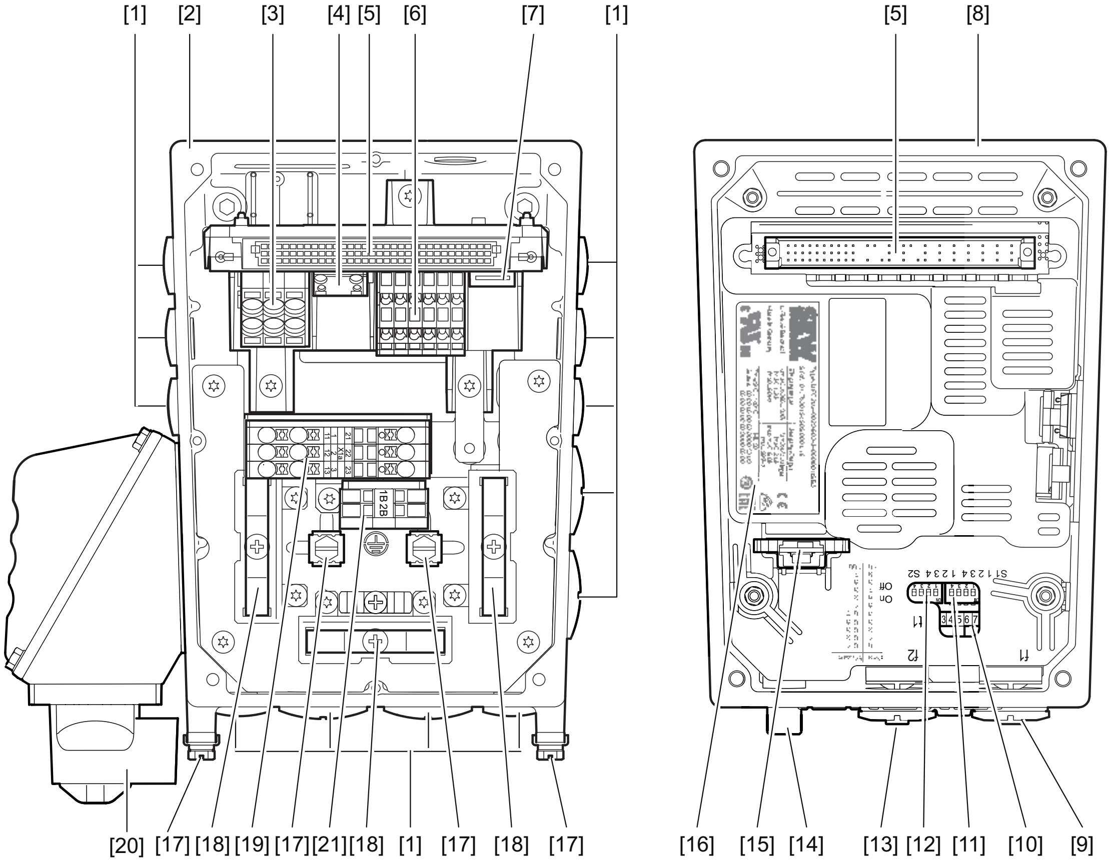
3.7 Electronics

3.7.1 Electronics cover (inside) and connection box

The following figure shows the connection box and the bottom side of the electronics cover:



32211237899

[1] Cable glands
[2] Connection box
[3] Line connection L1, L2, L3 (X1, only WITHOUT switch disconnector)
[4] Braking resistor connection
[5] Plug connector connection unit for electronics cover
[6] Electronics terminal strip
[7] Engineering interface
[8] Electronics cover
[9] Potentiometer f1 (underneath the screw plug)
[10] Potentiometer t1
[11] DIP switches S1/1 – S1/4
[12] DIP switches S2/1 – S2/4
[13] Potentiometer f2 (underneath the screw plug)
[14] Plug connectors
[15] Replaceable memory module
[16] Electronics cover nameplate
[17] Screws for PE connection
[18] Shield clamps
[19] Line connection L1, L2, L3 (X1a, only in combination WITH switch disconnector)
[20] Switch disconnector (optional)
[21] Internal clamp connection

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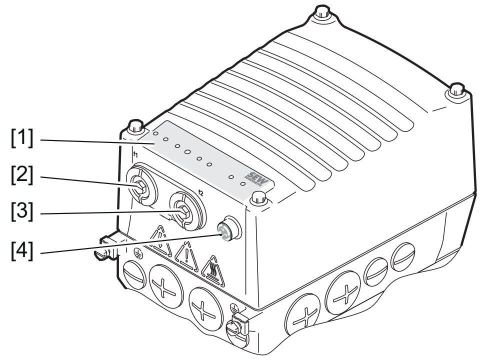
3.7.2 Electronics cover (outside)

The following figure shows one of the electronics cover designs using one size as an example:



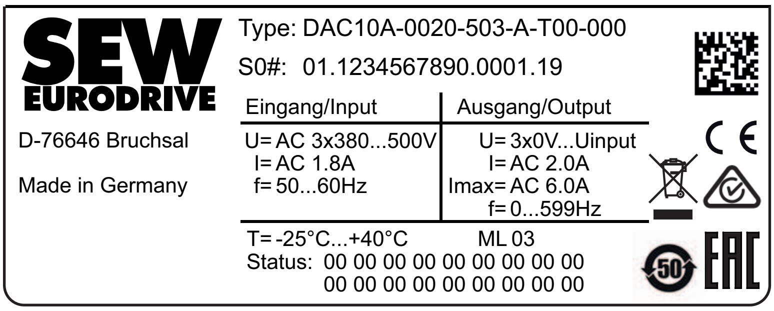
9007228529750667

[1] LED displays and designation plate of electronics cover
[2] Potentiometer f1 (underneath the screw plug)
[3] Potentiometer f2 (underneath the screw plug)
[4] Plug connectors

3.8 Example nameplate and type designation of electronics

3.8.1 Nameplate

The following figure gives an example of a nameplate of the electronics cover. For the structure of the type designation, refer to chapter "Type designation of the electronics cover".



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3.8.2 Type designation of the electronics cover

The following table shows the type designation of the electronics cover:

DAC	**Product family**
	DAC = Electronics cover **D**irect **A**S-Interface **C**ommunication
1	**Communication type**
	1 = AS-Interface
0	**Connection configuration**
	0 = M12 plug connector on electronics cover (standard)
A	**Communication version**

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–	
0020	**Nominal output current of the electronics cover** 0020 = 2.0 A 0025 = 2.5 A 0032 = 3.2 A 0040 = 4.0 A 0055 = 5.5 A
–	
5	**Connection voltage** 5 = AC 500 V
0	**Power section design EMC** 0 = Basic interference suppression 1 = IT system design
3	**Connection type** 3 = 3-phase
–	
A	**Version**
–	
D	**Device variant** T = Technology profile (fieldbus connection)
0	**Technology level** 0 = Technology level 0 (standard)
0	**Application level** 0 = Application level 0 (standard)
–	
000	**MOVIKIT® version** 000 = No MOVIKIT® module loaded at factory settings
/	
B	**Operating mode options** B = Brake control

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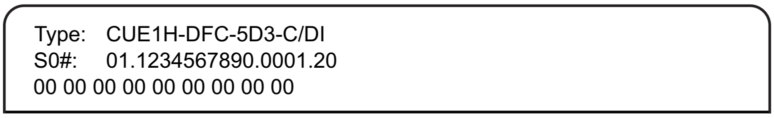
3.9 Example nameplate and type designation of connection unit

3.9.1 Nameplate

The following figure gives an example of a nameplate of the connection unit. For the structure of the type designation, refer to chapter "Type designation of the connection unit".



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3.9.2 Type designation of connection unit

The following table shows the type designation of the connection unit:

CU	**Product family** CU = Connection unit (motor with electronics cover)
E	**Hardware design** E = For MOVIMOT® advanced
1	**Flange dimensions for relevant cover size** 1 = Suitable for electronics cover size 1 (with/without cooling fins)
H	**Fieldbus connection configuration** H = Hybrid
–	
DFC	**Communication variant** DBC = **D**irect **B**inary **C**ommunication DAC = **D**irect **A**S-Interface **C**ommunication DFC = **D**irect **F**ieldbus **C**ommunication DSI = **D**irect **S**ystem bus **I**nstallation
–	
5	**Connection voltage** 5 = AC 500 V
D	**EMC variant** D = EMC filter with limit value category C3 (EN 61800-3)
3	**Connection type** 3 = 3-phase
–	

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C	**Version**
/	
DI	**Option** DI = Digital interface (MOVILINK® DDI) DE = Digital interface (MOVILINK® DDI) with encoder evaluation

4 Mechanical installation

4.1 Installation notes

INFORMATION

Adhere to the safety notes during installation.

⚠ WARNING

Improper installation/disassembly of drive unit and mount-on components.

Serious injuries.

- Adhere to the notes about installation and disassembly.
- Before releasing shaft connections, make sure that there are no active torsional moments present (tensions within the system).

⚠ WARNING

Risk of injury if the device starts up unintentionally, and danger of electrical voltage.

Severe or fatal injuries.

- Disconnect the device from the power supply with suitable external measures before you start working on the device and secure it against unintentional reconnection to the voltage supply.
- Secure the output shaft against rotation.

⚠ WARNING

Risk of injury caused by rapidly moving output elements.

Serious injuries.

- Disconnect the drive unit from the power supply and safeguard it against unintentional power up before you start working on it.
- Equip the input and output elements (e.g. customer shaft with contact shoulder or clamping ring, shrink disk) with a touch guard.

4.2 Required tools and resources

- Set of wrenches, set of screwdrivers, set of socket wrenches
- Torque wrench
- Mounting device
- Compensation elements (shims and spacing rings), if necessary
- Fasteners for output elements
- Lubricant (e.g. NOCO® fluid)
- Standard parts are not included in the delivery

4.2.1 Installation tolerances for motor shaft ends

The following table shows the permitted tolerances of the shaft ends and flanges of the drive unit.

Shaft end	Flanges
Diameter tolerance according to EN 50347 • ISO j6 at Ø ≤ 28 mm • ISO k6 at Ø ≥ 38 mm ≤ 48 mm • ISO m6 at Ø ≥ 55 mm • Center hole according to DIN 332, shape DR..	Centering shoulder tolerance according to EN 50347 • ISO j6 at Ø ≤ 250 mm • ISO h6 with Ø ≥ 300 mm

4.2.2 Tolerances for torque ratings

The specified torques must be adhered to with a tolerance of +/- 10%.

4.3 Installation requirements

Check that the following conditions have been met:

- The information on the drive unit's nameplate must match the voltage supply system.
- The drive unit is undamaged (no damage caused by shipping or storage).
- Ambient temperature according to the operating instructions, nameplate and lubricant table in the gearmotor catalog "DRN63 – 315, DR2S56 – 80, DR2L71 – 80".
- The drive unit must not be installed in the following ambient conditions:
  - Potentially explosive atmosphere
  - Oils
  - Acids
  - Gases
  - Vapors
  - Radiation
- For special designs: The drive unit is designed in accordance with the actual ambient conditions.
- Clean the output shafts and flange surfaces thoroughly to ensure that they are free of anti-corrosion agents, contamination or similar. Use a commercially available solvent. Do not expose the sealing lips of the oil seals to the solvent – damage to the material.
- When the drive is installed in abrasive ambient conditions, protect the output end oil seals against wear.

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4.4 Setting up the drive unit

4.4.1 Notes

- Only install the drive unit on a level, low-vibration, and torsionally rigid support structure.
- Observe the mounting position specified on the motor nameplate.
- Thoroughly remove any anti-corrosion agent from the shaft end. Use a commercially available solvent. Do not allow the solvent to penetrate the bearings and sealing rings as this could damage the material.
- Align the motor carefully to avoid placing any unacceptable strain on the motor shafts. Observe the permitted overhung and axial loads specified in the respective gearmotor catalog.
- Do not jolt or hammer the shaft end.
- Ensure that cooling air supply is unobstructed and that air discharged by other units does not influence cooling.
- Balance components that were subsequently mounted to the shaft with a half key (output shafts are balanced with a half key).
- Use suitable cable glands for the supply leads (use reducing adapters if necessary).
- Seal the cable entry properly.
- Thoroughly clean the sealing surfaces of the cover before reassembly.
- If the corrosion protection coating is damaged, restore the coating.
- Check whether the degree of protection specified in the operating instructions and on the nameplate is permitted in the ambient conditions on site.
- Observe the information of Directive VDI 2230-1 on determining the tightening torques for mounting the drive unit to the application.

Changing the mounting position

Make sure to read the following information when you operate the drive unit in a mounting position other than the one indicated in the order:

- **Adjust the position of the breather valve, if necessary.**

Also observe the information in the catalog "MOVIMOT® advanced Gearmotors"

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4.4.2 Electronics cover

▲ WARNING

Risk of burns due to hot surfaces.

Serious injuries.

- Let the devices cool down before touching them.

NOTICE

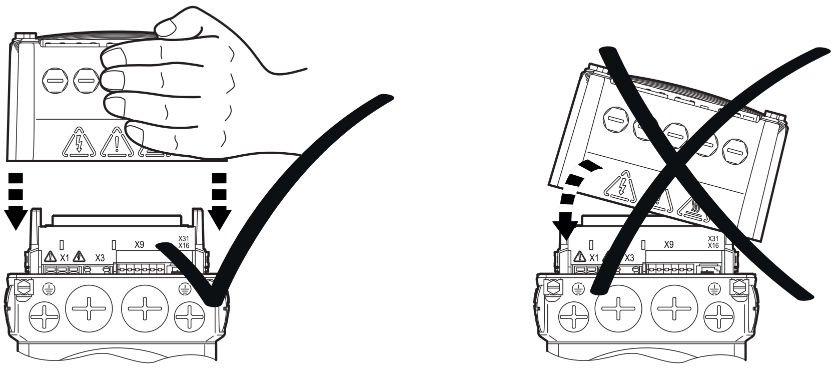
Loss of the guaranteed degree of protection.

Possible damage to property.

- When the cover is removed from the connection box, you have to protect the cover and the wiring space from humidity, dust or foreign particles.
- Make sure that the cover is mounted properly.

Installing the electronics cover

- Use only electronics covers that match the size.
- Be careful not to tilt the electronics cover when placing it on the connection box:



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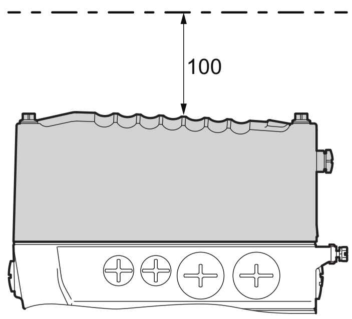
Minimum installation clearance

Note the minimum installation clearance (see following figure) required to remove the electronics cover. For detailed dimension drawings, see the section "Technical Data and Dimension Sheet".



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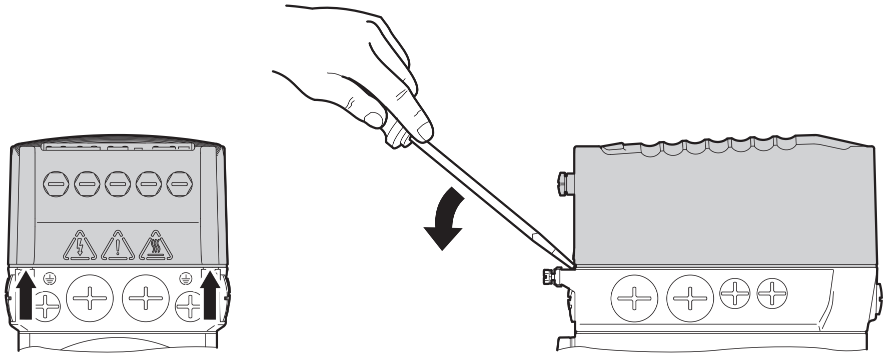
Removing the electronics cover

The following figure shows how you can lever off the electronics cover in the intended places:



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4.4.3 Installation in damp areas or in the open

Drive units are supplied in corrosion-resistant design for use in damp areas or in the open. Repair any damage to the paint work if necessary.

4.4.4 Derating depending on the installation altitude

Observe chapter "Technical data and dimension sheets" > "Technical data" > "Derating factors".

4.4.5 Painting drive units

NOTICE

Breather valves and oil seals may be damaged during painting or re-painting.

Potential damage to property.

- Clean the surface of the drive unit and make sure it is free from grease.
- Thoroughly cover the breather valves and sealing lip of the oil seals with strips prior to painting.
- Remove the masking strips after painting.

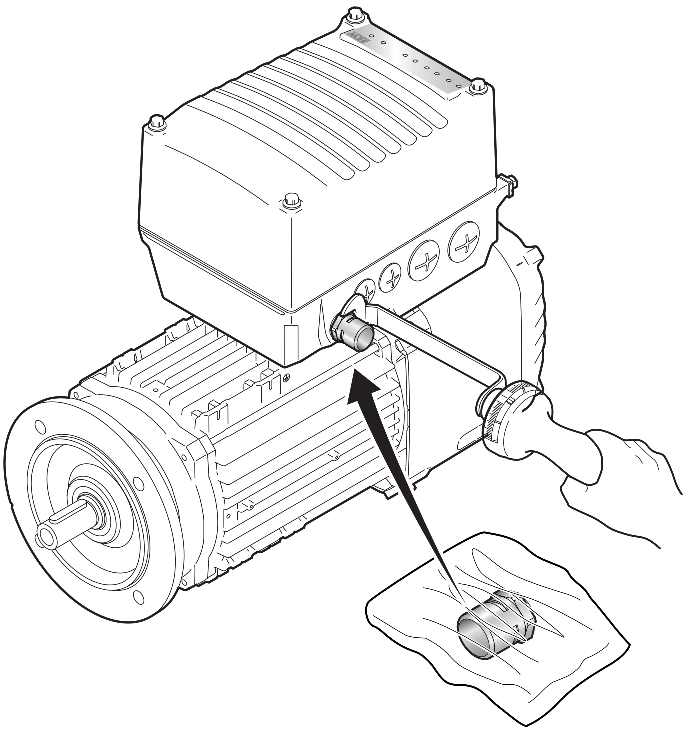
4.4.6 Pressure compensation on electronics (option /PE)

Designs with included pressure compensation fitting (option /PE)

On designs with an included pressure compensation fitting (option /PE), install the fitting depending on the mounting position used. The tightening torque is 4.0 Nm.

The following table shows the installation positions depending on the mounting positions:

Mounting positions

Mounting position B5
Mounting is possible in positions X or 2.
 32386219403
Mounting positions V1 and V2 only possible after consultation with SEW-EURODRIVE.

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4.5 Tightening torques

▲ WARNING

Risk of burns due to hot surfaces.

Serious injuries.

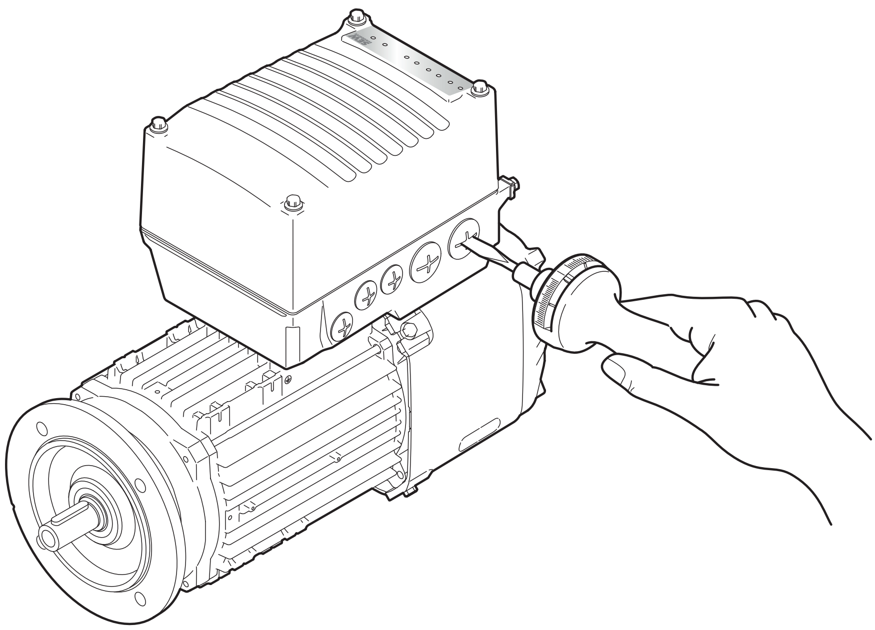
- Let the devices cool down before touching them.

4.5.1 Blanking plugs

Tighten the plastic blanking plugs **included in the delivery** by SEW-EURODRIVE with 2.5 Nm:

Example

The following figure shows an example. The number and position of cable entries depend on the ordered variant.



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4.5.2 Cable glands

Tightening torques

Tighten the EMC cable glands **optionally** supplied by SEW-EURODRIVE to the following torques:

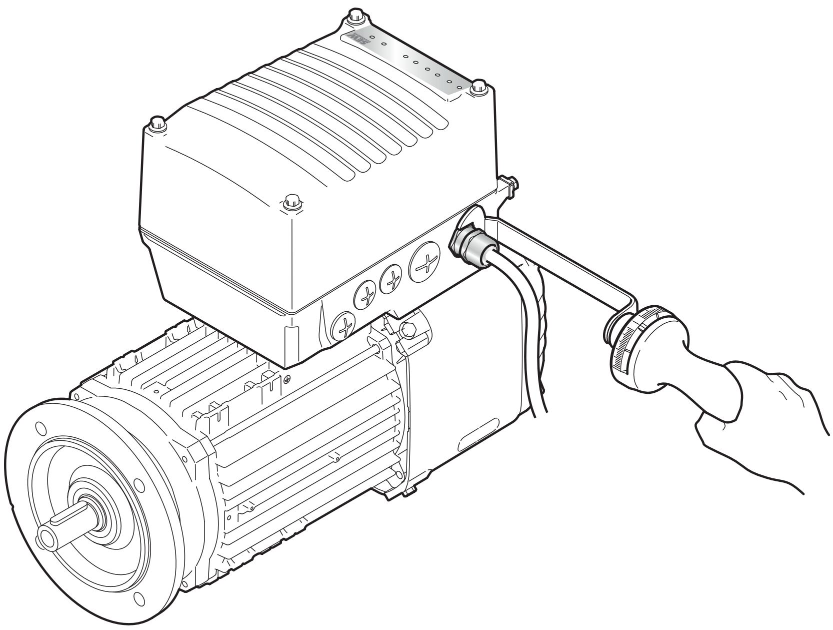
Screw fitting	Part number	Content	Size	Outer cable diameter	Tightening torque
EMC cable glands (nickel-plated brass)	18204783	10 pieces	M16 × 1.5	5 to 9 mm	4.0 Nm
	18204805	10 pieces	M25 × 1.5	11 to 16 mm	7.0 Nm
EMC cable glands (stainless steel)	18216366	10 pieces	M16 × 1.5	5 to 9 mm	4.0 Nm
	18216382	10 pieces	M25 × 1.5	11 to 16 mm	7.0 Nm
Cable gland for externally routed Ethernet cable with mini IO plug connector (brass, nickel-plated)	25676040	10 pieces	M25 × 1.5	1 x 6.5 mm	7.0 Nm
	25676032	10 pieces	M25 × 1.5	2 x 6.5 mm	7.0 Nm

The cable retention in the cable gland must withstand the following removal force of the cable from the cable gland:

- Cable with outer diameter > 10 mm: ≥ 160 N
- Cable with outer diameter < 10 mm: = 100 N

Example

The following figure shows an example of a cable gland:



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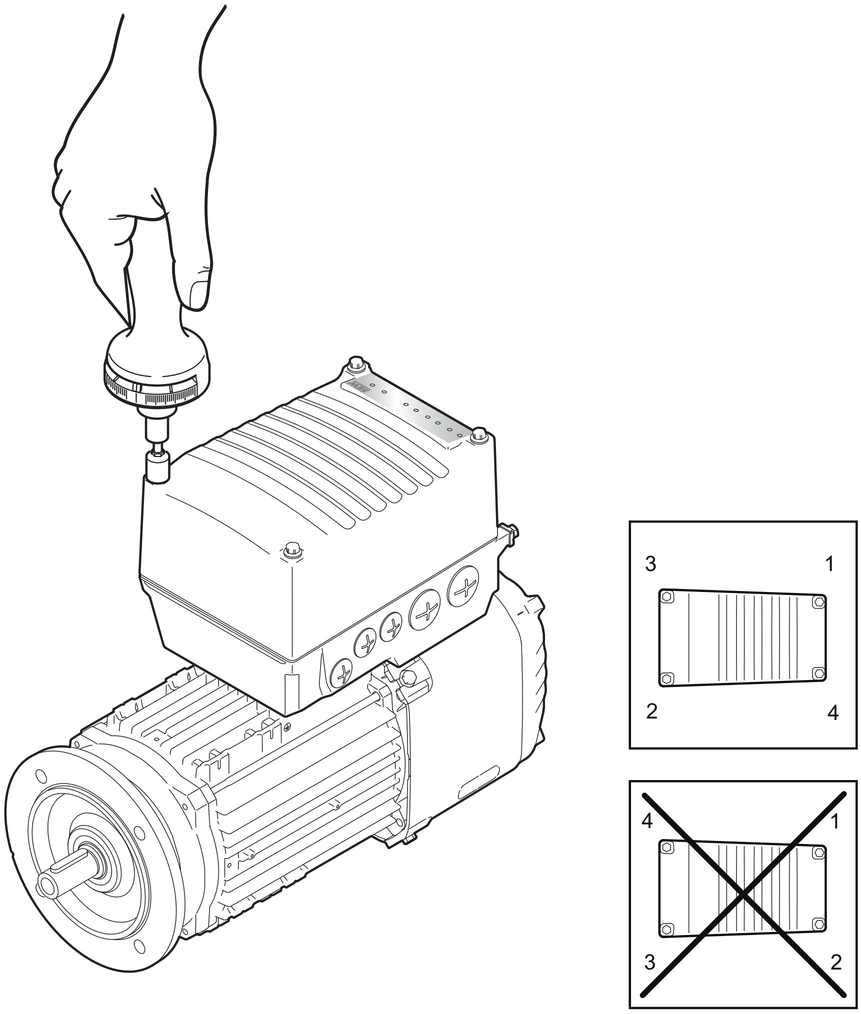
4.5.3 MOVIMOT® advanced electronics cover

Proceed as follows when installing the electronics cover: Insert the screws and tighten them in diametrically opposite sequence **step by step** with a tightening torque of 6.0 Nm.



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5 Electrical installation

INFORMATION

Adhere to the safety notes during installation.

5.1 Installation planning taking EMC aspects into account

5.1.1 Notes on arranging and routing installation components

The correct operation of decentralized inverters depends on selecting the correct cables, providing correct grounding, and on a properly functioning equipotential bonding.

Always adhere to the **relevant standards**.

Note the following information.

5.1.2 EMC-compliant installation

INFORMATION

This drive system is not designed for operation on a public low voltage supply system that supplies residential areas.

This is a product with restricted availability in accordance with IEC 61800-3. This product may cause EMC interference. In this case, it is recommended for the user to take suitable measures.

5.1.3 Cable selection, routing and shielding

⚠ WARNING

Electric shock caused by faulty installation.

Severe or fatal injuries.

- Take the utmost care when installing the units.
- Observe the connection examples.

For more information on cable selection, routing and shielding, refer to chapter "Cable routing and shielding".

5.1.4 Equipotential bonding

Regardless of the PE connection, it is essential that **low-impedance, HF-capable equipotential bonding** is provided (see also EN 60204-1 or DIN VDE 0100-540):

- Provide for a connection over a wide area between the device and the mounting plate.
- To do so, use a ground strap (HF litz wire), for example, to connect the device and the grounding point of the system.

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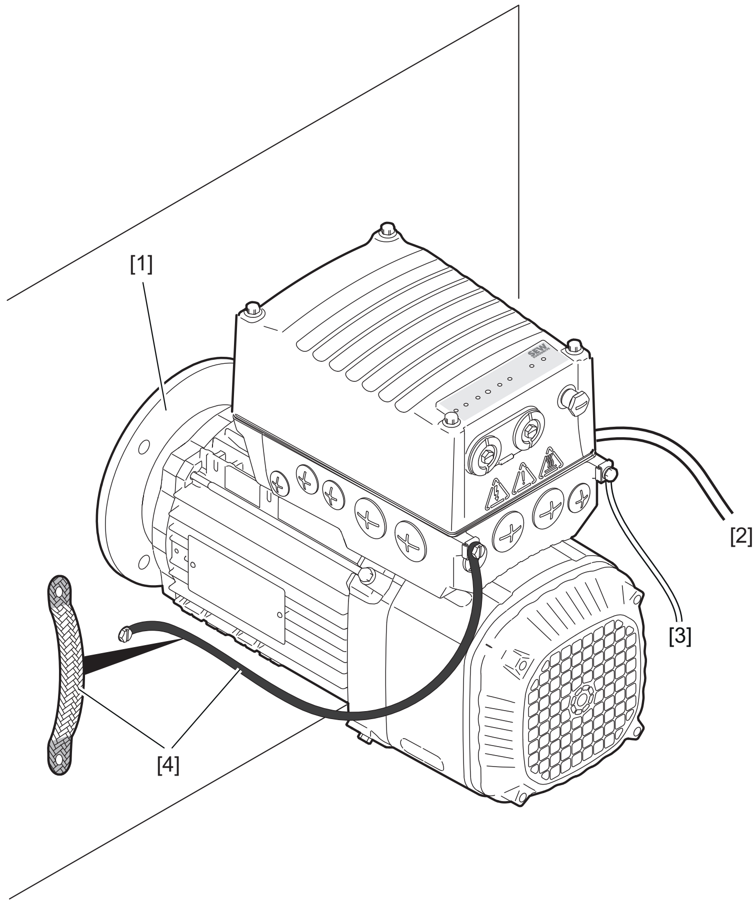
Example



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[1] The mechanical installation of a drive unit **with** hollow shaft does **not** create a conductive connection of drive unit and mounting plate. In this case, a low-impedance, Hf-capable equipotential bonding [4] is required. The mechanical installation of a drive unit **without** hollow shaft creates a conductive connection of drive unit and mounting plate. In this case, the entire contact surface must be conductive (e.g. unpainted).
[2] PE conductor in the supply system cable
[3] 2) PE conductor via separate terminals
[4] EMC-compliant equipotential bonding, for example using a ground strap (HF litz wire)
The contact surfaces must be conductive (free of paint).

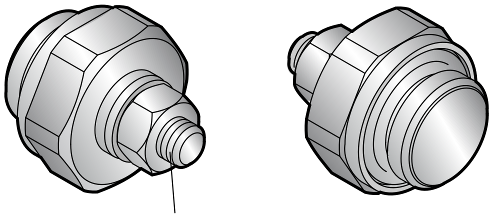
- Do not use the cable shields of data lines for equipotential bonding.

INFORMATION

For detailed information on equipotential bonding for decentralized inverters and drive units, refer to the publication "Equipotential Bonding of Decentralized Inverters" by SEW-EURODRIVE.

5.2 Equipotential bonding at the connection box

Another option for HF-capable equipotential bonding at a connection box is the following cable gland with M6 stud bolt:



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	Tightening torque of the cable gland	Tightening torque of the M6 nut for stud bolt	Part number
M16 cable gland with M6 stud bolt	4.0 Nm	3.0 Nm	08189234
M25 cable gland with M6 stud bolt	7.0 Nm	3.0 Nm	08192685

You can install this cable gland at a connection box that still has a free cable entry of size M16 or M25.

Screw the cable gland into the free cable entry and install the grounding cable (with ring cable lug) or the HF litz wire at the M6 stud bolt.

5.3 Installation instructions

5.3.1 Permitted voltage systems

Information on voltage systems	Information on permissibility
TN and TT systems – voltage systems with directly grounded star point	Use is possible without restrictions.
IT systems – voltage systems with non-grounded star point	Use is only permitted with electronics cover in IT system design (...-513-....). • For use in IT systems, SEW-EURODRIVE recommends using insulation monitors with pulse-code measurement. Using such devices prevents false tripping of the insulation monitor due to the earth capacitance of the inverter. • No EMC limits are specified for interference emission in IT systems. The EMC limits for interference emission specified in chapter "Technical data" do not apply to IT system designs.
Voltage systems with grounded outer conductor	Not permitted.

5.3.2 Connecting supply system cables

- The nominal voltage and frequency of the device must correspond with the data of the supply system.
- Dimension the cable cross section according to the input current I_{line} for nominal power (see chapter "Technical data and dimension sheets").
- Install safety equipment F11/F12/F13 for line fuses at the beginning of the power supply cable behind the supply bus junction, see chapter "Connection diagram".

  Dimension the safety features according to the cable cross section.
- Use only copper conductors with a minimum temperature range of 90 °C as connection cable.

5.3.3 Permitted cable cross section of terminals

Line terminals X1

Observe the permitted cable cross sections for installation:

Line terminals X1	Without conductor end sleeve	With conductor end sleeves (with or without plastic collar)
Connection cross section	0.5 mm^2 – 6 mm^2	0.5 mm^2 – 6 mm^2
Stripping length	13 mm – 15 mm	

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Line terminals X1a

Observe the permitted cable cross sections for installation:

Line terminals X1a	Without conductor end sleeve	With conductor end sleeves (with or without plastic collar)
Connection cross section	0.5 mm² – 6 mm²	0.5 mm² – 4 mm²
Stripping length	13 mm – 15 mm	

Terminals X3 for braking resistor

Observe the permitted cable cross sections for installation:

Terminals X3 for braking resistor	Without conductor end sleeve	With conductor end sleeve (with or without plastic collar)
Connection cross section	0.08 mm² – 4.0 mm²	0.25 mm² – 2.5 mm²
Stripping length	8 mm – 9 mm	

Control terminals X9

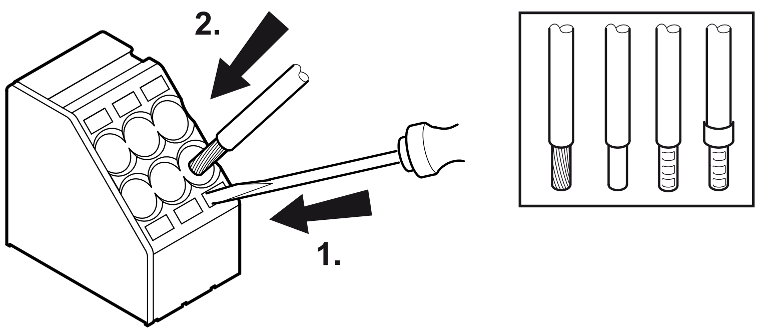
Observe the permitted cable cross sections for installation:

Control terminals X9	Without conductor end sleeve	With conductor end sleeve (without plastic collar)	With conductor end sleeves (with plastic collar)
Connection cross section	0.08 mm² – 2.5 mm²	0.25 mm² – 2.5 mm²	0.25 mm² – 1.5 mm²
Stripping length	5 mm – 6 mm		

5.3.4 Activating line terminals X1

Adhere to the following sequence when you activate the line terminals X1:

Line terminals X1 (the following figure shows a schematic illustration)



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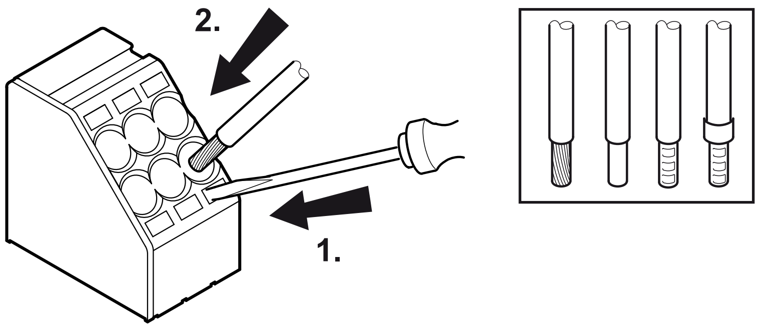
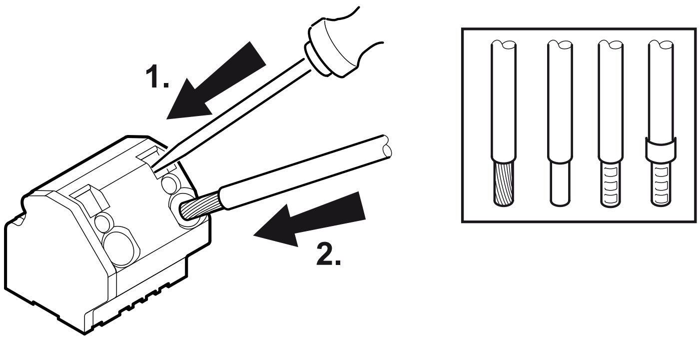
5.3.5 Actuating line terminals X1a

Adhere to the following sequence when actuating the line terminals X1a:

Line terminals X1a (the following figure shows a schematic illustration)
 25649924107

5.3.6 Activating terminals X3 for the braking resistor

Adhere to the following sequence when you activate the terminals X3 for the braking resistor:

Terminals X3 for the braking resistor (the following figure shows a schematic illustration)
 25650172171

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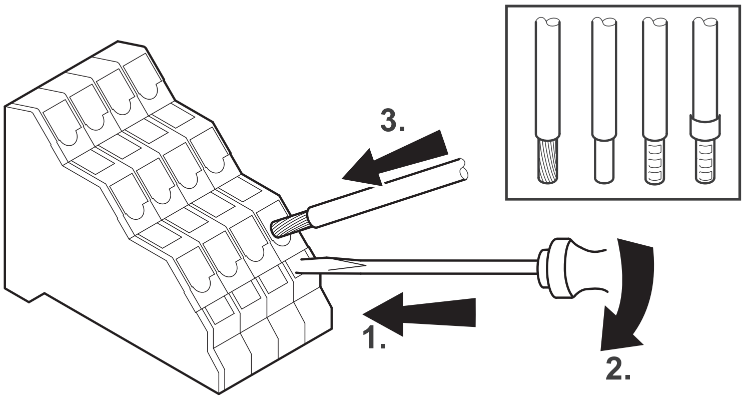
5.3.7 Activating control terminals X9

Adhere to the following sequence when you activate the X9 control terminals:

X9 control terminals (the following figure shows a schematic illustration)



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5.3.8 Residual current device

⚠ WARNING

No protection against electric shock if an incorrect type of residual current device is used.

Severe or fatal injuries.

- The product can cause direct current in the PE conductor. If a residual current device (RCD) or a residual current monitoring device (RCM) is used for protection in the event of a direct or indirect contact, only a type B RCD or RCM is permitted on the supply end of the product.

- If the use of a residual current device is not mandatory according to the standards, SEW-EURODRIVE recommends not to use a residual current device.

5.3.9 Line contactor

NOTICE

Non-compliance with the minimum switch-on/switch-off times.

Damage to the device.

- Keep the supply system switched off for 10 s before switching the power back on.
- Do not switch the supply system off and on more than once per minute.

- Use only a contactor of utilization category AC3 (EN 60947-4-1) as a line contactor.

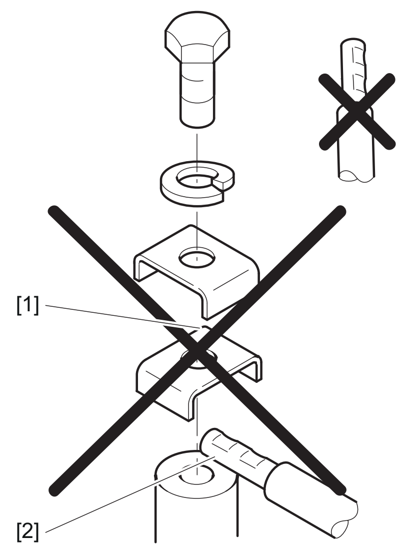
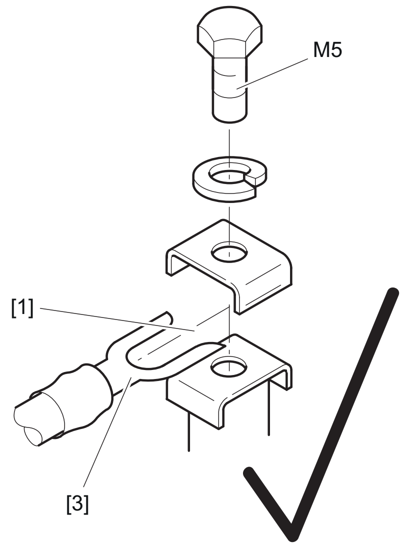
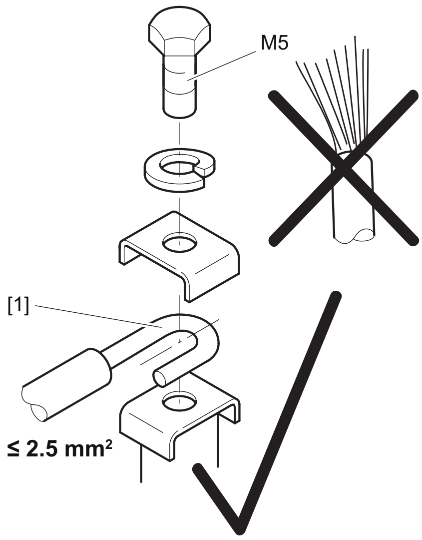
5.3.10 Notes on PE connection

⚠ WARNING

Electric shock due to incorrect connection of PE.

Severe or fatal injuries.

- The permitted tightening torque for the screw is 2.0 to 2.4 Nm.
- Observe the following notes regarding PE connection.

Impermissible assembly **Using a conductor end sleeve or using a straight, rigid core is not permitted.**	**Recommendation:** **Assembly with cable lug[1)]** **Permitted for all cross sections**	**Assembly with solid connecting wire[1)]** **Permitted for cross sections up to** **max. 2.5 mm²**
 *9007222159731851*	 *9007222159700491*	 *9007222159689227*

1) Use the specified material for the assembly that is included in the accessory bag.

[1] Install the PE connection cable between both U-shaped mounting panels.

[2] Incorrect installation sequence.

[3] Forked cable lug suitable for M5 PE screws.

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Leakage currents

Earth-leakage currents ≥ 3.5 mA can occur during normal operation. In order to fulfill EN 61800-5-1, observe the following notes:

- The protective earth (PE) connection must meet the requirements for systems with high earth-leakage currents.
- This usually means
  - installing a PE connection cable with a minimum cross section of 10 mm^2 (copper conductor)
  - or installing a second PE connection cable in parallel with the original PE connection.

    The second PE connection is not required according to DIN EN 61800-5-1, if the line connection is equipped with a plug connector for industrial applications (according to IEC 60309) and if the supply system cable has a diameter of ≥ 2.5 mm^2.

INFORMATION

The round M23 plug connectors of the 723 series by TE Connectivity - Intercontec products meet the requirements according to IEC 60309 "Plug connectors for industrial applications".

5.3.11 Installation with protective separation

The electronics cover meets all requirements for protective separation of power and electronics connections in accordance with EN 61800-5-1. The connected signal circuits and the DC 24 V voltage supply must meet the requirements according to SELV (**S**afety **E**xtra **L**ow **V**oltage) or PELV (**P**rotective **E**xtra **L**ow **V**oltage) to ensure protective separation. The installation must meet the requirements for protective separation.

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5.3.12 Installation above 1000 m amsl

You can install the drive units at altitudes from 1000 m to a maximum of 3800 m above sea level provided the following conditions are met.[1)]

- The nominal motor current I_N is reduced due to the reduced cooling above 1000 m (see chapter "Technical data and dimension sheets").
- Above 2000 m above sea level, the air and creeping distances are only sufficient for overvoltage category II. If the installation requires overvoltage category III, you will have to install additional external overvoltage protection to limit overvoltage peaks to 1.5 kV phase-to-phase and 2.5 kV phase-to-ground.
- If safe electrical disconnection is required, it must be implemented outside the unit for altitudes of 2000 m above sea level and higher (safe electrical disconnection in accordance with EN 61800-5-1).
- At installation altitudes between 2000 m and 3800 m above sea level, the permitted rated power supply voltages are reduced as follows:
  – By 6 V per 100 m

1) The maximum altitude is limited by the reduced electric strength due to the lower air density.

5.3.13 Protection devices

- The units come equipped with integrated protection devices against overload.
- Cable protection for the power cable must be implemented using external overload devices.
- Observe the relevant standards concerning the cable cross section, voltage drop and installation type.

5.3.14 UL-compliant installation (in preparation)

UL and cUL approval for the MOVIMOT® advanced series is in preparation.

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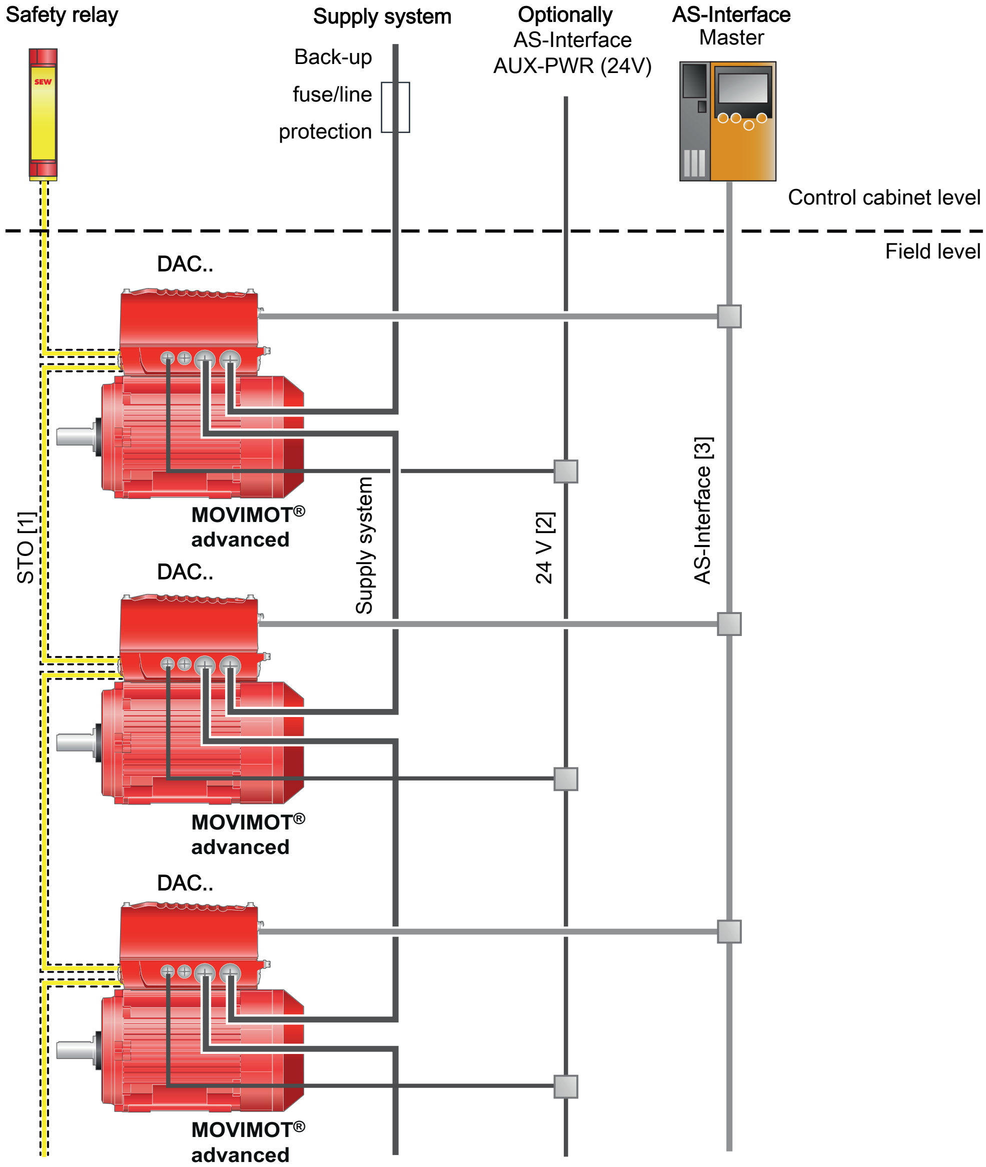
5.4 Installation topology

The following figure shows the basic installation topology with MOVIMOT® advanced:



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[1] The maximum permitted length of the STO cable between the safety relay and the last drive unit is 100 m.

[2] The drive unit is equipped with an integrated DC 24 V supply. As an option, the electronics of the drive unit may be supported by an external DC 24 V supply (AUX-PWR).

[3] AS-Interface communication cable

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5.5 Terminal assignment

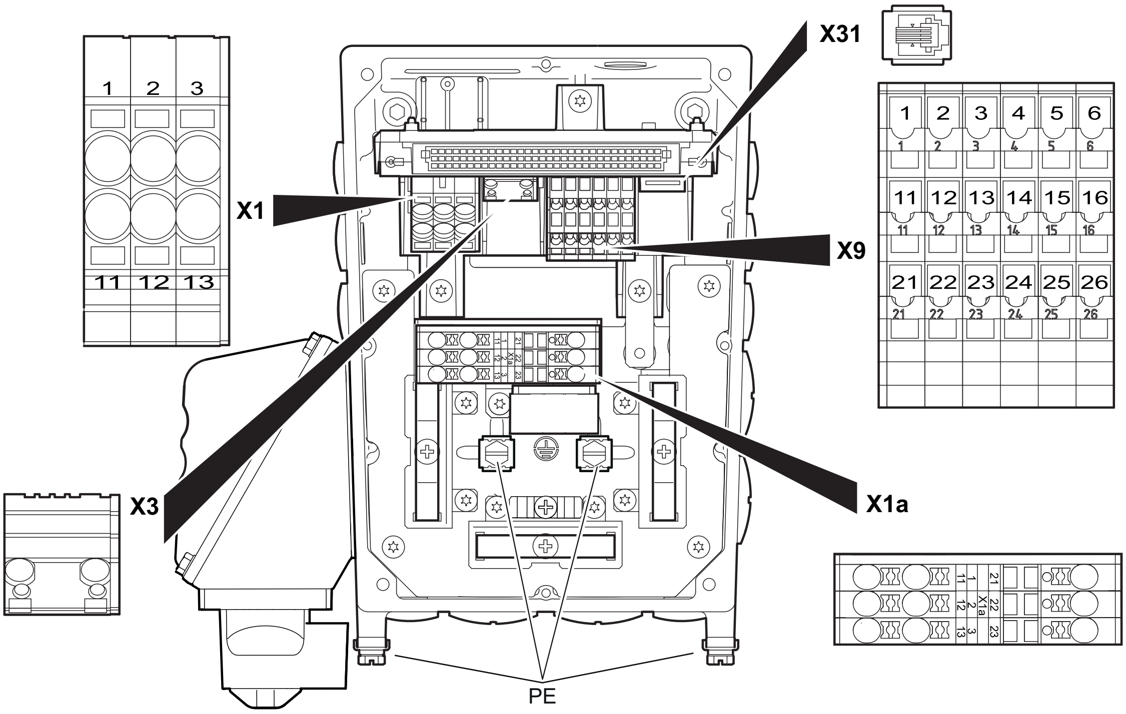
INFORMATION

The terminals X3 for connecting the braking resistor can be connected to an optional, internal braking resistor. As an alternative, you an connect an external braking resistor if the power rating of this braking resistor is not sufficient.

Proceed as follows to do so:

- Loosen the connections of the internal braking resistor.
- Insulate and fasten the connections of the internal braking resistor. Make sure all connections leading to other components are electrically insulated.
- Connect the external braking resistor again. Observe the installation instructions of the device and of the external braking resistor.

The following figure shows the terminal assignment of the MOVIMOT® advanced ..-DAC-C drive unit:



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Assignment				
Terminal	**No.**	**Name**	**Marking**	**Function**
X1[1] **Line terminals** **Without** option /D11 (switch disconnector)	1	L1	Brown	Line connection, phase L1 – IN
	2	L2	Black	Line connection, phase L2 – IN
	3	L3	Gray	Line connection, phase L3 – IN
	11	L1	Brown	Line connection, phase L1 – OUT
	12	L2	Black	Line connection, phase L2 – OUT
	13	L3	Gray	Line connection, phase L3 – OUT
X1a **line terminals** **With** option /D11 (switch disconnector)	1	L1	Gray	Line connection, phase L1 – IN
	2	L2	Gray	Line connection, phase L2 – IN
	3	L3	Gray	Line connection, phase L3 – IN
	11	L1	Gray	Line connection, phase L1 – OUT
	12	L2	Gray	Line connection, phase L2 – OUT
	13	L3	Gray	Line connection, phase L3 – OUT
⏚	–	PE	–	PE connection
X3 **braking resistor terminals**	1	BW	–	Braking resistor connection
	2	BW	–	Braking resistor connection

Assignment				
Terminal	**No.**	**Name**	**Marking**	**Function**
X9 control terminals	1	F_STO_P1	Yellow	Input STO+
	2	F_STO_P1	Yellow	Input STO+ (to loop through)
	3	0V24_OUT	–	0V24 reference potential for DC 24 V output
	4	24V_OUT	–	DC 24 V output
	5	DI01	–	Digital input DI01
	6	DI02	–	Digital input DI02
	11	F_STO_M	Yellow	Input STO_ground
	12	F_STO_M	Yellow	Input STO_ground (to loop through)
	13	24V_IN	–	DC 24 V supply
	14	DOR-C	–	Relay output DO R, common contact
	15	DI03	–	Digital input DI03
	16	DI04	–	Digital input DI04
	21	F_STO_P2	Yellow	Input STO+
	22	F_STO_P2	Yellow	Input STO+ (to loop through)
	23	0V24_IN	–	0V24 reference potential for DC 24 V supply
	24	DOR-NO	–	Relay output DO R, NO contact
	25	0V24_OUT	–	0V24 reference potential for DC 24 V output
	26	24V_OUT	–	DC 24 V output
X31 engineering interface	1	0V24_OUT	–	0V24 reference potential for DC 24 V auxiliary output
	2	CAN_L	–	CAN Low connection
	3	CAN_H	–	CAN High connection
	4	24V_OUT	–	DC 24 V auxiliary output

1) With the switch disconnector option, the line terminal X1 is assigned to the internal wiring.

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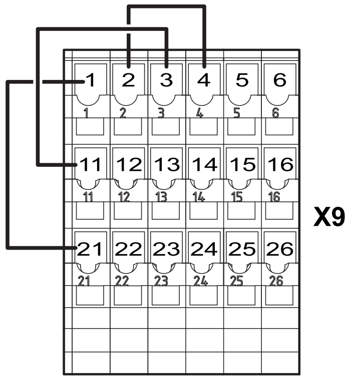
The following figure shows the factory-installed jumpers at the X9 terminals:



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These jumpers are not present in the following designs:

- Designs with plug connectors with STO function.

For additional information, refer to chapter "Functional safety".

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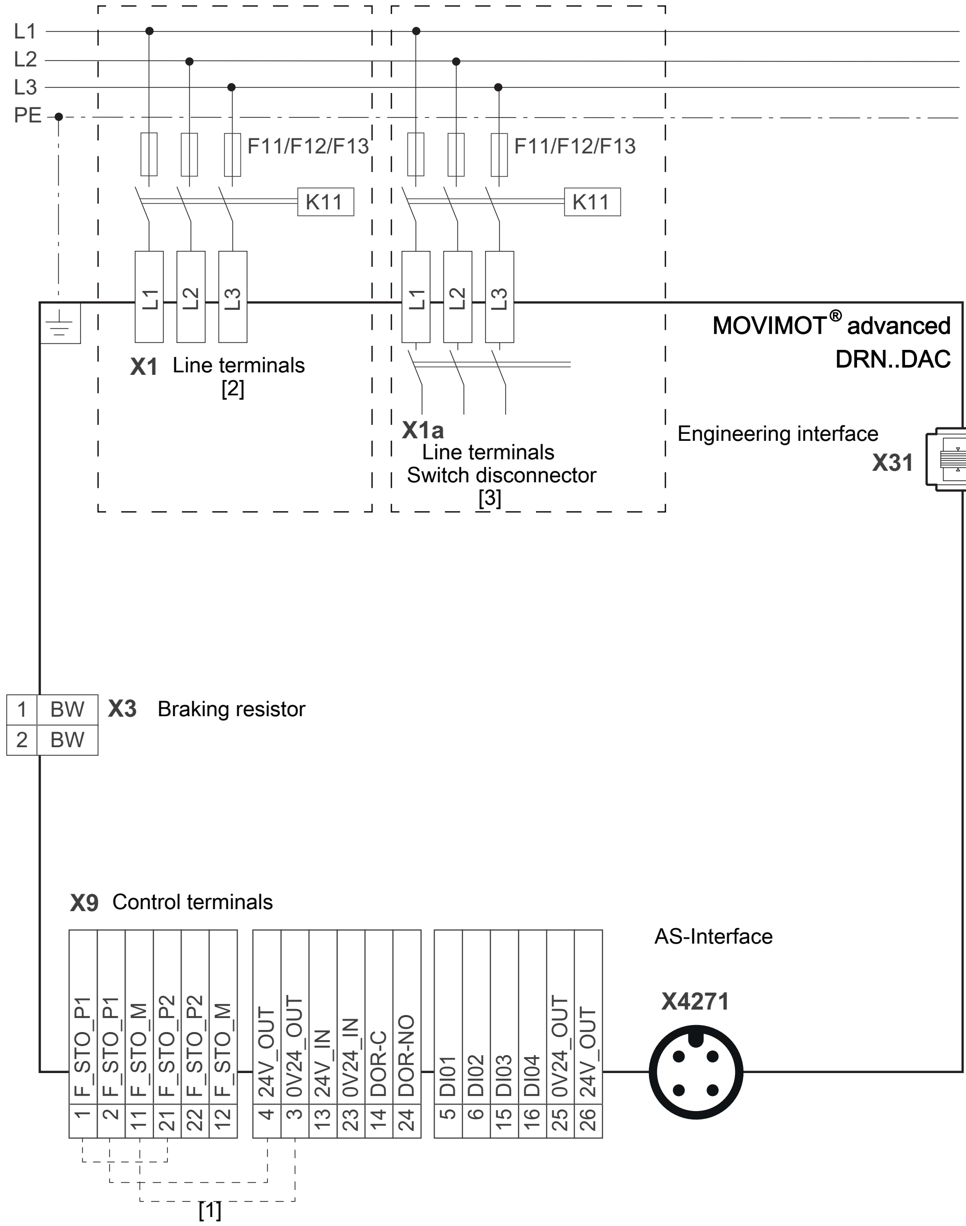
5.6 Connection diagram



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[1] Jumpers installed at the factory for designs without plug connectors with STO function. For additional information, refer to chapter "Functional safety".
[2] Line terminals X1 only **without** switch disconnector
[3] Line terminals X1a only **with** switch disconnector

For terminal assignment, refer to chapter "Terminal assignment".

For plug connector assignment, refer to chapter "Plug connectors".

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5.7 Cable routing and cable shielding

5.7.1 Accessory bag with installation equipment (part number 18241395)

INFORMATION

For some installation variants, you do not need all the parts of the accessory kit.

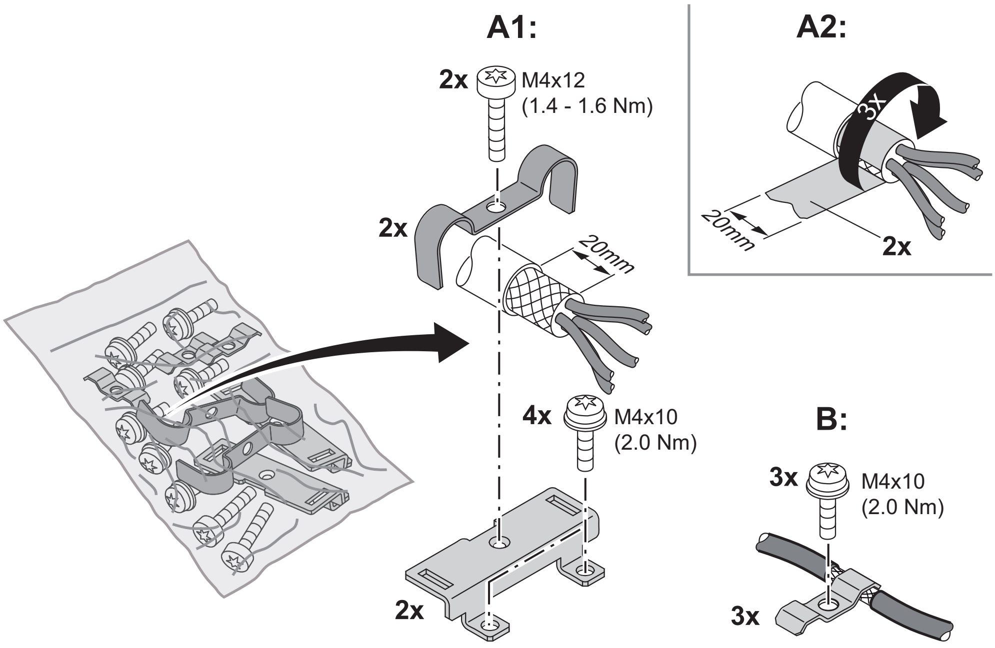
The delivery of each drive unit includes the following accessory bag with installation materials for cable shielding (exception: Does not apply when all possible connections were ordered in plug connector design):

- **A1: Installation material for line and hybrid cables:**

  2 x shield clamps with shield plate and screws to connect the shield of line cables or hybrid cables (outer shield).
- **A2: Conductive film:**

  2 x pieces of conductive film to wind around the braid shield. Use the conductive film if required.
- **B: Installation equipment for signal lines:**

  3 x shield clamps with screw to connect the shield of line cables (e.g. STO).



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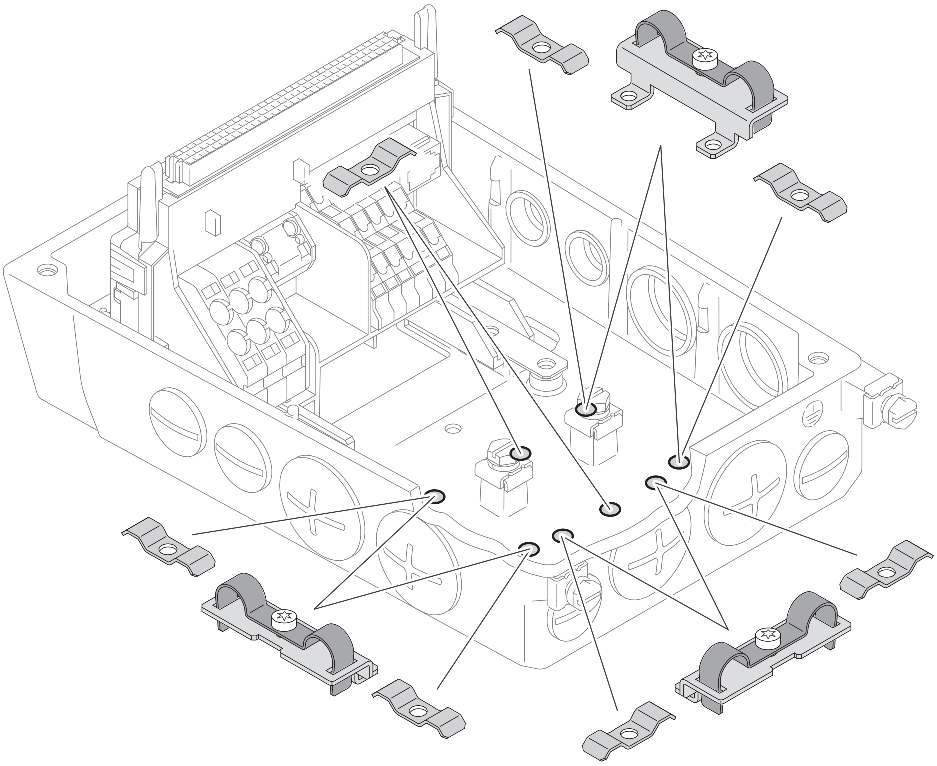
5.7.2 General installation options

The following figure shows the general installation options. The following chapters show common examples and contain important notes on cable selection and cable routing.



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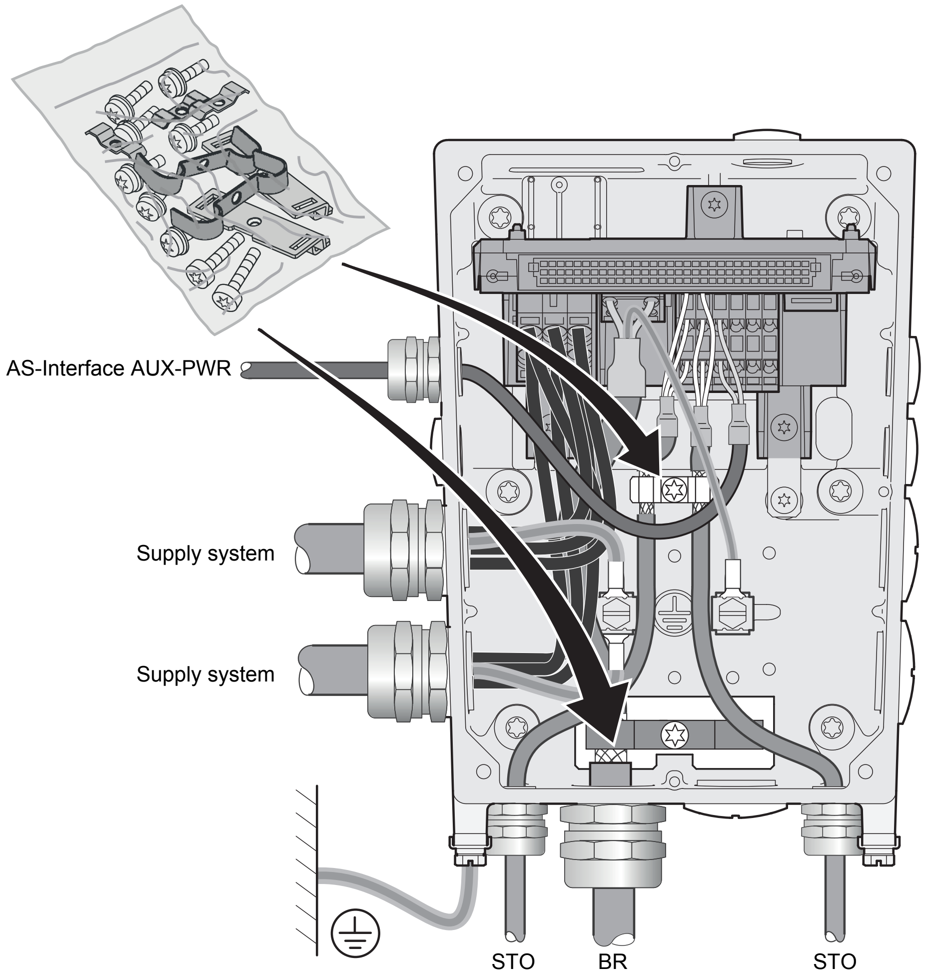
5.7.3 Installation with separately routed AS-Interface/AUX-PWR cable

Notes on cable routing and shielding – Recommended cable routing

Note the following when routing and shielding the cables:

- Cable selection
  - For cable selection, observe chapter "Technical data and dimension sheets / connection cables" in the operating instructions.
  - You can use unshielded connection cables for the supply system connection.
- Cable shielding
  - Connect the shields of the cables to the metal housing of the unit using the shield clamps of the installation equipment kit. To do so, strip off the cable sheath around the shield connection surface.
  - As an alternative, you can use optionally available EMC cable glands to connect the shield of cables, see chapter "Cable glands".
- External braking resistor
  - Also observe the notes in chapter "Terminal assignment".
- Observe the permitted bending radii of the installed cables for cable routing.

The following figure shows an example of the basic cable routing.



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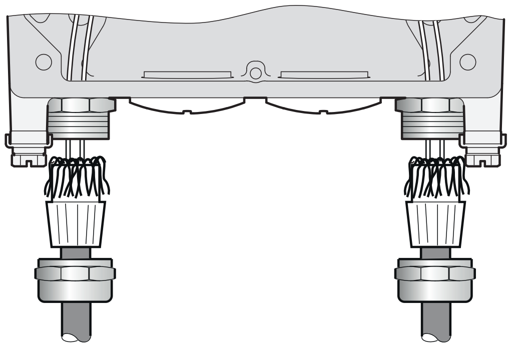
5.8 EMC cable glands

5.8.1 Cable shielding (alternative)

As an alternative to using shield clamps for shielded cables (e.g. control cables, STO cables, power cables), you can use EMC cable glands, which are available as an option, to connect the shield.



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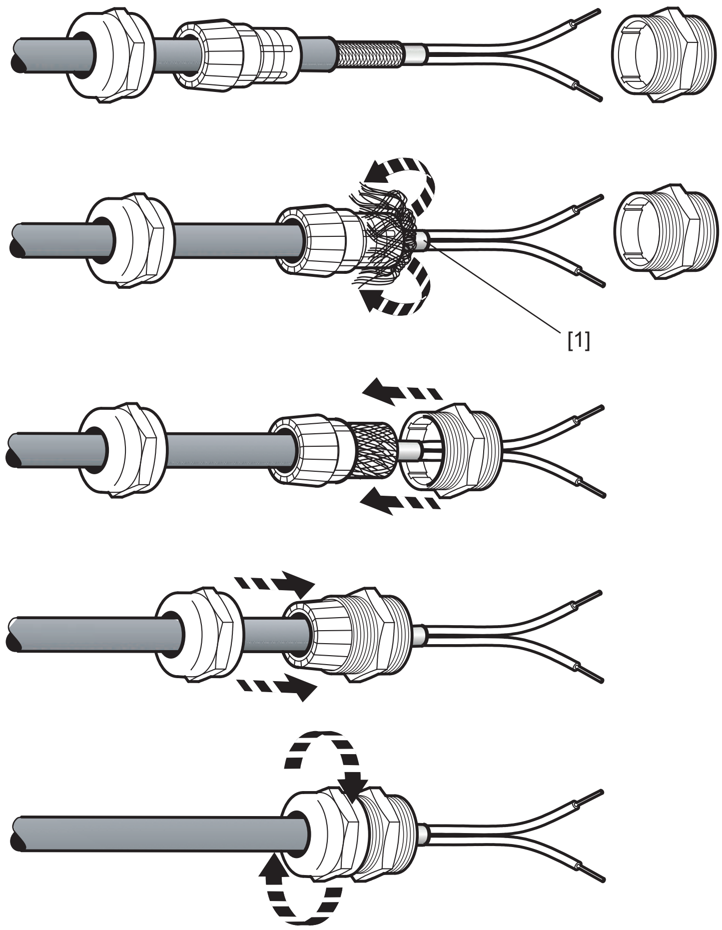
5.8.2 Assembly of EMC cable glands

Assemble the EMC cable glands supplied by SEW-EURODRIVE according to the following figure:



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[1] Cut off insulation foil and fold it back.

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5.9 Plug connectors

5.9.1 Representation of connections

The wiring diagrams of the plug connectors depict the contact end of the connections.

5.9.2 Designation key

The designation of plug connectors is specified according to the following key:

X	**Terminal**
2	**Group** 1 = Power input 2 = Power output 3 = Encoder 4 = Bus 5 = Inputs and outputs
01	**Function** Function of the plug connector within a group
2	**Type** Wiring diagram of the plug connector within a function
–	
	Group number (optional) For several plug connectors with the same function
	Sequence number (optional) In case of several plug connectors in one group

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5.9.3 Connection cables

INFORMATION

For more information on cable types, refer to chapter Technical data.

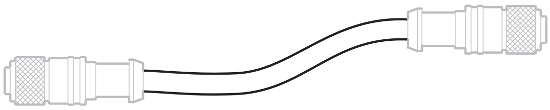
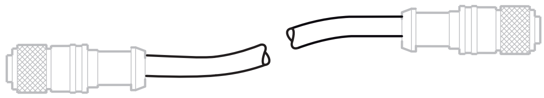
Connection cables are not included in the scope of delivery.

Prefabricated cables for connecting SEW-EURODRIVE components can be ordered. For each connection, the available prefabricated cables are listed. Specify the part number and length of the required cable in your order.

The number and design of the required connection cables depend on the type of the device and the components to be connected. This is why you do not need all listed cables.

Cable types

The table below shows the depiction and what they mean:

Representation	Meaning
	Fixed length
	Variable length
	Suitable for cable carriers
	Not suitable for cable carriers

Cable routing

Observe the permitted bending radii of the installed cables for cable routing. For detailed information, refer to chapter "Technical data" > "Dimension sheets" > "Plug connectors including mating connectors".

Using prefabricated cables with plug connectors

SEW-EURODRIVE uses prefabricated cables for certifications, type tests and approval of the units. The cables available from SEW-EURODRIVE meet all the requirements necessary for the functions of the unit and the connected components. The devices under consideration are always the basic devices including all connected components and corresponding connection cables.

This is why SEW-EURODRIVE recommends to use only the prefabricated cables specified in the documentation.

When using units with integrated safety functions according to EN ISO 13849, you also have to adhere to all the conditions and requirements for the installation and routing of cables described in the documentation for the units concerning functional safety.

Using third-party cables with plug connectors

If third-party cables are used – even if these cables are technically adequate – SEW-EURODRIVE does not accept any liability and cannot guarantee unit properties or functions.

If you use third-party cables for connecting the device and connected components, ensure their compliance with applicable national regulations. Note that the technical features of the device or unit network might be affected inadvertently when using third-party cables. This concerns in particular the following properties:

- Mechanical properties (e.g. IP degree of protection, cable carrier suitability)
- Chemical properties (e.g. silicone and halogen free, resistance to substances)
- Thermal properties (e.g. thermal stability, increase in device temperature, flammability class)
- EMC behavior (such as interference emission limit values, compliance with interference immunity values stipulated in standards)
- Functional safety (approvals according to EN ISO 13849-1)

Third-party cables not explicitly recommended by SEW-EURODRIVE must meet at least the requirements of the following standards and have been permitted according to these plug connector standards:

- IEC 60309
- IEC 61984

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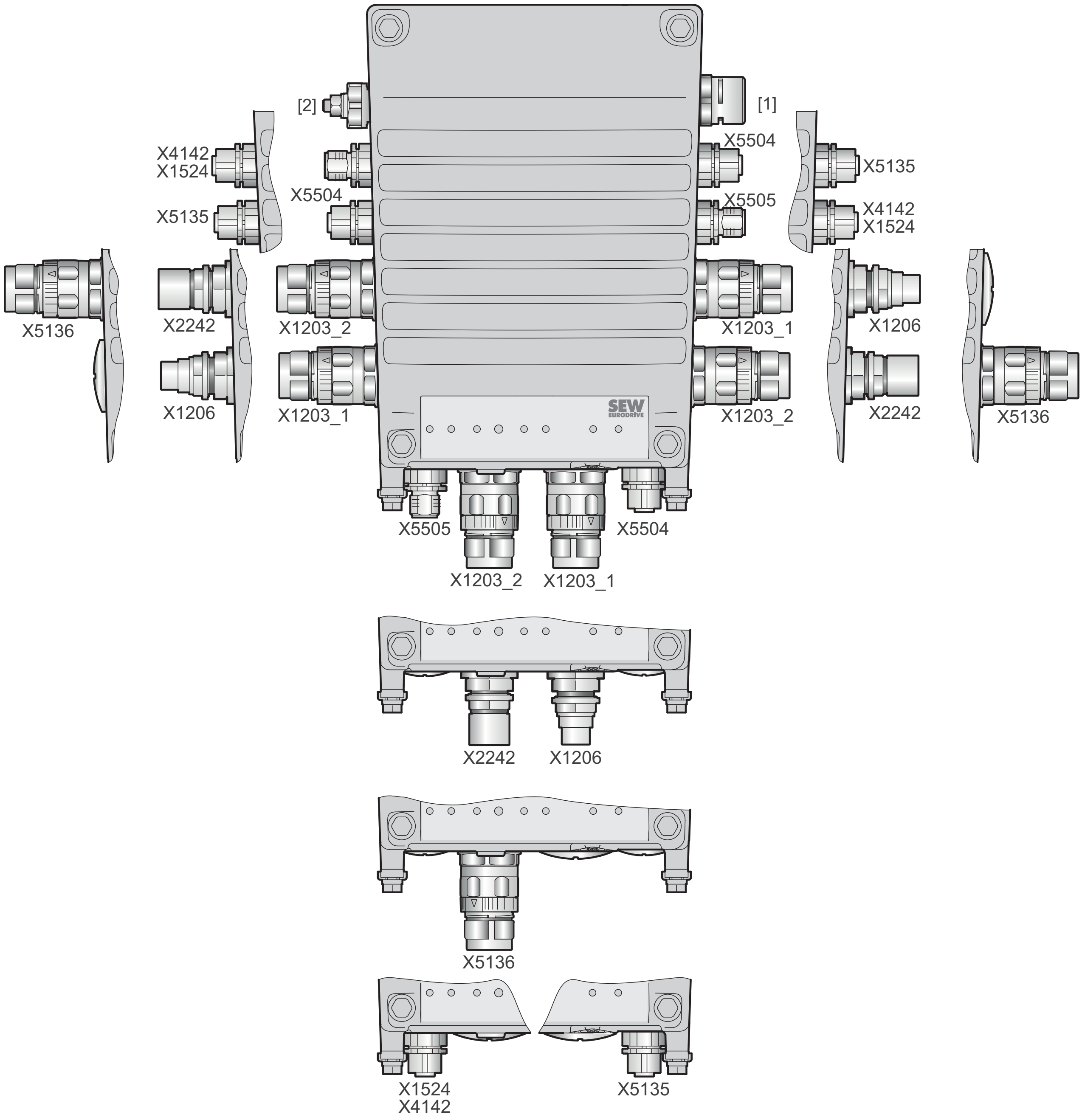
5.9.4 Plug connector positions of the MOVIMOT® advanced DAC drive unit

The following figure shows possible plug connector positions:



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Plug connectors				Not together at a position with the plug connector:
Designation	Coding ring/ color	Function	Position	
X1203_1	Black	AC 400 V connection[1)]	X, 2 or 3	• X1206
X1203_2	Black	AC 400 V connection	X, 2 or 3	• X2242 • X5136
X1206	-	AC 400 V connection (IN)[2)]	X, 2 or 3	• X1203_1

Plug connectors				Not together at a position with the plug connector:
Designation	**Coding ring/ color**	**Function**	**Position**	
X2242	-	AC 400 V connection (OUT)	X, 2 or 3	• X1203_2 • X5136
X5504	Yellow	STO (3-core connection)3)	X, 2 or 3	• X5135
X5505	Yellow	STO (3-core connection)3)	X, 2 or 3	• X1524 • X4142
X5136	-	Digital inputs/outputs	X, 2 or 3	• X1203_2 • X2242
X5135	Black	Digital inputs	X, 2 or 3	• X5504
X1524	Black	DC 24 V backup voltage (AUX-PWR)	X, 2 or 3	• X5505 • X4142
X4142	Black	Engineering interface	X, 2 or 3	• X5505 • X1524
-	-	[1] Optional pressure compensation	X or 2	• Optional connection for equipotential bonding
-	-	[2] Optional connection for equipotential bonding	X or 2	• Optional pressure compensation

1) Plug connector X1203_1 can also be ordered individually (i.e. without plug connector X1203_2).
2) Plug connector X1206 can be ordered separately (i.e. without plug connector X2242).
3) Plug connectors X5504 and X5505 can only be ordered together.

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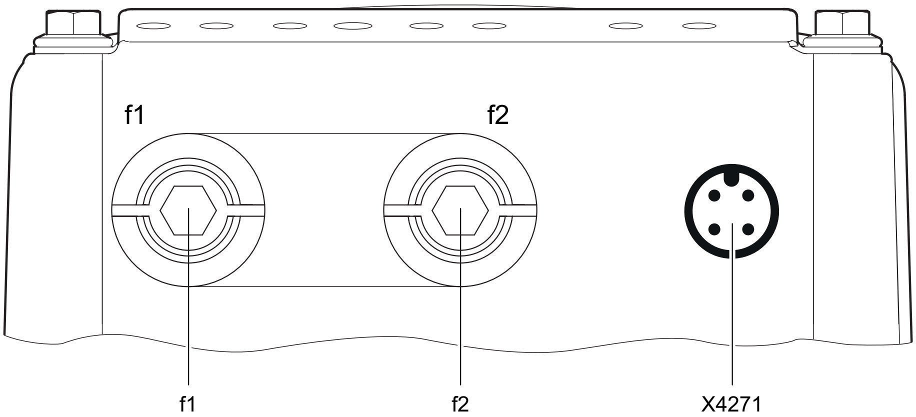
5.9.5 Plug connector positions at the electronics cover

The following figure shows the positions of the potentiometers and plug connectors.



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Designation	Function
f1	Potentiometer f1 (underneath the screw plug)
f2	Potentiometer f2 (underneath the screw plug)
X4271	AS-Interface

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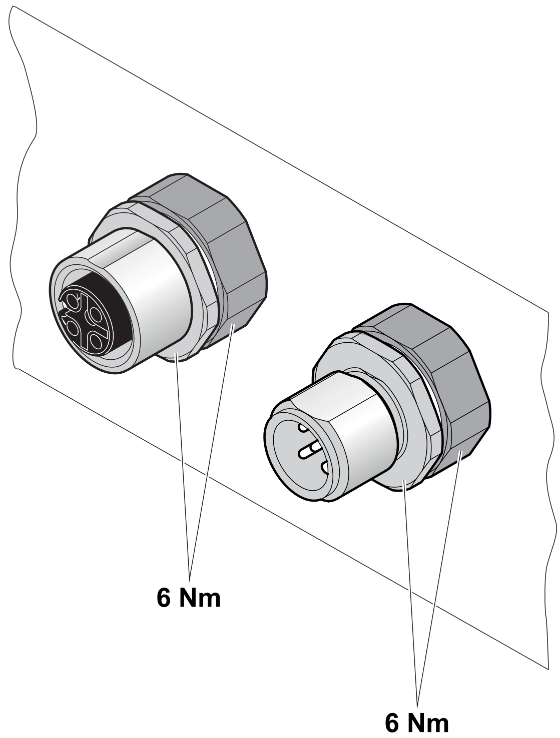
5.9.6 Plug connector variants

M12 plug connector at the connection box

M12 plug connectors at the connection box are pre-installed so they match the connection cables provided by SEW-EURODRIVE. Customers can adjust the orientation of plug connectors if required.

The following figure shows a schematic illustration with the permitted tightening torques:



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M23 plug connector

▲ CAUTION

Possible damage of the right-angle connector when rotated without mating connector.

Irreparable damage to the thread, damage to the sealing surface.

- Do not use pliers to adjust the right-angle connector before connecting it.

▲ CAUTION

Loss of the guaranteed degree of protection.

Potential damage to property.

- Remove the union nut from the M23 plug connector using 3 Nm.
- Between plug connector and bushing is a gap of 2 mm.

▲ CAUTION

Adjusting the right-angle connector too often can damage it.

Potential damage to property.

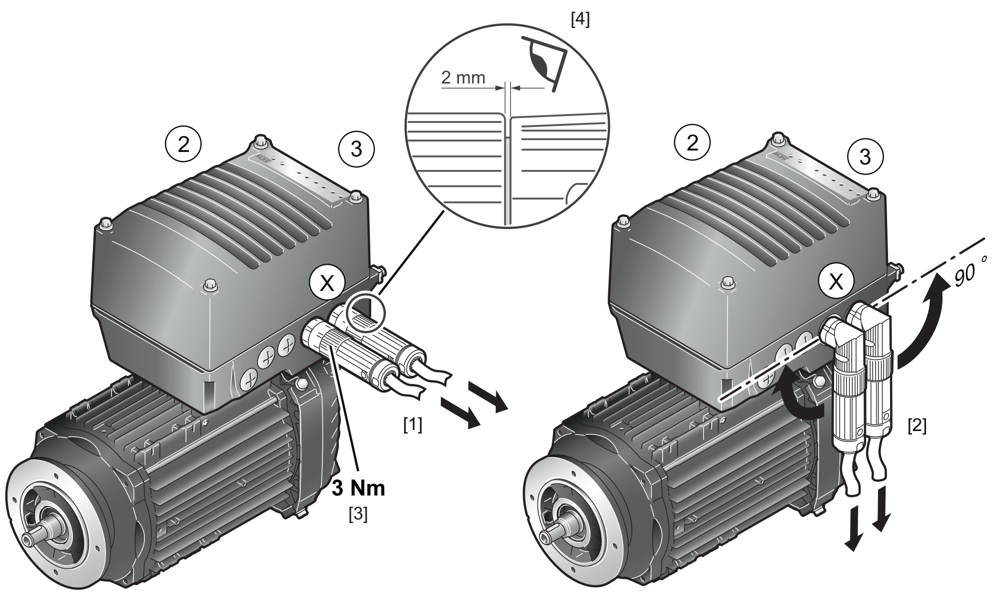
- Adjust the plug connector only when installing and connecting the drive unit.
- Do not turn the plug connector regularly once it has been installed.

The M23 plug connectors are available in the following variants:

- [1] "Straight" plug connector
- [2] "Right-angle" plug connector

Once the mating connector has been plugged in, the "right-angle" connector can be adjusted without using additional tools.

Examples of MOVIMOT® advanced



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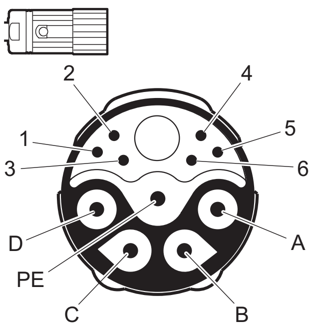
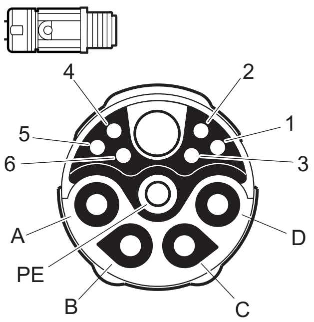
5.9.7 Using plug connectors assembled by yourself

The power plug connectors for assembling connection cables yourself, and the corresponding assembly tool set is available for order from TE Connectivity - Intercontec products.

Contact TE Connectivity - Intercontec products if the order designation is not available in the online order system of Intercontec.

Order information

The table below shows the order designations for connectors by TE Connectivity - Intercontec products with the matching coding for assembly by the customer:

Plug connector type		Cable outer diameter/ core cross section of crimp contacts	Designation for order from the supplier TE Connectivity - Intercontec products
Plug connector AC 400 V Coding ring: Black	Cable plug (male, union nut)  	14 mm - 17 mm / 2.5 mm² - 4.0 mm²	H 51 A 019 MR 02 59 0102 000
		9.5 mm - 14.5 mm / 2.5 mm² - 4.0 mm²	H 51 A 019 MR 02 42 0102 000
		9.5 mm - 14.5 mm / 0.35 mm² - 2.5 mm²	In preparation
	Cable socket (female/male thread)  	14 mm - 17 mm / 2.5 mm² - 4.0 mm²	H 52 A 013 FR 02 59 0102 000
		9.5 mm - 14.5 mm / 2.5 mm² - 4.0 mm²	H 52 A 013 FR 02 42 0102 000
		9.5 mm - 14.5 mm / 0.35 mm² - 2.5 mm²	In preparation

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5.10 Optional plug connector assignment

⚠ WARNING

Electric shock when disconnecting or connecting voltage-carrying plug connectors.

Severe or fatal injuries

- Switch off the line voltage.
- Never plug or unplug plug connectors while they are energized.

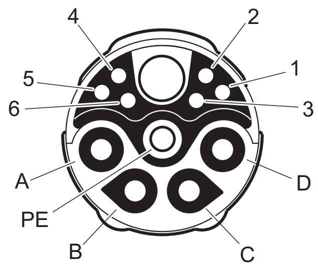
5.10.1 X1203_1 and X1203_2: AC 400 V connection

The following table shows information about this connection:

Function
AC 400 V connection for supplying the device/for looping through

Connection type
M23, SEW insert, 723 series, SpeedTec-capable, company: TE/Intercontec, female, coding ring: black, protected against contact

Connection diagram



Assignment		
Contact	**Signal**	**Description**
A	L1	Line connection, phase L1
B	L2	Line connection, phase L2
C	L3	Line connection, phase L3
D	Res.	Reserved
PE	PE	PE connection
1	Res.	Reserved
2	Res.	Reserved
3	Res.	Reserved
4	Res.	Reserved
5	Res.	Reserved
6	Res.	Reserved

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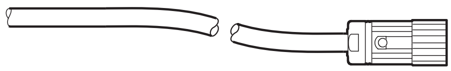
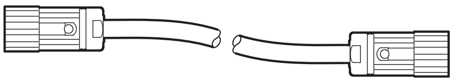
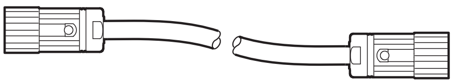
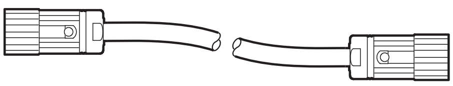
Connection cables

The following tables list the cables available for this connection:

Cable cross section 1.5 mm²

Connection cable	Conformity/ part number	Cable type	Length/installation type	Cable cross section/operating voltage
 Open — M23, coding ring: black, male	CE: 18180094	HELUKABEL® JZ-600	Variable	1.5 mm² / AC 500 V

Cable cross section 2.5 mm²

Connection cable	Conformity/ part number	Cable type	Length/installation type	Cable cross section/operating voltage
 M23, coding ring: black, male — M23, coding ring: black, male	CE: 18127460	HELUKABEL® TOPFLEX® – 600-PVC	Variable	2.5 mm² / AC 500 V
 M23, coding ring: black, male — M23, coding ring: black, male	CE: 18133959	HELUKABEL® TOPFLEX® – 611-PUR (halogen-free)	Variable	2.5 mm² / AC 500 V
 M23, coding ring: black, male — M23, coding ring: black, male	UL: 18153267	HELUKABEL® – JZ-602	Variable	2.5 mm² / AC 500 V

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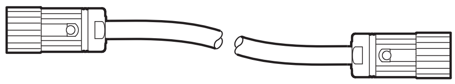
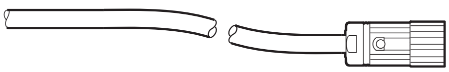
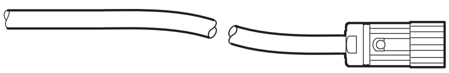
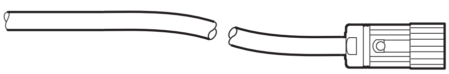
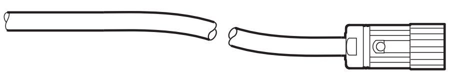
Connection cable	Conformity/ part number	Cable type	Length/installation type	Cable cross section/operating voltage
 M23, coding ring: black, male — M23, coding ring: black, male	UL: 18153275	HELUKABEL® MULTIFLEX® – 512	Variable	2.5 mm² / AC 500 V
 Open — M23, coding ring: black, male	CE: 18127479	HELUKABEL® TOPFLEX® – 600-PVC	Variable	2.5 mm² / AC 500 V
 Open — M23, coding ring: black, male	CE: 18133967	HELUKABEL® TOPFLEX® – 611-PUR (halogen-free)	Variable	2.5 mm² / AC 500 V
 Open — M23, coding ring: black, male	UL: 18153283	HELUKABEL® – JZ-602	Variable	2.5 mm² / AC 500 V
 Open — M23, coding ring: black, male	UL: 18153291	HELUKABEL® MULTIFLEX® – 512	Variable	2.5 mm² / AC 500 V

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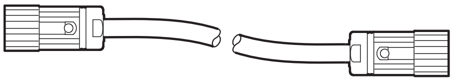
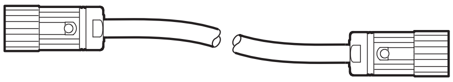
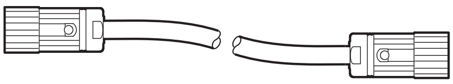
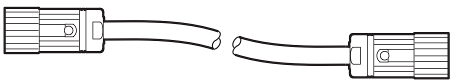
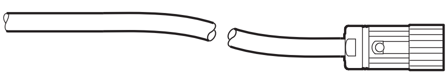
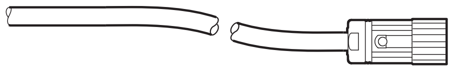
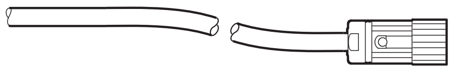
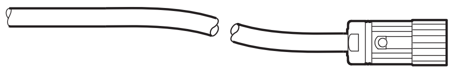
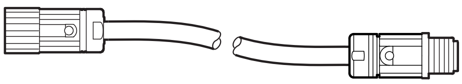
Cable cross section 4.0 mm²

Connection cable	Conformity/ part number	Cable type	Length/installation type	Cable cross-section/operating voltage
 M23, coding ring: black, male — M23, coding ring: black, male	CE: 18127487 CE: 18133975	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	4 mm² / AC 500 V
 M23, coding ring: black, male — M23, coding ring: black, male	CE: 18133975	HELUKABEL® TOPFLEX® – 611-PUR (Halogen-free)	Variable 	4 mm² / AC 500 V
 M23, coding ring: black, male — M23, coding ring: black, male	UL: 18153305	HELUKABEL® – JZ-602	Variable 	4 mm² / AC 500 V
 M23, coding ring: black, male — M23, coding ring: black, male	UL: 18153313	HELUKABEL® MULTIFLEX® – 512	Variable 	4 mm² / AC 500 V
 Open — M23, coding ring: black, male	CE: 18127495	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	4 mm² / AC 500 V

Connection cable	**Conformity/ part number**	**Cable type**	**Length/installation type**	**Cable cross-section/operating voltage**
 Open — M23, coding ring: black, male	CE: 18133983	HELUKABEL® TOPFLEX® – 611-PUR (Halogen-free)	Variable	4 mm² / AC 500 V
 Open — M23, coding ring: black, male	UL: 18153321	HELUKABEL® – JZ-602	Variable	4 mm² / AC 500 V
 Open — M23, coding ring: black, male	UL: 18153348	HELUKABEL® MULTIFLEX® – 512	Variable	4 mm² / AC 500 V
 M23, coding ring: black, male — M23, coding ring: black, female	UL: 18166318	HELUKABEL® MULTIFLEX® – 512	Variable	4 mm² / AC 500 V

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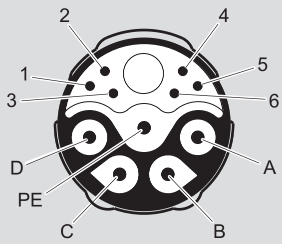
Connection of cables with open end

The following table shows the core assignment of cables with the following part numbers:

Part numbers
18180094, 18127479, 18133967, 18153283, 18153291, 18127495, 18133983, 18153321, 18153348

Assembly					
Open cable end			**Description**	**Prefabricated plug connectors**	
					
Core color/ Core cross section	**Identi-fication**	**Assembly**		**Signal**	**Contact**
Black 1.5 mm² 2.5 mm²	1	Not pre-fabricated	Line connection, phase L1	L1	A
Black 1.5 mm² 2.5 mm²	2	Not pre-fabricated	Line connection, phase L2	L2	B
Black 1.5 mm² 2.5 mm²	3	Not pre-fabricated	Line connection, phase L3	L3	C
Green/yel-low 1.5 mm² 2.5 mm²	–	Not pre-fabricated	PE connection	PE	PE

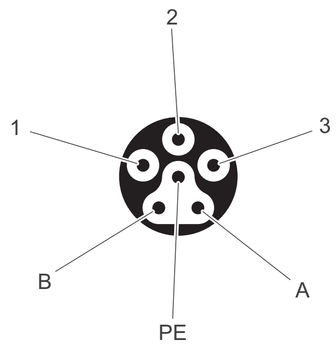
5.10.2 X1206: AC 400 V connection (IN)

The following table shows information about this connection:

Function
AC 400 V connection (IN)

Connection type
MQ15-X-Power, male, plug connector without union nut, MURR Elektronik, (current load max. 16 A)

Connection diagram



Assignment		
Contact	**Signal**	**Description**
1	L1	Line connection, phase L1 (IN)
2	L2	Line connection, phase L2 (IN)
3	L3	Line connection, phase L3 (IN)
PE	PE	PE connection
A	Res.	Reserved
B	Res.	Reserved

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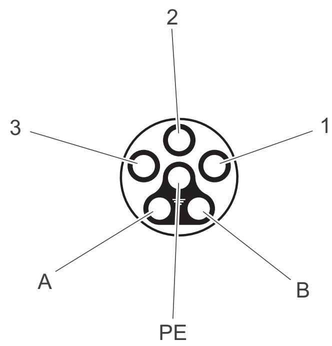
5.10.3 X2242: AC 400 V connection (OUT)

The following table shows information about this connection:

Function
AC 400 V connection (OUT)

Connection type
MQ15-X-Power, female, plug connector with union nut, MURR Elektronik, (current load max. 16 A)

Connection diagram



Assignment		
Contact	**Signal**	**Description**
1	L1	Line connection, phase L1 (OUT)
2	L2	Line connection, phase L2 (OUT)
3	L3	Line connection, phase L3 (OUT)
PE	PE	PE connection
A	Res.	Reserved
B	Res.	Reserved

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5.10.4 X5504: STO (3 cores)

⚠ WARNING

No safe disconnection of the device.

Severe or fatal injuries.

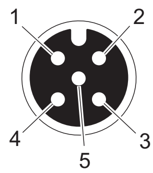
- Do not use the 24 V output (pins 1 and 3) for safety-related applications.
- Only jumper the STO connection with 24 V if the device does not have to fulfill any safety function.

The following table shows information about this connection:

Function
Connection for safe torque off (STO, 3 cores)

Connection type
M12, 5-pin, female, A-coded, color: yellow

Connection diagram



Assignment

Contact	Signal	Description
1	24V_OUT	DC 24 V auxiliary output
2	F_STO_P2	F_STO_P2 connection
3	0V24_OUT	0V24 reference potential for DC 24 V auxiliary output
4	F_STO_P1	F_STO_P1 connection
5	F_STO_M	F_STO_M connection

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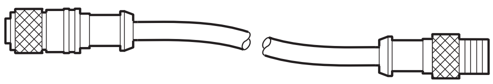
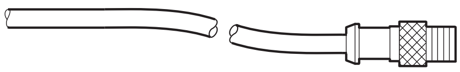
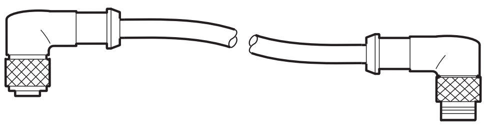
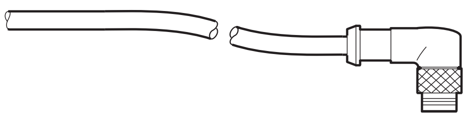
Connection cables

INFORMATION

Use only shielded cables for this connection and only suitable plug connectors that connect the shield with the device in an HF-capable manner.

The following table provides an overview of the cables available for this connection:

Connection cables	Conformity/ part number	Cable type	Length/installation type	Cable cross section/operating voltage
 M12, 5-pin, A-coded, female — M12, 5-pin, A-coded, male	CE/UL: 28110935	HELUKABEL® LiYCY	Variable	3 × 0.75 mm^2 / DC 60 V
 Open — M12, 5-pin, A-coded, male	CE/UL: 28110943	HELUKABEL® LiYCY	Variable	3 × 0.75 mm^2 / DC 60 V
 M12, 5-pin, A-coded, female — M12, 5-pin, A-coded, male	CE/UL: 28110951	HELUKABEL® LiYCY	Variable	3 × 0.75 mm^2 / DC 60 V
 Open — M12, 5-pin, A-coded, male	CE/UL: 28110978	HELUKABEL® LiYCY	Variable	3 × 0.75 mm^2 / DC 60 V

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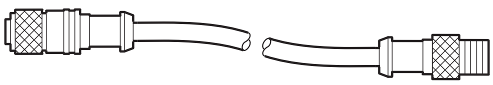
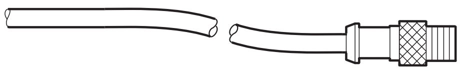
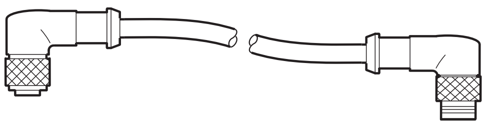
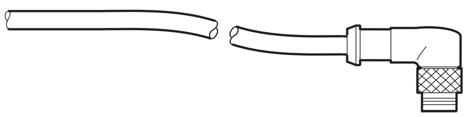
Connection cables	Conformity/ part number	Cable type	Length/installation type	Cable cross section/operating voltage
 M12, 5-pin, A-coded, female / M12, 5-pin, A-coded, male	CE/UL: 28110994	igus chainflex CF78.UL	Variable	4 × 0.5 mm² / DC 60 V
 Open / M12, 5-pin, A-coded, male	CE/UL: 28111001	igus chainflex CF78.UL	Variable	4 × 0.5 mm² / DC 60 V
 M12, 5-pin, A-coded, female / M12, 5-pin, A-coded, male	CE/UL: 28111028	igus chainflex CF78.UL	Variable	4 × 0.5 mm² / DC 60 V
 Open / M12, 5-pin, A-coded, male	CE/UL: 28111036	igus chainflex CF78.UL	Variable	4 × 0.5 mm² / DC 60 V

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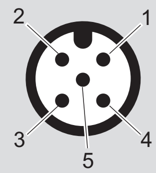
Connection of cables with open end

HELUKABEL

The following table shows the core assignment of cables with the following part numbers:

Part numbers
28110978, 28110943

Assembly					
Open cable end			**Description**	**Prefabricated plug connectors**	
					
Core color/ Core cross section	**Identification**	**Assembly**		**Signal**	**Contact**
[1]	–	Not prefabricated	DC 24 V auxiliary output	24V_OUT	1
White 0.75 mm^2	–	Not prefabricated	F_STO_P2 connection	F_STO_P2	2
[1]	–	Not prefabricated	0V24 reference potential for DC 24 V auxiliary output	0V24_OUT	3
Brown 0.75 mm^2	–	Not prefabricated	F_STO_P1 connection	F_STO_P1	4
Green 0.75 mm^2	–	Not prefabricated	F_STO_M connection	F_STO_M	5

1) Do not connect these cores in the plug connector.

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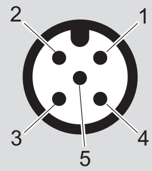
igus chainflex

The following table shows the core assignment of cables with the following part numbers:

Part numbers
28111001, 28111036

Assembly					
Open cable end			Description	Prefabricated plug connectors	
					
Core color/ Core cross section	Identification	Assembly		Signal	Contact
1)	–	Not prefabricated	DC 24 V auxiliary output	24V_OUT	1
Black 0.75 mm^2	1	Not prefabricated	F_STO_P2 connection	F_STO_P2	2
1)	–	Not prefabricated	0V24 reference potential for DC 24 V auxiliary output	0V24_OUT	3
Black 0.75 mm^2	2	Not prefabricated	F_STO_P1 connection	F_STO_P1	4
Black 0.75 mm^2	3	Not prefabricated	F_STO_M connection	F_STO_M	5

1) Do not connect these cores in the plug connector.

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5.10.5 X5505: STO (3 cores)

⚠ WARNING

Disabling of the safety-related disconnection of further devices due to parasitic voltages when using an STO jumper plug.

Severe or fatal injuries.

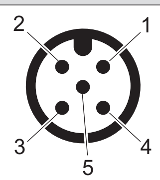
- Only use the STO jumper plug when all incoming and outgoing STO connections have been removed from the device.

The following table shows information about this connection:

Function
Connection for safe torque off (STO, 3 cores)

Connection type
M12, 5-pin, male, A-coded, color: yellow

Connection diagram



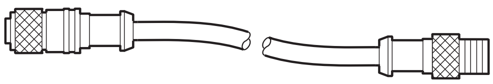
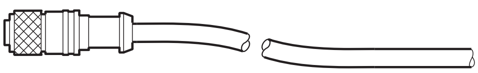
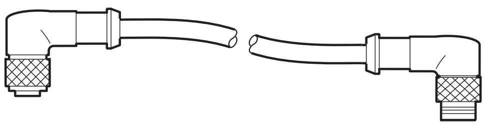
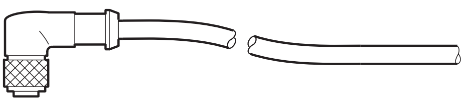
Assignment		
Contact	**Signal**	**Description**
1	Res.	Reserved
2	F_STO_P2	F_STO_P2 connection
3	Res.	Reserved
4	F_STO_P1	F_STO_P1 connection
5	F_STO_M	F_STO_M connection

Connection cables

INFORMATION

Use only shielded cables for this connection and only suitable plug connectors that connect the shield with the device in an HF-capable manner.

The following table provides an overview of the cables available for this connection:

Connection cables	Conformity/ part number	Cable type	Length/installation type	Cable cross section/operating voltage
 M12, 5-pin, A-coded, female — M12, 5-pin, A-coded, male	CE/UL: 28110935	HELUKABEL® LiYCY	Variable 	3 × 0.75 mm^2 / DC 60 V
 M12, 5-pin, A-coded, female — Open	CE/UL: 28117808	HELUKABEL® LiYCY	Variable 	3 × 0.75 mm^2 / DC 60 V
 M12, 5-pin, A-coded, female — M12, 5-pin, A-coded, male	CE/UL: 28110951	HELUKABEL® LiYCY	Variable 	3 × 0.75 mm^2 / DC 60 V
 M12, 5-pin, A-coded, female — Open	CE/UL: 28110986	HELUKABEL® LiYCY	Variable 	3 × 0.75 mm^2 / DC 60 V

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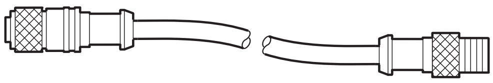
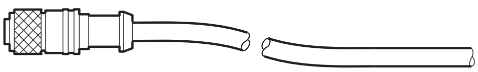
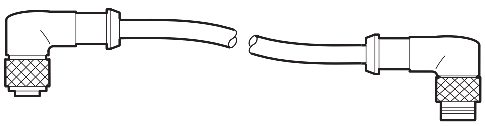
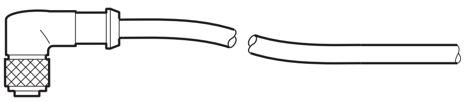
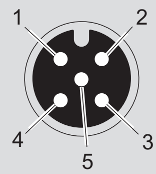
Connection cables	Conformity/ part number	Cable type	Length/installation type	Cable cross section/operating voltage
 M12, 5-pin, A-coded, female — M12, 5-pin, A-coded, male	CE/UL: 28110994	igus chainflex CF78.UL	Variable 	4 × 0.5 mm^2 / DC 60 V
 M12, 5-pin, A-coded, female — Open	CE/UL: 28117816	igus chainflex CF78.UL	Variable 	4 × 0.5 mm^2 / DC 60 V
 M12, 5-pin, A-coded, female — M12, 5-pin, A-coded, male	CE/UL: 28111028	igus chainflex CF78.UL	Variable 	4 × 0.5 mm^2 / DC 60 V
 M12, 5-pin, A-coded, female — Open	CE/UL: 28111044	igus chainflex CF78.UL	Variable 	4 × 0.5 mm^2 / DC 60 V

Connection of cables with open end

HELUKABEL

The following table shows the core assignment of cables with the following part numbers:

Part numbers
28117808, 28110986

Assembly					
Open cable end			Description	Prefabricated plug connectors	
					
Core color/ Core cross section	Identification	Assembly		Signal	Contact
1)	–	Not prefabricated	DC 24 V auxiliary output	24V_OUT	1
White 0.75 mm^2	–	Not prefabricated	F_STO_P2 connection	F_STO_P2	2
1)	–	Not prefabricated	0V24 reference potential for DC 24 V auxiliary output	0V24_OUT	3
Brown 0.75 mm^2	–	Not prefabricated	F_STO_P1 connection	F_STO_P1	4
Black 0.75 mm^2	–	Not prefabricated	F_STO_M connection	F_STO_M	5

1) Do not connect these cores in the plug connector.

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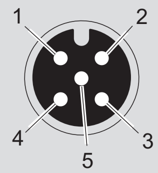
igus chainflex

The following table shows the core assignment of cables with the following part numbers:

Part numbers
28117816, 28111044

Assembly					
Open cable end			Description	Prefabricated plug connectors	
					
Core color/core cross section	Identification	Assembly		Signal	Contact
1)	–	Not prefabricated	DC 24 V auxiliary output	24V_OUT	1
Black 0.75 mm^2	1	Not prefabricated	F_STO_P2 connection	F_STO_P2	2
1)	–	Not prefabricated	0V24 reference potential for DC 24 V auxiliary output	0V24_OUT	3
Black 0.75 mm^2	2	Not prefabricated	F_STO_P1 connection	F_STO_P1	4
Black 0.75 mm^2	3	Not prefabricated	F_STO_M connection	F_STO_M	5

1) Do not connect these cores in the plug connector.

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5.10.6 STO jumper plug (3-core)

⚠ WARNING

Safe disconnection of the device is not possible when using the STO jumper plug.

Severe or fatal injuries.

- Only use use the STO jumper plug if the device is not used to fulfill any safety function.

⚠ WARNING

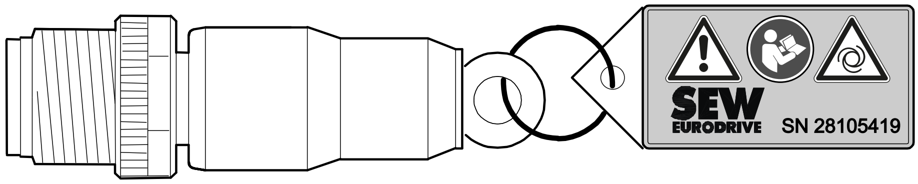
Disabling of the safety-related disconnection of further devices due to parasitic voltages when using an STO jumper plug.

Severe or fatal injuries.

- Only use the STO jumper plug when all incoming and outgoing STO connections have been removed from the device.

The STO jumper plug can be connected to the STO plug connector X5504 of the device. The STO jumper plug deactivates the safety functions of the device.

The following figure shows the STO jumper plug with the printed **red** tag, part number 28105419:



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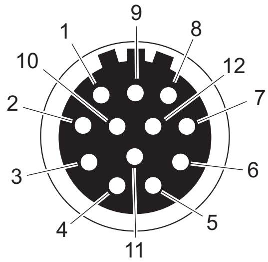
5.10.7 X5136: Digital inputs, relay output

The following table shows information about this connection:

Function
Digital inputs, relay output

Connection type
M23, female, male thread, TE Connectivity - Intercontec products, P insert, SpeedTec equipment, 12-pin, 0°-coded, coding ring: without, protected against contact

Connection diagram



Assignment		
Contact	**Signal**	**Description**
1	DI01	Digital input DI01
2	DI02	Digital input DI02
3	DI03	Digital input DI03
4	DI04	Digital input DI04
5	Res.	Reserved
6	DOR-C	Relay output DO R, common contact
7	DOR-NO	Relay output DO R, NO contact
8	+24V_O	DC 24 V output
9	0V24_O	0 V 24 reference potential
10	Res.	Reserved
11	+24V_O	DC 24 V output
12	FE	Functional earth

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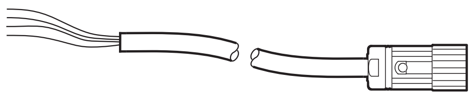
Connection cable

INFORMATION

Use only shielded cables for this connection and only suitable plug connectors that connect the shield with the device in an HF-capable manner.

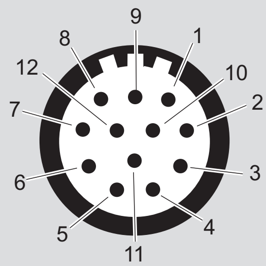
The following table provides an overview of the cables available for this connection:

Connection cable	Conformity/ part number	Cable type	Length/installation type	Cable cross section/operating voltage
 Open M23, 12-pin, 0°-coded	CE/UL: 11741457	HELUKABEL Li9Y91YC11Y -HF	Variable 	6 × 2 × 0.25 mm^2 / DC 60 V

Connection of cables with open end

The following table shows the core assignment of cables with the following part number:

Part numbers
11741457

Assembly					
Open cable end			Description	Prefabricated plug connectors	
					
Core color/ Core cross section	Identification	Assembly		Signal	Contact
Pink 0.25 mm²	–	Not prefabricated	Digital input DI01	DI01	1
Gray 0.25 mm²	–	Not prefabricated	Digital input DI02	DI02	2
Red 0.25 mm²	–	Not prefabricated	Digital input DI03	DI03	3
Blue 0.25 mm²	–	Not prefabricated	Digital input DI04	DI04	4
Yellow 0.25 mm²	–	Not prefabricated	Reserved	Res.	5
Green 0.25 mm²	–	Not prefabricated	Relay output DO R, common contact	DOR-C	6
Purple 0.25 mm²	–	Not prefabricated	Relay output DO R, NO contact	DOR-NO	7
Black 0.25 mm²	–	Not prefabricated	DC 24 V output	+24V_O	8
Brown 0.25 mm²	–	Not prefabricated	0 V 24 reference potential	0V24_O	9
White 0.25 mm²	–	Not prefabricated	Reserved	Res.	10
Gray/pink 0.25 mm²	–	Not prefabricated	DC 24 V output	+24V_O	11
Green/yellow 0.25 mm²	–	Not prefabricated	Functional earth	FE	12

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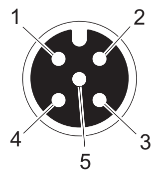
5.10.8 X5135: Digital inputs

The following table shows information about this connection:

Function
Digital inputs

Connection type
M12, 5-pin, female, A-coded, color: black

Connection diagram



Assignment		
Contact	**Signal**	**Description**
1	+24V	DC 24 V sensor supply
2	DI02	Digital input DI02
3	0V24	0V24 reference potential for sensors
4	DI01	Digital input DI01
5	FE	Functional earth

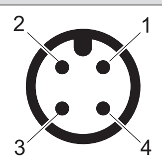
5.10.9 X1524: DC 24 V backup voltage, input (AUX-PWR)

The following table shows information about this connection:

Function
Input of DC 24 V backup voltage / DC 24 V supply (AUX-PWR)

Connection type
M12, 4-pin, male, A-coded, color: black

Connection diagram



Assignment		
No.	**Name**	**Function**
1	+24V	DC 24 V input (AUX-PWR)
2	Res.	Reserved
3	0V24	0V24 Reference potential (AUX-PWR)
4	Res.	Reserved

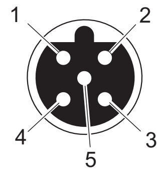
5.10.10 X4142: Engineering interface

The following table shows information about this connection:

Function
Engineering interface (CAN)

Connection type
M12 SPEEDCON, 5-pin, female, B-coded, color: black

Connection diagram



Assignment		
Contact	**Signal**	**Description**
1	Res.	Reserved
2	24V_OUT	DC 24 V auxiliary output[1)]
3	0V24_OUT	0V24 reference potential[1)]
4	CAN_H	CAN High connection
5	CAN_L	CAN Low connection

1) Only use this output to supply components by SEW-EURODRIVE.

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Connection cables

The following table provides an overview of the cables available for this connection:

Connection cables	Conformity/ part number	Length/installation type	Operating voltage
Connection to interface adapter USM21A:  M12 SPEEDCON, 5-pin, B-coded, male — RJ10	CE: 28139038	3.0 m 	DC 60 V
Connection to CBG.. keypad :  M12 SPEEDCON, 5-pin, B-coded, male — D-sub, 9-pin, male, angled	CE: 28139046	3.0 m 	DC 60 V

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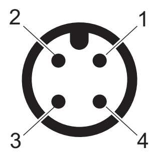
5.11 Plug connector assignment at the electronics cover

5.11.1 X4271: AS-Interface

The following table shows information about this connection:

Function
AS-Interface

Connection type
M12, 4-pin, male, A-coded, color: black

Connection diagram


Assignment		
Contact	**Signal**	**Description**
1	ASI+	AS-Interface data cable +
2	Res.	Reserved
3	ASI-	AS-Interface data cable -
4	Res.	Reserved

5.12 PC connection

Connect the PC to the drive unit before you start the engineering software MOVISUITE®.

You have several options to connect a PC to the drive unit.

5.12.1 Connection via interface adapter USM21A

The USM21A interface adapter is used to connect the PC and the engineering interface of the device.

The data is transferred according to the USB 2.0 standard. It is also possible to work with a USB 3.0 interface.

You need the following components for the connection:

Component	Part number
USM21A interface adapter The following connection cables are included in the delivery: • USB 2.0 connection cable – USB type A/USB type B, – Length: 1.5 m • RJ10/RJ10 connection cable For connection to the engineering interface X31 – With 2 RJ10 plug connectors – Length: 3 m	28231449
Connection cable RJ10/M12 For connection to the engineering interface X4142 • With RJ10 plug connector • With M12 SPEEDCON plug connector, 5-pin, male, B-coded • Length: 3 m	28139038
Retrofit set M12 engineering interface X4142 M12 SPEEDCON, 5-pin, B-coded, female	28273273

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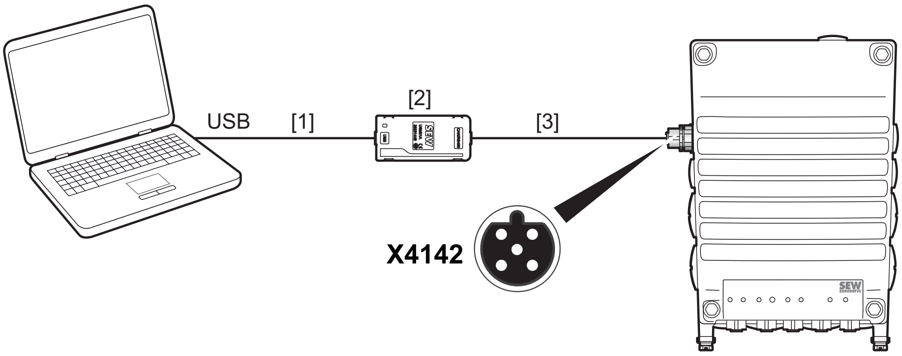
Connection to X4142 (M12 at the connection box)

The engineering interface X31 at the connection unit in the connection box is assigned to the internal wiring of plug connector X4142.



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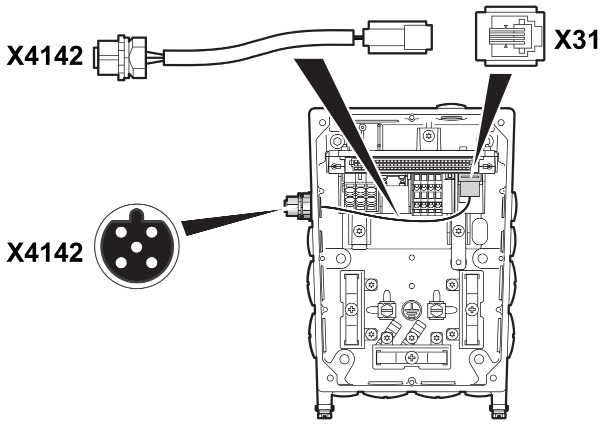
[1] USB 2.0 connection cable
(commercial, included in the USM21A delivery)
[2] USM21A interface adapter
[3] Connection cable RJ10/M12
(available for delivery from SEW-EURODRIVE, part number: 28139038)

Installing the included engineering plug connector X4142

In some cases, the X4142 engineering plug connector is provided in an accessory bag (part number: 28273273) included in the drive unit delivery from SEW-EURODRIVE. In this case, install the engineering plug connector X4142 to the connection box of the drive unit as follows:

1. It is essential that you observe the startup instructions.
2. Switch off the voltage supply and wait for at least 5 minutes.
3. Loosen the screws and remove the electronics cover from the connection box.
4. Plug in the plug connector RJ10 from outside through one of the permitted cable entry bores (for the permitted positions, see chapter "Plug connector positions"). Push the cable completely into the connection box.
5. Screw plug connector M12 into the cable entry bore. Fasten the nut of the M12 plug connector (tightening torque: 6 Nm).
6. Insert the RJ10 plug connector into plug connector X31 in the connection box. The following figure shows an example of the cable routing:



32385963403

7. Plug the electronics cover onto the connection box. Screw on the electronics cover with 4 screws (tightening torque: 6 Nm).

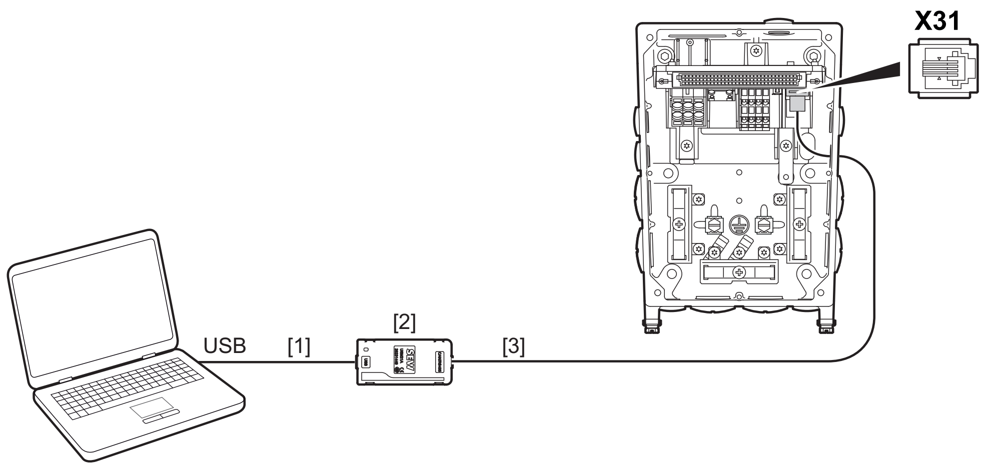
Connection to X31 (RJ10 in the connection box)

NOTICE

Connector X31 provides a 24 V supply voltage for operating the connected options.

Damage to connected options with low nominal voltage.

- Only connect options with a nominal voltage of 24 V to connector X31, such as:
  - Interface adapter USM21A,
  - CBG.. keypad
- Do **not** connect the following options with 5 V nominal voltage to the X31 connector:
  - Interface adapters USB11A, UWS11A, UWS21A
  - Keypads DBG.., GBG21A.



9007224818777355

[1] USB 2.0 connection cable
(commercial, included in the delivery of USM21A)
[2] Interface adapter USM21A
[3] RJ10/RJ10 connection cable
(included in the delivery of the USM21A interface adapter)

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5.12.2 Connection via CBG21A or CBG11A keypad

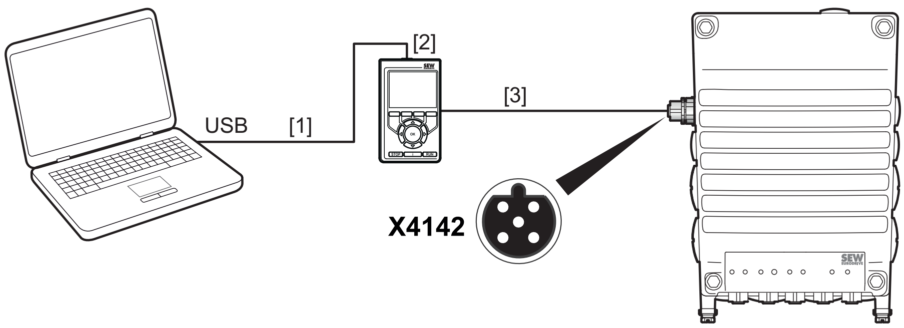
Use the CBG21A or CBG11A keypad to connect the PC and the engineering interface of the device.

The data is transferred according to the USB 2.0 standard. It is also possible to work with a USB 3.0 interface.

You need the following components for the connection:

Component	Part number
CBG21A keypad	28238133
CBG11A keypad	28233646
CBG.. connection cable D-sub/RJ10 For connecting the X31 engineering interface to the 24 V supply voltage • With D-sub plug connector 9-pin, male • With RJ10 plug connector • Length: 3 m	28117832
USB connection cable USB A/USB 2.0 Mini B For connecting the CBG.. keypad to the USB interface of the PC • With USB A plug connector • With USB 2.0 Mini B plug connector • Length: 3 m	25643517
CBG.. connection cable D-sub/M12 SPEEDCON, B-coded For connecting the X4142 engineering interface to the 24 V supply voltage • With D-sub plug connector 9-pin, male • With M12 plug connector, 5-pin, male, A-coded • Length: 3 m	28139046

Connection to X4142 (M12 at the connection box)



32386058507

[1] Connection cable USB A/USB 2.0 Mini B
(available for delivery from SEW-EURODRIVE, part number: 25643517)
[2] CBG21A or CBG11A keypad
[3] D-sub/M12 connection cable
(available for delivery from SEW-EURODRIVE, part number: 28139046)

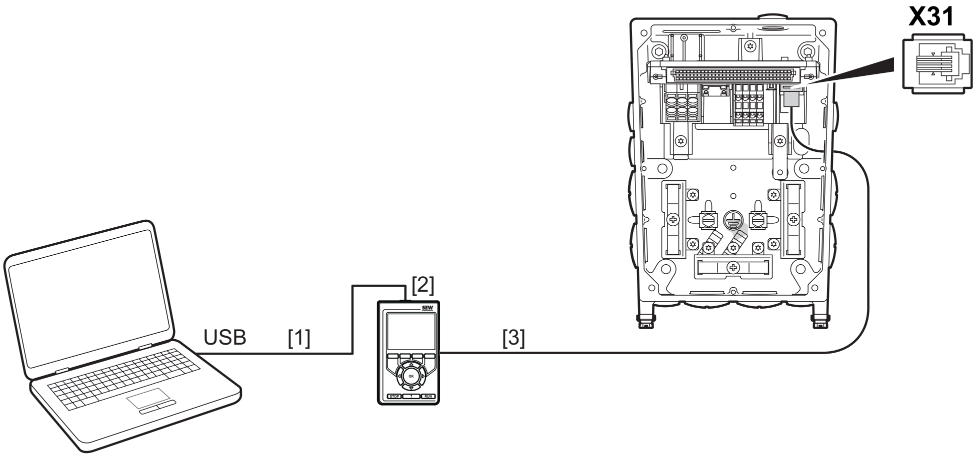
Connection to X31 (RJ10 in the connection box)

NOTICE

Connector X31 provides a 24 V supply voltage for operating the connected options.

Damage to connected options with low nominal voltage.

- Only connect options with a nominal voltage of 24 V to connector X31, such as:
  - Interface adapter USM21A,
  - CBG.. keypad
- Do **not** connect the following options with 5 V nominal voltage to the X31 connector:
  - Interface adapters USB11A, UWS11A, UWS21A
  - Keypads DBG.., GBG21A.



9007224880237067

[1] Connection cable USB A/USB 2.0 Mini B
(available for delivery from SEW-EURODRIVE, part number: 25643517)
[2] CBG21A or CBG11A keypad
[3] D-sub/RJ10 connection cable
(available for delivery from SEW-EURODRIVE, part number: 28117832)

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6 Startup

6.1 Startup notes

INFORMATION

It is essential to comply with the safety notes during startup.

▲ WARNING

Risk of injury due to missing or defective protective covers.

Severe or fatal injuries.

- Install the protective covers of the system according to the instructions.
- Never start the device if the protection covers are not installed.

▲ WARNING

Electric shock caused by dangerous voltages in the connection box. Dangerous voltages can still be present for up to 5 minutes after disconnection from the power supply system.

Severe or fatal injuries.

- Before removing the electronics cover, de-energize the device via a suitable external disconnection device.
- Secure the device against unintended re-connection of the voltage supply.
- Secure the output shaft against rotation.
- Wait for at least the following time before removing the electronics cover: **5 minutes**

▲ WARNING

Risk of burns due to hot surfaces.

Serious injuries.

- Let the devices cool down before touching them.

▲ WARNING

Device malfunction due to incorrect device setting.

Severe or fatal injuries.

- Observe the startup instructions.
- Always have the installation carried out by trained specialists.
- Only use settings that are correct for the function.

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NOTICE

Undercutting the minimum switch-off time of the line contactor.

Irreparable damage to the inverter or unforeseen malfunctions.

- You must observe a minimum switch-off time of 10 s after switching off the voltage supply.
- Do not switch the voltage supply on or off **more often than once per minute**.

INFORMATION

- Before startup, remove the paint protection cap from the LED displays.
- Before startup, remove the paint protection film from the nameplates.

INFORMATION

- To ensure fault-free operation, do not disconnect or connect signal cables during operation.

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6.1.1 Lifting applications

⚠ WARNING

Danger of fatal injury if the hoist falls.

Severe or fatal injuries.

- In case of products used in lifting applications, additional monitoring systems or mechanical protection devices must be used.

⚠ WARNING

Risk from falling loads.

This can result in severe or fatal injuries.

- Do **not** use the function "Releasing the brake / deactivating DynaStop® with FCB 01" for hoist applications and applications with potentially falling loads.
- Inhibit the function via the following steps:
  - Deactivate the function of the DIP switch S1/2 using the parameter *Deactivation* = **"1"** (path: *Functions* > *Inputs/outputs* > *Basic device* > *DIP switch functions* > *Releasing the brake / deactivating DynaStop® with FCB 01 – enable*)
  - Inhibit the functions using the parameter *Releasing the brake / deactivating DynaStop® with FCB 01 – enable* = **"0"** (path: *Functions* > *Drive functions* > *FCB 01 Output stage inhibit*).

Startup notes for lifting applications

INFORMATION

The recommended settings and procedures must be matched to the requirements of the application and its safety assessment, and adjusted accordingly.

SEW-EURODRIVE recommends the following settings and procedures for lifting applications:

- Set parameter *Apply brake/activate DynaStop® in STO state (8501.3)* **= "1"** (Yes), see chapter "Mechanical brake in connection with STO".
- Set parameter *Integrator mode (8404.9)* = **"0"** (hold).

  Path: *Optimization DT1* > *Set controller dynamics* > *Advanced settings*.

6.2 Startup requirements

NOTICE

Gear unit overload.

Damage to the gear unit.

- Observe the peak torque of the gear unit when you configure the current limit and torque limit.
- Check the current limits and torque limits and adjust them, if necessary.

Startup is only required when you need to change the factory set parameterization.

In this case, the following conditions apply to startup:

- You have installed the device correctly both mechanically and electrically.
- You have performed a correct project planning for the device.
- Safety measures prevent accidental startup of devices.
- Safety measures prevent danger to persons or machines.

Required hardware components:

- PC or laptop as specified in chapter "PC connection".
- Interface cable and, if necessary, interface adapter according to chapter "PC connection".

Required software:

- Engineering software MOVISUITE® standard by SEW-EURODRIVE.

6.2.1 Torque limiting

NOTICE

Gear unit overloaded by the motor.

Possible damage to property.

- The maximum output torque might have to be limited to the torque specified on the nameplate.

Also observe the information in the catalog "MOVIMOT® advanced Gearmotors"

6.3 Parameterization mode

The following parameterization modes are available to perform the device startup.

Easy mode

Easy startup with predefined control interface.

- Setting parameters, setpoints, and additional functions can only be set using the mechanical setting elements (potentiometer and DIP switch) at the device.
- Startup does not require any software or keypads.
- All parameters are reset to delivery state when the device is switched to Easy mode.
- All device parameters are write-protected.

Exceptions:

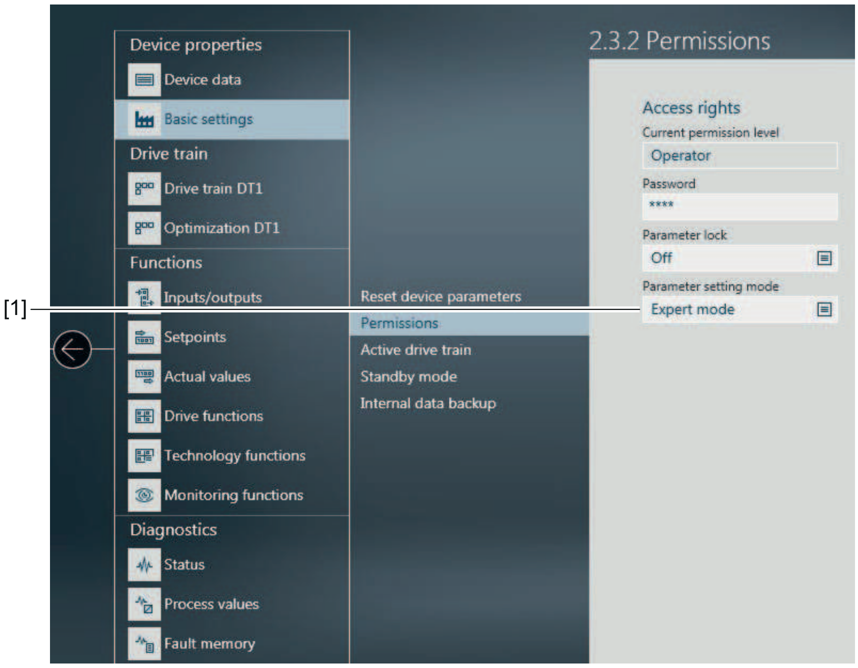
- When you switch to Easy mode, the addressing parameters are not reset to the delivery state.
- You can also change the parameters for device address configuration and the parameterization mode when the device is set to Easy mode.

Expert mode

Expert mode is a parameterization mode that allows full access to all device functions via the MOVISUITE® engineering software or the CBG.. keypad.

- The predefined connection interfaces of the device can be adjusted to the requirements of the application.
- You can deactivate the mechanical setting elements. Doing so, you will activate the (parameterizable) replacement values of the mechanical setting elements.
- You can set the device parameters.

The parameterization mode can be set via the MOVISUITE® engineering software or the CBG.. keypad.



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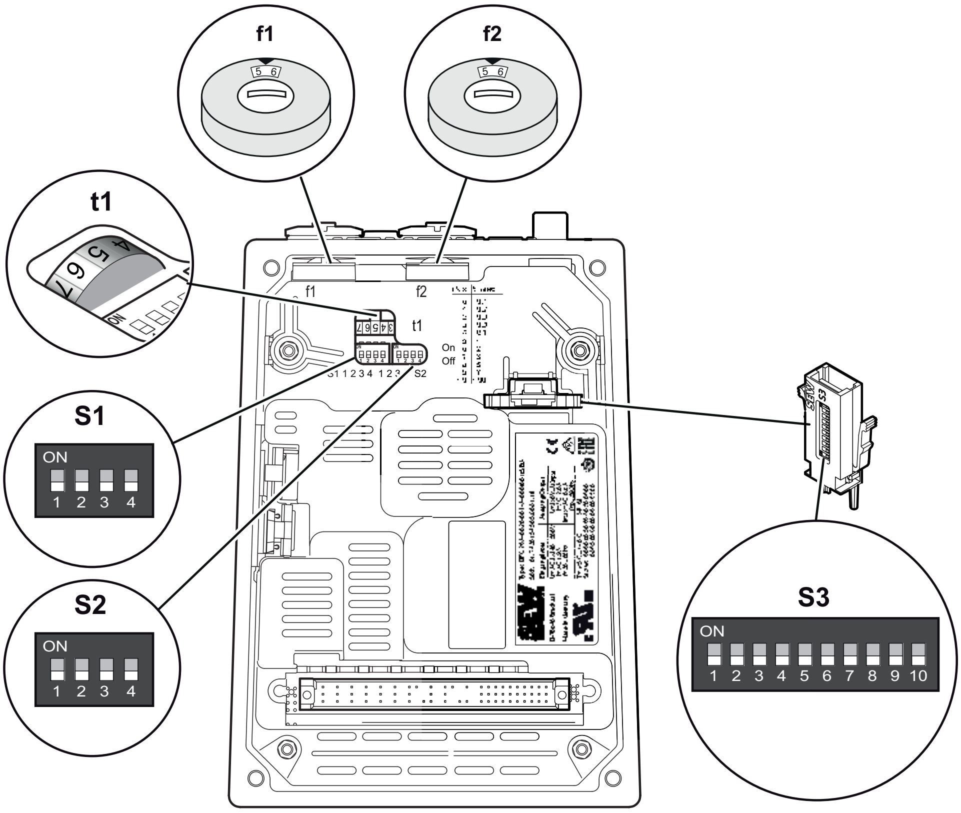
[1] Basic settings > authorizations > parameterization mode > Expert mode

6.4 Control elements

6.4.1 Overview

The following figure gives an overview of the control elements at the electronics cover:



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f1	Potentiometer f1 (underneath the screw plug)
f2	Potentiometer f2 (underneath the screw plug)
t1	Potentiometer t1
S1	DIP switch S1
S2	DIP switch S2
S3	DIP switch S3

6.4.2 Potentiometer f1

NOTICE

Loss of the ensured degree of protection if the screw plug of the potentiometer is not installed or not installed correctly.

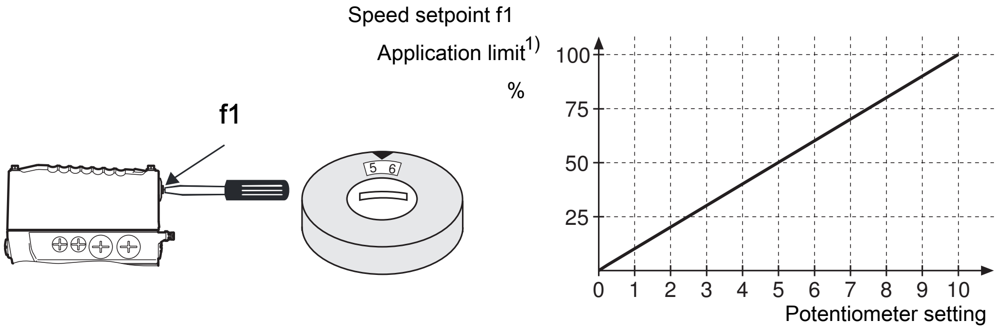
Damage to the device.

- After setting the setpoint, make sure the screw plug of the potentiometer has a seal and screw it in.

Use the f1 potentiometer to adjust speed setpoint f1.

- When the device is set to Easy mode, the predefined setpoint is always active at the potentiometer f1.
- The potentiometer f1 can be deactivated in Expert mode. In this case, the parameterizable replacement value is activated as speed setpoint f1.

The following figure shows how to scale the speed setpoint f1 using potentiometer f1:



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1) Depending on the selected direction of rotation, the parameter *Application limit – positive speed* or the parameter *Application limit – negative speed* are used to scale the speed setpoint f1.
For the application limit, refer to the MOVISUITE® parameter tree in the following menu: *Functions* > *Monitoring functions* > *Limit values* > *Application limit*.

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6.4.3 Potentiometer f2

NOTICE

Loss of the ensured degree of protection if the screw plug of the potentiometer is not installed or not installed correctly.

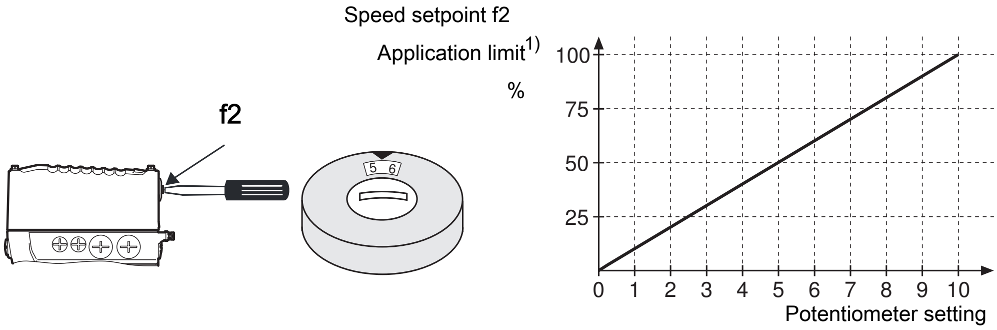
Damage to the device.

- After setting the setpoint, make sure the screw plug of the potentiometer has a seal and screw it in.

Use the potentiometer f2 to adjust speed setpoint f2.

- When the device is set to Easy mode, the predefined setpoint is always active at the potentiometer f2.
- The potentiometer f2 can be deactivated in Expert mode. In this case, the parameterizable replacement value is activated as speed setpoint f2.

The following figure shows how to scale the speed setpoint f2 using potentiometer f2:



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1) Depending on the selected direction of rotation, the parameter *Application limit positive* or the parameter *Application limit negative* are used to scale the speed setpoint f2.
For the application limit, refer to the MOVISUITE® parameter tree in the following menu: *Functions* > *Monitoring functions* > *Limit values* > *Application limit*.

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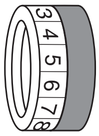
6.4.4 Potentiometer t1

Use the potentiometer t1 to set the acceleration/deceleration setpoint t1.

- When the device is set to Easy mode, the predefined setpoint is always active at the potentiometer t1.
- The potentiometer t1 can be deactivated in Expert mode.

  In this case, the parameters *Acceleration 1* and *Deceleration 1* of the fixed setpoint processing are activated.



The following table lists the scaling of acceleration/deceleration setpoint t1 depending on the setting of potentiometer t1:

Potentiometer t1											
Detent setting	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Acceleration/deceleration $min^{-1}s^{-1}$	30000	15000	10000	6000	4286	**3000**	1500	1000	600	429	300
Ramp time[1] s	0.1	0.2	0.3	0.5	0.7	**1**	2	3	5	7	10

1) Alternative information on the equivalent ramp times for acceleration/deceleration based on a speed change of 3000 min-1.

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6.5 DIP switches

6.5.1 Overview

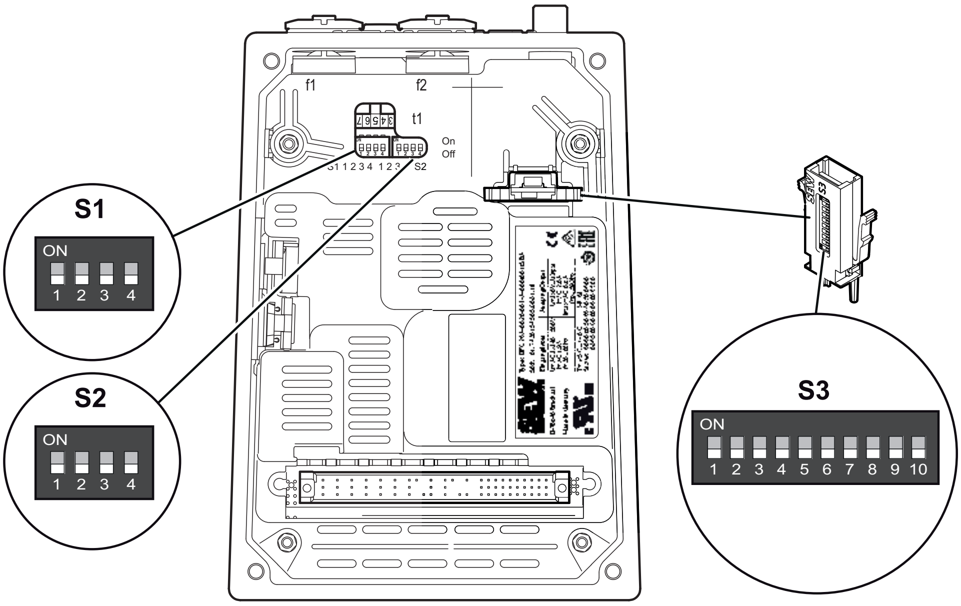
NOTICE

Damage to the DIP switches caused by unsuitable tools.

Possible damage to property.

- To set the DIP switches, use only suitable tools, such as a slotted screwdriver with a blade width of no more than 3 mm.
- The force used for setting the DIP switches must not exceed 5 N.

The following figure shows the DIP switches of the drive unit:



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DIP switch S1

The following table shows the functions of DIP switch S1:

DIP switch	S1			
	1	2	3	4
Meaning	**Direction of rotation reversal**	**Releasing the brake / deactivating DynaStop® with FCB 01 – enable**	**Speed monitoring deactivation**	**Reserved**
ON	On	On	Speed monitoring Off	On
OFF	**Off**1)	**Off**1)	**Speed monitoring On**1)	**Off**1)

1) The factory settings are shown in boldface.

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You must not alter the factory setting of the S1/4 DIP switch = OFF.

DIP switch S2

The following table shows the functions of DIP switch S2:

DIP switch	S2			
	1	2	3	4
	Reserved	Selected AS-Interface slave type/profile		
		Bit 2^0	Bit 2^1	Bit 2^2
ON	–	1	1	1
OFF	–	**0**	**0**	**0**

You must not alter the factory setting of the S2/1 DIP switch = OFF.

DIP switch S3

The S3 DIP switches on the memory module are reserved.

Do not change the factory setting of the S3 DIP switches = OFF.

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6.5.2 Description of the DIP switches

DIP switch S1/1: Reversing the direction of rotation

INFORMATION

The direction of rotation is reversed depending on the setting of the DIP switch and of the parameter drive train 1 > Controller > *Direction of rotation reversal*. If both settings are active, the speed setpoint is not inverted (logical XOR).

You can reverse the direction of rotation of the drive using this DIP switch.

- OFF (S1/1 = OFF): The drive turns clockwise for a positive setpoint and counterclockwise for a negative setpoint.
- ON (S1/1 = ON): The drive turns counterclockwise for a positive setpoint and clockwise for a negative setpoint.

DIP switch S1/2: Releasing the brake / deactivating DynaStop®with FCB 01 – enable

⚠ WARNING

Risk from falling loads.

This can result in severe or fatal injuries.

- Do not enable the function "Releasing the brake / deactivating DynaStop®" for hoist applications and applications with potentially falling loads.

INFORMATION

If the function of this DIP switch is deactivated via parameter access, the last active setting of the relevant parameter is maintained.

Use this DIP switch to enable the function "Releasing the brake / deactivating DynaStop® with FCB 01" even when the drive is disabled.

- OFF (S1/2 = OFF): The function "Releasing the brake / deactivating DynaStop® with FCB 01" is inhibited.
- ON (S1/2 = ON): The function "Releasing the brake / deactivating DynaStop® with FCB 01" is enabled.

  When the function block FCB 01 is active, you can release the brake or deactivate DynaStop® using a digital input or an actuated process data bit.

INFORMATION

For more information about disabling DynaStop® without drive enable, refer to chapter "Operation".

DIP switch S1/3: Deactivating the speed monitoring

INFORMATION

If the function of this DIP switch is deactivated via parameter access, the last active setting of the relevant parameter is maintained.

This DIP switch is used to disable speed monitoring.

- Speed monitoring OFF (S1/3 = ON): Speed monitoring is not active.
- Speed monitoring ON (S1/3 = OFF): Speed monitoring is active.

  Speed monitoring is used to protect the drive in case of blockage.

  When speed monitoring is active and the drive operates at the current limit for longer than 1 second (factory settings), the drive unit triggers the fault "Speed monitoring". The drive unit signals the fault, for example via the "DRIVE" status LED. The current limit must be reached permanently for the duration of the delay time before the monitoring function trips.

DIP switches S2/2 – S2/4: Selecting the AS-Interface slave type/profile

Use this DIP switch to select the slave type and the profile for the AS-Interface communication.

DIP switch			AS-Interface slave type/profile
S2/2	**S2/3**	**S2/4**	
OFF	OFF	OFF	Binary slave 4DI/4DO, profile: S-7.F
ON	OFF	OFF	Double slave 4DI/4DO The drive is A- and B-slave • A-slave -> CTT3, profile: S-7.A.7 • B-slave -> CTT2 (SMART parameter access), profile: S-7.A.5
OFF	**ON**	OFF	A/B-Slave 4DI/4DO, profile: S-7.A.7 The drive is A- or B-slave (each CTT3)
ON	**ON**	OFF	Double slave 8DI/8DO The drive is A- and B-slave • A-slave -> CTT3, profile: S-7.A.A • B-slave -> CTT2 (SMART parameter access), profile: S-7.A.5
OFF	OFF	**ON**	A/B-slave 8DI/8DO, profile: S-7.A.A The drive is A- or B-slave (each CTT3)
ON	OFF	**ON**	Reserved
OFF	**ON**	**ON**	Reserved
ON	**ON**	**ON**	Reserved

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6.6 Startup procedure

6.6.1 Startup in Easy mode

In Easy mode (delivery state), startup is performed without a PC or keypad.

The device functions are predefined in Easy mode.

The setpoint is only set using mechanical setting elements (potentiometer, DIP switch).

The electronics cover controls the drive unit using the drive function FCB 05 Speed control.

6.6.2 Startup in Easy mode

In Expert mode, perform startup of the devices using the MOVISUITE® engineering software of SEW-EURODRIVE.

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The startup procedure is divided into segments. The following steps illustrate the start-up procedure for a device by way of an example.

Drive train segment

Drive train		Configuring drive trains.

Interfaces segment

Standard interfaces		Basic settings of the standard interfaces • Standard I/O • Encoder 1

Functions segment

I/O configuration		• Standard I/O • I/O card DI/DO

MOVIKIT® configuration (optional)		• Basic settings • Monitoring functions • Drive functions • Inputs/outputs • Process data interface
PO configuration		• Advanced PO configuration
PI configuration		• Advanced PE configuration
Drive functions		• FCB 05 Speed control
Advanced drive functions		• FCB 01 Output stage inhibit • FCB 02 Stop default • FCB 26 Stop at user limit
Monitoring functions		• Limit values 1 • Monitoring functions 1 • Energy-saving function

Information on the drive unit

Device data is available via the project nodes.

Device data		• Device identification • Main component • Subcomponent • Production label
Fault responses Overview		• Axis module • Power supply monitoring • Functions
Setup		• Access rights • Resetting device parameters.

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Checklist for startup

The following checklist lists the necessary steps for complete startup.

Step	Startup step	Finished
1	Install the drive unit.	
2	Install the MOVI-C® component.	
3	Start MOVISUITE®.	
4	Start up the drive train.	
5	Parameterize the setpoints.	
6	Parameterize the function blocks (FCBs).	
7	Configure digital inputs and outputs.	
8	Configure the process data (PD).[1]	
9	Configure the software modules (MOVIKIT®).	
10	Test the drive unit/application.	

1) Not available with DBC designs.

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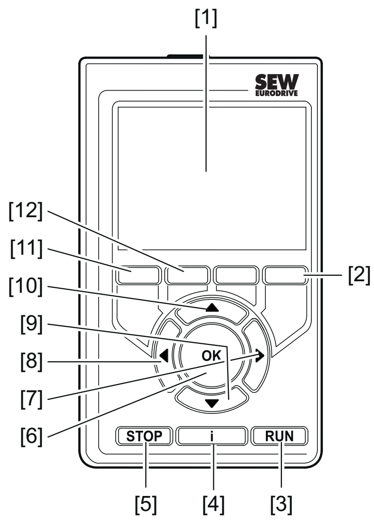
6.7 Startup with the CBG21A keypad

Using the CBG21A keypad, startup can be performed intuitively guided by the symbols and functions of the color display.

6.7.1 CBG21A keypad

The following figure shows the CBG21A keypad:



[1]	Color display	
[2]	Function keys (Function according to bottom line on color display)	
[3]	<RUN> key	(Start)
[4]	<I> key	(**I**nformation)
[5]	<STOP> key	(Stop)
[6]	<OK> key	(Acknowledgment)
[7]	<►> key	(Left)
[8]	<◄> key	(Right)
[9]	<▼> key	(Down)
[10]	<▲> key	(Up)
[11]	Function key <⇦>	(Back)
[12]	Function key <⇨>	(Next)

Operation

Activating a field	Select a field using the arrow keys <◄>/<►>/<▲>/<▼>. Use the <OK> key to activate the field.
Entering numbers	Use the arrow keys <◄>/<►> to change the digit within the number. The editable digit is highlighted. Change the value of the number using the arrow keys <▲>/<▼>. Confirm the number with the <OK> key.

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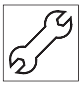
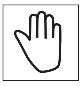
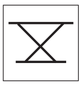
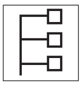
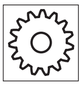
Symbols used

The available functions are shown with pictograms in the keypad display.

	Startup
	Manual mode
	Optimization of the control mode
	Application
	Diagnostics
	Parameter
	Data management
	Settings
	Back
	Next

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6.8 Startup with the CBG11A keypad

Using the CBG11A keypad, startup can be performed intuitively guided by the symbols and functions of the color display.

INFORMATION

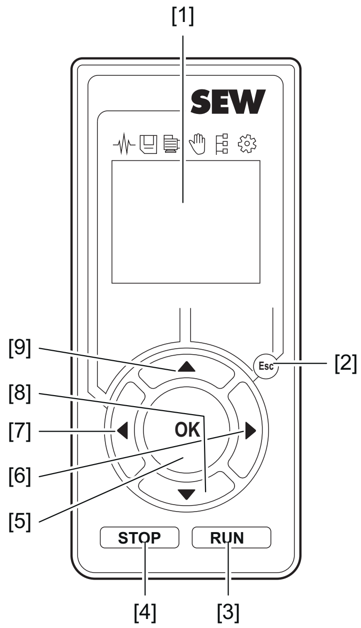
You cannot start up a motor with encoder using the CBG11A keypad.

You can carry out this particular startup with a CBG21A keypad or with the MOVISUITE® engineering software.

6.8.1 CBG11A keypad

The following figure shows the CBG11A keypad:

[1]	Color display	
[2]	<Esc> key	
[3]	<RUN> key	(Start)
[4]	<STOP> key	(Stop)
[5]	<OK> key	(Acknowledgment)
[6]	<►> key	(Left)
[7]	<◄> key	(Right)
[8]	<▼> key	(Down)
[9]	<▲> key	(Up)



All text on the color display is only available in English.

Operation

Select functions	Use the <Esc> key to return to the main menu. Select a function using the arrow keys <◄>/<►>/<▲>/<▼>. Confirm your selection with the <OK> key.
Entering numbers	Use the arrow keys <◄>/<►> to change the digit within the number. The editable digit is underlined. Change the value of the number using the arrow keys <▲>/<▼>. Confirm the number with the <OK> key.

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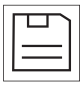
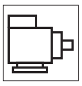
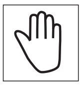
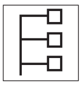
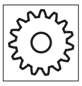
Symbols used

The available functions are shown with pictograms in the keypad display.

	Diagnostics
	Data management
	Startup
	Manual mode
	Parameter tree
	Keypad settings

6.9 Process data configuration

In Easy mode, the following process data configuration is active.

In Expert mode, you can assign different functions to the individual data bits.

6.9.1 Control word 1

<table>
<tr><th colspan="5">Control word 1 – Cyclic data bits of the AS-Interface</th></tr>
<tr><th>DO
(AS-Interface)</th><th>PO1
(Device)</th><th>Function</th><th colspan="2">Usable data width of the AS-Interface slave profile</th></tr>
<tr><td>DO0</td><td>0</td><td>Positive direction of rotation</td><td rowspan="4">4 bits</td><td rowspan="8">8 bits</td></tr>
<tr><td>DO1</td><td>1</td><td>Negative direction of rotation</td></tr>
<tr><td>DO2</td><td>2</td><td>Potentiometer f2</td></tr>
<tr><td>DO3</td><td>3</td><td>Output stage enable/fault reset</td></tr>
<tr><td>DO4</td><td>4</td><td>Fixed speed setpoint bit 0</td><td rowspan="12"></td></tr>
<tr><td>DO5</td><td>5</td><td>Fixed speed setpoint bit 1</td></tr>
<tr><td>DO6</td><td>6</td><td>FCB 13 Stop at application limit</td></tr>
<tr><td>DO7</td><td>7</td><td>Releasing the brake / deactivating DynaStop® with FCB 01</td></tr>
<tr><td>–</td><td>8</td><td>No function</td><td rowspan="8"></td></tr>
<tr><td>–</td><td>9</td><td>No function</td></tr>
<tr><td>–</td><td>10</td><td>No function</td></tr>
<tr><td>–</td><td>11</td><td>No function</td></tr>
<tr><td>–</td><td>12</td><td>No function</td></tr>
<tr><td>–</td><td>13</td><td>No function</td></tr>
<tr><td>–</td><td>14</td><td>No function</td></tr>
<tr><td>–</td><td>15</td><td>No function</td></tr>
</table>

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6.9.2 Status word 1

Status word 1 – Cyclic data bits of the AS-Interface				
DI (AS-Interface)	**PI1 (Device)**	**Function**	**Usable data width of the AS-Interface slave profile**	
DI0	0	Ready for operation	4 bits	8 bits
DI1	1	Local mode/manual mode active		
DI2	2	DI01		
DI3	3	DI02		
DI4	4	Motor standstill – filtered		
DI5	5	STO active		
DI6	6	Electromechanical utilization prewarning		
DI7	7	Fault		
–	8	No function		
–	9	No function		
–	10	No function		
–	11	No function		
–	12	No function		
–	13	No function		
–	14	No function		
–	15	No function		

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6.9.3 Control word 2

<table>
<tr><th colspan="5">Control word 2 – Acyclic parameter bits of the AS-Interface</th></tr>
<tr><th>PO
(AS-Interface)</th><th>PO2
(Device)</th><th colspan="2">Function</th><th>Usable data width of the AS-Interface slave profile</th></tr>
<tr><td>PO0</td><td>0</td><td colspan="2">No function</td><td rowspan="5">4 bits</td></tr>
<tr><td>PO1</td><td>1</td><td colspan="2">No function</td></tr>
<tr><td>PO2</td><td>2</td><td colspan="2">No function</td></tr>
<tr><td rowspan="2">PO3</td><td rowspan="2">3</td><td>Bits reserved for AS-Interface
-> Bit permanently set to "0"</td><td>A/B-slave,
Double slave</td></tr>
<tr><td>No function</td><td>Binary slave</td></tr>
<tr><td>–</td><td>4</td><td colspan="2">No function</td><td rowspan="12"></td></tr>
<tr><td>–</td><td>5</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>6</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>7</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>8</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>9</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>10</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>11</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>12</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>13</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>14</td><td colspan="2">No function</td></tr>
<tr><td>–</td><td>15</td><td colspan="2">No function</td></tr>
</table>

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6.9.4 Status word 2

Status word 2 – Acyclic parameter bits of the AS-Interface			
PI (AS-Interface)	**PI2 (Device)**	**Function**	**Usable data width of the AS-Interface slave profile**
PI0	0	No function	4 bits
PI1	1	No function	
PI2	2	No function	
PI3	3	No function	
–	4	No function	
–	5	No function	
–	6	No function	
–	7	No function	
–	8	No function	
–	9	No function	
–	10	No function	
–	11	No function	
–	12	No function	
–	13	No function	
–	14	No function	
–	15	No function	

6.10 Configuring the drive behavior at standstill (FCB 02, FCB 13, FCB 14)

The parameter *Behavior at standstill* defines the drive behavior in case the drive enable is revoked and the motor is at standstill (path: *Functions* > *Drive functions* > *FCB 02 Stop default*). This parameter is effective when the function blocks FCB 02, FCB 13 and FCB 14 are active.

The following table lists the drive behavior after motor standstill:

Index	Parameter	Setting of parameter *Behavior at standstill*	Behavior at motor standstill		
			Brake	**Motoring position hold control**	**Effect on the motor shaft**
8563.1	*Behavior at standstill* (Path: *Functions* > *Drive functions* > *FCB02 Stop default)*	Drive energized (brake released / DynaStop® deactivated)	Brake released	Position hold control active	The motor shaft is regulated to rotational speed = "0" by the motor.
		Drive not energized (brake applied / DynaStop® activated)	Brake applied	Motor de-energized	Motor shaft is held by brake.
		Drive not energized (without brake/ DynaStop®)	Brake released	Motor de-energized	The motor shaft can rotate freely.

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7 Operation

7.1 Switch disconnector

▲ WARNING

Electric shock due to dangerous voltages at the line terminals.

The switch disconnector disconnects the electronics cover from the voltage supply. Voltage is still present at the terminals of the device.

- A correct installation includes that terminals of the device are protected against contact.
- Secure the device against unintended reconnection of the voltage supply.
- Wait for at least the following time before removing the electronics cover: **5 minutes**

NOTICE

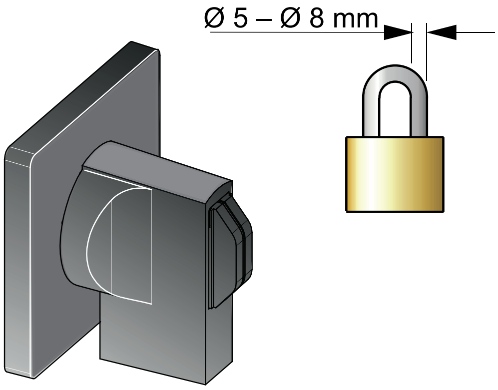
Increased wear of the switch contacts.

Destruction of the switch contacts.

- Do not operate the switch disconnector under load.

The switch disconnector of the device serves to interrupt the voltage supply of the electronics cover. The feedback contact (NC contact) of the switch disconnector affects the digital input DI08 of the device. If the device is connected to a DC 24 V backup voltage, the status of the switch disconnector can be retrieved via digital input DI08.

The switch disconnector can be secured with 3 locks.



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7.2 Manual mode with MOVISUITE®

For manual operation of the device, you can use the manual mode function of the MOVISUITE® engineering software.

1. First connect the PC to the device, see chapter "PC connection".
2. Start the MOVISUITE® engineering software and add the device to MOVISUITE®.
3. Next, click the "Tools" [2] choice box. Select the "Manual mode" [1] menu item.

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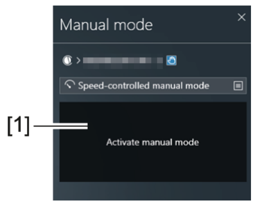
⇨ MOVITSUITE® opens the "Manual mode" window.

7.2.1 Activating/deactivating manual mode

Activation

Manual mode can only be activated when the device is inhibited.

To activate manual mode, click the [Activate manual mode] button [1].



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Manual mode remains active even after a fault reset.

Deactivation

⚠ WARNING

Risk of injury if the device starts up unintentionally.

Severe or fatal injuries.

- Before deactivating manual mode, take measures to prevent the device from starting up unintentionally.
- Take additional safety precautions depending on the application to avoid injury to people and damage to machinery.

Manual mode is deactivated:

- When you click on the [Deactivate manual mode] button
- Or when you close the "Manual mode" window.

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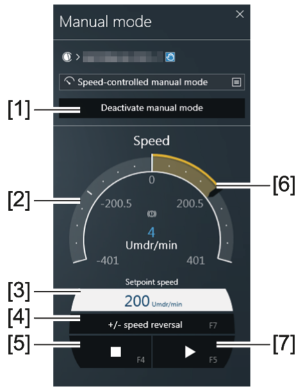
7.2.2 Control in manual mode

Manual mode window

Once manual mode has been successfully activated, you can control the device using the controls in the MOVISUITE® "Manual mode" window.



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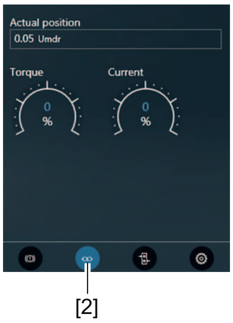
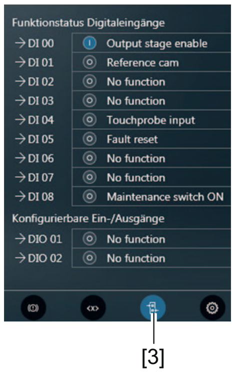
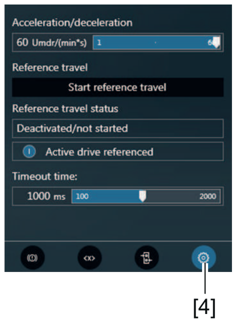
Controller

1. Set the setpoint speed using the edit box [3] or graphic input [6].
2. To specify the direction of rotation, click the button [4].
3. To enable the device, click the button [7].
4. To stop the device, click the button [5].

The "Speed" group [2] shows the actual speed of the device.

Advanced functions and displays of manual mode

The following functions are available in manual mode using MOVISUITE®:

Release brake Disable output stages	Actual values	Digital inputs and outputs	Acceleration Reference travel Timeout
 [1]	 [2]	 [3]	 [4]
Key [1]	Key [2]	Key [3]	Key [4]

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7.3 Function "Releasing the brake / deactivating DynaStop® with FCB 01"

7.3.1 Activating the function

⚠ WARNING

Risk from falling loads.

This can result in severe or fatal injuries.

- Do **not** use the function "Releasing the brake / deactivating DynaStop® with FCB 01" for hoist applications and applications with potentially falling loads.
- Inhibit the function via the following steps:
  - Deactivate the function of the DIP switch S1/2 using the parameter *Deactivation* = **"1"** (path: *Functions > Inputs/outputs > Basic device > DIP switch functions > Releasing the brake / deactivating DynaStop® with FCB 01 – enable*)
  - Inhibit the functions using the parameter *Releasing the brake / deactivating DynaStop® with FCB 01 – enable* = **"0"** (path: *Functions > Drive functions > FCB 01 Output stage inhibit*).

In case the output stage is inhibited, you can release the brake by a control signal (digital input or process data bit) using the function "Releasing the brake / deactivating DynaStop® with FCB 01". For example, this allows to move loads freely using a horizontal conveyor.

Now make the following settings:

1. **Enabling the function**:
   - **Via DIP switch S1/2**

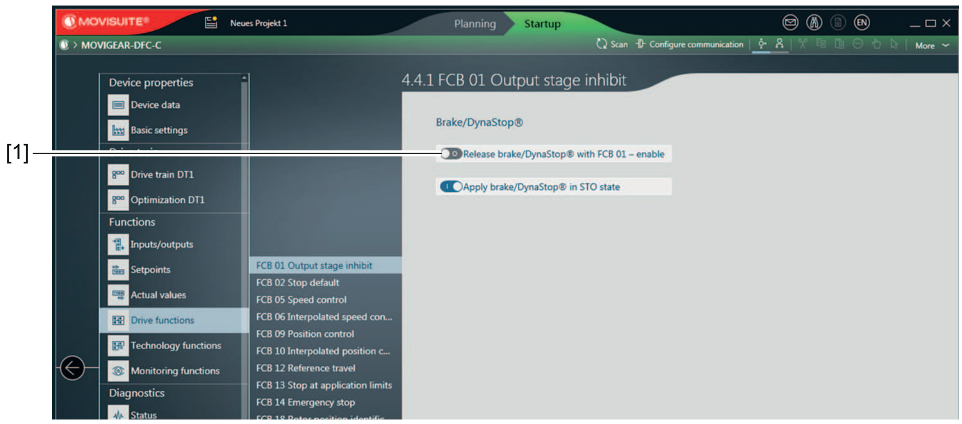
     Set the DIP switch S1/2 "Releasing the brake / deactivating DynaStop® with FCB 01 – enable" = ON.
   - **Via parameter settings**

     Deactivate the DIP switch S1/2 by setting the parameter *Deactivation* = **"1"**.

     (Path: *Functions > Inputs/outputs > Basic device > DIP switch functions > Releasing the brake / deactivating DynaStop® with FCB 01 – enable)*

     Enable the function "Releasing the brake / deactivating DynaStop® with FCB 01 – enable" by setting the parameter *Releasing the brake / deactivating DynaStop® with FCB 01 – enable* to **"1"** [1].

     (Path: *Functions > Drive functions > FCB 01 Output stage inhibit*)



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2. **Configuring the control signal**:

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- **Control via the digital input**

  Assign the function "Releasing the brake / deactivating DynaStop® with FCB 01" [2] to a digital input.

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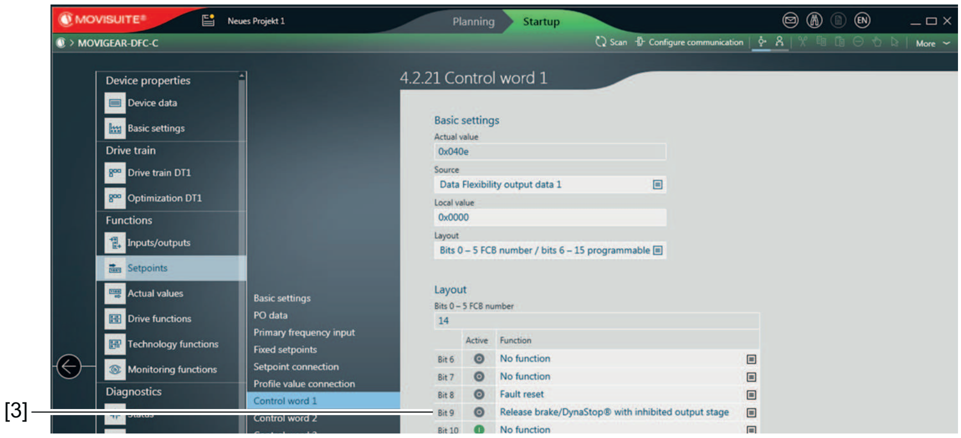
- **Control via process data bit** (not available with DBC designs)

  Assign the function "Releasing the brake / deactivating DynaStop® with FCB 01" [3] to a process output bit.



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The set control signal can be used to release the brake when the function block FCB01 is active.

7.4 Mechanical brake in connection with STO

7.4.1 Using the mechanical brake in connection with the STO function

The following table shows the behavior of the drive depending on the parameter settings:

Index	Parameters	Setting	Meaning
8563.1	*Behavior at standstill* (Path: *Functions > Drive functions > FCB02 Stop default*)	Drive energized (brake released / DynaStop® deactivated)	If the enable signals are revoked, the drive decelerates according to the active deceleration setpoint. When the speed is "0", the brake remains released. Motor position hold control is active.
		Drive not energized (brake applied / DynaStop® activated)	If the enable signals are revoked, the drive decelerates according to the active deceleration setpoint. When the speed is "0", the brake is applied. The motor is de-energized.
8501.3	*Apply brake/activate DynaStop® in STO state* (Path: *Functions > Drive functions > FCB01 Output stage inhibit > Brake/ DynaStop®*)	**0 (no)**	The brake state remains unchanged when STO is activated.
		1 (yes)	The brake is activated (not safety-related) when STO is activated.

Recommended setting

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8 Service

NOTICE

Improper work on the drive units can lead to damage.

Possible damage to property.

- Note that only qualified personnel is permitted to repair drives from SEW-EURODRIVE.
- Consult SEW-EURODRIVE Service department.

8.1 Failures of the mechanical drive

Observe the information in the "CM3C Synchronous Servomotors" operating instructions.

Also observe the information in the "DR..71-315, DRN63-315, DR2..56-80 AC Motors" operating instructions.

8.1.1 Motor malfunctions

Fault	Possible cause	Measure
Motor heats up excessively and trips with a fault	Overload	Measure power, use larger motor or reduce load if necessary, check travel profile
	Ambient temperature too high	Observe permitted temperature range
	Insufficient cooling	Clean the drive
Running noise on motor	Bearing damage	• Contact SEW-EURODRIVE Service • Replace the motor
	Vibration of rotating parts	Rectify cause, possible imbalance
Oil leaks in the connection box or at the motor/flange gasket (only with gearmotors)	Internal seal defective	• Contact SEW-EURODRIVE • Have seal changed by SEW-EURODRIVE Service or a qualified technician trained by SEW-EURODRIVE

8.1.2 Brake malfunctions

Fault	Possible cause	Measure
Brake does not release	Electronics cover defective	• Contact SEW-EURODRIVE Service • Replace electronics cover
	Max. permitted working air gap exceeded because brake lining worn down	• Contact SEW-EURODRIVE • Have brake lining replaced by SEW-EURODRIVE Service or a qualified technician trained by SEW-EURODRIVE
	Brake defective	• Contact SEW-EURODRIVE • Have brake replaced by SEW-EURODRIVE Service or a qualified technician trained by SEW-EURODRIVE
Motor does not brake	Brake lining worn	• Contact SEW-EURODRIVE • Have brake lining replaced by SEW-EURODRIVE Service or a qualified technician trained by SEW-EURODRIVE
	Incorrect braking torque	• Contact SEW-EURODRIVE • Have braking torque changed by SEW-EURODRIVE Service or a qualified technician trained by SEW-EURODRIVE
	Oil leakage (only with gearmotors)	• Contact SEW-EURODRIVE • Have leakage remedied by SEW-EURODRIVE Service or a qualified technician trained by SEW-EURODRIVE

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8.2 Evaluating fault messages

8.2.1 MOVISUITE®

The following section shows a sample evaluation of a fault message in MOVISUITE®:

1. Open the parameter tree in MOVISUITE®.
2. In the parameter tree [6], select the "Status" node.
   - ⇨ The **current fault messages** can be found in the "Fault status" [5] group.
   - ⇨ **Additional information** on the causes for the "Not ready" status can be found in the "Device status" [4] group.
   - ⇨ Information on the **history of the fault messages** can be found in the "Fault memory" [7] node.

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[1] Fault status of the main component
[2] Fault status of the subcomponent
[3] Display of the status bits

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8.3 Switch-off responses

<table>
<tr><th>Fault response</th><th>Description</th></tr>
<tr><td>No response</td><td>The inverter ignores the event.</td></tr>
<tr><td>Warning with self reset</td><td>The inverter sends a warning message with self-reset.</td></tr>
<tr><td>Warning</td><td>The inverter issues a warning message.</td></tr>
<tr><td>Application stop (with output stage inhibit)</td><td rowspan="2">The inverter stops with the deceleration set for the application limit.
For n=0: Brake "applied" and output stage "off".</td></tr>
<tr><td>Application stop (with output stage inhibit) with self reset</td></tr>
<tr><td>Emergency stop (with output stage inhibit)</td><td rowspan="2">The inverter stops with the set emergency stop deceleration.</td></tr>
<tr><td>Emergency stop (with output stage inhibit) with self-reset</td></tr>
<tr><td>Inhibit output stage with self re-set</td><td rowspan="2">The output stage is deactivated and the brake is applied.</td></tr>
<tr><td>Inhibit output stage</td></tr>
</table>

Self-reset means: Eliminating the cause of the fault acknowledges the fault. The inverter automatically resumes the operation performed before the fault. The drive restarts automatically.

8.4 Fault messages with parameterizable response

Fault	Description	Index no.	Possible fault response
Heat sink overtemperature – prewarning	Here you can set the device response when the prewarning threshold for heat sink utilization is exceeded (index 8336.1).	8622.2	• No response • Warning
Positioning lag error	Here you can set the device response to a lag error (lag error window exceeded, index 8509.4).	8622.3	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Line phase failure	Here you can set the device response to a line phase failure (values below threshold defined by the user, index 8351.5).	8622.4	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
External fault	Here you can set the device response to an external fault (e.g. triggered by terminal or control word).	8622.5	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Fieldbus – timeout	Here one can set how the device is to respond to a timeout on the EtherCAT®/SBus^{PLUS} (timeout period, Index 8455.3).	8622.6	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage • Warning with self-reset • Application stop (with output stage inhibit) with self-reset • Emergency stop (with output stage inhibit) with self-reset • Inhibit output stage with self reset

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Fault	Description	Index no.	Possible fault response
External synchronization	Here you can set the device response to loss of external synchronization.	8622.7	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage • Warning with self-reset • Application stop (with output stage inhibit) with self-reset • Emergency stop (with output stage inhibit) with self-reset • Inhibit output stage with self reset
Motor temperature prewarning – current parameter set	Motor temperature current parameter set – prewarning.	8442.5	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Electromechanical capacity utilization – prewarning	Here you can set the device response to an exceeded prewarning threshold for electromechanical capacity utilization (index 8336.2).	8622.10	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
HW limit switches – current parameter set		8572.1	• No response • Emergency stop (with output stage inhibit) • Emergency stop (with output stage inhibit) with self-reset
SW limit switches – current parameter set		8572.2	• No response • Emergency stop (with output stage inhibit) • Emergency stop (with output stage inhibit) with self-reset

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Fault	Description	Index no.	Possible fault response
Encoder – warning	Here you can set the device response to an encoder warning.	8622.13	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Encoder – fault	Here you can set the device response to an encoder fault.	8622.14	• Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Application heartbeat timeout (only with DSI designs)	Here you can set the device response to a timeout of the application heartbeat.	8622.21	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage

8.5 Resetting fault messages

⚠ WARNING

Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically.

Severe or fatal injuries.

- Prevent unintended startup.

Acknowledge fault message by:

- Switch the supply system off and on again.
- Via the controller/PLC: Send "reset command".

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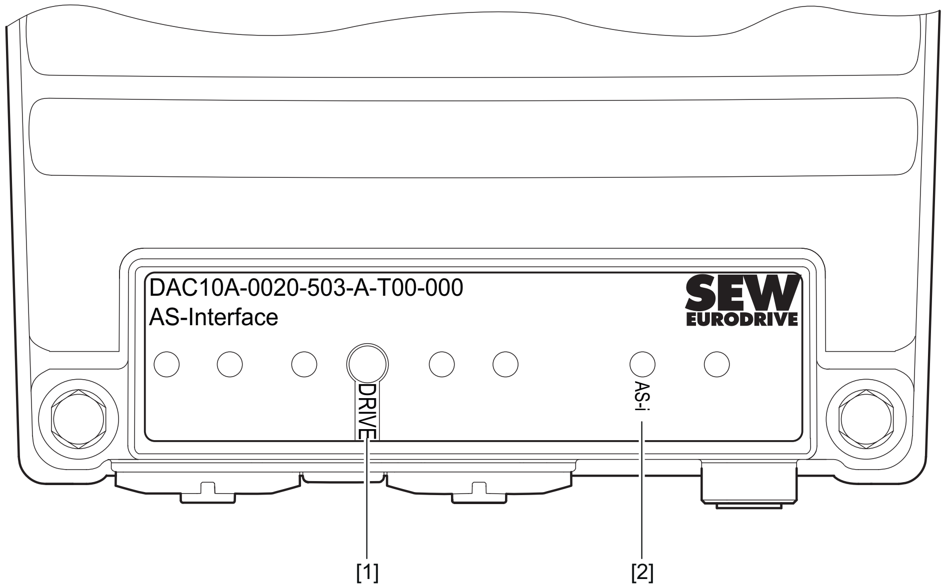
8.6 Description of status and operating displays

8.6.1 LED displays of AS-Interface

The following figure shows the LEDs of the AS-Interface design:



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[1] "DRIVE" status LED
[2] LED "AS-i"

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8.6.2 General LEDs

"DRIVE" status LED

LED	Operating status/		Meaning	Measure
	Fault code	Subfault code		
– **Off**	Not ready for operation		Line voltage absent.	Switch on the line voltage.
Yellow **Flashes very rapidly, 4 Hz**	Not ready for operation		Initialization phase	Wait for the initialization to be completed.
Yellow **Flashes 1 Hz**	Ready but unit inhibited		The "STO" signal is active.	Deactivate the "STO" signal.
Yellow **Flashes slowly, 0.5 Hz**	Ready for operation, but manual mode/local mode, device inhibited		Line voltage is OK.	–
Yellow **Flashes rapidly, 2 Hz**	Ready		Deactivation of DynaStop® without drive enable is active.	–
Yellow **Steady light**	Ready but unit inhibited		Line voltage is OK. The output stage is locked.	–
Green **Flashes slowly, 0.5 Hz**	Unit enabled, but condition manual mode/local mode		The output stage is enabled. The motor is in operation.	–
Green **Flashes very rapidly, 4 Hz**	Unit enabled, but current limit active.		The drive is at the current limit.	Reduce the load.
Green **Steady light**	Unit enabled.		The output stage is enabled. The motor is in operation.	–
Yellow/red **Flashes with changing colors, 1 Hz** **(2 × yellow, 2 × red)**	Ready		A displaying fault is present. The output stage is locked.	Consult the “Fault table” chapter for possible measures to be taken.
Green/red **Flashes with changing colors, 1 Hz** **(2 × green, 2 × red)**	Ready		A displaying fault is present. The output stage is enabled. The motor is in operation.	Consult the “Fault table” chapter for possible measures to be taken.

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LED	Operating status/ Fault code	Subfault code	Meaning	Measure
Red **Flashes 1 Hz**	3	1	Ground fault	Consult the “Fault table” chapter for possible measures to be taken.
	4	1	Brake chopper fault	
	6	1	Line fault	
	7	1	DC link fault	
	8	1, 2, 3	Speed monitoring fault	
	9	1, 2, 5, 6, 9, 10	Control mode fault	
	10	1, 3 – 11	Data Flexibility fault	
	11	1 – 6	Temperature monitoring fault	
	12	1, 2	Brake fault	
	13	5, 24	Encoder 1 fault	
	16	5 – 8, 10, 20 – 27	Startup fault	
	19	1 – 9	Process data fault	
	20	2, 11	Device monitoring fault	
	23	4	Power section fault	
	25	2 – 7, 20, 21, 30, 31, 61, 70	Parameter memory monitoring	
	26	1, 3	External fault	
	28	1 – 12, 14	FCB drive function fault	
	29	1 – 4	Hardware limit switch fault	
	30	1 – 3	Software limit switch fault	
	31	1 – 4, 7, 9	Thermal motor protection fault	
	32	2 – 6, 12	Communication fault	
	33	11, 12, 13	System initialization fault	
	34	1	Process data configuration fault	
	35	1 – 5	Function activation fault	
	42	1 – 3	Lag fault	
	44	2, 3, 4	Fault overcurrent phase U, V, W	
	46	2, 3, 50, 51, 52	Safety card fault	
	51	1	Analog processing fault	

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LED	Operating status/ Fault code	Subfault code	Meaning	Measure
Red **Steady light**	1	1, 2	Output stage monitoring fault	Contact SEW-EURODRIVE Service.
	4	2	Brake chopper fault	
	7	2	DC link fault	
	9	3, 4, 8	Control mode fault	
	10	2, 99	Data Flexibility fault	
	11	7, 8	Temperature monitoring fault	
	13	1, 3, 6, 7, 8, 9, 11, 13, 15, 22, 23	Encoder 1 fault	
	16	2, 11, 12. 30	Startup fault	
	17	7	Internal processor fault	
	18	1, 3,4, 7, 8, 9, 10, 12, 13	Software error	
	20	1.7	Device monitoring fault	
	21	1	S-Drive 1 fault	
	23	5, 6, 7, 8	Power section fault	
	25	10, 12 – 19, 50, 51, 81	Parameter memory monitoring	
	28	13	FCB drive function fault	
	33	1, 2, 6, 7, 8, 10	System initialization fault	
	46	1	Safety card fault	

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8.6.3 Bus-specific LEDs for AS-Interface

LED "AS-i"

LED	Operating status/	Meaning	Measure
– **Off**	Not ready for operation	Line voltage absent.	Switch on the line voltage. Wait for initialization to be completed.
		The firmware of the subcomponent is not compatible to the used hardware.	Contact the SEW-EURODRIVE Service.
		The firmware of the subcomponent cannot be started.	Contact the SEW-EURODRIVE Service.
Green **Steady light**	Ready for operation	The device works in normal operation.	–
Yellow **Flashing**	Not ready for operation	A firmware update of the sub component is running.	Wait for the update to be completed.
Red **Flashing**	Not ready for operation	The communication to the AS-Interface master is interrupted.	Check the AS-Interface connection of the device. Check the configuration of the AS-Interface master. Check all connections of the AS-Interface installation.
1 × red, 1 × yellow **Flashing**	Not ready for operation	The slave address is set to 0.	Set a valid slave address.
2 × red, 2 × yellow **Flashing**	Not ready for operation	The AS-Interface master has detected an address conflict. The address is used by another slave.	Set an unused slave address.
Red **Steady light**	Not ready for operation	The AS-Interface communication is interrupted.	Check the AS-Interface connection of the device. Check all connections of the AS-Interface installation.

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8.7 Fault table

8.7.1 Fault 1 Output stage monitoring

Subfault: 1.1 Description: Short circuit in motor output terminals		
	Response: Output stage inhibit	
	Cause	Measure
	Overcurrent in output stage or faulty output stage control detected, and output stage inhibited by hardware.	Possible causes for overcurrent are short circuit at the output, excessive motor current, or a defective power output stage.

Subfault: 1.2 Description: Overcurrent in output stage		
	Response: Output stage inhibit	
	Cause	Measure
	Motor current too high.	Connect a smaller motor.
	Current supply.	Check the current supply.
	Current transformer	Check the current transformer.
	Ramp limit deactivated and set ramp time too short.	Increase the ramp time.
	Phase module defective.	Check the phase module.
	DC 24 V supply voltage unstable.	Check the DC 24 V supply voltage.
	Interruption or short circuit on signal lines of phase modules.	Check the signal lines.

8.7.2 Fault 3 Ground fault

Subfault: 3.1 Description: Ground fault		
	Response: Output stage inhibit	
	Cause	Measure
	Ground fault in the motor lead.	Eliminate ground fault in motor lead.
	Ground fault in the inverter.	Eliminate ground fault in inverter.
	Ground fault in the motor.	Eliminate ground fault in motor.
	Ground fault in line components.	Eliminate ground fault in line components.

8.7.3 Fault 4 Brake chopper

Subfault: 4.1

Description: Brake chopper overcurrent

Response: Output stage inhibit

Cause	Measure
Excessive regenerative power.	Extend the deceleration ramps.
Short circuit detected in braking resistor circuit.	Check the supply cable to the braking resistor.
Braking resistance too high.	Check the technical data of the braking resistor.

Subfault: 4.2

Description: Brake chopper defective

Response: Output stage inhibit

Cause	Measure
Output stage of brake chopper defective.	Replace the defective brake chopper.

8.7.4 Fault 6 Line fault

Subfault: 6.1

Description: Line phase failure

Response: Line phase failure

Cause	Measure
Missing line phase detected.	Check the supply system cable.
DC link voltage periodically too low.	Check the configuration of the supply system.
Inadequate line voltage quality.	Check supply (fuses, contactor).

8.7.5 Fault 7 DC link

Subfault: 7.1

Description: DC link overvoltage

Response: Output stage inhibit

Cause	Measure
Maximum permitted DC link voltage limit exceeded and output stage inhibited by hardware.	– Extend the deceleration ramps. – Check supply cable to the braking resistor. – Check the technical data of the braking resistor.

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8.7.6 Fault 8 Speed monitoring

Subfault: 8.1

Description: Speed monitoring – motor mode

Response: Output stage inhibit

Cause	Measure
Speed controller operates at setting limit (mechanical overload or phase failure in supply system or motor).	Increase the delay time set for speed monitoring, or reduce the load.
Encoder not connected correctly.	Check the encoder connection and direction of rotation. If necessary, increase the current limiting or reduce the acceleration values.
Encoder has incorrect direction of rotation.	– Check encoder connection and direction of rotation. If necessary, increase current limiting or reduce acceleration values. – Check motor lead and motor, check line phases.

Subfault: 8.2

Description: Speed monitoring – generator mode

Response: Output stage inhibit

Cause	Measure
Speed controller operates at setting limit (mechanical overload or phase failure in supply system or motor).	Increase the delay time set for speed monitoring, or reduce the regenerative load.
Encoder not connected correctly.	Check the encoder connection and direction of rotation. If necessary, increase the current limiting or reduce the deceleration values.
Encoder has incorrect direction of rotation.	– Check the encoder connection and direction of rotation. If necessary, increase the current limiting or reduce the deceleration values. – Check motor cable and motor. Check the line phases.

Subfault: 8.3

Description: Maximum speed at motor shaft

Response: Output stage inhibit

Cause	Measure
Actual speed exceeded "Maximum speed at motor shaft" limit value (index 8360.9 / 8361.9). This limit value is set at startup matching the motor and gear unit.	Reduce the maximum speed.

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8.7.7 Fault 9 Control mode

Subfault: 9.1

Description: Magnetization of motor not possible

Response: Output stage inhibit

Cause	Measure
The user-defined current limit or output stage monitoring have reduced the possible maximum current to such a degree that the required magnetizing current cannot be set.	– Reduce the output stage utilization, e.g. by reducing the PWM frequency or reducing the load. – Increase the user-defined current limit.

Subfault: 9.2

Description: Requested operating mode not possible with active control mode

Response: Output stage inhibit

Cause	Measure
The current FCB activated an operating mode. The active control mode does not support this operating mode, for example "position control" or "torque control" with U/f control mode.	– Use a control mode that supports the required operating mode. Connect an encoder if necessary. – Select an operating mode that is supported by the current control mode.

Subfault: 9.3

Description: Absolute rotor position not available

Response: Output stage inhibit

Cause	Measure
The current control mode requires an absolute rotor position. The encoder selected for "Source of actual speed" does not provide an absolute rotor position.	Use an absolute encoder, or identify the rotor position using FCB 18.

Subfault: 9.4

Description: Correct current supply of motor not possible

Response: Output stage inhibit

Cause	Measure
Failed to set required current during premagnetization.	Check the cabling, or disable the function "Current monitoring during premagnetization".

Subfault: 9.5

Description: Maximum output frequency exceeded

Response: Output stage inhibit

Cause	Measure
Maximum output frequency exceeded.	Reduce the maximum speed.

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Subfault: 9.6		
Description: Maximum model speed exceeded		
	Response: Output stage inhibit	
	Cause	Measure
	Speed of drive calculated in ELSM® control mode too high for motor control.	If possible, minimize the "Speed/position controller sampling cycle", or reduce the speed.

Subfault: 9.8		
Description: Flux model error		
	Response: Output stage inhibit	
	Cause	Measure
	Rotor flux calculated by motor model not plausible, or calculated internal voltage too small.	– Check configuration data. – Check motor data. – Check machine: Idle state or speed too low. – Check the connection cable between inverter and motor. – Contact SEW-EURODRIVE Service.

Subfault: 9.9		
Description: Parameter measurement not possible with active motor type		
	Response: Output stage inhibit	
	Cause	Measure
	Parameter measurement is possible only with "asynchronous" and "synchronous" motor types. No magnetic reluctance motors and LSPM motors.	Select the correct motor type.

Subfault: 9.10		
Description: Rotor stall monitoring		
	Response: Output stage inhibit	
	Cause	Measure
	The current control cannot hold the load torque. The deviation between stationary setpoint voltage and actual voltage is too large.	Reduce the load torque (hoist) in the controlled system.

Subfault: 9.11		
Description: Standstill current function		
	Response: Output stage inhibit	
	Cause	Measure
	With the ELSM® method, the standstill current function is possible only in combination with rotor position measurement.	– Enable rotor position measurement. – Check motor data.

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8.7.8 Fault 10 Data Flexibility

Subfault: 10.1		
Description: Initialization		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Init task error.	The init task has issued a return code ! = 0. Check the program.

Subfault: 10.2		
Description: Illegal operation code		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Illegal opcode in Data Flexibility program.	Contact the SEW-EURODRIVE Service.

Subfault: 10.3		
Description: Memory access		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Memory area violated while accessing array.	For example, an array access results in writing beyond the permitted memory range. Check the program.

Subfault: 10.4		
Description: Stack		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Overflow of Data Flexibility stack detected.	Check the program.

Subfault: 10.5		
Description: Division by 0		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Division by 0.	Check the program.

Subfault: 10.6		
Description: Runtime		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Runtime error/watchdog.	Check the program. The program execution time exceeds the permitted time.
	PDI or PDO tasks.	Check the program. The execution time of the PDI or PDO task exceeds the permitted time.

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Subfault: 10.7		
Description: Calculation result of multiplication/division command too large		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Calculation result of multiplication/division command exceeds 32 bits.	Check the program.
	Failed to write calculation result of multiplication/division command into result variable.	Check the program.

Subfault: 10.8		
Description: Illegal connection		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Index used in connect not allowed.	Check the program. The index used either does not exist or is not permitted for access via process data – see parameter list.

Subfault: 10.9		
Description: CRC code		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Wrong CRC checksum of code.	Load the program again. The program memory is corrupt. Unauthorized write access to the program memory.

Subfault: 10.10		
Description: Setpoint cycle time not supported		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Non-supported setpoint cycle time parameterized.	Set the setpoint cycle time to the default value 1 ms.

Subfault: 10.11		
Description: No application program loaded		
	Response: Output stage inhibit	
	Cause	Measure
	No Data Flexibility application program loaded.	Load the program or disable Data Flexibility.

Subfault: 10.99		
Description: Unknown error		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Unknown Data Flexibility error.	Contact the SEW-EURODRIVE Service.

8.7.9 Fault 11 Temperature monitoring

Subfault: 11.1

Description: Heat sink overtemperature

Response: Output stage inhibit

Cause	Measure
Maximum permitted heat sink temperature exceeded. The capacity utilization is possibly too high.	– Reduce the load. – Reduce the rms value of the current. – Reduce the PWM frequency. – Ensure sufficient cooling. – Reduce the ambient temperature.

Subfault: 11.2

Description: Heat sink utilization – prewarning

Response: Heat sink utilization – prewarning

Cause	Measure
High thermal load on heat sink of device, and prewarning threshold reached.	– Reduce the load. – Reduce the rms value of the output current. – Reduce the PWM frequency. – Ensure sufficient cooling. – Reduce the ambient temperature.

Subfault: 11.3

Description: Device utilization

Response: Output stage inhibit

Cause	Measure
The temperature has reached or exceeded the switch-off threshold. Possible causes: Mean output current too high.	Reduce the load.
PWM frequency too high.	Reduce the PWM frequency.
Ambient temperature too high.	Ensure sufficient cooling.
Unfavorable air convection.	Check air convection.
Fan defective.	Check the fan and replace if necessary.

Subfault: 11.5

Description: Electromechanical utilization

Response: Output stage inhibit

Cause	Measure
Electromechanical components of device overloaded by excessive continuous current.	Reduce the load. If necessary, reduce the rms value of the current.

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Subfault: 11.6		
Description: Electromechanical utilization – prewarning		
	Response: Electromechanical utilization – prewarning	
	Cause	Measure
	High load on electromechanical components of device due to high continuous current. Prewarning threshold reached.	– Reduce the load. – Reduce the PWM frequency. – Reduce the rms value of the current. – Reduce the ambient temperature.

Subfault: 11.7		
Description: Wire break at temperature sensor of heat sink		
	Response: Output stage inhibit	
	Cause	Measure
	Wire break at temperature sensor of heat sink.	Contact the SEW-EURODRIVE Service.

Subfault: 11.8		
Description: Short circuit at temperature sensor of heat sink		
	Response: Output stage inhibit	
	Cause	Measure
	Short circuit at temperature sensor of heat sink.	Contact the SEW-EURODRIVE Service.

8.7.10 Fault 12 Brake

Subfault: 12.1		
Description: Brake output		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	No brake connected.	Check the connection of the brake.
	Brake cable disconnected in switched-on state.	Check the connection of the brake.
	Overload due to overcurrent > 2 A	Check the sequential profile of brake control.
	Overload due to excessive connection (> 0.5 Hz)	Check the sequential profile of brake control.
	Monitoring works only with parameter setting "Brake installed" and "Brake applied".	Make sure that the connected brake is permitted.

Subfault: 12.2		
Description: DC 24 V brake voltage		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	DC 24 V supply voltage not within permitted tolerance of ± 10%.	Check the DC 24 V supply voltage.
	Monitoring is only active with parameter settings “Brake installed” and “Brake applied”.	Check the parameter setting.

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Subfault: 12.3 Description: Temperature		
	Response: Output stage inhibit	
	Cause	Measure
	Brake temperature outside permitted range (too high or too low).	Check the ambient conditions and the application.
	Brake temperature too high. When using decentralized devices, DC link overvoltage is reduced by the brake.	Check the application for how often generator mode occurs.

Subfault: 12.4 Description: Brake control module missing		
	Response: Output stage inhibit	
	Cause	Measure
	Brake control has been activated although the hardware is not equipped with the matching module.	Select another brake type or brake connection.

Subfault: 12.5 Description: Short circuit		
	Response: Output stage inhibit	
	Cause	Measure
	Short circuit in the brake detected.	Check the brake connection.

Subfault: 12.6 Description: Wear limit reached		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Brake worn	Replace the brake or readjust it.

Subfault: 12.10 Description: Digital motor integration fault – critical		
	Response: Output stage inhibit	
	Cause	Measure
	The intelligent brake rectifier of "digital motor integration" signaled a critical component fault.	See subcomponent fault.

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8.7.11 Error 13 encoder 1 fault

Subfault: 13.1 **Description: Position comparison check**		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Faulty comparison between raw position and track counter of absolute encoders.	– Check the track signal wiring. – Check interference sources (e.g. from the area of EMC). – Replace encoder. – Replace the card. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.2 **Description: Unknown encoder type**		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder type not known and not supported by inverter.	– Check the encoder type. – Contact SEW-EURODRIVE Service. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.3 **Description: Invalid data**		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Invalid encoder nameplate data (measuring steps/pulses per revolution/multi-turn).	– Check the startup parameters. – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.4		
Description: Track measurement error		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error during track measurement.	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from EMC). – Check the encoder. Replace if necessary. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.5		
Description: Internal warning		
	Response: Encoder – warning	
	Cause	Measure
	Encoder signaled warning.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Clean the sensor.

Subfault: 13.6		
Description: Signal level too low		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Vector below permitted limit during signal level monitoring.	– Check the wiring. – Check interference sources (e.g. from the area of EMC). – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.7		
Description: Signal level too high		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Vector exceeds permitted limit during signal level monitoring.	Check the gear ratio of the resolver in use. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

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Subfault: 13.8 **Description: Signal level monitoring**	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Vector exceeds permitted limit during signal level monitoring.	Check the resolver mounting position. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.9 **Description: Quadrant check**	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Error checking quadrants (sine encoder).	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from the area of EMC). – Check the encoder. Replace if necessary. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.10 **Description: Position tolerance range monitoring**	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Position outside tolerance range.	– Check the startup parameters. – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.11		
Description: Data timeout		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder process data timeout.	– Check interference sources (e.g. from the area of EMC). – Check the startup parameters. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.12		
Description: Emergency		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder signaled emergency.	– Check interference sources (e.g. from the area of EMC). – Check the startup parameters. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.13		
Description: Error during initialization		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Communication error during initialization.	– Check parameterization. – Check baud rate. – Ensure that the CANopen interface on the encoder (Node ID) is correctly adjusted. – Check the wiring. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

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Subfault: 13.14 Description: Communication		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Faulty communication with encoder.	– Check the voltage supply. – Check interference sources (e.g. from the area of EMC). – Check the wiring. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.15 Description: System error		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	System error while evaluating encoder.	– Ensure that the multi-turn encoder is within the configured path range. – Check the limits. – Check for correct settings of encoder numerator/denominator factors. – Check interference sources (e.g. from the area of EMC). – Check the startup parameters. – Switch the device off and on again. – If the fault occurs repeatedly, contact SEW-EURODRIVE Service. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.16 Description: Permanent high level in data line – critical		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.17		
Description: Permanent high level in data line		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.18		
Description: Permanent low level in data line – critical		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Permanent low level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.19		
Description: Permanent low level in data line		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Permanent low level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.20		
Description: SSI error bit – critical		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error bit set in SSI protocol.	– Check the startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.

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Subfault: 13.21 Description: SSI error bit		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Error bit set in SSI protocol.	– Check the startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.

Subfault: 13.22 Description: Internal fault – critical		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.23 Description: Internal fault		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

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Subfault: 13.24		
Description: Travel range exceeded		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Current position mode (index 8381.10) does not allow for larger travel range.	Check the travel range. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.25		
Description: Error during encoder startup		
	Response: Output stage inhibit	
	Cause	Measure
	Fatal error during encoder startup.	Switch the device off and on again. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.26		
Description: Digital motor integration fault – critical		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder of "Digital motor integration" signaled a component fault.	– Check interference sources. – Replace encoder.

Subfault: 13.27		
Description: Digital motor integration fault		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Encoder of "Digital motor integration" signaled a component fault.	– Check interference sources. – Replace encoder.

Subfault: 13.28		
Description: Digital motor integration warning		
	Response: Encoder – warning	
	Cause	Measure
	Encoder of "Digital motor integration" signaled a warning.	– Check interference sources.

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8.7.12 Fault 16 Startup

Subfault: 16.1 Description: Motor not started up		
	Response: Output stage inhibit	
	Cause	Measure
	Motor not started up or not started up completely.	Perform complete motor startup.

Subfault: 16.2 Description: Cannot calculate controller parameters		
	Response: Output stage inhibit	
	Cause	Measure
	Delay of encoder in use too long to calculate required filter coefficients.	Use an encoder with a shorter delay, or contact SEW-EURODRIVE Service.

Subfault: 16.3 Description: Thermal motor model not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Invalid parameters for thermal motor model or for drive enable although starting up thermal model not yet completed.	Check the parameters of the thermal motor model, and perform startup.

Subfault: 16.5 Description: Current limit smaller than magnetizing current of the motor		
	Response: Output stage inhibit	
	Cause	Measure
	Current limit smaller than magnetizing current of the motor calculated by active control mode.	Increase the current limit. Required magnetizing current: See diagnostics parameters of control mode.

Subfault: 16.6 Description: Control mode not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Wrong control mode selected for the motor.	Choose a control mode that matches the selected motor.

Subfault: 16.7 Description: PWM frequency not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Specified PWM frequency not allowed for this power output stage.	Choose another PWM frequency. For possible PWM frequencies, refer to the device configuration data.

Subfault: 16.8 Description: Temperature sensor motor 1		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty startup of temperature sensor of motor 1.	Perform startup again.

Subfault: 16.9 Description: Temperature sensor motor 2		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty startup of temperature sensor of motor 2.	Perform startup again.

Subfault: 16.10 Description: Actual position source not assigned		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Active control mode requires an encoder for position mode.	– Assign actual position source in encoder assignment of the active drive train (Index 8565.3 or 8566.3). – If no encoder is installed, activate the FCBs only using "torque control" or "speed control" operating mode.

Subfault: 16.11 Description: Motor data calculation error		
	Response: Output stage inhibit	
	Cause	Measure
	Motor startup not possible because of inconsistent motor data or wrong device configuration data.	Check the motor data for plausibility, or contact SEW-EURODRIVE Service.

Subfault: 16.12 Description: Motor data write sequence		
	Response: Output stage inhibit	
	Cause	Measure
	Subindex 1 not written to zero before writing electrical startup parameters (index 8357, 8360, 8394, 8420 or 8358, 8361, 8395, 8421).	Reset the fault. Set parameters 8360/1 or 8361/1 to "0" before writing additional parameters.

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Subfault: 16.20		
Description: Nominal speed too high or nominal frequency too low		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Nominal speed too high or nominal frequency too low. The resulting number of pole pairs is 0.	Enter plausible motor data (nominal speed and nominal frequency).

Subfault: 16.21		
Description: Nominal slip negative		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data, the calculated nominal slip is negative: Nominal frequency too low, or nominal speed too high, or number of pole pairs too high.	Enter plausible motor data (nominal frequency, nominal speed, number of pole pairs).

Subfault: 16.22		
Description: Specify the number of pole pairs		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: It is not possible to calculate the number of pole pairs accurately from nominal frequency and nominal speed.	Enter the number of pole pairs.

Subfault: 16.23		
Description: Plausibility check failed		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: The estimated nominal power does not match the entered nominal power.	Check entered nameplate data for plausibility.

Subfault: 16.24		
Description: Speed controller sampling cycle not possible with current PWM frequency or current control mode		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	At a PWM frequency of "2.5 kHz", only the speed controller sampling cycle of 2 ms is permitted. For the ELSM® control mode, the only permitted speed controller sampling cycles are 1 ms and 2 ms.	Increase PWM frequency or increase sampling cycle of speed controller to 2 ms. Set the sampling cycle to 1 ms or 2 ms for ELSM® control mode.

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Subfault: 16.25 Description: User-defined current limit too low for standstill current		
	Response: Output stage inhibit	
	Cause	Measure
	User-defined current limit value too small for minimum standstill current.	Increase the user-defined current limit, or disable the standstill current function.

Subfault: 16.26 Description: Nominal values incomplete or implausible		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Nominal voltage, nominal current, nominal speed or nominal torque are not entered or are not plausible.	Enter or check nominal voltage, nominal current, nominal speed, and nominal torque.

Subfault: 16.27 Description: Maximum current or maximum torque not plausible		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Maximum current or maximum torque not entered, or maximum current and maximum torque not plausible.	Check the maximum current and maximum torque.

Subfault: 16.30 Description: Faulty EtherCAT® EEPROM configuration state		
	Response: Warning	
	Cause	Measure
	Faulty EtherCAT®/SBus^{PLUS} EEPROM configuration status. EEPROM not loaded; binary file not loaded.	Contact the SEW-EURODRIVE Service.
	Faulty EEPROM loading procedure.	Contact the SEW-EURODRIVE Service.
	Faulty EEPROM checksum.	Contact the SEW-EURODRIVE Service.

Subfault: 16.40 Description: Data of selected motor not valid		
	Response: Output stage inhibit	
	Cause	Measure
	Startup data set on replaceable memory module not valid for this motor.	Replace the memory module.

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Subfault: 16.41		
Description: Data of selected motor does not exist		
	Response: Output stage inhibit	
	Cause	Measure
	No startup data set found on the replaceable memory module for the selected motor.	Check the selection and, if necessary, start up another motor or replace the memory module.

Subfault: 16.50		
Description: Brake parameters not initialized		
	Response: Output stage inhibit	
	Cause	Measure
	No brake data present	Check startup.

8.7.13 Fault 17 Internal processor fault

Subfault: 17.7		
Description: Exception error		
	Response: Output stage inhibit	
	Cause	Measure
	Exception trap in CPU.	Contact the SEW-EURODRIVE Service.

8.7.14 Fault 18 Software error

Subfault: 18.1		
Description: Motor management		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Error detected at motor management interface.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.

Subfault: 18.3		
Description: Task system warning		
	Response: Warning	
	Cause	Measure
	Error while processing internal task system. This may be a timeout for cyclical tasks, for example.	– Acknowledge the warning. – Contact SEW-EURODRIVE Service if the warning occurs regularly.

Subfault: 18.4 Description: Task system	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
A fault was detected during the processing of the internal task system. This may be a timeout for cyclical tasks, for example.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.

Subfault: 18.7 Description: Fatal error	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
Fatal software error.	– Switch the device off and on again. – If the fault occurs repeatedly, replace the device and send it together with the fault number to SEW-EURODRIVE. For further support, contact SEW-EURODRIVE Service.

Subfault: 18.8 Description: Invalid fault code	
Response: Output stage inhibit	
Cause	Measure
Invalid fault code requested.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.

Subfault: 18.9 Description: Internal software error	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
The software reports an unexpected event.	– Switch the device off and on again. – If the fault occurs repeatedly, replace the device and send it together with the fault number to SEW-EURODRIVE. For further support, contact SEW-EURODRIVE Service.

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Subfault: 18.10 Description: Watchdog		
	Response: Output stage inhibit	
	Cause	Measure
	Software no longer operates within intended cycle time.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.

Subfault: 18.12 Description: Configuration data		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Configuration data not plausible or cannot be interpreted by active firmware version.	Update the firmware or load valid configuration data.

Subfault: 18.13 Description: Calibration data		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Calibration data not plausible.	Load valid calibration data.

8.7.15 Fault 19 Process data

Subfault: 19.1 Description: Torque setpoint violation		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Implausible values specified as torque setpoints.	Adjust torque setpoints.

Subfault: 19.2 Description: Position setpoint violation		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Position setpoint outside software limit switches.	Check the position setpoint.
	Position setpoint outside modulo range.	Check the position setpoint.
	Position in user unit generates number overflow in the system unit.	Check the position in user unit.

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Subfault: 19.3		
Description: Speed setpoint violation		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Specified rotational speed setpoints not plausible.	Adjust rotational speed setpoints.

Subfault: 19.4		
Description: Acceleration setpoint violation		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The specified acceleration setpoints are not plausible. Only a value range of >= 0 is permitted.	Adjust acceleration setpoints.

Subfault: 19.5		
Description: Drive function does not exist		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Non-existing drive function (FCB) selected via process data.	Specify an existing FCB number for FCB activation via process data.

Subfault: 19.6		
Description: Mass moment of inertia setpoint violation		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Implausible values specified as mass moment of inertia setpoints. Only a value range of >= 0 is permitted.	Adjust the setpoints for the mass moment of inertia.

Subfault: 19.7		
Description: Referencing missing		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Activated function permitted only with referenced encoder.	Reference the encoder first, then activate the function.

Subfault: 19.8		
Description: Drive train changeover not allowed		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Drive train changeover requested while output stage is enabled.	Inhibit the output stage before changing to another drive train.

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Subfault: 19.9 Description: Jerk setpoint violation		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Jerk values not plausible.	Adjust jerk setpoints.

8.7.16 Fault 20 Device monitoring

Subfault: 20.1 Description: Supply voltage fault		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Internal electronics supply voltage or externally connected DC 24 V standby supply voltage outside permitted voltage range.	Check the voltage level of the external DC 24 V standby supply voltage and check for correct port. If required, correct. – Acknowledge the fault. – If the fault occurs repeatedly, replace the device. For further support, contact SEW-EURODRIVE Service.

Subfault: 20.2 Description: Supply voltage overload		
	Response: Output stage inhibit	
	Cause	Measure
	For MOVIDRIVE® system, the current load of the current paths of the DC 24 V standby supply voltage inside the device is too high. The device signal output of the device was de-energized because of the fault message.	Identify the consumer that is overloading the internal supply voltage: 1. Remove all external consumers: – At the digital outputs of the basic device. – At options that may be present. – At all encoder connections. – At other consumers at the DC 24 V output voltage terminals. 2. Acknowledge the fault. 3. Reconnect the consumers with the device, one after the other, until the fault message appears once again. 4. To eliminate the fault, connect a consumer with a lower current consumption or eliminate the short circuit.

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Subfault: 20.7		
Description: Internal hardware fault		
	Response: Output stage inhibit	
	Cause	Measure
	Fault in the device hardware.	– Acknowledge the fault. – If the fault occurs repeatedly, replace the device. For further support, contact SEW-EURODRIVE Service.

Subfault: 20.8		
Description: Fan warning		
	Response: Warning with self-reset	
	Cause	Measure
	Fan function impaired.	Check the fan for proper functioning.

Subfault: 20.9		
Description: Fan fault		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Fan defective.	Contact the SEWEURODRIVE Service.

Subfault: 20.10		
Description: Fan supply voltage fault		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Supply voltage of fan missing.	Check the connection or establish a connection.

Subfault: 20.11		
Description: STO – switching delay		
	Response: Output stage inhibit	
	Cause	Measure
	Switching delay between STO signals F-STO_P1 and F-STO_P2.	– Check the STO wiring. – Check the STO wiring before acknowledging the fault, and make sure that both STO signals are switched to low level.

8.7.17 Fault 21 Digital motor integration 1

Subfault: 21.1		
Description: Communication error		
	Response: Output stage inhibit	
	Cause	Measure
	Communication error detected on the interface of the "digital motor integration".	Check the cabling.

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Subfault: 21.2	
Description: Slave required	
Response: Output stage inhibit	
Cause	Measure
Device started up with a drive with "digital motor integration" but no drive with "Digital motor integ-ration" is connected.	Connect a drive with "digital motor integration" matching startup, or perform a new startup.

Subfault: 21.3	
Description: Incompatible drive motor	
Response: Output stage inhibit	
Cause	Measure
Connected drive not compatible with started-up drive.	Connect a drive that matches startup, or perform a new startup.

Subfault: 21.4	
Description: Invalid label	
Response: Output stage inhibit	
Cause	Measure
The connected drive contains invalid data.	Replace the drive.

Subfault: 21.5	
Description: Incompatible slave	
Response: Output stage inhibit	
Cause	Measure
The connected slave of "digital motor integration" cannot be used with this inverter firmware.	Update inverter or slave.

Subfault: 21.6	
Description: Overload/short circuit on the interface	
Response: Output stage inhibit	
Cause	Measure
Short circuit in the cabling of components of "Di-gital motor integration".	Check the cabling of the component of "digital motor integration".
Voltage of "Digital motor integration" component too low.	Check the voltage supply of the component.

8.7.18 Fault 23 Power section

Subfault: 23.1 **Description: Warning**		
	Response: Warning with self-reset	
	Cause	Measure
	Power section fault with fault response of the type "Warning".	See also "Power section subcomponent" fault status.

Subfault: 23.2 **Description: Fault**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Power section fault with fault response of the type "Standard".	See also "Power section subcomponent" fault status.

Subfault: 23.3 **Description: Critical fault**		
	Response: Output stage inhibit	
	Cause	Measure
	Power section fault with fault response of the type "Critical fault".	See also "Power section subcomponent" fault status.

Subfault: 23.4 **Description: Hardware fault**		
	Response: Output stage inhibit	
	Cause	Measure
	A fault occurred in a hardware component of the power section, e.g.: Overcurrent hardware comparator.	– Check the current supply. – Increase the ramp time. – Check for correct motor size (the motor current is too high). – Contact SEWEURODRIVE Service.
	Switched-mode power supply fault, hardware fault.	– Check the current supply. – Check the DC 24 V supply voltage.
	Fault at the gate driver of an IGBT.	Defect in the power output stage. Contact the SEWEURODRIVE Service.
	Invalid process data configuration. Status of control section and power section are not compatible.	Contact the SEWEURODRIVE Service.

Subfault: 23.5 **Description: Invalid process data configuration**		
	Response: Output stage inhibit	
	Cause	Measure
	Invalid process data configuration.	Contact the SEWEURODRIVE Service.

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Subfault: 23.6		
Description: Process data timeout		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Power section communication interface detected process data timeout.	If the error occurs repeatedly, contact SEW-EURODRIVE Service.

Subfault: 23.7		
Description: Parameter communication timeout		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Power section communication interface detected timeout in parameter communication.	If the error occurs repeatedly, contact SEW-EURODRIVE Service.

Subfault: 23.8		
Description: Parameter communication error		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Power section communication interface detected error in parameter communication.	If the error occurs repeatedly, contact SEW-EURODRIVE Service.

Subfault: 23.9		
Description: Firmware of power section corrupt		
	Response: Output stage inhibit	
	Cause	Measure
	Failed to update firmware on power section.	Update the firmware again.

8.7.19 Fault 25 Parameter memory monitoring

Subfault: 25.2		
Description: NV memory – runtime error		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Runtime error of non-volatile memory system.	– Reset the device. – If this occurs repeatedly, replace device. Contact the SEW-EURODRIVE Service.

Subfault: 25.6		
Description: Incompatible device configuration		
	Response: Output stage inhibit	
	Cause	Measure
	The data set in the device was copied from another device, which differs from the current device in the device family, power, or voltage.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
	Replaceable memory module used by another device. Power rating, device family, or voltage differs from the current device.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
	The power section was replaced and differs in its power rating or voltage from the original power section.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".

Subfault: 25.7		
Description: NV memory initialization – error		
	Response: Output stage inhibit	
	Cause	Measure
	Error initializing non-volatile memory system.	– Reset the device. – If this occurs repeatedly, replace device. Contact the SEW-EURODRIVE Service.

Subfault: 25.10		
Description: Power section configuration data – version conflict		
	Response: Output stage inhibit	
	Cause	Measure
	Wrong version of configuration data of power section.	Contact the SEW-EURODRIVE Service.

Subfault: 25.12		
Description: Power section configuration data – CRC error		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty configuration data of power section.	Contact the SEW-EURODRIVE Service.

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Subfault: 25.13 **Description: Control electronics configuration data – CRC error**		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty configuration data of control electronics.	Contact the SEW-EURODRIVE Service.

Subfault: 25.14 **Description: Calibration data of power section – version conflict**		
	Response: Output stage inhibit	
	Cause	Measure
	Wrong version of calibration data of power section.	Contact the SEW-EURODRIVE Service.

Subfault: 25.15 **Description: Calibration data of control electronics – version conflict**		
	Response: Output stage inhibit	
	Cause	Measure
	Wrong version of calibration data of control electronics.	Contact the SEW-EURODRIVE Service.

Subfault: 25.16 **Description: Power section calibration data – CRC error**		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty calibration data of power section.	Contact the SEW-EURODRIVE Service.

Subfault: 25.17 **Description: Control electronics calibration data – CRC error**		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty calibration data of control electronics.	Contact the SEW-EURODRIVE Service.

Subfault: 25.18 **Description: Power section QA data – CRC error**		
	Response: Warning	
	Cause	Measure
	Faulty quality assurance data of power section.	Contact the SEW-EURODRIVE Service.

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Subfault: 25.19 Description: Control electronics QA data – CRC error	
Response: Warning	
Cause	Measure
Faulty quality assurance data of control electronics.	Contact the SEW-EURODRIVE Service.

Subfault: 25.20 Description: Initialization error – basic device memory	
Response: Output stage inhibit	
Cause	Measure
Initialization error of the basic device memory.	Contact the SEW-EURODRIVE Service.

Subfault: 25.21 Description: Runtime error – basic device memory	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Runtime error in memory of basic device.	Contact the SEW-EURODRIVE Service.

Subfault: 25.30 Description: Initialization error – replaceable memory module	
Response: Output stage inhibit	
Cause	Measure
The formatting of the replaceable memory module does not match.	Restore delivery state. NOTICE: All the data on the replaceable memory module will be reset to default.
Initialization error of replaceable memory module after delivery state.	Contact the SEW-EURODRIVE Service.

Subfault: 25.31 Description: Runtime error – replaceable memory module	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Runtime error of replaceable memory module.	Contact the SEW-EURODRIVE Service.

Subfault: 25.32 Description: Replaceable memory module not compatible	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
The inserted replaceable memory module cannot be used.	Replace the memory module.

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Subfault: 25.50 Description: Runtime error – replaceable safety memory module	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
Runtime error of the replaceable safety memory module.	Contact the SEW-EURODRIVE Service.

Subfault: 25.51 Description: Initialization error – replaceable safety memory module	
Response: Warning	
Cause	Measure
Initialization error of the replaceable safety memory module.	Contact the SEW-EURODRIVE Service.

Subfault: 25.61 Description: Error – restore point	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Failed to create restore point.	Delete restore point.

Subfault: 25.70 Description: Incompatible card configuration	
Response: Emergency stop + output stage inhibit	
Cause	Measure
The current configuration of the cards does not match the state of the stored startup. For example, a card was removed that was still present during startup.	– Restore the original configuration of the cards. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".

8.7.20 Fault 26 External fault

Subfault: 26.1 Description: Terminal	
Response: External fault	
Cause	Measure
Error message about external error source.	Programmable via 8622.5 (default: application stop (with output stage inhibit)).

Subfault: 26.3 Description: Power section emergency shutdown		
	Response: Output stage inhibit	
	Cause	Measure
	Power section requested external emergency shutdown because it detected critical fault.	Contact SEW-EURODRIVE Service.

Subfault: 26.4 Description: External braking resistor fault		
	Response: Response to external braking resistor fault	
	Cause	Measure
	External braking resistor's temperature switch connected to terminal tripped.	– Check the resistor mounting position. – Clean the resistor. – Check the configuration of the resistor. – Install a larger resistor. – Check the trip switch settings. – Optimize the travel cycle so that less regenerative operation energy arises.

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8.7.21 Fault 28 FCB drive functions

Subfault: 28.1		
Description: FCB 11/12 – Timeout while searching zero pulse		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Failed to find zero pulse of encoder's C track within specified search time during reference travel.	Check the encoder wiring.

Subfault: 28.2		
Description: FCB 11/12 – Hardware limit switch upstream of reference cam		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The hardware limit switch was reached during reference travel. The reference cam was not detected.	Make sure that the reference cam is not installed downstream of the hardware limit switch.

Subfault: 28.3		
Description: FCB 11/12 – Hardware limit switch and reference cam not flush		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Hardware limit switch and reference cam not mounted flush.	Make sure that the reference cam and the hardware limit switch are mounted flush.

Subfault: 28.4		
Description: FCB 11/12 – Reference offset error		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Error when determining reference offset.	– Make sure that the reference offset is not set to a larger value than the "Modulo maximum" limit value. When using a single-turn absolute encoder, make sure that the reference offset is not set to a larger value than one encoder revolution.

Subfault: 28.5		
Description: FCB 11/12 – Referencing not possible		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	In the active drive train, the "Actual position source" parameter is set to "No encoder".	Assign "Actual position source", or do not perform any referencing.

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Subfault: 28.6	
Description: FCB 11/12 – Limit switch/reference cam not flush/overlapping with fixed stop	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Hardware limit switch or reference cam that has not been selected was approached during reference travel to fixed stop.	Check whether the parameters set for reference travel are correct.
During reference travel to fixed stop with selected hardware limit switch or reference cam, the fixed stop was reached without approaching the hardware limit switch or reference cam.	Check whether the parameters set for reference travel are correct.

Subfault: 28.7	
Description: FCB 21 – Test torque greater than maximum torque at motor shaft	
Response: Output stage inhibit	
Cause	Measure
The required test torque for the brake test is higher than the maximum torque. It cannot be generated by the motor/inverter combination.	Reduce the test torque.

Subfault: 28.8	
Description: FCB 21 – Test torque not reached	
Response: Output stage inhibit	
Cause	Measure
Test torque required for brake test exceeds valid limit values.	– Reduce the test torque. – Check limit values.

Subfault: 28.9	
Description: FCB 18 – Rotor position identification not possible	
Response: Output stage inhibit	
Cause	Measure
Rotor position identification started with incremental encoder but aborted prematurely.	– Restart the rotor position identification. – Check whether the encoder is connected correctly. – Check whether the encoder is defective.
Result of rotor position identification cannot be stored in encoder.	Select "Inverter" as storage location.
Combination of "Automatic" mode and "Encoder" storage location not permitted.	Set the operating mode to "Manual" or the storage location to "Inverter".

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Subfault: 28.10		
Description: FCB 25 – Unbalanced motor phases		
	Response: Output stage inhibit	
	Cause	Measure
	Significantly different values determined in the three phases while measuring stator resistances.	– Check whether the motor is connected correctly. – Check all contact points on the motor and inverter. – Check the motor and motor cable for damage.

Subfault: 28.11		
Description: FCB 25 – At least one phase with high resistance		
	Response: Output stage inhibit	
	Cause	Measure
	At least one motor phase could not be measured during motor parameter measurement.	– Check whether the motor is connected correctly. – Check all contact points on the motor and inverter. – Check the motor and motor cable for damage.

Subfault: 28.12		
Description: FCB 25 – Timeout during stator resistance measurement		
	Response: Output stage inhibit	
	Cause	Measure
	Motor parameter measurement activated while motor is turning.	– Stop the motor. – Start motor parameter measurement when the motor is at standstill.

Subfault: 28.13		
Description: FCB 25 – Characteristic curve identification not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Motor parameter measurement does not allow for unique identification of the characteristic curve.	Contact the SEW-EURODRIVE Service.

Subfault: 28.14		
Description: Modulo min. and max. swapped		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	In the active data set, the value for "Modulo minimum" is greater than the value for "Modulo maximum"; see Monitoring functions\Limit values 1 or Monitoring functions\Limit values 2.	Swap the values for modulo minimum and modulo maximum.

Subfault: 28.15		
Description: FCB 25 – Timeout		
	Response: Output stage inhibit	
	Cause	Measure
	Measuring rotor resistance, LSigma, or stator inductance not completed.	Contact the SEW-EURODRIVE Service.

8.7.22 Fault 29 HW limit switches

Subfault: 29.1		
Description: Positive limit switch approached		
	Response: HW limit switch – current drive train	
	Cause	Measure
	Positive hardware limit switch approached.	– Check hardware limit switch wiring. – Check target position. – Move clear of the hardware limit switch at negative speed.

Subfault: 29.2		
Description: Negative limit switch approached		
	Response: HW limit switch – current drive train	
	Cause	Measure
	Negative hardware limit switch approached.	– Check hardware limit switch wiring. – Check target position. – Move clear of the hardware limit switch at positive speed.

Subfault: 29.3		
Description: Limit switch missing		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Both positive and negative hardware limit switches approached at the same time.	– Check hardware limit switch wiring. – Check the parameter setting of digital inputs. – Check the parameter setting of process output data.

Subfault: 29.4		
Description: Limit switches swapped		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Positive hardware limit switch approached at negative speed, or negative hardware limit switch approached at positive speed.	Check whether hardware limit switch connections are swapped.

8.7.23 Fault 30 Software limit switches

Subfault: 30.1 **Description: Positive limit switch approached**		
	Response: SW limit switches – current drive train	
	Cause	Measure
	Positive software limit switch approached.	– Check software limit switch position. – Check target position. – Move clear of software limit switch at negative speed.

Subfault: 30.2 **Description: Negative limit switch approached**		
	Response: SW limit switches – current drive train	
	Cause	Measure
	Negative software limit switch approached.	– Check software limit switch position. – Check target position. – Move clear of software limit switch at positive speed.

Subfault: 30.3 **Description: Limit switches swapped**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Position value of negative software limit switch greater than position value of positive software limit switch.	Check software limit switch positions.

8.7.24 Fault 31 Thermal motor protection

Subfault: 31.1 **Description: Temperature sensor wire break – motor 1**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Connection to temperature sensor of motor 1 interrupted.	Check the temperature sensor wiring.

Subfault: 31.2 **Description: Temperature sensor short circuit – motor 1**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Short circuit in connection with temperature sensor of motor 1.	Check the temperature sensor wiring.

Subfault: 31.3		
Description: Temperature sensor overtemperature – motor 1		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature sensor of motor 1 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).

Subfault: 31.4		
Description: Temperature model overtemperature – motor 1		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of motor 1 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).

Subfault: 31.5		
Description: Temperature sensor prewarning – motor 1		
	Response: Thermal motor protection 1 – prewarning threshold	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 1 exceeds prewarning threshold.	Check for motor overload.

Subfault: 31.6		
Description: Temperature model prewarning – motor 1		
	Response: Thermal motor protection 1 – prewarning threshold	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 1 exceeds prewarning threshold.	Check for motor overload.

Subfault: 31.7		
Description: UL temperature monitoring		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of active motor signals overtemperature.	Check for motor overload.

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Subfault: 31.8 **Description: Communication timeout temperature sensor – motor 1**		
	Response: Output stage inhibit	
	Cause	Measure
	Communication with temperature sensor is disrupted, e.g. via MOVILINK® DDI.	Check the cabling.

Subfault: 31.9 **Description: Temperature too low – temperature sensor – motor 1**		
	Response: Warning with self-reset	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 1 below -50 °C.	– Check if a KTY temperature sensor is installed in the motor but the parameterization has been carried out for a Pt1000 temperature sensor. – Heat the motor.

Subfault: 31.11 **Description: Temperature sensor wire break – motor 2**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Connection to temperature sensor of motor 2 interrupted.	Check the temperature sensor wiring.

Subfault: 31.12 **Description: Temperature sensor short circuit – motor 2**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Short circuit in connection with temperature sensor of motor 2.	Check the temperature sensor wiring.

Subfault: 31.13 **Description: Temperature sensor overtemperature – motor 2**		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature sensor of motor 2 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).

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Subfault: 31.14		
Description: Temperature model overtemperature – motor 2		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of motor 2 signals overtem-perature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).

Subfault: 31.15		
Description: Temperature sensor prewarning – motor 2		
	Response: No response	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 2 exceeds prewarning threshold.	Check for motor overload.

Subfault: 31.16		
Description: Temperature model prewarning – motor 2		
	Response: No response	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 2 exceeds prewarning threshold.	Check for motor overload.

Subfault: 31.19		
Description: Temperature too low – temperature sensor – motor 2		
	Response: Warning with self-reset	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 2 below -50 °C.	– Check if a KTY temperature sensor is installed in the motor but the parameterization has been carried out for a Pt1000 temperature sensor. – Heat the motor.

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8.7.25 Fault 32 Communication

Subfault: 32.2 Description: EtherCAT®/SBus^{PLUS} process data timeout		
	Response: Fieldbus – timeout response	
	Cause	Measure
	Process data timeout during EtherCAT®/SBus^{PLUS} communication.	– Check the wiring of the system bus and module bus. – Check that the EtherCAT®/SBus^{PLUS} configuration is correctly set in the MOVI-C® CONTROLLER. – Check EtherCAT®/SBus^{PLUS} timeout configuration in the device.

Subfault: 32.3 Description: Faulty synchronization signal		
	Response: External synchronization	
	Cause	Measure
	Faulty synchronization signal period.	Check for correct setting of the EtherCAT®/SBus^{PLUS} configuration in the MOVI-C® CONTROLLER.

Subfault: 32.4 Description: No synchronization signal		
	Response: External synchronization	
	Cause	Measure
	No synchronization signal present.	Check for correct setting of the EtherCAT®/SBus^{PLUS} configuration in the MOVI-C® CONTROLLER.

Subfault: 32.5 Description: Synchronization timeout		
	Response: External synchronization	
	Cause	Measure
	Timeout while synchronizing to synchronization signal.	Check for correct setting of the EtherCAT®/SBus^{PLUS} configuration in the MOVI-C® CONTROLLER.

Subfault: 32.6 Description: Copy parameter set		
	Response: Output stage inhibit	
	Cause	Measure
	Error while downloading parameter set to device.	– Check the wiring of the system bus and module bus. – Restart download.

Subfault: 32.8 **Description: User-timeout timeout**		
	Response: User timeout timeout response	
	Cause	Measure
	The timeout time of the user timeout function elapsed.	Write the parameter for triggering the user timeout function cyclically before the timeout time elapses.

Subfault: 32.11 **Description: Local mode timeout**		
	Response: Local mode – timeout response	
	Cause	Measure
	Communication connection to device interrupted in local mode.	– Increase the timeout setting in local mode.
	New Scope project created.	– Reset the fault. – Restart local operation.
	Scope measurement loaded from device.	– Reset the fault. – Restart local operation.

Subfault: 32.12 **Description: Manual mode timeout**		
	Response: Manual mode – timeout response	
	Cause	Measure
	Communication connection to device interrupted in manual mode.	– Check whether too many programs are open on the operator PC. – Increase the timeout time in manual mode.
	New Scope project created.	– Reset the fault. – Restart manual mode.
	Scope measurement loaded from device.	– Reset the fault. – Restart manual mode.

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8.7.26 Fault 33 System initialization

Subfault: 33.1		
Description: Motor current measurement		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Motor current measurement detected an error.	Contact the SEW-EURODRIVE Service.

Subfault: 33.2		
Description: Firmware CRC check		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Error checking firmware.	Contact the SEW-EURODRIVE Service.

Subfault: 33.6		
Description: FPGA configuration		
	Response: Output stage inhibit	
	Cause	Measure
	Error checking FPGA configuration.	Contact the SEW-EURODRIVE Service.

Subfault: 33.7		
Description: Function block compatibility error		
	Response: Output stage inhibit	
	Cause	Measure
	Error checking compatibility of function block.	Contact the SEW-EURODRIVE Service.

Subfault: 33.8		
Description: SW function block configuration		
	Response: Output stage inhibit	
	Cause	Measure
	Error detected while checking configuration of software function block.	Contact the SEW-EURODRIVE Service.

Subfault: 33.9		
Description: Power section hardware compatibility fault		
	Response: Output stage inhibit	
	Cause	Measure
	Firmware does not match hardware of power section.	Contact the SEW-EURODRIVE Service.

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Subfault: 33.10 **Description: Run-up timeout**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Timeout during system run-up.	Contact the SEW-EURODRIVE Service.

Subfault: 33.11 **Description: Hardware compatibility error**		
	Response: Output stage inhibit	
	Cause	Measure
	Firmware does not match device.	Contact the SEW-EURODRIVE Service.

Subfault: 33.12 **Description: Memory module plugged in**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	A plugged-in memory module was detected during device start. The setting for the device parameter source is set to "Internal memory".	– Switch off the device. Remove the memory module and restart the device. – Change the parameter "Non-volatile memory source" to "Arbitrary" or "Replaceable memory module". Switch the device off and on again.

Subfault: 33.13 **Description: Memory module removed**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	The device was started without a memory module. The setting for the device parameter source is set to "Replaceable memory module".	Switch off the device. Insert the memory module and restart the device.
	Replaceable memory module removed during ongoing operation.	Change the parameter "Non-volatile memory source" to "Internal memory". Switch the device off and on again.

Subfault: 33.14 **Description: EtherCAT® slave controller cannot be accessed**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	EtherCAT® slave controller cannot be accessed.	Contact the SEW-EURODRIVE Service.

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Subfault: 33.15 Description: Firmware configuration		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	The Device Update Manager detected a modified version of the application firmware.	Acknowledge the fault. Doing so will update the configuration data of the Device Update Manager.
	The error occurs repeatedly several times. The Device Update Manager is outdated and cannot save the configuration.	Update the Device Update Manager.

8.7.27 Fault 34 Process data configuration

Subfault: 34.1 Description: Changed process data configuration		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Process data configuration changed during active process data operation.	– Stop the process data and make your changes. Then start the process data again. – Perform a reset. Doing so will stop the process data, apply the changes, and restart the process data.

8.7.28 Fault 35 Function activation

Subfault: 35.1 Description: Activation key – application level invalid		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The activation key was entered incorrectly.	Enter the activation key again.
	The activation key was not created for this device.	Check the activation key.
	When using a double axis, the activation key for the wrong instance was entered in the device.	Enter the activation key for the allocated instance.
	An activation key for a technology level was entered in the parameter "Application level – Activation key".	Enter the activation key in the correct parameter.

Subfault: 35.2 Description: Application level too low		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The activated software module requires a higher application level.	Enter an activation key for the required application level. You can find the required level in the parameter 8438.3 "Application level – Required level".

Subfault: 35.3 Description: Technology level too low		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	An activated technology function requires a higher technology level.	Enter an activation key for the required technology level. You can find the required level in the parameter 8438.13 "Technology level – Required level".

Subfault: 35.4 Description: Activation key – technology level invalid		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The activation key was entered incorrectly.	Enter the activation key again.
	The activation key was not created for this device.	Check the activation key.
	When using a double axis, the activation key for the wrong instance was entered in the device.	Enter the activation key for the allocated instance.
	An activation key for an application level was entered in the parameter "Technology level – Activation key".	Enter the activation key in the correct parameter.

8.7.29 Fault 42 Lag error

Subfault: 42.1

Description: Positioning lag error

Response: Positioning lag error

Cause	Measure
A lag error occurred during positioning. Incorrect encoder connection.	Check the connection of the encoder.
Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
Wiring faulty.	Check the wiring of encoder, motor, and line phases.
Acceleration ramps too short.	Extend the acceleration ramps.
P component of the position controller too small.	Set P component of the position controller to a larger value.
Speed controller parameters set incorrectly.	Check controller parameters.
Value of lag error tolerance too small.	Increase the lag error tolerance.
Mechanical components cannot move freely or are blocked.	Make sure mechanical parts can move freely, and check whether they are blocked.

Subfault: 42.2

Description: Jog mode lag error

Response: Output stage inhibit

Cause	Measure
A lag error occurred in jog mode (FCB 20). Incorrect encoder connection.	Check the connection of the encoder.
Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
Wiring faulty.	Check the wiring of encoder, motor, and line phases.
Acceleration ramps too short.	Extend the acceleration ramps.
P component of the position controller too small.	Set P component of the position controller to a larger value.
Speed controller parameters set incorrectly.	Check controller parameters.
Value of lag error tolerance too small.	Increase the lag error tolerance.
Mechanical components cannot move freely or are blocked.	Make sure mechanical parts can move freely, and check whether they are blocked.

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Subfault: 42.3 Description: Standard lag error		
	Response: Output stage inhibit	
	Cause	Measure
	A lag error has occurred outside a positioning process. Incorrect encoder connection.	Check the connection of the encoder.
	Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
	Wiring faulty.	Check the wiring of encoder, motor, and line phases.
	Acceleration ramps too short.	Extend the acceleration ramps.
	P component of the position controller too small.	Set P component of the position controller to a larger value.
	Speed controller parameters set incorrectly.	Check controller parameters.
	Value of lag error tolerance too small.	Increase the lag error tolerance.

8.7.30 Fault 44 Subcomponent power section

Subfault: 44.2 Description: Overcurrent phase U		
	Response: Remote – critical fault	
	Cause	Measure
	Overcurrent phase U.	– Rectify the short circuit. – Connect a smaller motor. – Increase the ramp time. – In the event of a defective output stage, contact SEW-EURODRIVE Service.

Subfault: 44.3 Description: Overcurrent phase V		
	Response: Remote – critical fault	
	Cause	Measure
	Overcurrent phase V.	– Rectify the short circuit. – Connect a smaller motor. – Increase the ramp time. – In the event of a defective output stage, contact SEW-EURODRIVE Service.

Subfault: 44.4 Description: Overcurrent phase W		
	Response: Remote – critical fault	
	Cause	Measure
	Overcurrent phase W.	– Rectify the short circuit. – Connect a smaller motor. – Increase the ramp time. – In the event of a defective output stage, contact SEW-EURODRIVE Service.

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8.7.31 Fault 45 Fieldbus interface

Subfault: 45.1

Description: No response

Response: Emergency stop + output stage inhibit

Cause	Measure
Basic device detects a plugged fieldbus interface. However, it is not starting properly and so cannot be addressed.	– Switch the power off and on again/perform a reset. – If the fault occurs repeatedly, replace the fieldbus interface and send it to SEW-EURODRIVE together with the fault number. For further support, contact SEW-EURODRIVE Service.

Subfault: 45.2

Description: Option interface

Response: Fieldbus – timeout response

Cause	Measure
Basic device detects fault on internal interface for fieldbus connection.	– Switch the power off and on again/perform a reset. – If the fault occurs repeatedly, replace the fieldbus interface and send it to SEW-EURODRIVE together with the fault number. For further support, contact SEW-EURODRIVE Service.

Subfault: 45.3

Description: Process output data timeout

Response: Fieldbus – timeout response

Cause	Measure
Fieldbus interface detected timeout of process output data on fieldbus interface.	– Check master communication routine. – Check the communication connection between process data producer (master) and fieldbus interface. The data line might be interrupted. – Extend the fieldbus timeout time. – Switch off monitoring.

Subfault: 45.5

Description: Engineering interface

Response: Warning

Cause	Measure
Engineering interface no longer works, or works only to a limited extent.	– Switch the power off and on again/perform a reset. – If the fault occurs repeatedly, replace the fieldbus interface and send it to SEW-EURODRIVE together with the fault number. For further support, contact SEW-EURODRIVE Service.

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Subfault: 45.7 Description: Invalid process output data		
	Response: Fieldbus – timeout response	
	Cause	Measure
	– The producer of the process output data reports that the data is invalid. – Process data is exchanged via the fieldbus but the data is invalid.	– Check whether the PLC is in "Stop" state. – Restart the PLC.

Subfault: 45.9 Description: Fieldbus interface – warning		
	Response: Warning	
	Cause	Measure
	Basic device detects non-critical fault on internal interface for fieldbus connection.	– Reset the fault. – If the fault occurs repeatedly, replace the fieldbus interface and send it to SEW-EURODRIVE together with the fault number. For further support, contact SEW-EURODRIVE Service.

Subfault: 45.50 Description: Fieldbus interface – warning		
	Response: Warning with self-reset	
	Cause	Measure
	Fieldbus interface signals subcomponent fault of the type "Warning".	Refer to the subcomponent fault of the fieldbus interface and perform the action required for eliminating the fault.

Subfault: 45.51 Description: Fieldbus interface – fault		
	Response: Fieldbus – timeout response	
	Cause	Measure
	Fieldbus interface signals subcomponent fault of the type "Standard".	Refer to the subcomponent fault of the fieldbus interface and perform the action required for eliminating the fault.

Subfault: 45.52 Description: Fieldbus interface – critical fault		
	Response: Fieldbus – timeout response	
	Cause	Measure
	Fieldbus interface signals subcomponent fault of the type "Critical fault".	Refer to the subcomponent fault of the fieldbus interface and perform the action required for eliminating the fault.

8.7.32 Fault 46 Safety card

Subfault: 46.1
Description: No response

Response: Output stage inhibit

Cause	Measure
Failed to synchronize with subcomponent.	– Check device assignment of basic device and option. – Check card slot and installation and correct if necessary. – Restart the device. – Contact SEW-EURODRIVE Service.

Subfault: 46.2
Description: Invalid variant

Response: Output stage inhibit

Cause	Measure
Plugged safety card design does not match inverter type.	– Remove the safety card. – Use the correct safety card design.
For double axes, only designs without encoder interface can be used.	– Remove option. – Use the design without encoder interface.
For double axes, no encoder option must be plugged in.	Remove the option.

Subfault: 46.3
Description: Internal communication timeout

Response: Output stage inhibit

Cause	Measure
Communication interrupted between inverter and safety card.	Check card slot and installation and correct if necessary. Contact SEW-EURODRIVE Service if the error is still present.
Safety card signals subcomponent fault of the type "Warning".	Check card slot and installation and correct if necessary. Contact SEW-EURODRIVE Service if the error is still present.

Subfault: 46.50
Description: Warning

Response: Warning with self-reset

Cause	Measure
Safety card signals subcomponent fault of the type "Warning".	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).

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Subfault: 46.51		
Description: Fault		
	Response: Emergency stop + output stage inhibit with self-reset	
	Cause	Measure
	Safety card signals subcomponent fault of the type "Standard fault".	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).

Subfault: 46.52		
Description: Critical fault		
	Response: Output stage inhibit with self-reset	
	Cause	Measure
	Safety card signals subcomponent fault of the type "Critical fault".	– For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3). – If the jumper plug is plugged at terminal "X6", remove the jumper plug.

8.7.33 Fault 51 Analog processing

Subfault: 51.1		
Description: Analog current input 4 mA limit		
	Response: Warning with self-reset	
	Cause	Measure
	Input current below 4 mA.	Check the input current.

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8.7.34 Fault 52 Explosion protection function category 2

Subfault: 52.1		
Description: Startup error		
	Response: Output stage inhibit	
	Cause	Measure
	No valid startup available.	Perform startup.

Subfault: 52.2		
Description: Impermissible system function		
	Response: Output stage inhibit	
	Cause	Measure
	Impermissible system function activated.	Disable impermissible functions when Ex protection function is active, such as "Activate standstill current" = "On" in the active control mode.

Subfault: 52.3		
Description: Inverter too large		
	Response: Output stage inhibit	
	Cause	Measure
	Ratio of inverter current to nominal motor current too large.	Check the assignment of motor and inverter, and check the dimensioning of the system.

Subfault: 52.4		
Description: Parameterization of current limit characteristic		
	Response: Output stage inhibit	
	Cause	Measure
	Error while setting parameters for current limit characteristic.	– Parameterize the current limit characteristic. – Perform startup again.

Subfault: 52.5		
Description: Time duration exceeded f < 5 Hz		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Duration of 60 s for f < 5 Hz exceeded.	Check the dimensioning of the system: If speed control = FCB 05, increase the speed. If speed = 0, inhibit output stage / with stop FCBs, activate the brake function if a brake is installed.

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8.8 Device replacement

⚠ WARNING

Electric shock caused by dangerous voltages in the connection box. Dangerous voltages can still be present for up to 5 minutes after disconnection from the power supply system.

Severe or fatal injuries.

- Before removing the electronics cover, de-energize the device via a suitable external disconnection device.
- Secure the device against unintended re-connection of the voltage supply.
- Secure the output shaft against rotation.
- Wait for at least the following time before removing the electronics cover: **5 minutes**

⚠ WARNING

Improper installation/disassembly of drive units and mount-on components.

Risk of injury.

- Adhere to the notes about installation and disassembly.
- Before releasing shaft connections, make sure that there are no active torsional moments present (tensions within the system).

8.8.1 Replacing the electronics cover

1. Observe the safety notes.
2. Loosen the screws and take off the electronics cover from the connection box.
3. Compare the data on the nameplate of the previous electronics cover with the data on the nameplate of the new electronics cover.

INFORMATION

Always replace the electronics cover with an electronics cover with the same type designation.

But it is permitted to use an electronics cover with a nominal output current that is up to 3 times higher or lower than what the old electronics cover had.

- However, if you use an electronics cover with a higher nominal output current, the power at the output shaft will not be increased.
- When you use an electronics cover with a lower nominal output current than the old electronics cover, the power at the output shaft may no longer be high enough to meet the requirements.

INFORMATION

In safety-related applications, replace an electronics cover only with an electronics cover with the same FS logo.

4. Set all the control elements (e.g. DIP switches, see "Startup" chapter) on the new electronics cover in the same way as the controls of the previous electronics cover.
5. Remove the replaceable memory module from the old electronics cover. Insert the replaceable memory module in the new electronics cover.
6. Place the new electronics cover onto the connection box and screw it on.
7. Supply the device with voltage.
8. Check the new electronics cover for proper functioning.

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8.8.2 Replacing the memory module

1. Observe the safety notes.
2. Loosen the screws and take off the electronics cover from the connection box.
3. Remove the memory module from the old electronics cover.
4. Compare the part number of the memory module.

INFORMATION

The new memory module must have the same part number and the same (or a higher) status as the old memory module.

5. Set the DIP switches on the new memory module in the same way as the control elements of the previous memory module.
6. Insert the new memory module in the new electronics cover.
7. Place the electronics cover onto the connection box and screw it on.
8. Supply the device with voltage.
9. Check the startup of the device.
   - ⇨ If required, perform startup again or load the saved startup to the device.
   - ⇨ For devices with safety card, check the startup of the safety card. For more information, refer to the "MOVISAFE® CSB51A Safety Option" manual.
10. Check the new electronics cover for proper functioning.

8.8.3 Replacing the drive unit

1. Observe the safety notes.
2. Install the lifting eyes to the drive unit, see chapter "Service" > "Device replacement" > "Installing the lifting eyes".
3. Disassemble the drive unit. Observe the notes in chapter "Mechanical Installation".
4. Compare the data on the nameplates of the old drive unit to the data on the nameplates of the new drive unit.

INFORMATION

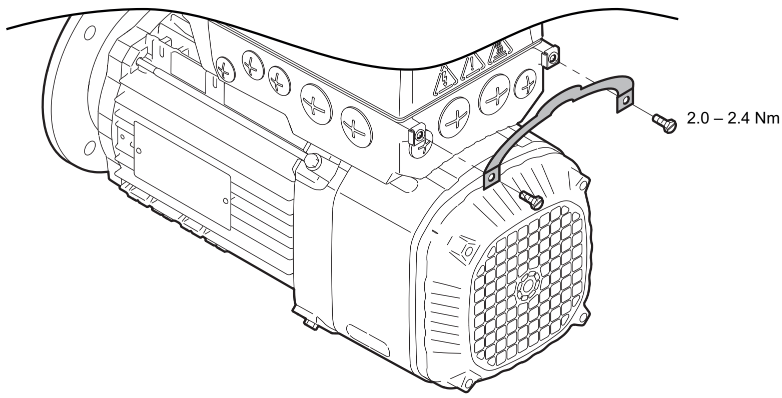
Always replace the drive unit with a drive unit that has the same properties.

In safety-related applications, replace a drive unit only with a drive unit with the same FS logo.

5. Mount the drive unit. Observe the "Mechanical installation" chapter.
6. Remove the lifting eyes from the new drive unit. Store the lifting eyes for future service work.
7. Perform the installation according to the "Electrical Installation" chapter.
8. Set all the controls (e.g. DIP switches, see "Startup" chapter) on the new electronics cover in the same way as the controls of the previous electronics cover.
9. Remove the memory module from the old electronics cover. Insert this memory module in the new electronics cover.
10. Place the electronics cover onto the connection box and screw it on.
11. Supply voltage to the drive.
12. Check the new drive unit for proper functioning.

8.8.4 Installing the lifting eye for motors without gear units

1. Remove the PE connection cable.
2. Install the lifting eye for transportation as depicted in the following image:



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8.9 SEW-EURODRIVE Service

8.9.1 Sending in a unit for repair

If a fault cannot be repaired, please contact SEW-EURODRIVE Service (see "Address list").

Please always specify the digits of the status label when you contact the SEW electronics service so our Service personnel can assist you more effectively.

Provide the following information when sending the device in for repair:

- Serial number (see nameplate)
- Type designation
- Unit design
- Short description of the application (application, control type, etc.)
- Nature of the fault
- Accompanying circumstances
- Your own presumptions as to what has happened
- Any unusual events preceding the problem, etc.

8.10 Shutdown

⚠ WARNING

Electric shock caused by dangerous voltages in the connection box. Dangerous voltages can still be present for up to 5 minutes after disconnection from the power supply system.

Severe or fatal injuries.

- Before removing the electronics cover, de-energize the device via a suitable external disconnection device.
- Secure the device against unintended re-connection of the voltage supply.
- Secure the output shaft against rotation.
- Wait for at least the following time before removing the electronics cover: **5 minutes**

To shut down the unit, de-energize the unit using appropriate measures.

8.11 Storage

Observe the following instructions when shutting down or storing the device:

- If you shut down and store the device for a longer period, close open cable bushings and cover ports with protective caps.
- Make sure that the unit is not subject to mechanical impact during storage.

Observe the notes on storage temperature in chapter "Technical data".

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8.12 Extended storage

8.12.1 Drive

NOTICE

Volatilization of the VCI anti-corrosion agent

Possible damage to property

- Drive units must be kept tightly closed until they are started up.

INFORMATION

For storage periods longer than 9 months, SEW-EURODRIVE recommends the "Extended storage" design. Drive units in this design are designated with a corresponding label.

The lubricant of those drive units is then mixed with a VCI anti-corrosion agent (**v**olatile **c**orrosion **i**nhibitors). Please note that this VCI anti-corrosion agent is only effective in a temperature range of -25 °C to +50 °C. The shaft ends are also treated with an anti-corrosion agent. Drive units of the "extended storage" design are equipped with OS2 surface protection without further notice. Instead of OS2, you can order OS3. For further information refer to chapter "Surface protection".

8.12.2 Storage conditions

Observe the storage conditions specified in the following table for extended storage:

Climate zone	Packaging[1)]	Storage location[2)]	Storage duration
Temperate (Europe, USA, Canada, China and Russia, excluding tropical zones)	Packed in containers, with desiccant and moisture indicator sealed in plastic wrap.	Under roof, protected against rain and snow, no shock loads.	Up to 3 years with regular checks of the packaging and moisture indicator (relative humidity < 50%).
	Open	Under roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 50 °C, < 50% relative humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). No aggressive vapors, no shocks.	2 years or more with regular inspections. Check for cleanness and mechanical damage during the inspection. Check corrosion protection.

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Climate zone	Packaging[1]	Storage location[2]	Storage duration
Tropical (Asia, Africa, Central and South America, Australia, New Zealand excluding temperate zones)	Packed in containers, with desiccant and moisture indicator sealed in plastic wrap. Protected against insect damage and mildew by chemical treatment.	Under roof, protected against rain and shocks.	Up to 3 years with regular checks of the packaging and moisture indicator (relative humidity < 50%).
	Open	Under roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 50 °C, < 50% relative humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). No aggressive vapors, no shocks. Protected against insect damage.	2 years or more with regular inspections. Check for cleanness and mechanical damage during the inspection. Check corrosion protection.

1) The packaging must be carried out by an experienced company using the packaging materials that have been explicitly specified for the particular application.
2) SEW-EURODRIVE recommends storing the drive according to the mounting position.

8.12.3 Electronics

INFORMATION

For electronics components, adhere to the following notes in addition to the notes in chapters "Extended storage" > "Drive" and "Extended storage" > "Storage conditions".

If the device is in extended storage, connect it to the supply voltage for at least 5 minutes every 2 years. Otherwise, the device's service life may be reduced.

Procedure in case maintenance has been neglected

Electrolytic capacitors are used in the inverters. They are subject to aging effects when de-energized. This effect can damage the capacitors if the device is connected directly to the nominal voltage after a longer period of storage. If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the line voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview. After you have completed the regeneration process, the device can be used immediately or stored again for an extended period with maintenance.

The following graduations are recommended:

AC 400/500 V units:

- Stage 1: AC 0 V to AC 350 V within a few seconds
- Stage 2: AC 350 V for 15 minutes
- Stage 3: AC 420 V for 15 minutes
- Stage 4: AC 500 V for 1 hour

8.13 Waste disposal

Dispose of the product and all parts separately in accordance with their material structure and the national regulations. Put the product through a recycling process or contact a specialist waste disposal company. If possible, divide the product into the following categories:

- Iron, steel or cast iron
- Stainless steel
- Magnets
- Aluminum
- Copper
- Electronic parts
- Plastics

The following materials are hazardous to health and the environment. These materials must be collected and disposed of separately.

- Oil and grease

  Collect used oil and grease separately according to type. Ensure that the used oil is not mixed with solvent. Dispose of used oil and grease correctly.
- Screens
- Capacitors

Waste disposal according to WEEE Directive 2012/19/EU

This product and its accessories may fall within the scope of the country-specific application of the WEEE Directive. Dispose of the product and its accessories according to the national regulations of your country.

For further information, contact the responsible SEW-EURODRIVE branch or an authorized partner of SEW-EURODRIVE.

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9 Inspection and maintenance

9.1 Determining the operating hours

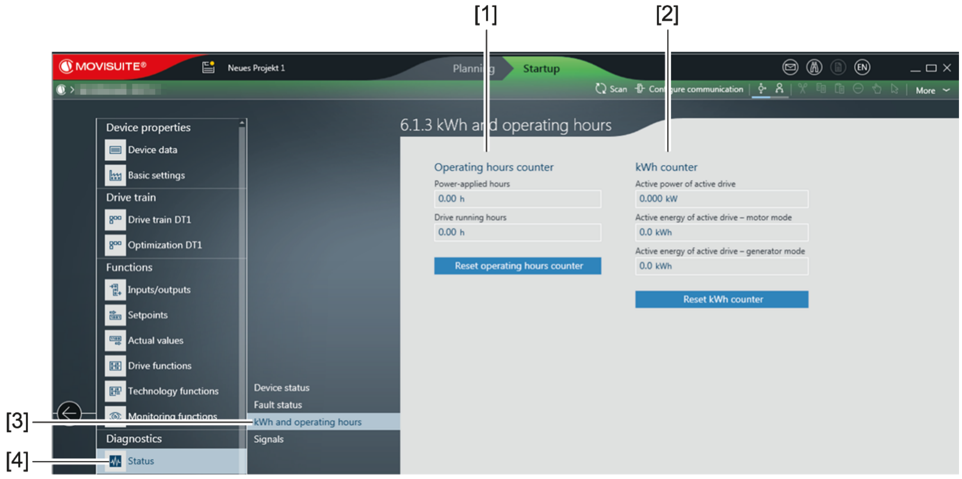
9.1.1 About MOVISUITE®

The device allows for reading the operating hours performed in order to assist with inspection and maintenance work.

To determine the operating hours performed, proceed as follows:

1. In MOVISUITE®, open the parameter tree of the device.
2. In the parameter tree [4], select the "Status" node.

   ⇨ The **operating hours** performed can be found in the "kWh and operating hours" [3] group.



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[1] Display of operating and drive running hours performed
[2] Display of active power and active energy

9.2 Inspection and maintenance intervals

The following table shows the inspection intervals:

Time interval	What to do?	Who is permitted to perform the work?
When the electronics cover is opened after an operating period of ≥ 6 months.	When the electronics cover is opened after an operating period of ≥ 6 months, the gasket between the connection box and the electronics cover must always be replaced. The 6-month period can be shortened by harsh ambient/operating conditions, e.g. cleaning with aggressive chemicals or frequent temperature variations.	Specialists at customer site

Time interval	What to do?	Who is permitted to perform the work?
Each time the electronics cover is opened	Visual inspection of the gasket between connection box and electronics cover: Replace the gasket if it is damaged or separating from the connection box.	Specialists at customer site
Varying (depending on external factors)	Touch up or renew the surface/anti-corrosion coating	Specialists at customer site

9.2.1 Motor

Also observe the information in the "DR..71-315, DRN63-315, DR2..56-80 AC Motors" operating instructions.

9.2.2 Brake

Also observe the information in the "DR..71-315, DRN63-315, DR2..56-80 AC Motors" operating instructions.

9.3 Inspection and maintenance work

9.3.1 Preliminary work regarding inspection and maintenance

Observe the following notes before you start with inspection/maintenance work:

⚠ WARNING

Risk of injury if the device starts up unintentionally, and danger of electrical voltage.

Dangerous voltages may still be present for up to 5 minutes after disconnection from the line voltage.

- Disconnect the device from the power supply with suitable external measures before you start working on the device and secure it against unintentional reconnection to the voltage supply.
- Secure the output shaft against rotation.
- Before removing the electronics cover, wait for at least the following time: **5 minutes.**

⚠ WARNING

Risk of burns due to hot surfaces and hot gear unit oil.

Serious injuries.

- Let the devices cool down before touching them.
- Remove the screw plugs and the breather valve carefully.
- The gear unit must still be warm, otherwise the high viscosity of excessively cold oil will make it more difficult to drain the oil correctly.

NOTICE

Damage to the drive unit.

Potential damage to property.

- Make sure that only the SEW-EURODRIVE Service or qualified personnel trained by SEW-EURODRIVE opens the gear unit cover.

NOTICE

Filling in the wrong oil may result in significantly different lubricant characteristics.

Potential damage to property.

- Do not mix different synthetic lubricants and do not mix synthetic and mineral lubricants.
- Synthetic oil is used as the standard lubricant.

9.3.2 Replacing the output oil seal

1. Observe the notes in chapter "Preliminary work regarding inspection and maintenance" and in chapter "Inspection and maintenance intervals" in the "DR..71-315, DRN63-315, DR2..56-80 AC Motors" operating instructions.
2. Remove the drive unit from the system.
3. **NOTICE!** Oil seals with a temperature below 0 °C may get damaged during installation. Potential damage to property. Store oil seals at ambient temperatures over 0 °C. Warm up the oil seals before you install them, if necessary.
   When changing the oil seal, ensure that there is a sufficient grease reservoir between the dust lip and sealing lip, depending on the type of gear unit.
   ⇨ If you use double oil seals, fill one-third of the gap with grease.
   ⇨ Do not install the oil seal on the same track.
4. Touch up or renew the surface/anti-corrosion coating.

9.3.3 Painting the drive unit

1. Observe the notes in chapter "Preliminary work for inspection and maintenance".
2. **NOTICE!** Breather valves and oil seals may be damaged during painting or repainting. Potential damage to property. Thoroughly cover the breather valves and sealing lip of the oil seals with strips prior to painting.
   Clean the surface of the drive unit and make sure it is free from grease.
3. Remove the strips after painting.

9.3.4 Cleaning the drive unit

Observe the notes in chapter "Preliminary work for inspection and maintenance".

Excessive dirt, dust or shavings can have a negative impact on the function of drive units; in some cases, these factors can cause the motor to break down.

For this reason, you must clean the drives at regular intervals (after one year at the latest) to ensure a sufficiently large area for heat dissipation.

Insufficient heat dissipation can have unwanted consequences. The bearing service life is reduced through operation at impermissibly high temperatures (bearing grease degrades).

9.3.5 Connection cables

Observe the notes in chapter "Preliminary work for inspection and maintenance".

Check the connection cables for damage at regular intervals and replace if necessary.

9.3.6 Replacing the gasket between connection box and electronics cover

Spare part kit

The gasket is available as a spare part (1, 10 or 50 pieces) from SEW-EURODRIVE.

Content	Part number
1 piece	18187765
10 piece	28266161
50 piece	28266188

Steps

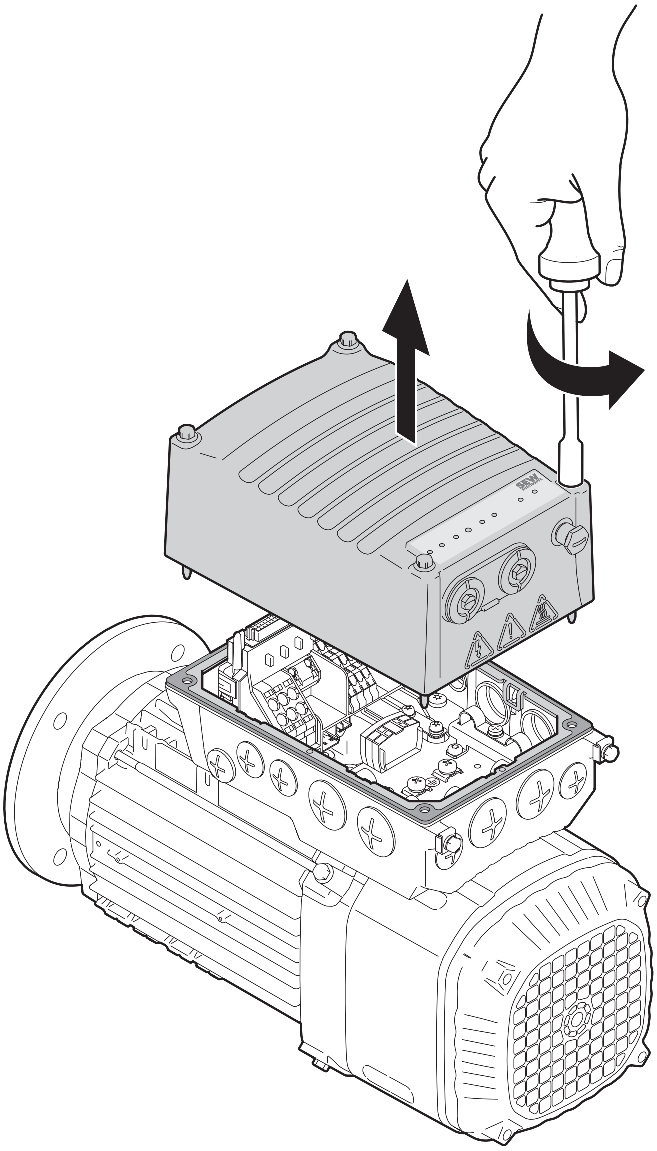
NOTICE

Loss of the guaranteed degree of protection.

Possible damage to property.

- When the cover is removed from the connection box, you have to protect the cover and the wiring space from humidity, dust or foreign particles.
- Make sure that the cover is mounted properly.

1. Observe the notes in chapter "Preliminary work for inspection and maintenance".
2. Loosen the screws of the electronics cover and remove it.



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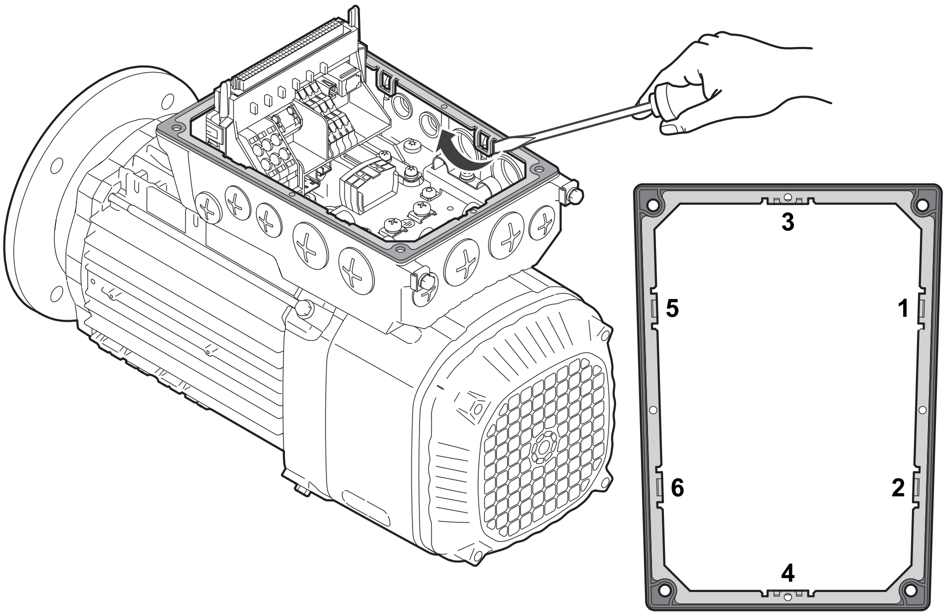
3. **NOTICE!** Loss of the guaranteed degree of protection. Possible damage to property. Make sure not to damage the sealing surfaces when removing the gasket. Loosen the used gasket by levering it off the retaining cams.
   ⇨ Doing so will be easier if you adhere to the sequence shown in the figure below.



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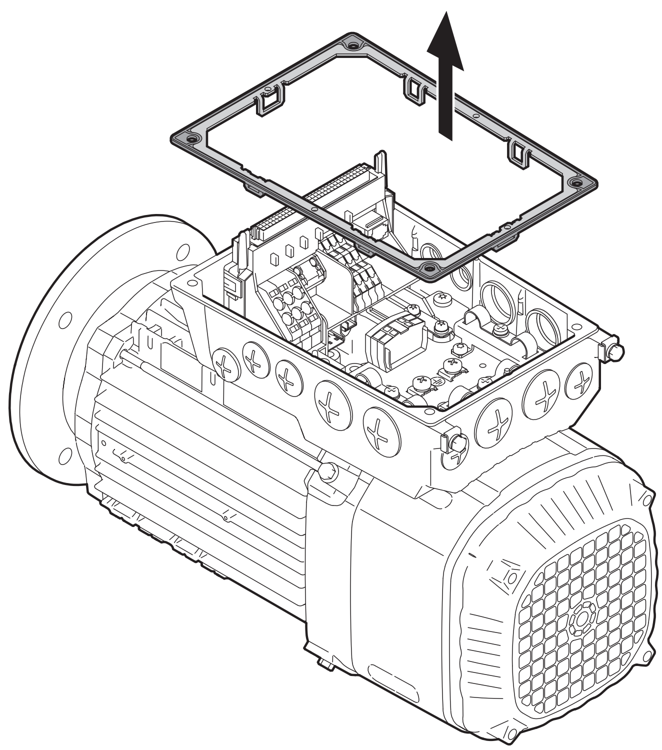
4. Remove the old gasket completely from the connection box.



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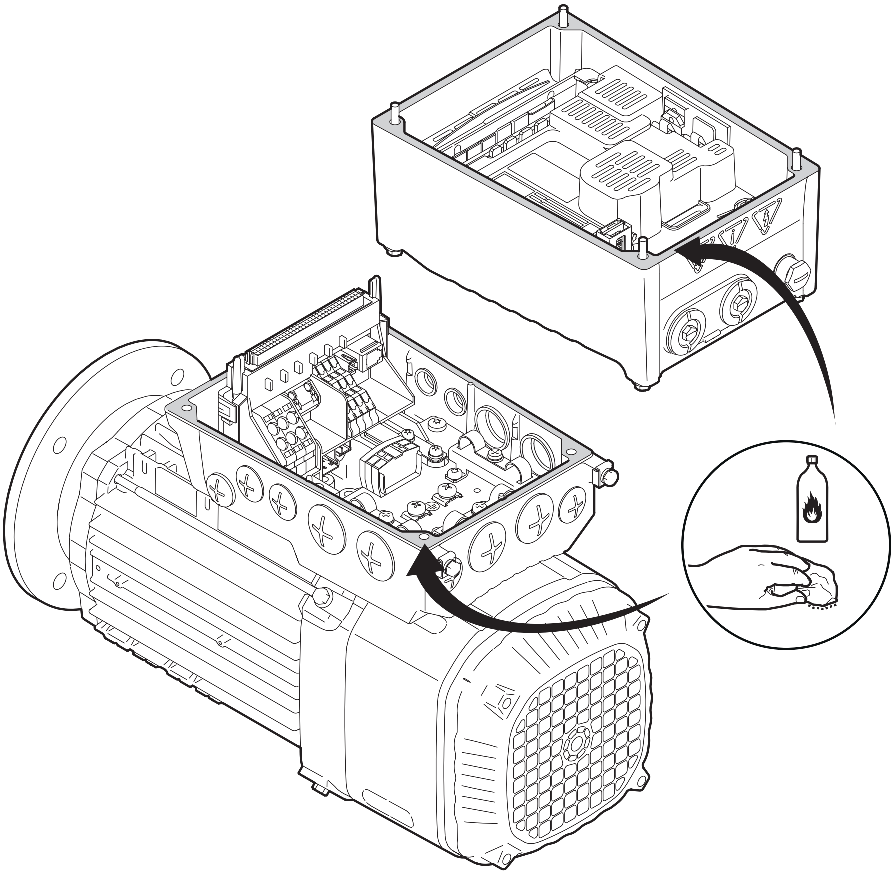
5. **CAUTION!** Risk of injury due to sharp edges. Risk of cutting injuries. Use protective gloves for cleaning. Work may only be carried out by qualified personnel.
   Clean the sealing surfaces of the connection box and the electronics cover carefully.



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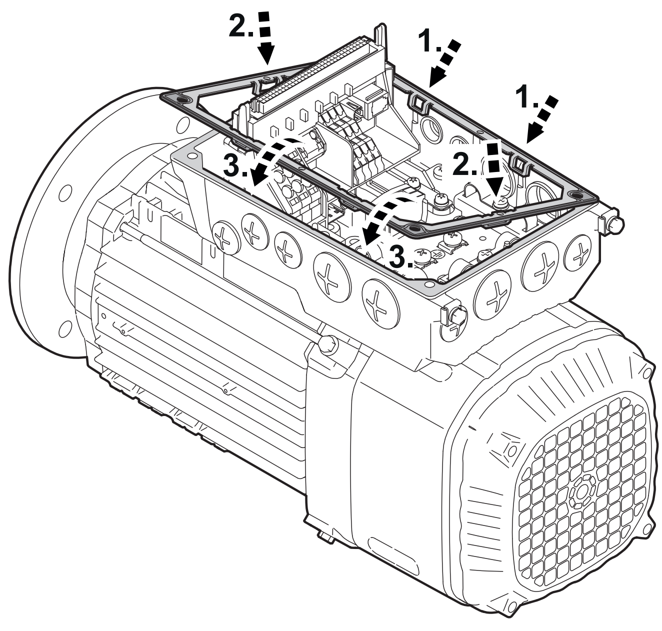
6. Place the new gasket on the connection box and fix it in position with the retaining cams. Doing so will be easier if you adhere to the sequence shown in the figure below.



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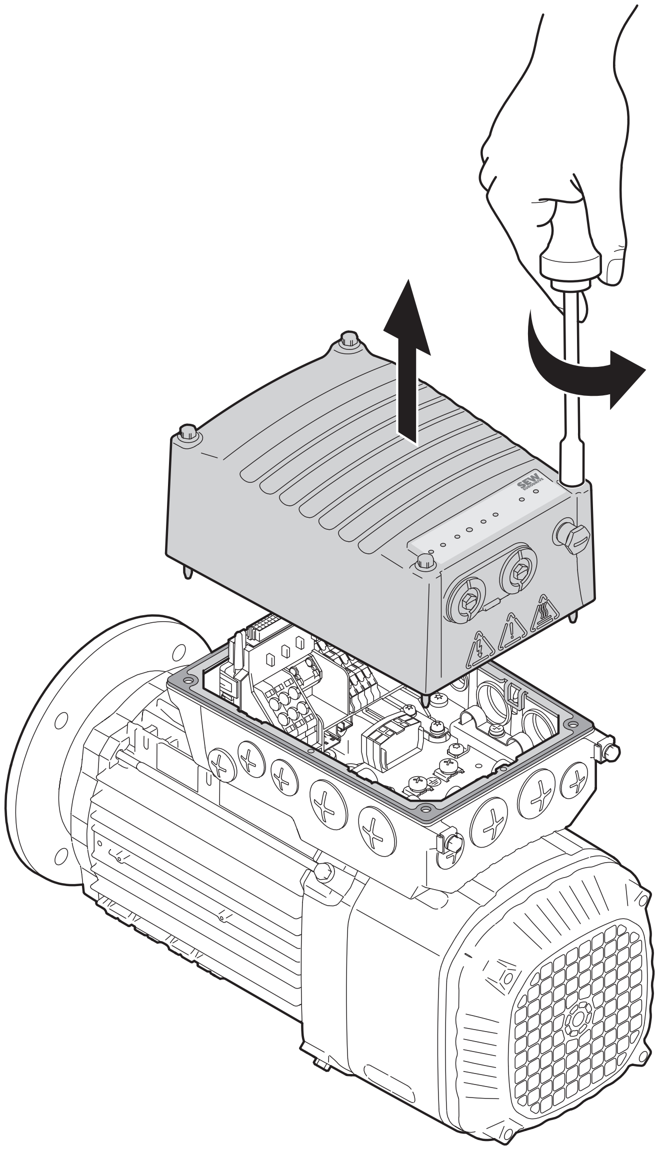
7. Check the installation and startup of the drive unit using the applicable operating instructions.
8. Place the electronics cover on the connection box again and fasten it.
   ⇨ Proceed as follows when installing the electronics cover: Insert the screws and tighten them in diametrically opposite sequence **step by step** with a tightening torque of 6.0 Nm.



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10 Project planning

10.1 Preliminary information

INFORMATION

Data may differ due to continuous product development.

10.2 Data for drive selection/designation

Certain data is required to be able to precisely define the components for your drive. These include:

Data for drive selection/designation		
Abbreviation	**Description**	**Unit**
Gear unit		
i	Gear unit ratio	
i_{min}	Ideal gear unit ratio	
Torques		
M_A	Peak torque of the motor	Nm
M_N	Nominal motor torque	Nm
M_n	Required application torque in the nth travel section	Nm
M_G	Required application torque with consideration of the efficiency	Nm
M_{eff}	Effective (thermally equivalent S1) torque	Nm
M_{max}	Maximum required application torque	Nm
$M_{a\ max}$	Maximum output torque of the gear unit	Nm
$M_{max\ Motor}$	Maximum required application torque calculated on the basis of the motor shaft	Nm
Rotational speeds		
n_a	Output speed	min^{-1}
n_e	Motor speed	min^{-1}
n_N	Nominal motor speed	min^{-1}
n_{min}	Minimum required application speed	min^{-1}
n_{max}	Maximum required application speed	min^{-1}
$n_{a\ min}$	Minimum output speed	min^{-1}
$n_{a\ max}$	Maximum output speed	min^{-1}
$n_{min\ motor}$	Minimum required application speed calculated on the basis of the motor shaft	min^{-1}
$n_{max\ motor}$	Maximum required application speed calculated on the basis of the motor shaft	min^{-1}

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Data for drive selection/designation		
Other		
t_n	Duration of the nth travel section	s
η_L η_{load} η_{app}	Load efficiency	
W	Mean braking work	J
P_{brake}	Mean regenerative power during deceleration	W
IP..	Degree of protection to ISO 20653	
H	Installation altitude above sea level	m
ϑ_{amb}	Ambient temperature	°C

10.2.1 Determining the motor data

To select the proper drive, you first need the data (weight, speed, setting range, etc.) of the machine to be driven.

This determines the torque and the rotational speed. Refer to the documentation "Drive Engineering – Practical Implementation, Project Planning" or the SEW-Workbench project planning software for assistance.

10.2.2 Selecting the proper drive

Based on the calculated values for torque and rotational speed, the suitable drive can now be configured under adherence of any other mechanical requirements.

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10.3 MOVIMOT® advanced

10.3.1 Project planning procedure

The following flow diagram illustrates the project planning procedure for a MOVIMOT® advanced drive unit consisting of gear unit, motor and inverter. This is a highly simplified illustration that serves to clarify the process. For example, the following points are left out:

- Reduction of the available nominal torque at low speeds
- Capacity utilization of the field weakening range operation
- Project planning of a mechanical braking
- Checking non-cyclical special loads
- Project planning of external braking resistors
- Consideration of the mass moment of inertia ratio
- Detailed calculation of permitted overhung loads

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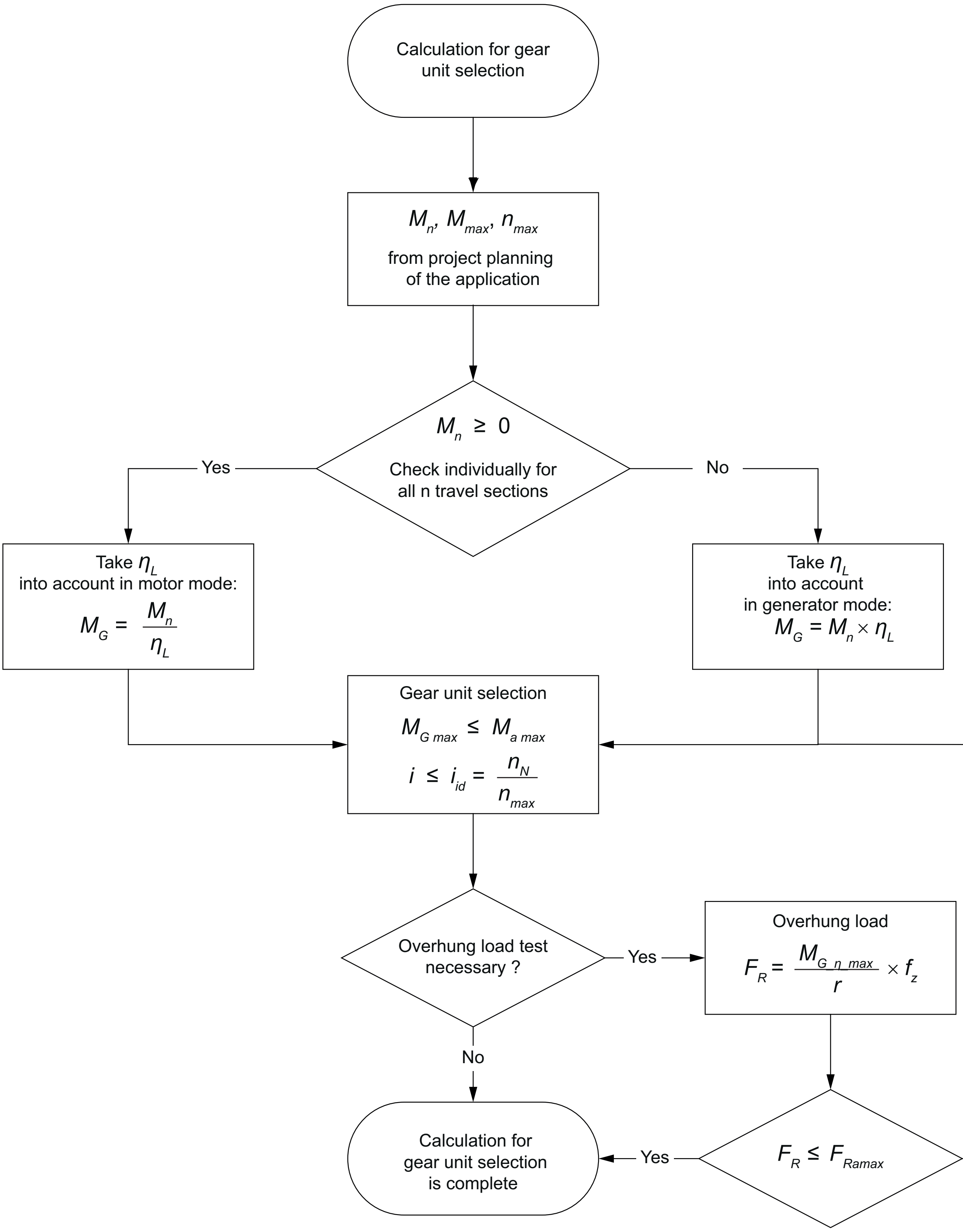

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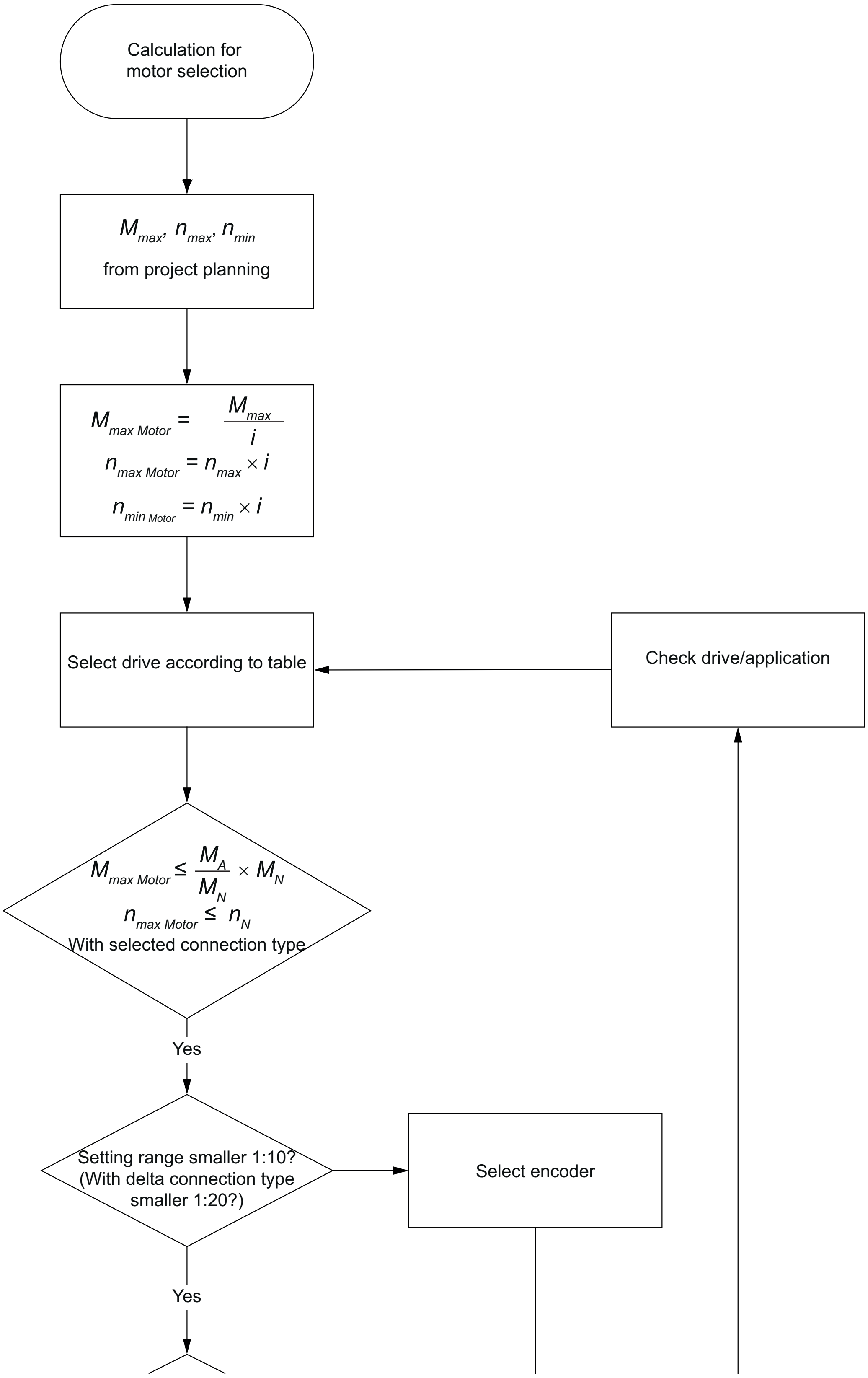

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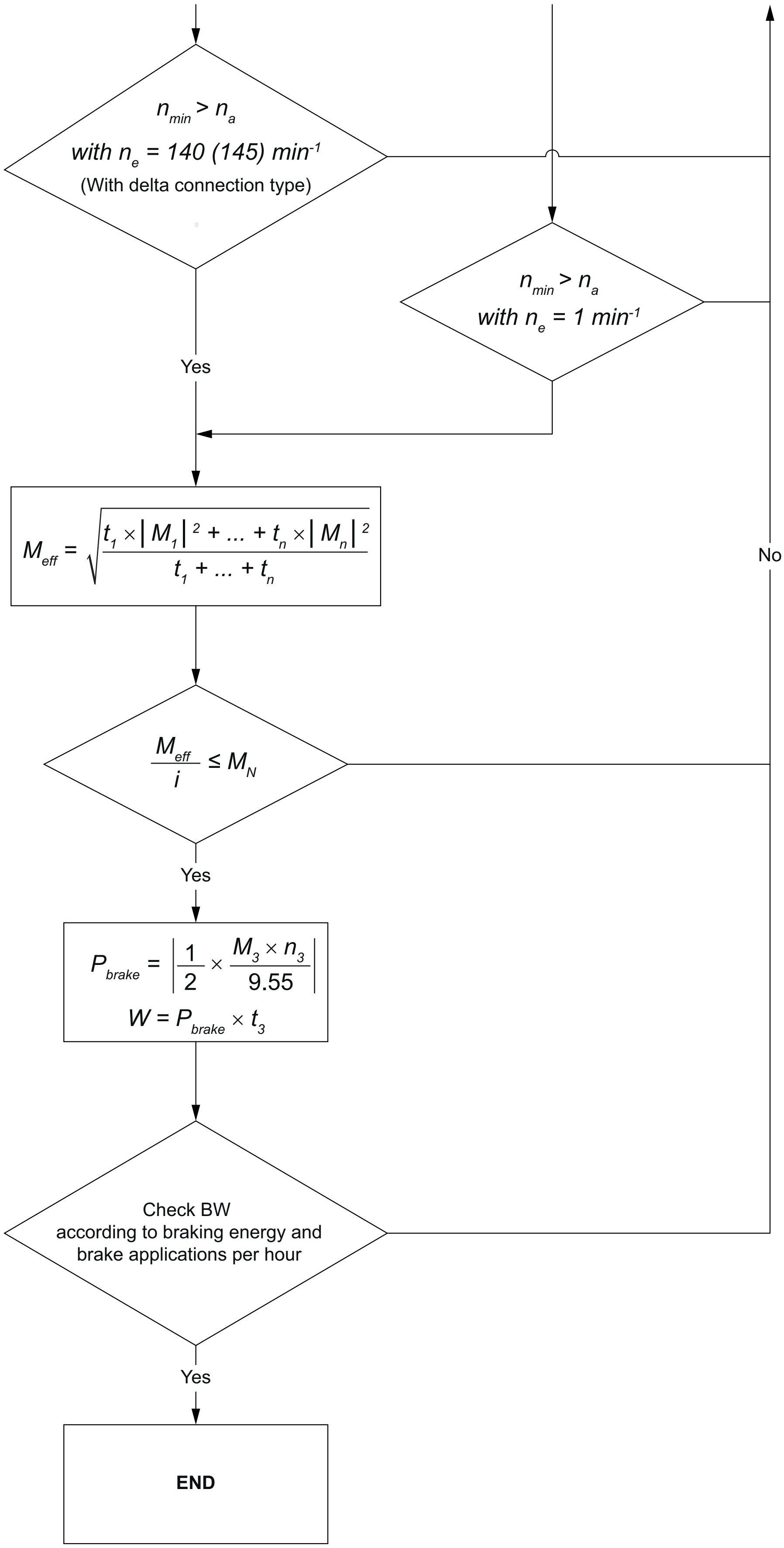

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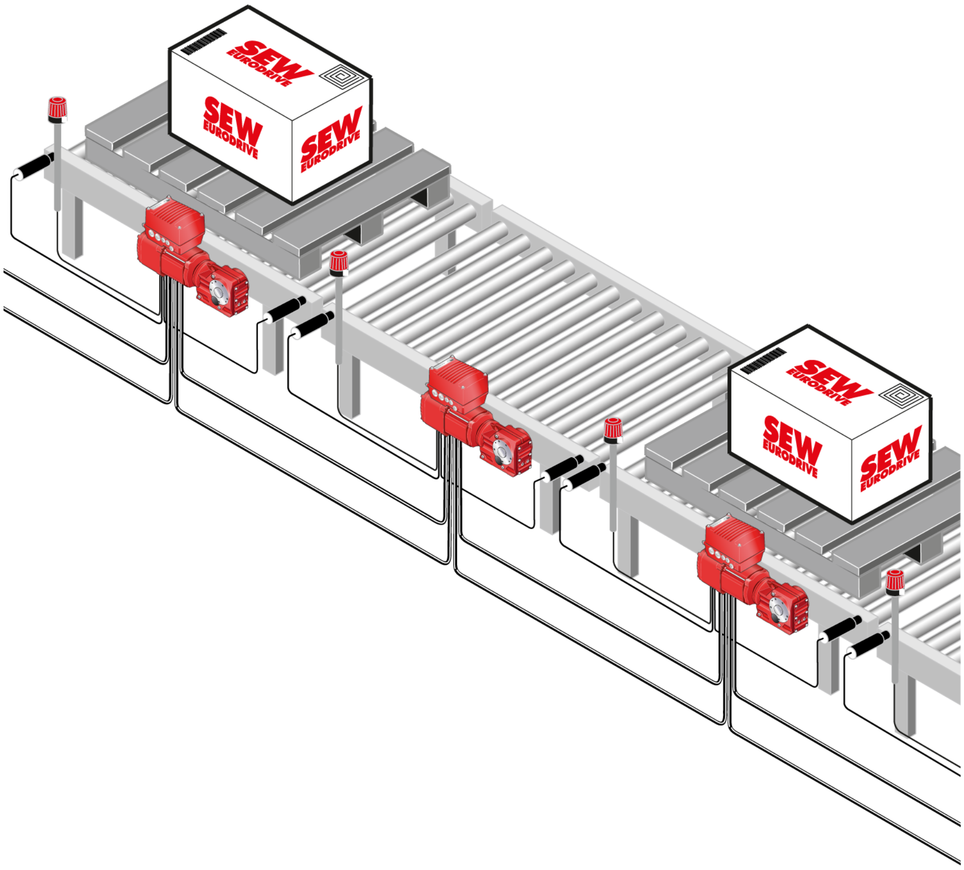
10.3.2 Drive selection using the example of a roller conveyor

Description of the application

This chapter illustrates the drive unit selection using the example of a roller conveyor for transporting wooden pallets with the following specifications:

Load weight	m	2,500 kg
Conveying speed	v	22 m/min
Positioning speed	v	5 m/min
Acceleration	a	0.4 m/s²
Number of rollers	a	8
Efficiency of the application with rollers	η_{app}	0.7
Roller diameter	D	140 mm
Lever arm of the rolling friction (wood/steel)	f	1.2
Bearing diameter	d	28 mm
Bearing friction value	$\mu_{bearing}$	0.005
Switching frequency	c	6 times/hour
Maximum external force at standstill	F_{ext}	800 N

The following figure shows a schematic illustration:



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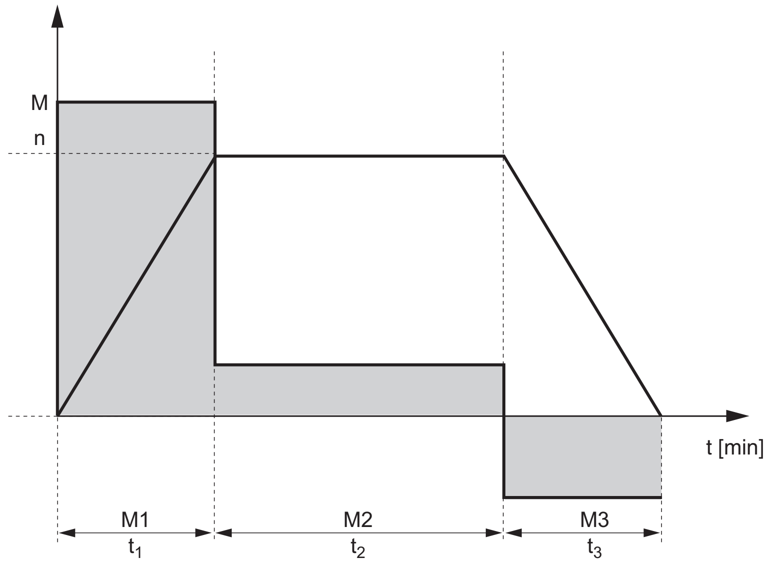
Calculating the application

The travel profile consists of the 3 travel sections acceleration, constant movement, and deceleration.



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The following table shows the calculations for the application that are required to determine the drive units:

Calculations	
Static resistance to vehicle motion	$F_R = \mu \times m \times g$ $\mu = \left[\frac{2}{D} x \left(\mu_{bearing} \times \frac{d}{2} + f\right) + c\right]$ $\mu = \left[\frac{2}{140mm} x \left(0.005 \times \frac{28mm}{2} + 1.2\right) + 0\right]$ $\mu = 0.01814$ $F_R = 0.01814 \times 2500kg \times 9.81$ $F_R = 445N$ 25222496907
Dynamic resistance to vehicle motion	$F_{Dyn} = m \times a$ $F_{Dyn} = 2500kg \times 0.4\, m/s^2$ $F_{Dyn} = 1000N$
Torque in range M1	$M_1 = \frac{\left(F_R + F_{Dyn}\right) \times D}{2 \times \eta}$ $M_1 = \frac{\left(445N + 1000N\right) \times 0.14m}{2 \times 0.7} = 145.5Nm$
Torque in range M2	$M_2 = \frac{F_R \times D}{2 \times \eta} = 45.5Nm$

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Calculations	
Torque in range M3	$M_3 = \left(\frac{F_R}{\eta} - F_{Dyn} \times \eta \right) \times \frac{D}{2}$ $M_3 = \left(\frac{445N}{0.7} - 1000 \times 0.7 \right) \times \frac{0.14m}{2} = -4.5Nm$
Output speed	$n_{amin} = \frac{v_{min}}{\pi \times D} = \frac{5\,m/\min}{\pi \times 0.14m} = 11.4\min^{-1}$ $n_{amax} = \frac{v_{max}}{\pi \times D} = \frac{22\,m/\min}{\pi \times 0.14m} = 50.0\min^{-1}$

Selecting the MOVIMOT® advanced drive unit

Observe the following procedure when selecting the drive unit:

1. Selecting a suitable gear unit size

   (Specification: Helical-bevel gear unit)

   Requirement: The maximum output torque of the gear unit must be greater than the maximum required application torque: $M_{a\,max} \geq M_{max}$.

   On the basis of the application calculations and taking account of the efficiency, the maximum application torque during startup (first travel section) is

   $M_{max} = 145\ Nm$

   Result: Helical-bevel gear units of size K.37 meet this requirement.

2. Selecting the gear ratio with suitable output speed:

   Requirement: The application calculations result in a maximum required output speed of $n_{max} = 50\ min^{-1}$.

   To achieve a high setting range and an optimum efficiency, the required output speed should be achieved as precisely as possible at an input speed of

   $n_e = n_N = 1400\ min^{-1}$ (nominal motor speed with star connection).

   Result: As there is no ideal gear ratio for the selected gear unit, the next smaller gear ratio available *i* = 24.99 is selected.

   $$i_{id} = \frac{n_N}{n_{max}} = \frac{1400\ min^{-1}}{50\ min^{-1}} = 28$$

   There are no external overhung loads acting on the gear shaft in this example.

3. Selecting a suitable motor:

   Requirement: Select a motor/inverter combination that can provide at least

   $$M_{max\ Motor} = \frac{M_{max}}{i} = \frac{145\ Nm}{24.99} \approx 5.8\ Nm$$

   at peak performance.

   Result: Select the DRN80MK4/D.. motor with the assigned inverter 2.0 A from the following table (from chapter "Technical data").

   $$M_{max\ Motor} = \frac{M_{max}}{i} = \frac{145\ Nm}{24.99} \approx 5.8\ Nm$$

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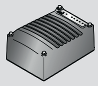
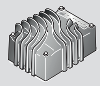
MOVIMOT® advanced		DRN..					
		71M4/D . .	80MK4/D..	80M4/D..	90S4/D..	90L4/D..	100LS4/ D..
Size of the electronics cover		**Size 1** 				**Size 1 with cooling fins** 	
Electronics cover (inverter)		**0020**	**0020**	**0025**	**0032**	**0040**	**0055**
Nominal output current of the electronics cover		2.0 A	2.0 A	2.5 A	3.2 A	4.0 A	5.5 A
Nominal power	P_N	0.37 kW	0.55 kW	0.75 kW	1.1 kW	1.5 kW	2.2 kW
Nominal torque	M_N	2.5 Nm	**3.65 Nm**	4.95 Nm	7.2 Nm	9.8 Nm	14.5 Nm
Overload capacity of M_N		200%	**200%**	200%	200%	200%	200%

4. Checking further topics:
   - Feasibility of the selected motor/gear unit combination
   - Service factor
5. Checking the setting range:

   Setting range of the application

   $5\ m/min : \ 22\ m/min \approx 1:4.4$

   This means the standard setting range of 1:10 (star connection) is sufficient. The encoder option must not be selected.

$$n_a = \frac{145\ min^{-1}}{24.99} \approx 5.6\ min^{-1} < n_{a\ min} = 11.4\ min^{-1}$$

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6. Thermal checking of MOVIMOT® advanced

   Requirement: In order to avoid thermal problems, the effective torque requirement of the application must be smaller than the continuous output torque of the drive unit.

$$t_1 = t_3 = \frac{v}{a} = \frac{22m/\min}{0.4\frac{m}{s^2}\times 60} = 0.92s$$

$$t_2 = 10\min \times 60\frac{s}{\min} - t1 - t3 = 598.16s$$

$$M_{eff} = \sqrt[2]{\frac{t_1 \times \left|M_1\right|^2 + t_2 \times \left|M_2\right|^2 + t_3 \times \left|M_3\right|^2}{t_1 + t_2 + t_3}}$$

$$M_{eff} = \sqrt[2]{\frac{0.92s \times \left|145.5Nm\right|^2 + 598.16s \times \left|45.5Nm\right|^2 + 0.92s \times \left|-4.5Nm\right|^2}{0.92s + 598.16s + 0.92s}} = 45.1Nm$$

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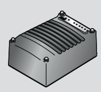
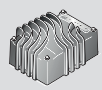
The effective torque requirement (including the efficiency of the application) is 45.1 *Nm*, which corresponds to a torque requirement at the motor shaft of

$$\frac{M_{eff}}{i} = \frac{45.1\ Nm}{24.99} \approx 1.8\ Nm$$

The selected motor/inverter combination DRN80MK4/D.. with the assigned inverter 2.0 A has a nominal torque of 3.65 *Nm*.

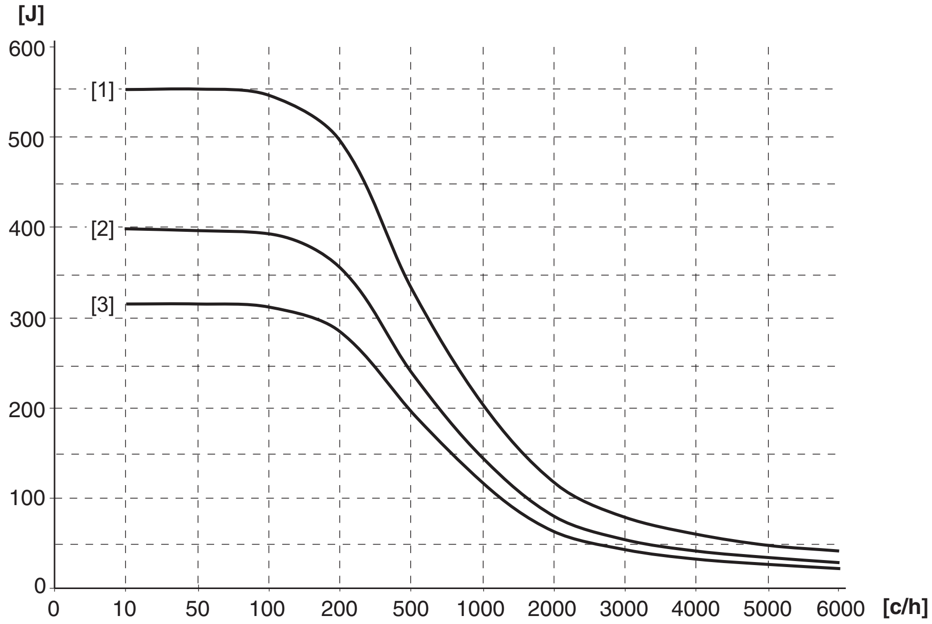
Result: The requirements are met.

MOVIMOT® advanced		**DRN..**					
		71M4/D . .	**80MK4/D..**	**80M4/D..**	**90S4/D..**	**90L4/D..**	**100LS4/ D..**
Size of the electronics cover		**Size 1** 				**Size 1 with cooling fins** 	
Electronics cover (inverter)		**0020**	**0020**	**0025**	**0032**	**0040**	**0055**
Nominal output current of the electronics cover		2.0 A	**2.0 A**	2.5 A	3.2 A	4.0 A	5.5 A
Nominal power	P_N	0.37 kW	0.55 kW	0.75 kW	1.1 kW	1.5 kW	2.2 kW
Nominal torque	M_N	2.5 Nm	**3.65 Nm**	4.95 Nm	7.2 Nm	9.8 Nm	14.5 Nm
Overload capacity of M_N		200%	200%	200%	200%	200%	200%

7. Checking further topics:
   - Derating due to increased ambient temperature
   - Derating due to installation altitude

10.3.3 Regenerative load capacity of the integrated braking resistor

The following diagram shows the load capacity per braking operation of the BW1 braking resistor integrated in the drive unit as standard:



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[1] Deceleration ramp 10 s
[2] Deceleration ramp 4 s
[3] Deceleration ramp 0.2 s
c/h Cycles/hour

Calculation example

The known values are:

- Average braking power: 11.8 W
- Deceleration ramp: 0.92 s
- 6 brake applications per hour

Calculating the energy from the power of the deceleration ramp: $W = P \times t = 11.8W \times 0.92s = 10.9J$

The specified deceleration ramp in seconds refers to a speed change of 3000 min^{-1}.

Calculation of the deceleration ramp for MOVIMOT® advanced:

$$t_{ab} = \frac{3000\ min^{-1}}{50\ min^{-1} \times 24.99} \times 0.92\ s \approx 2.4\ s$$

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For the deceleration ramp of 2.4 s, you can use deceleration ramp [3] (0.2 s) in the diagram.

Use the characteristic curve with the shorter deceleration ramp because a shorter deceleration ramp means more braking energy.

The diagram permits 310 J of braking energy for the 0.2 s deceleration ramp at 6 cycles per hour. In this case, the required 10.9 J can be dissipated via BW1.

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10.3.4 Project planning notes – R, F, K, S, W gear units

Efficiency of gear units

General information

The efficiency of the gear units is mainly determined by the gearing and bearing friction as well as by churning losses. Keep in mind that the starting efficiency of a gear unit is always less than its efficiency at operating speed. This factor is particularly true for helical-worm and SPIROPLAN® right-angle gear units.

INFORMATION

For information on churning losses and thermal rating, refer to chapter "Churning losses and thermal rating" (→ 🗎 230).

R, F, K gear units

Depending on the number of gear stages, the gearing efficiency of helical, parallel-shaft and helical-bevel gear units is up to 96% (3-stage), 97% (2-stage) and 98% (1-stage).

S and W gear units

The gearing in helical-worm and SPIROPLAN® gear units produces a high proportion of sliding friction. This is the reason why these gear units have higher tooth friction losses and lower efficiency than R, F or K gear units.

Other factors influencing the efficiency:

- Gear ratio of the helical-worm or SPIROPLAN® stage
- Input speed
- Ambient temperature

Helical-worm gear units from SEW-EURODRIVE are helical gear/worm combinations that are significantly more efficient than plain worm gear units; see chapter Technical data S. SF. SA. SAF 37 and subsequent chapters.

The efficiency may reach $\eta < 0.5$ if the helical-worm gear stage has a very high gear ratio.

Self-locking

Retrodriving torque in helical-worm or SPIROPLAN® gear units produces an efficiency of $\eta' = 2 - 1/\eta$, which is significantly less favorable than the forward efficiency. The helical-worm or SPIROPLAN® gear unit is self- static locking if the forward efficiency η is ≤ 0.5. SPIROPLAN® gear units W..10 – W..30 are dynamically self-locking to some extent (with highest ratios). Contact SEW-EURODRIVE if you want to make technical use of the braking effect of self-locking characteristics.

INFORMATION

Note that the self-locking effect of helical-worm and SPIROPLAN® gear units is not permitted as the sole safety function for hoists.

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Run-in phase

The tooth flanks of new helical-worm and SPIROPLAN® gear units are not yet completely smooth. This makes for a greater friction angle and less efficiency during the run-in phase than during later operation. This effect intensifies with increasing gear unit ratio.

During the running-in phase, the nominal efficiency of the gear unit is reduced by the respective value in the following tables.

	Worm	
	i range	**η reduction**
1-start	About 50 – 280	Approx. 12%
2-start	approx. 20 – 75	approx. 6%
3-start	approx. 20 – 90	approx. 3%
5-start	approx. 6 – 25	approx. 3%
6-start	approx. 7 – 25	approx. 2%

SPIROPLAN® W10 to W30	
i range	**η reduction**
approx. 35 – 75	approx. 15%
approx. 20 – 35	approx. 10%
approx. 10 – 20	approx. 8%
approx. 8	approx. 5%
approx. 6	approx. 3%

SPIROPLAN® W37 to W47	
i range	**η reduction**
–	–
–	–
approx. 30 – 70	approx. 8%
approx. 10 – 30	approx. 5%
approx. 3 – 10	approx. 3%

The run-in phase usually lasts 48 hours. Helical-worm and SPIROPLAN® gear units achieve their nominal efficiency values when the following conditions have been met:

- The gear unit has been completely run-in.
- The gear unit has reached nominal operating temperature.
- The recommended lubricant has been filled.
- The gear unit is operating in the nominal load range.

Operation at motor speeds above 1800 min^{-1}

SEW-EURODRIVE recommends using oil seals on the A- and B-side made of fluorocarbon rubber for motors and gearmotors operated on frequency inverters at motor speeds above 1800 min^{-1}.

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Churning losses and thermal rating

Churning losses may occur with the following conditions. They must be considered during thermal check:

- A mounting position where the first gear unit stage is fully immersed in the lubricant. The respective mounting positions of the gear units are marked with * in chapter Mounting position sheets.
- A high mean input speed and thus a high circumferential speed of the gear wheels of the input gear stage.

If one or both conditions are present, determine the requirements of the application and the corresponding operating conditions (see chapter "Data for calculating the thermal rating" (→ 🗎 230)) and contact SEW-EURODRIVE. SEW-EURODRIVE can calculate the thermal rating based on the actual operating conditions. The thermal rating of the gear unit can be increased by appropriate measure e.g. by using a synthetic lubricant with higher thermal endurance properties.

INFORMATION

To reduce churning losses to a minimum, use gear units preferably in M1 mounting position.

Data for calculating the thermal rating

The following information is required for calculating the thermal rating:

Gear unit type and design:

- Gear unit ratio i
- Mean input speed $\overline{n}_{Mot}$ or mean output speed $\overline{n}_G$ in min^{-1}
- Effective motor torque M_{Mot_eff} in Nm
- Input motor power P_{Mot} in kW
- Mounting position M1 – M6 or pivoting angle

Installation site:

- Ambient temperature T_{amb} in °C
- Installation altitude
- In small, closed rooms or in large rooms (halls) or outdoors

Installation on site:

- Space-critical or well ventilated
- Steel base or concrete base

More information

For more information, refer to the "MOVIMOT® advanced Gearmotors" catalog.

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11 Technical data and dimension sheets

11.1 Conformity

11.1.1 CE marking

- Low voltage directive:

  The documented device series fulfills the regulations of the low voltage directive 2014/35/EU.
- Electromagnetic compatibility (EMC):

  The devices are designed for use as components for installation in machinery and systems. They comply with the EMC product standard EN 61800-3 "Variable-speed electrical drives". Provided that the installation notes are followed, the requirements for CE marking of the entire machine/system equipped with these units on the basis of the EMC Directive 2014/30/EU are met. For detailed information about EMC-compliant installation, refer to the publication "Electromagnetic Compatibility in Drive Technology" from SEW-EURODRIVE.

The CE mark on the nameplate represents conformity with the low voltage directive 2014/35/EU and the EMC directive 2014/30/EU.

11.1.2 EAC

The EAC approval for this device series is in preparation.

11.1.3 UA.TR (Declaration of conformity to Technical Regulation of Ukraine)

The UA.TR approval for this device series is in preparation.

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11.2 General information

11.2.1 Power and torque ratings

The power and torque ratings listed in this documentation refer to mounting position M1 and similar mounting positions in which the input stage is not completely submerged in oil. In addition, the values are based on standard versions with standard lubrication under normal ambient conditions.

11.2.2 Noise levels

All drive units are well within the maximum permissible noise levels set forth in ISO 8579-1 for gear units and EN 60034-9 for motors.

11.2.3 Paint

Drive units are coated with "blue-gray" (RAL 7031 according to DIN 1843) machine paint as standard. Special paintings are available on request.

11.2.4 Surface and corrosion protection

All drive units can also be supplied with special surface protection for applications in extremely humid or chemically aggressive environments upon request.

11.2.5 Air admission and accessibility

When installing the driven machine, make sure there is enough space in axial and radial direction for a sufficient supply of cooling air and unobstructed heat dissipation.

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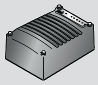
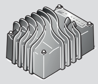
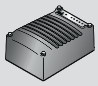
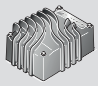
11.3 Technical data

11.3.1 General technical data of MOVIMOT® advanced

Input (connection type: ⅄)

MOVIMOT® advanced		**DRN..**					
		71M4/D . .	**80MK4/D..**	**80M4/D..**	**90S4/D..**	**90L4/D..**	**100LS4/ D..**
Size of the electronics cover		**Size 1** 				**Size 1 with cooling fins** 	
Electronics cover (inverter)		**0020**	**0020**	**0025**	**0032**	**0040**	**0055**
Nominal line current		2.0 A	2.0 A	2.5 A	3.2 A	4.0 A	5.5 A
Nominal line voltage AC (to EN 50160)	U_{line}	3 x 380 – 500 V					
Nominal line current AC	I_{line}	1.05 A	1.33 A	1.80 A	2.63 A	3.51 A	4.90 A
Line frequency	f_{line}	50 – 60 Hz ±10%					

Input (connection type: △)

MOVIMOT® advanced		**DRN..**				
		71M4/D . .	**80MK4/D..**	**80M4/D..**	**90S4/D..**	**90L4/D..**
Size of the electronics cover		**Size 1** 			**Size 1 with cooling fins** 	
Electronics cover (inverter)		**0020**	**0025**	**0032**	**0040**	**0055**
Nominal line current		2.0 A	2.5 A	3.2 A	4.0 A	5.5 A
Nominal line voltage AC (to EN 50160)	U_{line}	3 x 380 – 500 V				
Nominal line current AC	I_{line}	0.95 A	1.13 A	1.42 A	2.07 A	2.96 A
Line frequency	f_{line}	50 – 60 Hz ±10%				

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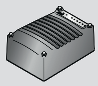
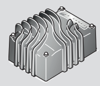
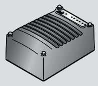
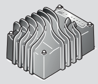
Motor 230/400 V, 50 Hz (connection type: ⅄, operating point of motor 400 V/50 Hz)

MOVIMOT® advanced			DRN..					
			71M4/D . .	**80MK4/D..**	**80M4/D..**	**90S4/D..**	**90L4/D..**	**100LS4/ D..**
Size of the electronics cover			**Size 1** 				**Size 1 with cooling fins** 	
Electronics cover (inverter)			**0020**	**0020**	**0025**	**0032**	**0040**	**0055**
Nominal output current of the electronics cover			2.0 A	2.0 A	2.5 A	3.2 A	4.0 A	5.5 A
Nominal power		P_N	0.37 kW	0.55 kW	0.75 kW	1.1 kW	1.5 kW	2.2 kW
Nominal torque		M_N	2.5 Nm	3.65 Nm	4.95 Nm	7.2 Nm	9.8 Nm	14.5 Nm
Overload capacity of M_N			200%	200%	200%	200%	200%	200%
Nominal speed		n_N	1400 min^{-1}	1400 min^{-1}	1400 min^{-1}	1400 min^{-1}	1400 min^{-1}	1400 min^{-1}
Nominal motor current		I_{Mot}	1.02 A	1.29 A	1.75 A	2.55 A	3.4 A	4.75 A
Motor efficiency		$\eta_{50\%}$	74.3%	78.6%	80.7%	83.5%	84.6%	86.4%
		$\eta_{75\%}$	77.3%	81.0%	82.9%	85.0%	86.1%	87.5%
		$\eta_{100\%}$	77.3%	80.8%	82.9%	84.5%	85.6%	86.9%
Brake type[1]			BE05	BE1	BE1	BE2	BE2	BE5
Braking torque[1]		M_B	5 Nm	7 Nm	10 Nm	14 Nm	20 Nm	28 Nm
Inertia	**Without brake**	J_{mot}	7.14 10^{-4} kgm^2	17.1 10^{-4} kgm^2	24.7 10^{-4} kgm^2	54.0 10^{-4} kgm^2	67.2 10^{-4} kgm^2	81.4 10^{-4} kgm^2
	with brake[1]	J_{BMot}	8.44 10^{-4} kgm^2	18.6 10^{-4} kgm^2	26.2 10^{-4} kgm^2	58.7 10^{-4} kgm^2	71.9 10^{-4} kgm^2	87.4 10^{-4} kgm^2
Mass	**Without brake**		11.5 kg	15.6 kg	19.0 kg	23.8 kg	27.0 kg	33.6 kg
	with brake[1]		14.1 kg	19.8 kg	23.2 kg	29.7 kg	32.9 kg	39.5 kg

1) Standard brake. For technical data of the optional brake, refer to the "DR..71-315, DRN63-315, DR2..56-80 AC Motors" operating instructions.

Motor 230/400 V, 50 Hz (connection type: △, operating point of motor 400 V/100 Hz)

MOVIMOT® advanced			DRN..				
			71M4/D . .	80MK4/D..	80M4/D..	90S4/D..	90L4/D..
Size of the electronics cover			**Size 1** 			**Size 1 with cooling fins** 	
Electronics cover (inverter)			**0020**	**0025**	**0032**	**0040**	**0055**
Nominal output current of the electronics cover			2.0 A	2.5 A	3.2 A	4.0 A	5.5 A
Nominal power		P_N	0.55 kW	0.75 kW	1.1 kW	1.5 kW	2.2 kW
Nominal torque		M_N	1.81 Nm	2.47 Nm	3.62 Nm	4.95 Nm	7.25 Nm
Overload capacity of M_N			200%	200%	200%	200%	200%
Nominal speed		n_N	2900 min^{-1}	2900 min^{-1}	2900 min^{-1}	2900 min^{-1}	2900 min^{-1}
Nominal motor current		I_{Mot}	0.95 A	1.13 A	1.42 A	2.07 A	2.96 A
Brake type[1)]			BE05	BE1	BE1	BE2	BE2
Braking torque[1)]		M_B	5 Nm	7 Nm	10 Nm	14 Nm	14 Nm
Inertia	**Without Brake**	J_{mot}	7.14 10^{-4} kgm^2	17.1 10^{-4} kgm^2	24.7 10^{-4} kgm^2	54.0 10^{-4} kgm^2	67.2 10^{-4} kgm^2
	with brake[1)]	J_{BMot}	8.44 10^{-4} kgm^2	18.6 10^{-4} kgm^2	26.2 10^{-4} kgm^2	58.7 10^{-4} kgm^2	71.9 10^{-4} kgm^2
Mass	**Without Brake**		11.5 kg	15.6 kg	19.0 kg	23.8 kg	27.0 kg
	with brake[1)]		14.1 kg	19.8 kg	23.2 kg	29.7 kg	32.9 kg

1) Standard brake. For technical data of the optional brake, refer to the "DR..71-315, DRN63-315, DR2..56-80 AC Motors" operating instructions.

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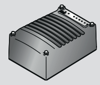
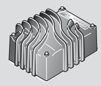
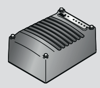
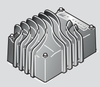
Electronics cover (inverter)

MOVIMOT® advanced						
Size of the electronics cover		**Size 1** 			**Size 1 (with cooling fins)** 	
Electronics cover (inverter)		**0020**	**0025**	**0032**	**0040**	**0055**
Nominal output current at f_{PWM} = 4 kHz	$I_{N\_inverter}$	2.0 A	2.5 A	3.2 A	4.0 A	5.5 A
Apparent output power	S_N	1.4 kVA	1.7 kVA	2.2 kVA	2.8 kVA	3.8 kVA
Overload capacity of $I_{N\_inverter}$ at F_{PWM} = 4 kHz		300%			f_{aus} < 3 Hz: 220% f_{aus} > 3Hz: 300%	
		The overload capacity of the drive unit is limited to 200% M_N and can be further limited depending on the gear unit ratio. Set the torque limit of the inverter accordingly. Refer to the "MOVIMOT® advanced Gearmotos" catalog for the maximum permitted output torques for MOVIMOT® advanced with gear units.				
PWM frequency	f_{PWM}	4/8/16 kHz (adjustable)				
Max. output frequency	f_{max}	U/f: 599 Hz VFC^PLUS: 250 Hz CFC: 500 Hz ELSM®: 500 Hz				
Nominal power loss **Power section**	P_V	19 W	24 W	31 W	40 W	58 W

Brake chopper and braking resistor

MOVIMOT® advanced						
Size of the electronics cover		**Size 1** 			**Size 1 with cooling fins** 	
Nominal output current **Electronics cover**		**2.0 A** **(0020)**	**2.5 A** **(0025)**	**3.2 A** **(0032)**	**4.0 A** **(0040)**	**5.5 A** **(0055)**
Minimum braking resistor value	R_{BWmin}	100 Ω				
Brake chopper continuous power		550 W	750 W	900 W	900 W	900 W
Brake chopper peak power		300% of the apparent output power S_N × 0.9				225% S_N x 0.9

Installation location

MOVIMOT® advanced		
Ambient temperature		See chapter "Environmental conditions"
Degree of protection	IP	Standard: IP65 according to EN 60529 (housing closed and all cable bushings sealed)
Pollution class		2 in accordance with IEC 60664-1
Overvoltage category		III in accordance with IEC 60664-1
Installation altitude	h	Up to h ≤ 1000 m without restrictions. The following restrictions apply to altitudes > 1000 m: • From 1000 m to maximum 3800 m: I_N reduction by 1% per 100 m • From 2000 m to maximum 3800 m: To maintain protective separation and the air gaps and creepage distances in accordance with EN 61800-5-1, you have to connect an overvoltage protection device in order to reduce the overvoltages from category III to category II.
Proof of mechanical strength		Class 3M5, 5M1 according to DIN EN 60721-3-3/-5

General information

MOVIMOT® advanced	
No. of times power may be switched on/off	1 × per minute
Minimum switch-off time for Power off	10 s
Operating mode	S1, DB (EN 60034-1)
Type of cooling	Natural cooling to DIN 41751 and EN 61800-5-1
Signaling functions	Display elements to indicate the device state
Required preventive measure	Grounding the device
Current carrying capacity of terminals	See chapter: • See chapter "Technical data and dimension sheets" > "Technical data" > "Current carrying capacity of the terminals" in the operating instructions. • "Electrical Installation" > "Installation instructions" > "Permitted cable cross section of terminals"
Interference immunity	EN 61800-3, 2. Environment (industrial environment)
Interference emission	EN 61800-3 category C3 With IT systems, **no** EMC category is specified.
Mass	See chapter "Technical data and dimensions sheets" > "Technical data" > "General technical data of MOVIMOT® advanced" > "Motor" (connection type ⅄ or △)

11.3.2 Environmental conditions

Ambient conditions	
Climatic conditions	• Long-term storage (weatherproof): EN 60721-3-1 class 1K2, ambient temperature -25 °C to +70 °C (deviating to the standard), non-condensing, no moisture condensation • Transport (weatherproof): EN 60721-3-2 class 2K3, ambient temperature -25 °C to +70 °C, non-condensing, no moisture condensation • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3K3, ambient temperature -25 °C to +60 °C (deviating to the standard), non-condensing, no moisture condensation • $I_{N\ motor}$ reduction: 3 % I_N per K at 40 °C to 60 °C
Chemically active substances	• Long-term storage (weatherproof): EN 60721-3-1 class 1C2, no corrosive gases, no salt mist (in contrast to the standard) • Transport (weatherproof): EN 60721-3-2 class 2C2, no corrosive gases, no salt mist, no sea water (in contrast to the standard) • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3C2, no corrosive gases, no salt mist
Mechanically active substances	• Long-term storage (weatherproof): EN 60721-3-3 class 1S1, no conductive dust • Transport (weatherproof): EN 60721-3-2 class 2S1 • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3S1, no conductive dust

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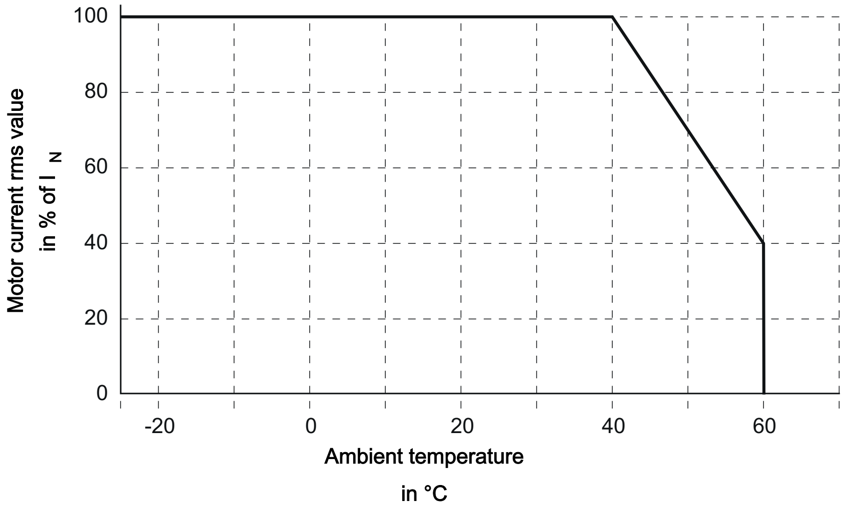
11.3.3 Derating factors

Derating depending on the ambient temperature

The following figure shows the I_N reduction depending on the ambient temperature:



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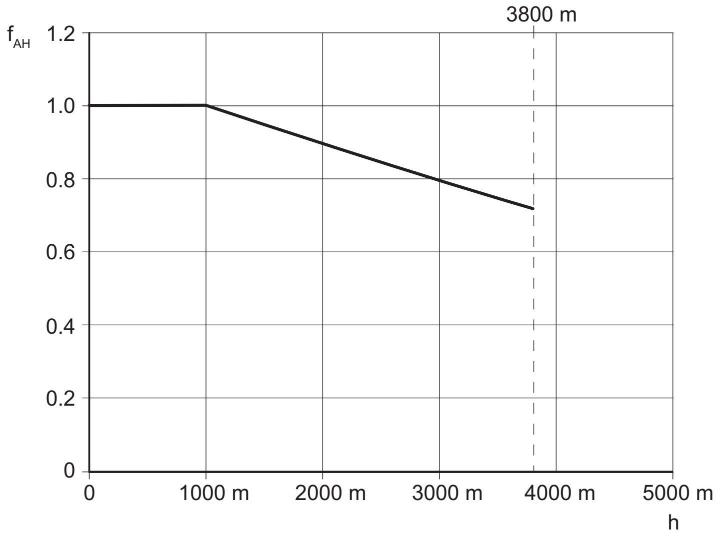
I_N reduction: 3% I_N per K at 40 °C to 60 °C

Derating depending on the installation altitude

The following diagram shows the factor f_{AH} (according to IEC 60034-1:2017, Table 12) by which the thermal motor torque has to be reduced depending on the installation altitude H. Observe the additional chapter "Technical data and dimension drawings" > "Derating depending on the ambient temperature".



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Notes

INFORMATION

Derating is based on typical operating conditions with a supply voltage of 24 V (sensor supply, input voltage of STO input).

11.3.4 Current-carrying capacity of terminals

Current carrying capacity of terminals		
Line terminals	X1	24 A (max. loop-through current)
Line terminals	X1a	24 A (max. loop-through current)
Control terminals	X9	10 A (max. loop-through current)

11.3.5 DC 24 V supply

Input for the independent backup voltage supply of the electronics		
DC 24 V input	24V_IN	U_{IN} = DC 24 V -10%/+20% according to EN 61131-2
	0V24_IN	Current consumption: I_E ≤ 500 mA, typically 100 mA for electronics • Plus up to 100 mA, for sensor supply

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11.3.6 Digital inputs

Digital inputs	
Number of inputs	4
Input type	PLC-compatible according to EN 61131-2 (digital inputs type 3) DI01 – DI04: R_i ≈ 4.5 kΩ, sampling cycle ≤ 2 ms Signal level DC +11 to +30 V = "1" = Contact closed DC -3 to +5 V = "0" = Contact open
Sensor/actuator supply	DC 24 V to EN 61131-2, External-voltage-proof and short-circuit proof
Maximum line length	30 m
Permitted total current for internal supply	100 mA (total of all connected sensors/actuators, maximum individual load: 100 mA)
Permitted total current for external supply	100 mA (total of all connected sensors/actuators, maximum individual load: 100 mA)

11.3.7 Relay output

Relay output	
Response time	≤ 15 ms
Contact details	DC 24 V/50 mA (DC 12 according to IEC 60947-5-1) (only SELV or PELV circuits)

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11.3.8 Technical data for the AS-interface

Technical data

AS-Interface	
External electronics supply	AS-Interface: 29.5 – 31.6 V (AS-Interface power supply unit according to EN 50295) I_E AS-Interface: ≤ 50 mA (typically 30 mA at 30 V)
Control input	Pin AS+: Connection of the AS-interface data line Pin AS- : Connection of the AS-interface data line

slave profile

Slave profile AS-Interface							
Slave type	**Number of data bits**	**AS-Interface slave profile**	**I/O configuration**	**ID code**	**Ext. ID-code 1**	**Ext. ID code 2**	**Address range**
Binary slave	4DI/4DO	S-7.F	7_{hex}	–	F_{hex} 1)	–	1 – 31
A/B-slave	4DI/4DO	S-7.A.7	7_{hex}	A_{hex}	7_{hex}	–	1A – 31A, 1B – 31B
	8DI/8DO	S-7.A.A	7_{hex}	A_{hex}	A_{hex}	–	1A – 31A, 1B – 31B
Double slave	4DI/4DO	A: S-7.A.7 B: S-7.A.5	7_{hex} 7_{hex}	A_{hex} A_{hex}	7_{hex} 5_{hex}	–	1A and 1B – 31A and 31B
	8DI/8DO	A: S-7.A.A B: S-7.A.5	7_{hex} 7_{hex}	A_{hex} A_{hex}	A_{hex} 5_{hex}	–	1A and 1B – 31A and 31B

1) The external ID code1 can be changed for the binary slave.

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11.3.9 Electronics data – Drive safety functions

The table below shows the technical data for the drive unit relating to the integrated safety technology.

The safe digital inputs comply with type 3 according to IEC 61131-2.

Reference potential for the F_STO_P1 and F_STO_P2 is F_STO_M (contact at terminal X9:11).

		Terminal designation	General electronics data		
Safety contact STO		X9			
Electrical data of inputs F_STO_P1, F_STO_P2			**Minimum**	**Typical**	**Maximum**
Input voltage range		X9:1 and X9:21	DC -3 V	DC 24 V	DC 30 V
Input capacitance against STO_M			–	300 pF	500 pF
Input capacitance against GND			–	300 pF	500 pF
Power consumption at DC 24 V	F_STO_P1		–	150 mW	200 mW
	F_STO_P2		–	150 mW	200 mW
	Sum[1)]		–	300 mW	400 mW
Input voltage for ON status (STO)			DC 11 V	–	–
Input voltage for OFF status (STO)			–	–	DC 5 V
Permitted leakage current of the external safety controller			–	–	1 mA
Technical data					
Time from disconnecting the safety voltage until deactivation of the rotating field			–	1.5 ms	10 ms 2 ms[2)]
Time from connecting the safety voltage until activation of the rotating field			–	–	110 ms

1) Each drive unit always requires a power consumption of 300 mW.
2) Only when a safety card by SEW-EURODRIVE is used

11.3.10 Technical data of encoder option

Encoder option	Single-turn resolution (position resolution per motor revolution)		Multi-turn resolution (max. counter for complete motor revolutions)		Interface connection:
/EZ8Z Single-turn absolute encoder	12 bits	4096 inc.	-	-	MOVILINK® DDI, coaxial

11.3.11 Technical data of the CBG.. keypads

Keypad	CBG11A	CBG21A
Part number	28232646	28238133
Interfaces	D-sub, 9-pin, female (CAN interface)	
	USB 2.0 mini B, female (PC connection)	
Operating temperature	0 to 60 °C	
Degree of protection	IP40 according to EN 60529	
Dimensions H × W × D	100 × 45 × 20 mm	110 × 65 × 20 mm
Display size H × W	23 × 28.5 mm	37 × 49 mm
Screen diagonal	1.5" (38 mm)	2.4" (61 mm)
Display resolution H × W	64 × 78 pixels	240 × 320 pixels

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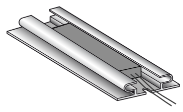
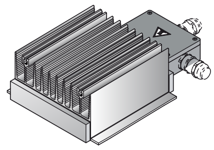
11.4 Braking resistors

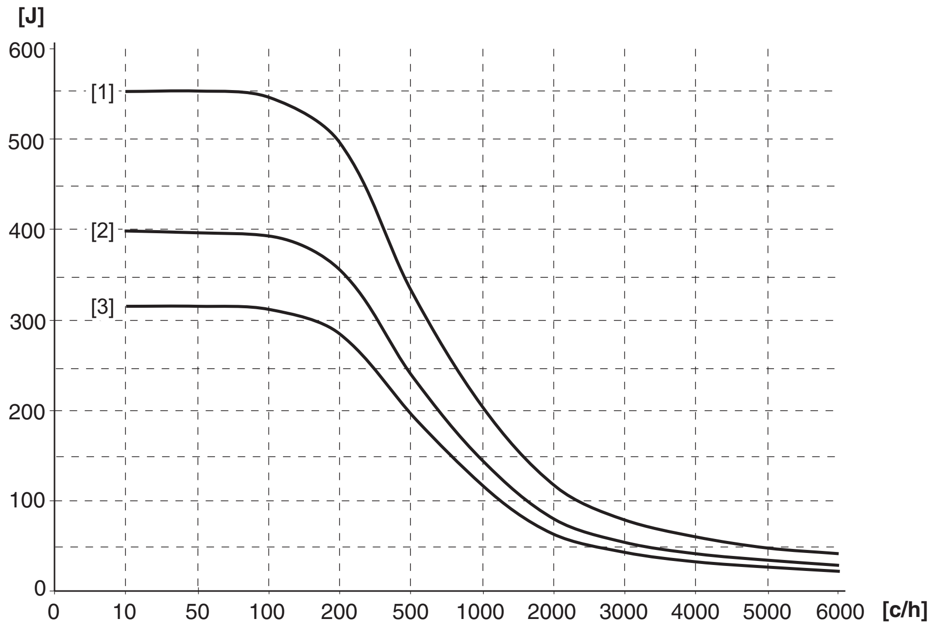
11.4.1 Overview

The drive unit is equipped with a brake chopper. The following table shows their possible use in regenerative mode:

Application	Dissipation of regenerative energy
	Brake chopper
Small amount of regenerative energy	Integrated braking resistor 
Medium/large amount of regenerative energy	External braking resistor 

11.4.2 Integrated BW1 braking resistor

The following diagram shows the current-carrying capacity of the BW1 braking resistor per braking operation:



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[1] Deceleration ramp 10 s
[2] Deceleration ramp 4 s
[3] Deceleration ramp 0.2 s
c/h Cycles/hour

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Calculation example

The known values are:

- Average braking power: 144 W
- Deceleration ramp: 2 s
- 200 brake applications per hour

Calculating the energy from the power of the deceleration ramp:

$$W = P \times t$$
$$W = 144\ W \times 2\ s$$
$$W = 288\ J$$

25296909835

For the deceleration ramp of 2 s, you can use deceleration ramp [3] (0.2 s) in the diagram. Use the characteristic curve with the shorter deceleration ramp because a shorter deceleration ramp means more braking energy.

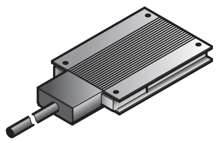
The diagram permits 290 J of braking energy for the 0.2 s deceleration ramp and 200 cycles per hour. In this case, the required 288 J can be dissipated via BW1.

11.4.3 External braking resistor

Operation with external braking resistor is necessary for applications with a large amount of regenerative energy.

The following table shows the external braking resistors.

BW...-.../K-1.5



Type	BW100-005/K-1.5	BW150-003/K-1.5
Part number	08282862	08282927
Function	Dissipating the regenerative energy	
Degree of protection	IP65	IP65
Resistance	100 Ω	150 Ω
Power rating in S1, 100% cdf	200 W	100 W
Dimensions W × H × D	252 × 15 × 80 mm	146 × 15 × 80 mm
Cable length	1.5 m	1.5 m
Assigned grids	BS-005 (part number: 0813152X)	

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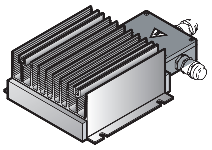
BW...-...-T

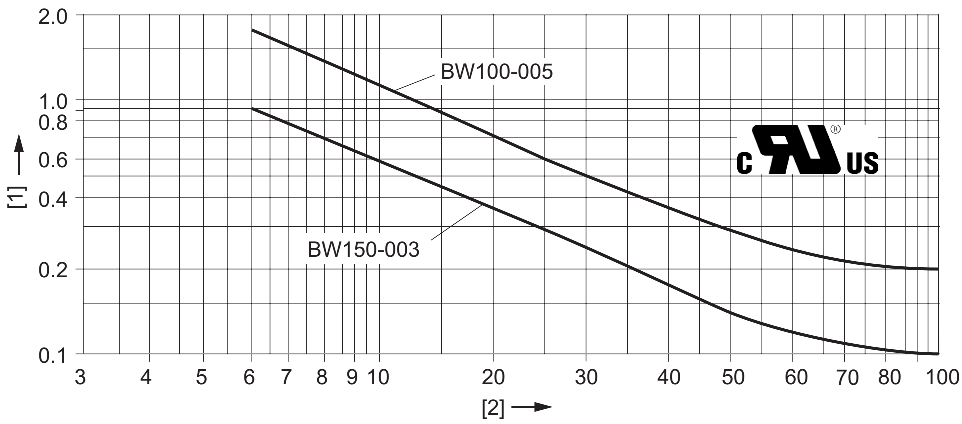


Type	BW150-006-T	BW100-009-T
Part number	17969565	17969573
Function	Dissipating the regenerative energy	
Degree of protection	IP66	IP66
Resistance	150 Ω	100 Ω
Power rating in S1, 100% cdf	600 W	900 W
Dimensions W × H × D	285 × 75 × 174 mm	435 × 75 × 174 mm
Prescribed connection cables	Shielded cables with a temperature resistance of T_{amb} ≥ 90 °C (194 °F)	
Maximum permitted cable length	15 m	15 m

11.4.4 Technical data of BW100-005/K-1.5 and BW150-003/K-1.5

Power diagrams

The following figure shows the rating diagrams of the braking resistors BW100-005/K-1.5, BW150-003/K-1.5:



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[1] Power in KW
[2] Cyclic duration factor cdf in %

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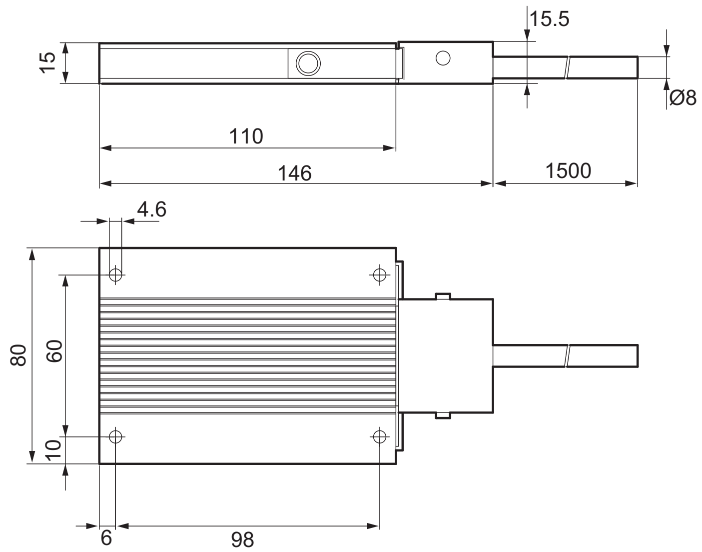
Dimension drawing of BW150-003/K-1.5

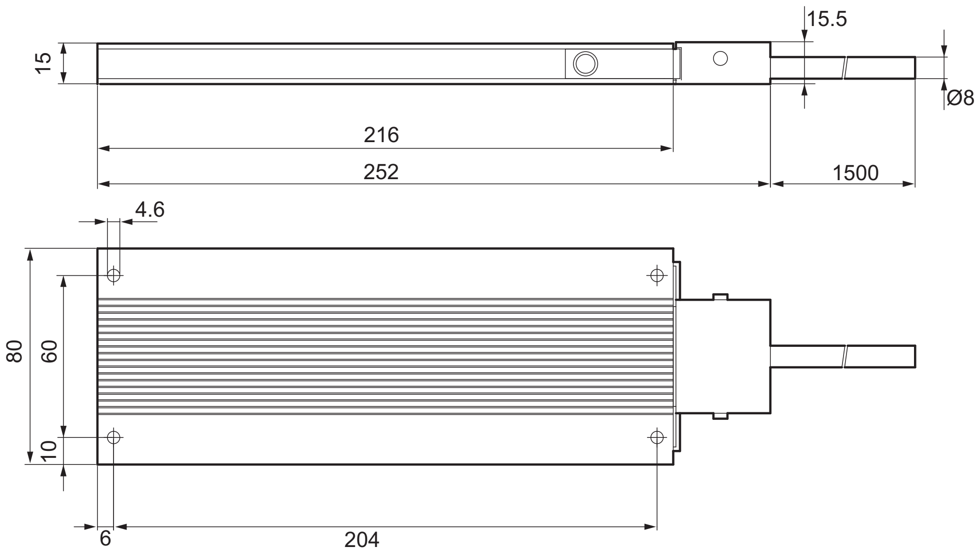
The following figure shows the dimensions of the external braking resistor BW150-003/K-1.5:



25298773259

Dimension drawing of BW100-005/K-1.5

The following figure shows the dimensions of the external braking resistor BW100-005/K-1.5:



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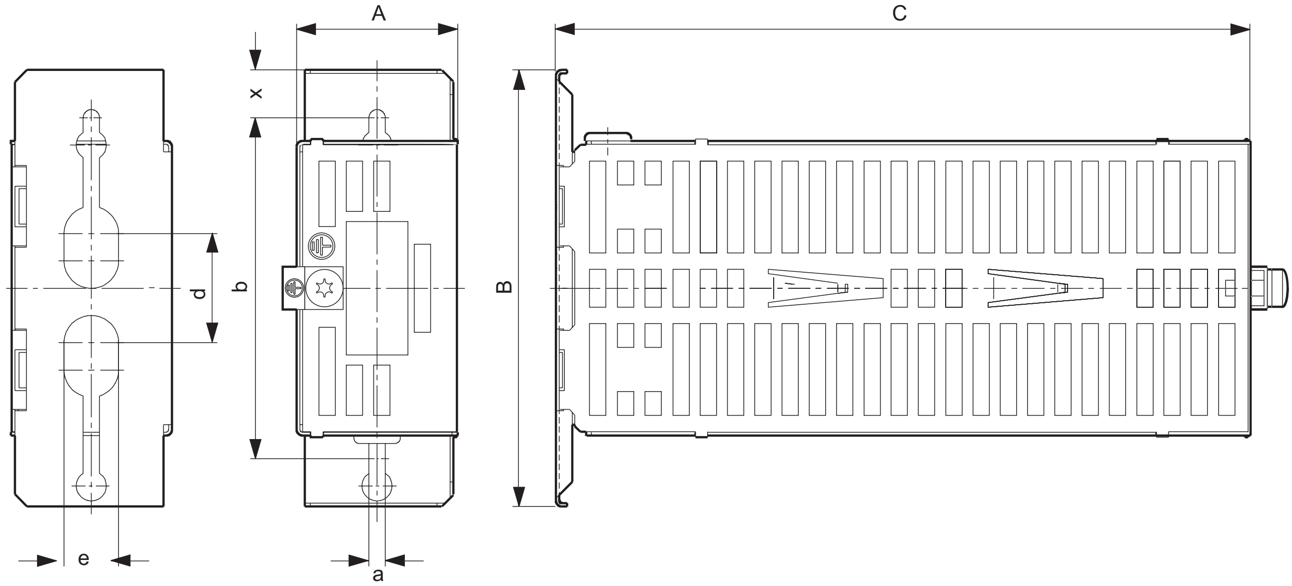
Dimension drawing for the BS-005 protective grid

The following figure shows the dimensions of the BS-005 protective grid:



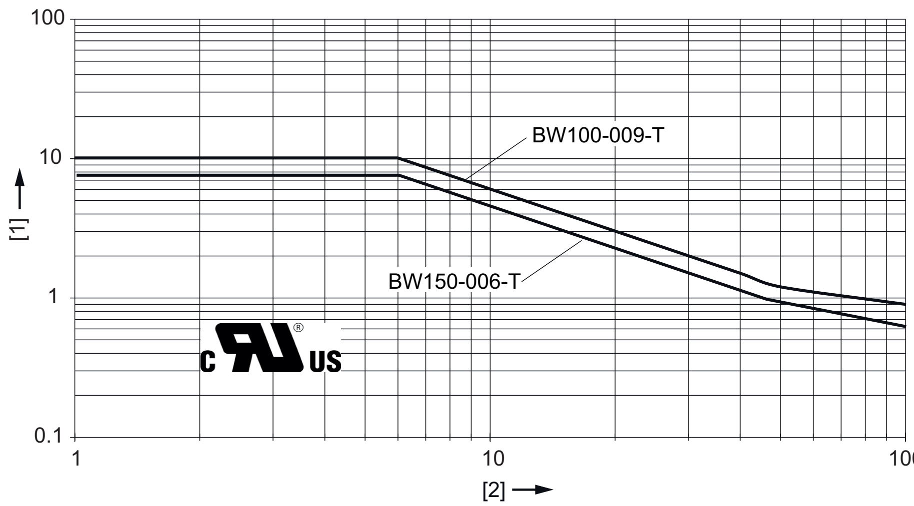
25842294795

Type	Main dimensions in mm			Mounting dimensions mm					Mass kg
	A	B	C	b	d	e	a	x	
BS-005	60	160	252	125	4	20	6	17.5	0.5

11.4.5 Technical data of BW150-006-T and BW100-009-T

Power diagrams

The following figure shows the rating diagrams of the braking resistors BW150-006-T and BW100-009-T:



25298798219

[1] Power in KW
[2] Cyclic duration factor cdf in %
ED Cyclic duration factor of the braking resistor, based on a cycle time of 120 s.

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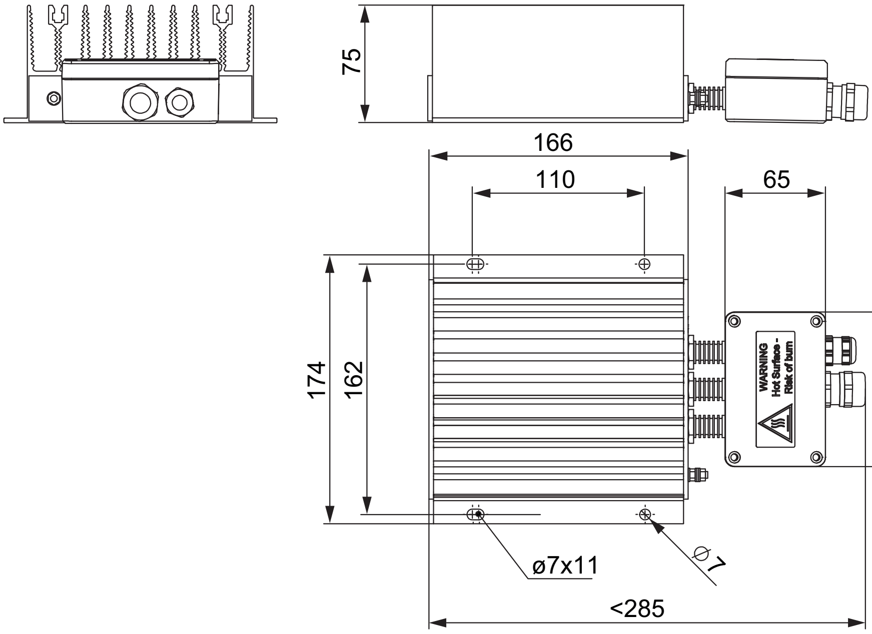
Dimension drawing of BW150-006-T

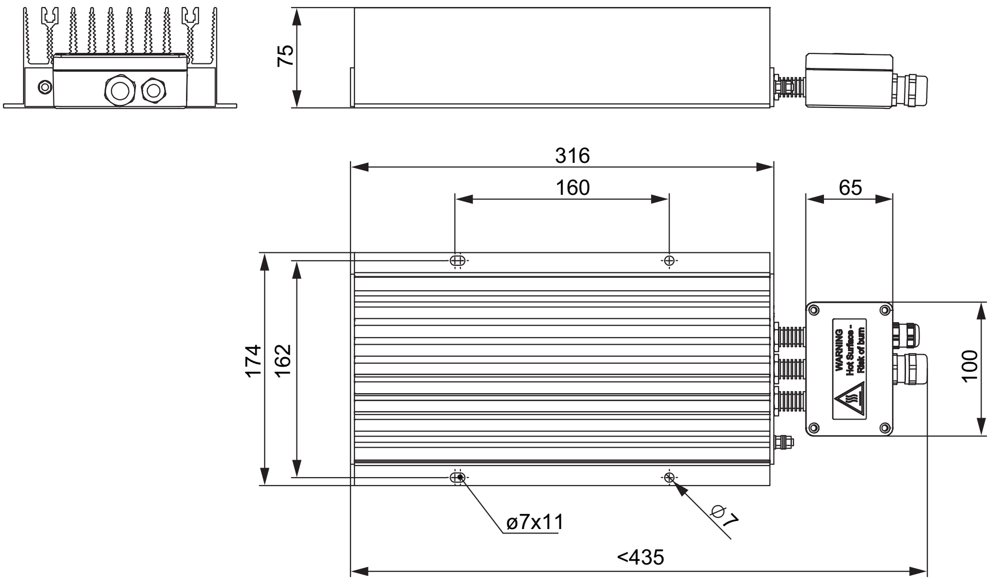
The following figure shows the dimensions of the external braking resistor BW150-006-T:



25298808587

Dimension drawing of BW100-009-T

The following figure shows the dimensions of the external braking resistor BW100-009-T:



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11.5 Technical data of the brake

Also observe the information in the "DR..71-315, DRN63-315, DR2..56-80 AC Motors" operating instructions.

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11.6 Surface protection

11.6.1 General information

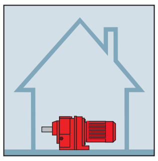
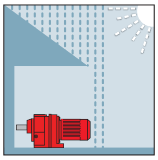
SEW-EURODRIVE offers the following optional protective measure for operating drive units under special environmental conditions.

- OS surface protection

In addition, special optional protective measures for the output shafts are also available.

11.6.2 Surface protection

Instead of the standard surface protection, the drive units are optionally available with the OS1 surface protection.

Surface protection		Ambient conditions	Sample applications
Standard		Suitable for machines and systems in buildings and enclosed rooms with neutral atmospheres. Similar to corrosivity category[1]: • C1 (negligible)	• Machines and systems in the automotive industry • Conveyor systems in logistics areas • Conveyor systems at airports
OS1		Suited for environments prone to condensation and atmospheres with low humidity or contamination, such as applications outdoors under roof or with protection. Similar to corrosivity category[1]: • C2 (low)	• Systems in saw mills • Hall gates • Agitators and mixers

1) According to DIN EN ISO 12 944-2

11.6.3 Special protective measures

Observe the information in the "DRN.." gearmotor catalog.

11.6.4 NOCO® fluid

As standard, SEW-EURODRIVE supplies NOCO® fluid corrosion protection and lubricant with every drive unit with hollow shaft. Use NOCO® fluid when installing gear units with hollow shafts. Using this fluid can help prevent contact corrosion and makes it easier to disassemble the drive at a later time. NOCO® fluid is also suitable for protecting machined metal surfaces that do not have corrosion protection, such as parts of shaft ends or flanges. You can also order NOCO® fluid in larger quantities from SEW-EURODRIVE.

NOCO® fluid is a food grade substance according to NSF-H1. You can tell that NOCO® fluid is a food grade oil by the NSF-H1 identification label on its packaging.

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11.7 Line choke

The line choke can be used as an option:

- To support overvoltage protection
- To smoothen the line current
- For protection in the event of distorted line voltage
- To limit the charging current, for example, when several inverters are connected together in parallel on the input end (nominal current of line choke = total of nominal input currents)

11.7.1 UL and cUL approval

The listed line chokes have cRUus approval independent of the drive unit.

11.7.2 Technical data

Line choke	ND0070-503	ND0160-503	ND0300-503	ND0420-503
Part number	17984173	17984181	17983800	17983819
Nominal line voltage U_N	3 × AC 230 V – 500 V 50/60 Hz			
Nominal current I_N	7 A	16 A	30 A	42 A
Nominal inductance	0.36 mH	0.2 mH	0.1 mH	0.045 mH
Nominal power loss	4 W	9 W	11 W	13 W
Ambient temperature ϑ_{amb}	-10 °C – 45 °C (reduction: 3% I_N up to maximum 60 °C)			
Connection contacts L1/L2/L3 – L1'/L2'/L3'	0.2 – 4 mm^2		0.2 – 10 mm^2	2.5 – 16 mm^2
Tightening torque L1/L2/L3 – L1'/L2'/L3'	0.5 – 1 Nm		1.2 – 2 Nm	2.5 Nm
PE connection contact	M4		M5	
Tightening torque PE	1.5 Nm		3 Nm	
Degree of protection	IPXXB in accordance with EN 60529			
Mass	0.5 kg	1.3 kg	1.95 kg	1.82 kg

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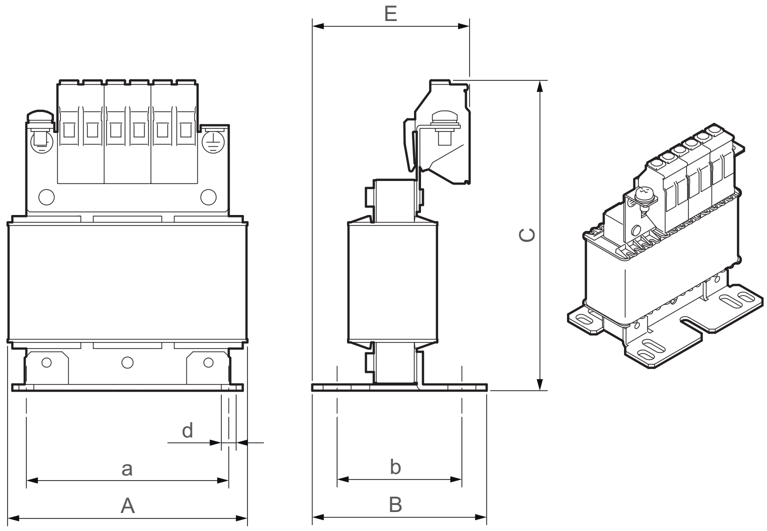
11.7.3 Dimension drawing



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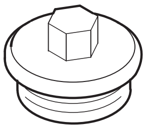
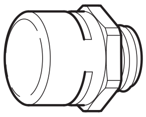
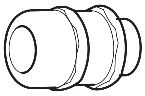
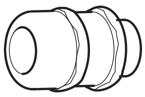
Line choke	Main dimensions in mm				Mounting dimensions in mm			Connection
	A	B	C	E	a	b	d	PE
ND0070-503	78	57	105	56	65	40	4.8	M4
ND0160-503	96	70	120	65	71	54	4.8	M4
ND0300-503	121	86	145	86	105	70	4.8	M5
ND0420-503	121	86	150	90	105	70	4.8	M5

11.8 Screw fittings

The following tables show the screw connections available from SEW-EURODRIVE.

11.8.1 Cable glands / screw plugs / pressure compensation

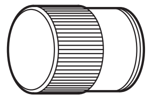
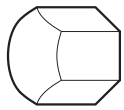
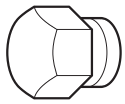
Type of screw fitting	Image	Content	Size	Tightening torque[1]	Outer cable diameter	Part number
Screw plugs external hexagon (made of stainless steel)		10 pieces	M16 × 1.5	6.8 Nm	–	18247342
		10 pieces	M25 × 1.5	6.8 Nm	–	18247350
Pressure compensation screw fittings (made of stainless steel)		1 piece	M16 × 1.5	4 Nm	–	28214617
EMC-compliant cable gland (brass, nickel-plated)		10 pieces	M16 × 1.5	4 Nm	5 to 9 mm	18204783
		10 pieces	M25 × 1.5	7 Nm	11 to 16 mm	18204805
EMC-compliant cable gland (made of stainless steel)		10 pieces	M16 × 1.5	4 Nm	5 to 9 mm	18216366
		10 pieces	M25 × 1.5	7 Nm	11 to 16 mm	18216382

1) The specified torques must be adhered to with a tolerance of +/- 10%.

The cable retention in the cable gland must withstand the following removal force of the cable from the cable gland:

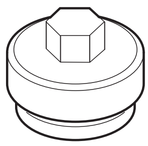
- Cable with outer diameter > 10 mm: ≥ 160 N
- Cable with outer diameter < 10 mm: = 100 N

11.8.2 Screw fittings: Plug connectors

Type of screw fitting	Figure	Content	Size	Tightening torque[1)]	Part number
M23 plug (made of stainless steel)		1 piece	M23 × 1.5	Tighten fully	19094558
M12 plug for plug connector with male thread (made of stainless steel)		10 pcs	M12 × 1.0	2.3 Nm	18202799
M12 plug for plug connector with female thread (made of stainless steel)		10 pcs	M12 × 1.0	2.3 Nm	18202276

1) The specified torques must be adhered to with a tolerance of +/- 10%.

11.8.3 Screw fittings of the potentiometer

Type of screw fitting	Image	Content	Size	Tightening torque[1)]	Part number
Hexagon head screw plug for potentiometer (stainless steel)		10 piece	M24 × 1.5	6.8 Nm	18241077

1) The specified torques must be adhered to with a tolerance of +/- 10%.

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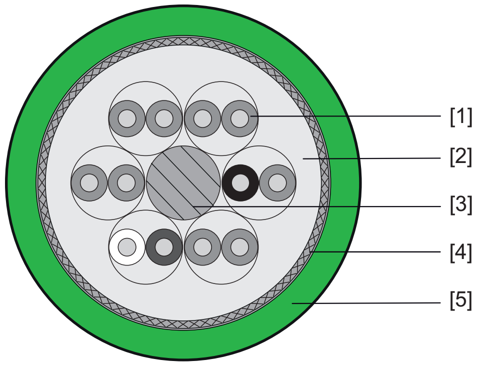
11.9 Connection cables

11.9.1 Specification of signal cables for digital inputs and relay output

Mechanical design

		HELUKABEL® Li9Y91YC11Y-HF
Mechanical design		 *29747895691*
[1]	**Cores**	6 conductor pairs, 2 × 0.25 mm² Copper
	Insulation	Polypropylene, 0.24 mm
	Colors	DIN 47100 yellow/green, pink/gray, blue/red, black/purple, pink-and gray/ red and blue, brown/white
[2]	**Inner sheathing**	TPE-O, halogen-free
	Color	Nature
[3]	**Filler**	–
[4]	**Shield**	Braided copper wires, tinned optical coverage min. 85%
[5]	**Outer cable jacket**	TPU, halogen-free
	Color	Green, similar to RAL 2018
	Label	SEW EURODRIVE 150665 Li9Y91YC11Y-HF 6x 2 x 0.25QMM E170315 AWM STYLE 20233 AWM I/II A/B 80 °C 300 V FT1 - DESINA - *week/year of production*
	Diameter	**15.6 mm**

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Technical data

The following table shows the technical data of the signal cable:

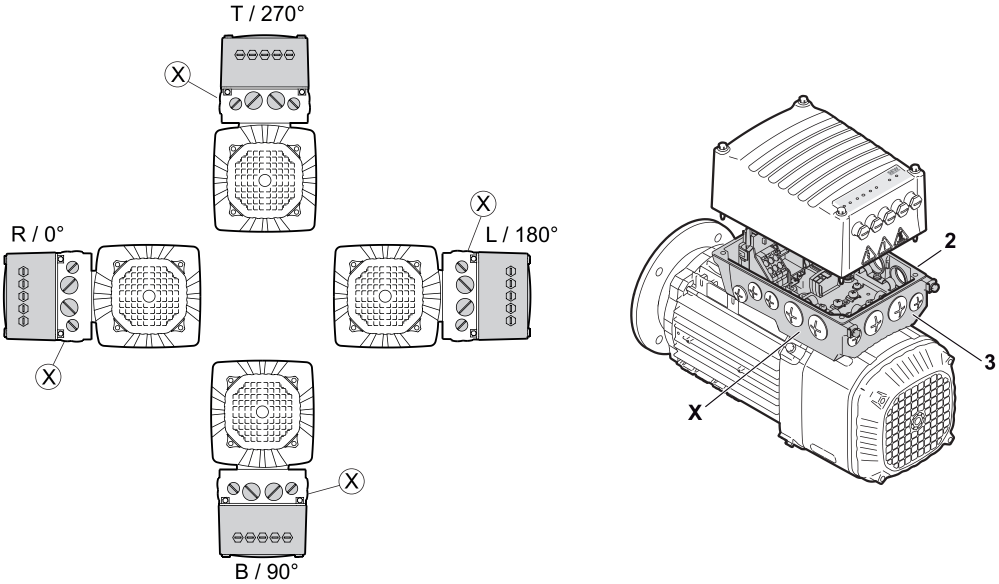
Properties	**Type: HELUKABEL® Li9Y91YC11Y-HF SEW EURODRIVE 150665**
UL properties	UL758 (AWM) UL Style 20223 (sheath) UL Style 10493 (insulation)
RoHS conformity	Yes
Test voltage core/ core	AC 1.5 kV 50 Hz/1 min.
Test voltage core/ shield	AC 1.5 kV 50 Hz/1 min.
Operating voltage	Max. AC 300 V (UL)
Insulation resistance	≥ 500 MΩ/km
Operating temperature	-50 °C to +80 °C (fixed installation) -30 °C to +80 °C (cable carrier) -20 °C to +60 °C (cable carrier with mechanical load)
Outer diameter	**15.6 mm**
Bending radiuses	Min. 5 × outer diameter (fixed installation)
	Min. 8 × outer diameter (cable carrier)
Bending cycles	Min. 10 million
Acceleration	Max. 20 m/s^2
Torsion	Max. ±30 °/m
Chemical properties	• Oil resistance according to DIN 60811-404, HD 22.10 Appendix A
	• Flame retardant according to IEC 60332-1-2, UL758 cable flame test
	• Halogen-free according to DIN VDE 0472 T.815 • Silicon-free

11.10 Mounting positions

11.10.1 Mounting positions of MOVIMOT® advanced stand-alone motors with IEC flange

Position of electronics cover and cable entry

The following figure shows the mounting positions of the MOVIMOT® advanced drive unit with IEC flange:



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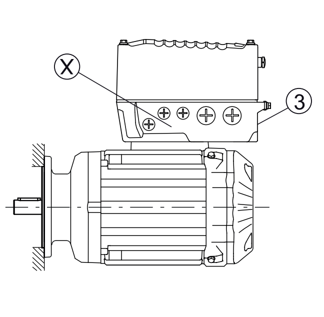
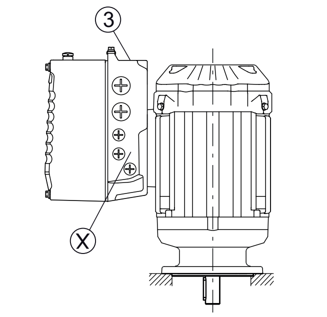
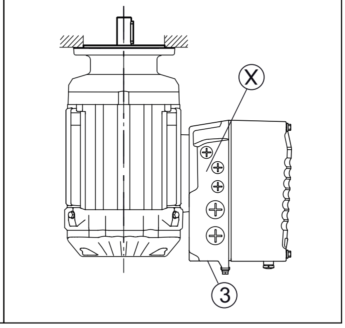
Mounting positions

IM B5	IM V1	IM V3
		

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Flange mounting	Flange mounting	Flange mounting
	Input end facing down	Input end facing up

11.11 Dimension drawings of the drive unit

11.11.1 Dimension sheet notes

Scope of delivery

 = Standard parts supplied by SEW-EURODRIVE.

 = Standard parts not supplied by SEW-EURODRIVE.

Tolerances

Breather valves and cable glands

The dimension drawings always show the screw plugs. The contour dimensions may vary slightly due to preinstalled breather valves, plug connectors or pressure compensation fittings (in conjunction with the design for wet areas).

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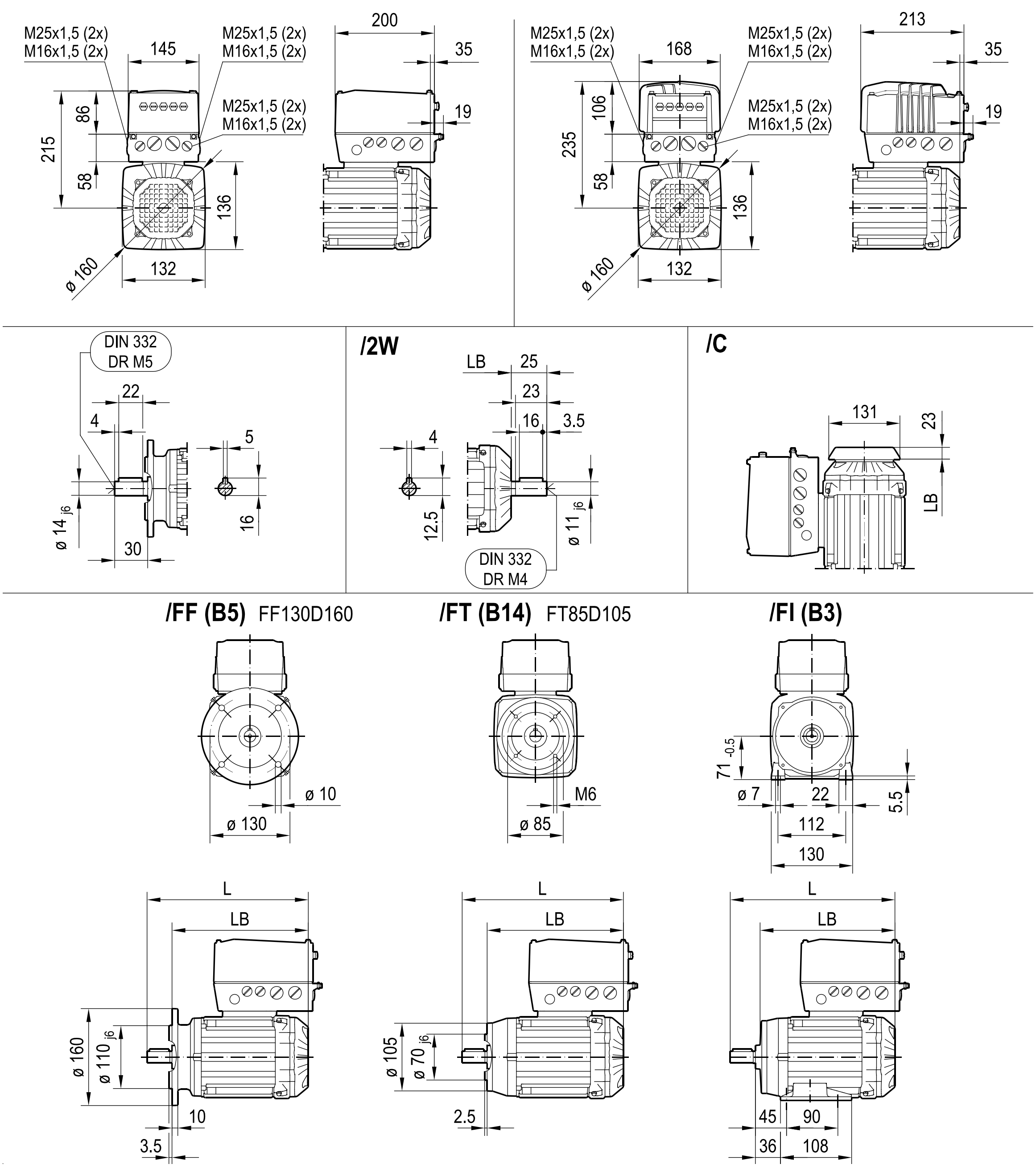
11.11.2 MOVIMOT® advanced[1)] .

1) For gearmotor dimension sheets, refer to the "MOVIMOT® advanced Gearmotors" catalog

DRN71M/MOVIMOT® advanced **08 180 00 19**
1(2)



(→ 📖)	71M							
L	252							
LB (B5/B14)	222							
LB (B3)	220							

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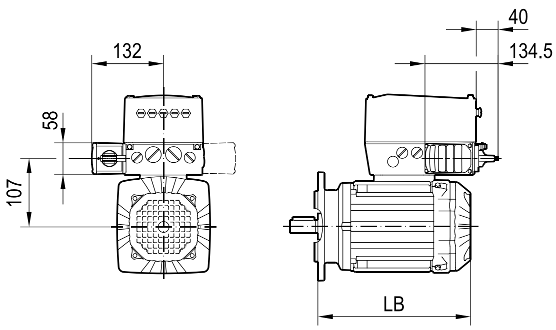
/D11

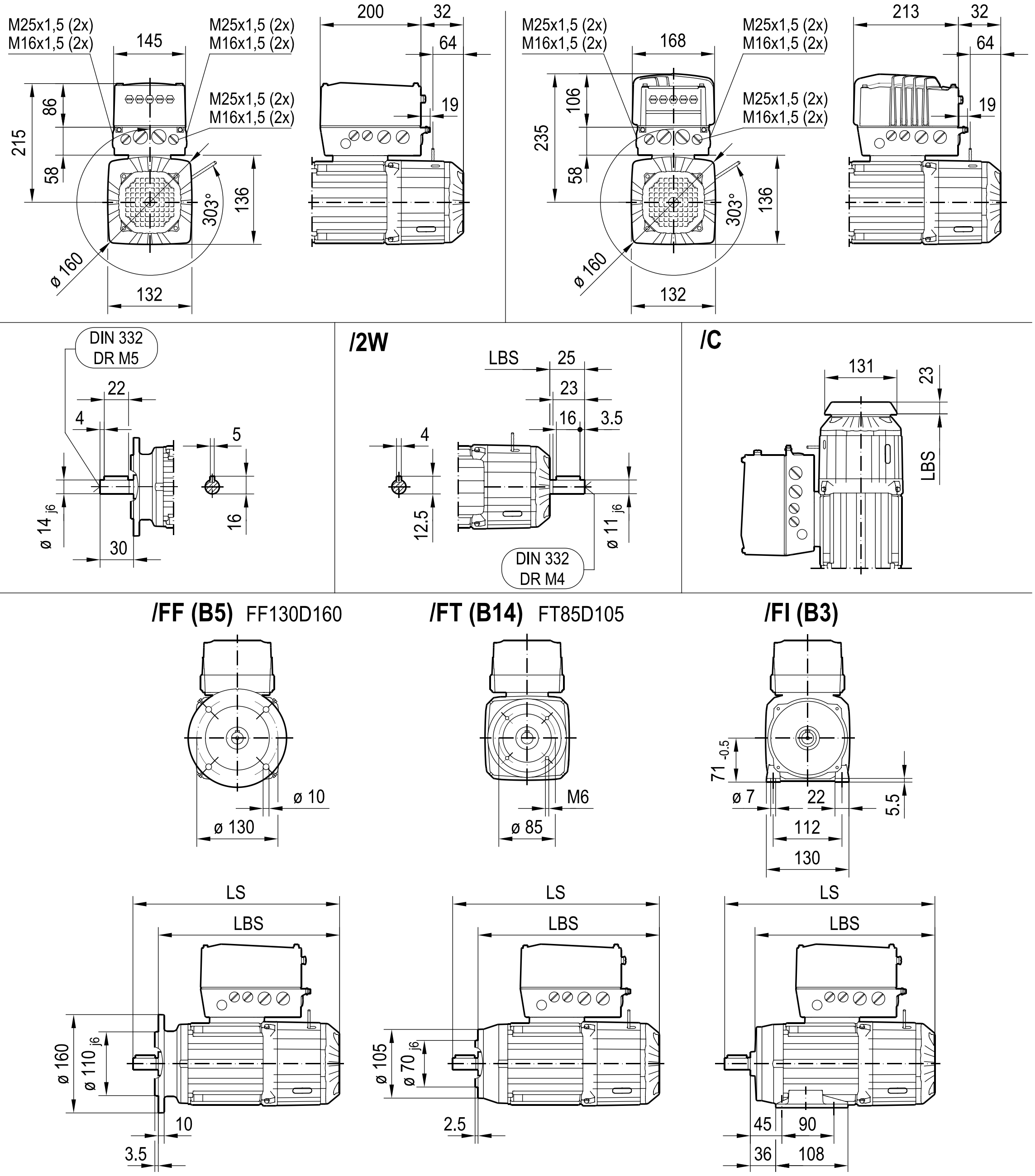
08 180 00 19
2(2)



(→ 📖)	71M							
L	252							
LB (B5/B14)	222							
LB (B3)	220							

DRN71M BE/MOVIMOT® advanced

09 154 00 19
1(2)



(→ 📖)	71M							
LS	319							
LBS (B5/B14)	289							
LBS (B3)	287							

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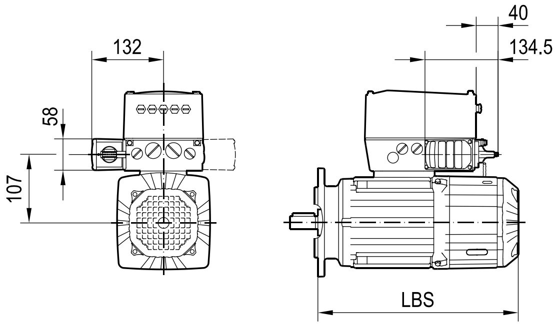
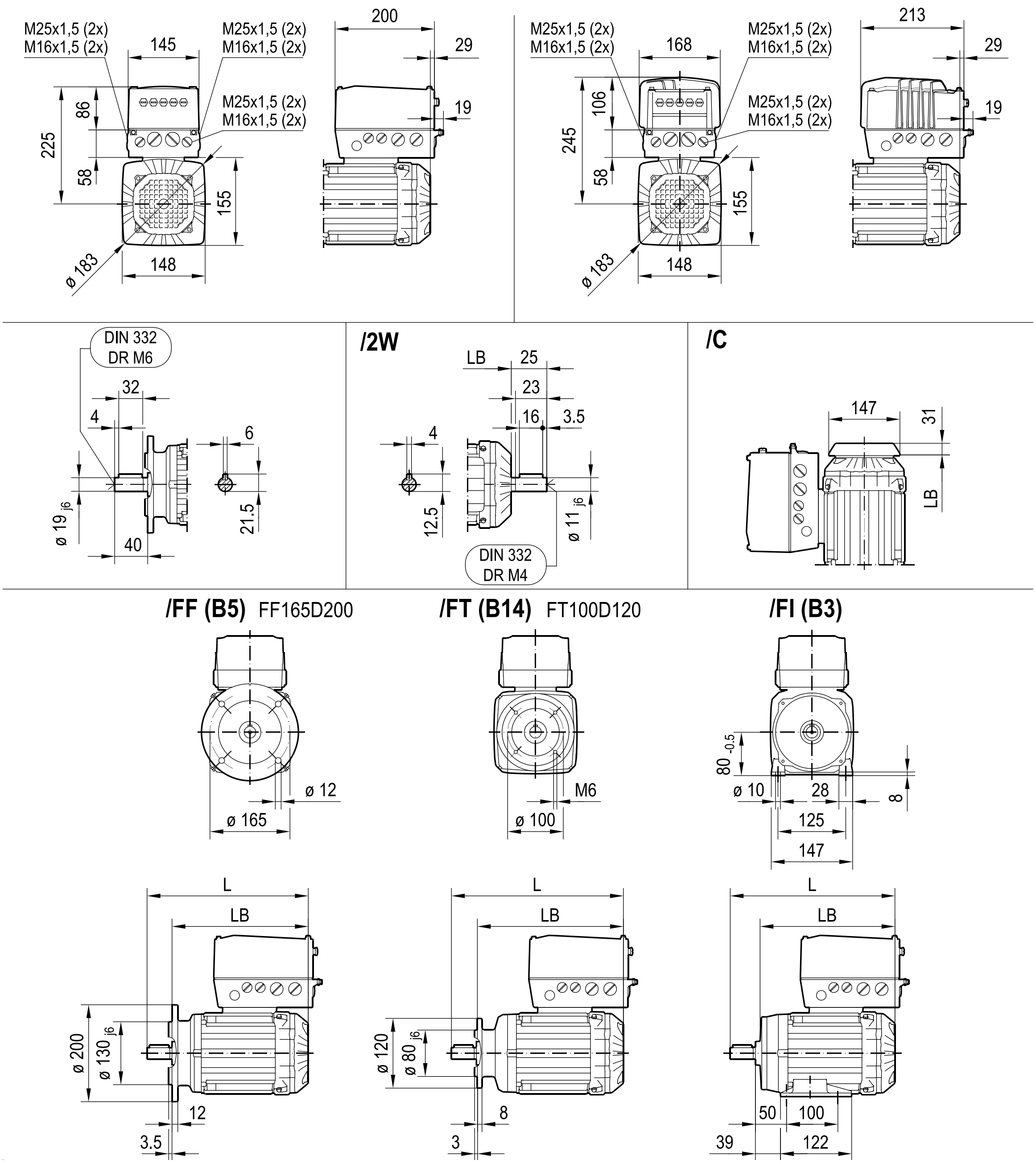
09 154 00 19
2(2)



(→ 📖)	71M							
LS	319							
LBS (B5/B14)	289							
LBS (B3)	287							

DRN80MK/MOVIMOT® advanced
DRN80M/MOVIMOT® advanced

08 181 00 19
1(2)



(→ 📖)	80MK	80M						
L	281	327						
LB (B5/B14)	241	287						
LB (B3)	239	285						

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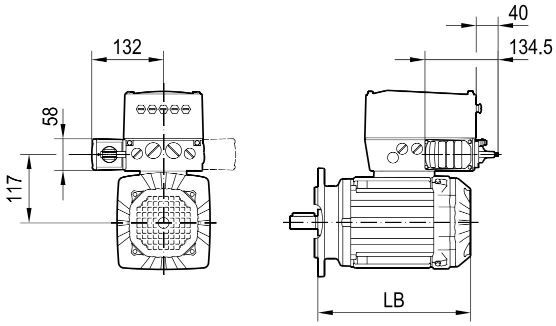
/D11

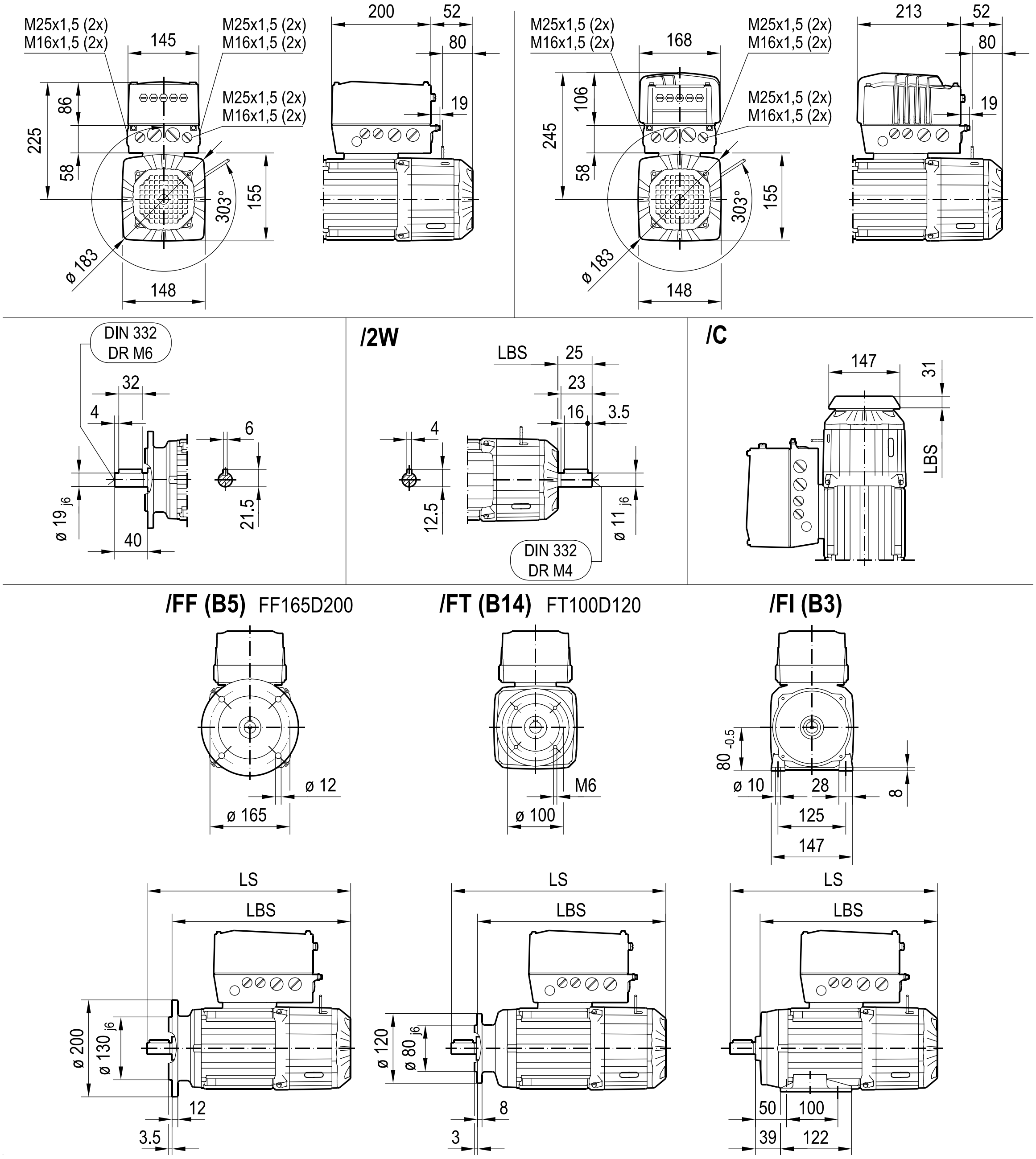
08 181 00 19
2(2)



(→ 📖)	80MK	80M						
L	281	327						
LB (B5/B14)	241	287						
LB (B3)	239	285						

DRN80MK BE/MOVIMOT® advanced
DRN80M BE/MOVIMOT® advanced

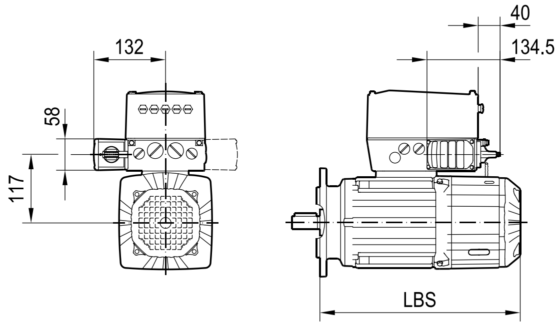
09 155 00 19
1(2)



(→ 📖)	80MK	80M						
LS	362	408						
LBS (B5/B14)	322	368						
LBS (B3)	320	366						

09 155 00 19
2(2)

/D11



(→ 📖)	80MK	80M						
LS	362	408						
LBS (B5/B14)	322	368						
LBS (B3)	320	366						

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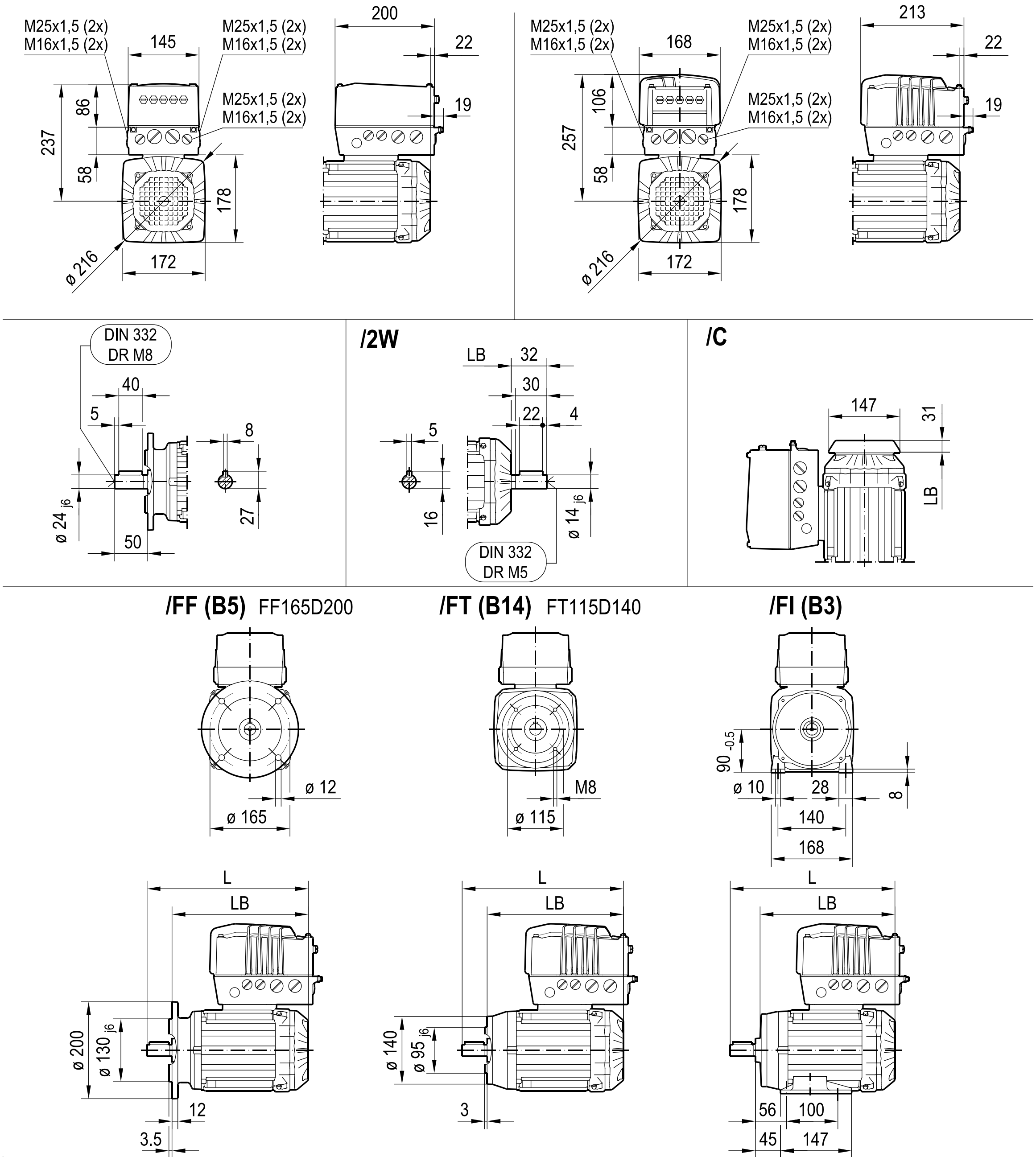
DRN90S/MOVIMOT® advanced
DRN90L/MOVIMOT® advanced

08 182 00 19
1(2)



(→ 📖)	90S	90L						
L	331	363						
LB (B5/B14)	281	313						
LB (B3)	279	311						

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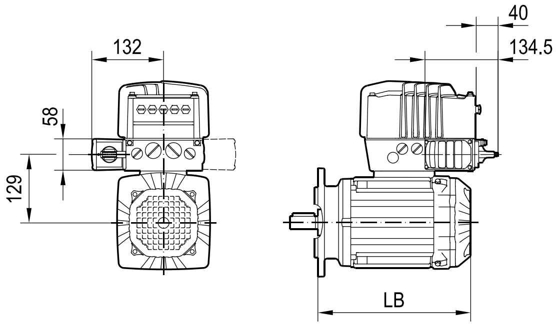
/D11

08 182 00 19
2(2)



(→ 📖)	90S	90L						
L	331	363						
LB (B5/B14)	281	313						
LB (B3)	279	311						

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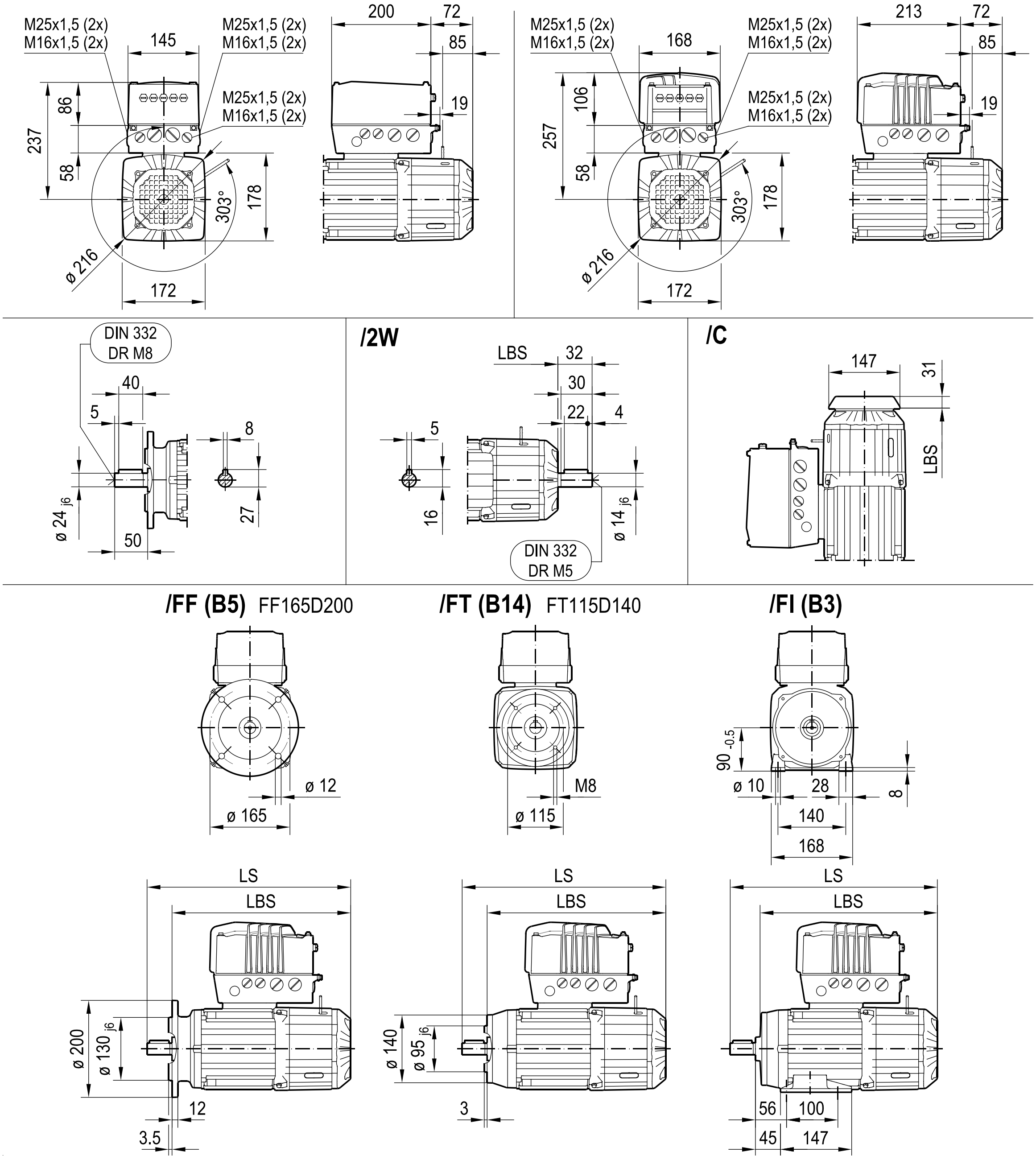
DRN90S BE/MOVIMOT® advanced
DRN90L BE/MOVIMOT® advanced

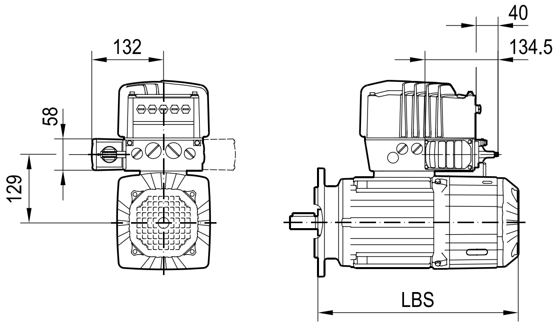
09 156 00 19
1(2)



(→ 📖)	90S	90L						
LS	425	457						
LBS (B5/B14)	375	407						
LBS (B3)	373	405						

/D11

09 156 00 19
2(2)



(→ 📖)	90S	90L						
LS	425	457						
LBS (B5/B14)	375	407						
LBS (B3)	373	405						

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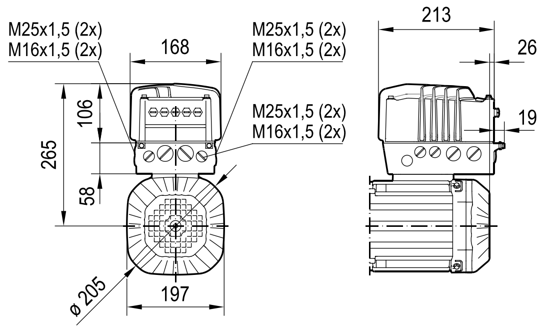
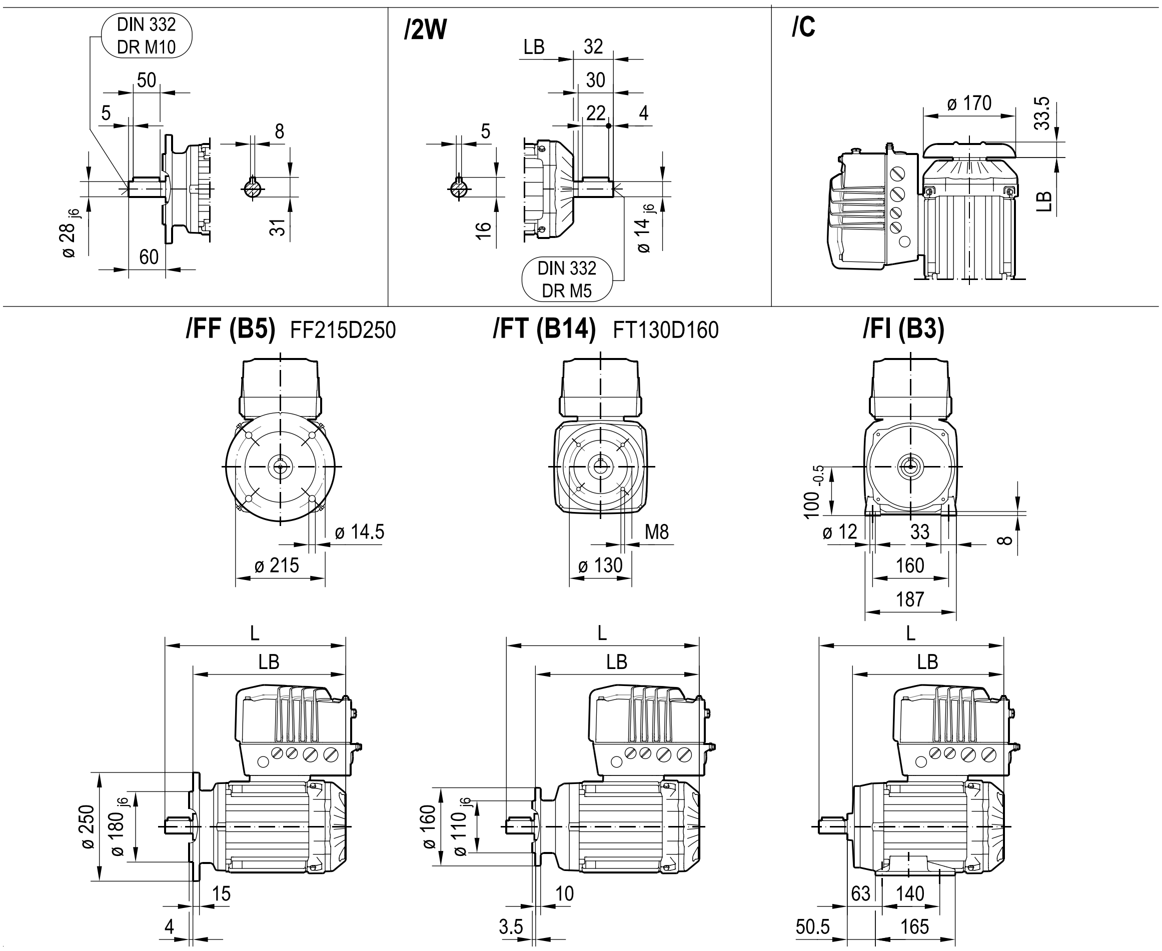
DRN100LS/MOVIMOT® advanced
DRN100LM/MOVIMOT® advanced

08 183 00 19
1(2)





(→ 📖)	100LS	100LM						
L	369	419						
LB (B5/B14)	309	359						
LB (B3)	307	357						

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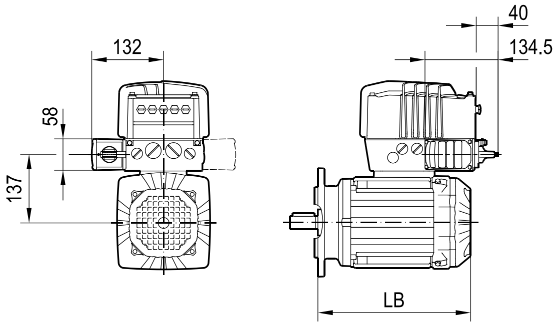
/D11

08 183 00 19
2(2)



(→ 📖)	100LS	100LM						
L	369	419						
LB (B5/B14)	309	359						
LB (B3)	307	357						

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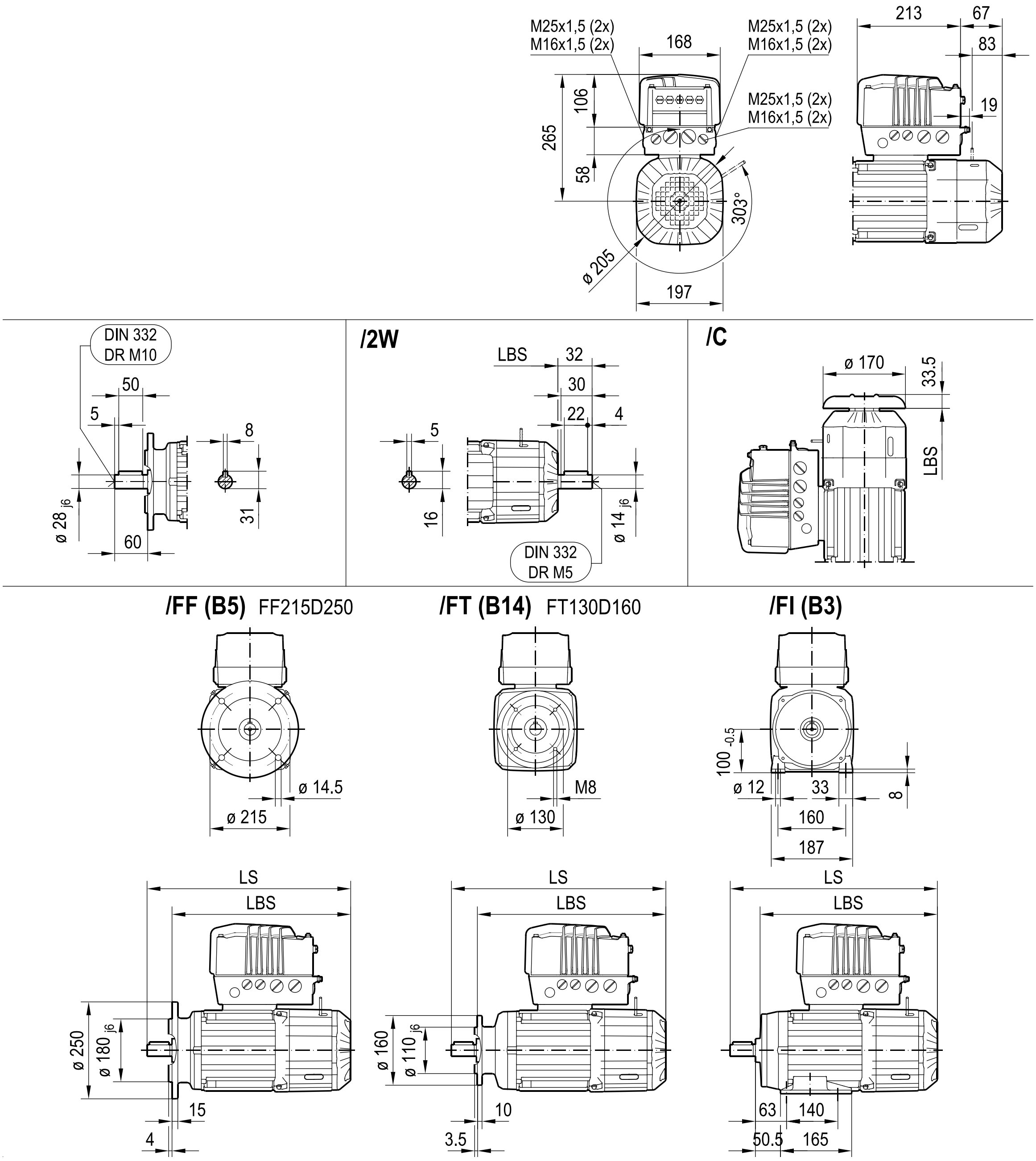
DRN100LS BE/MOVIMOT® advanced
DRN100LM BE/MOVIMOT® advanced

09 157 00 19
1(2)



(→ 🕮)	100LS	100LM						
LS	462	512						
LBS (B5/B14)	402	452						
LBS (B3)	400	450						

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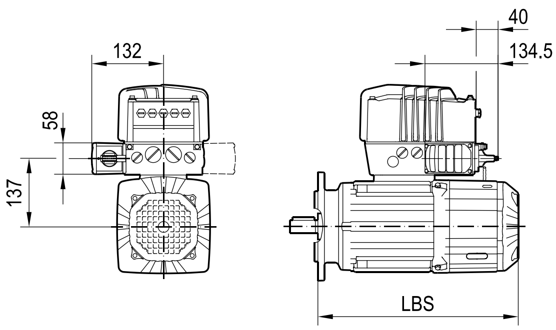
09 157 00 19
2(2)



(→ 📖)	100LS	100LM						
LS	462	512						
LBS (B5/B14)	402	452						
LBS (B3)	400	450						

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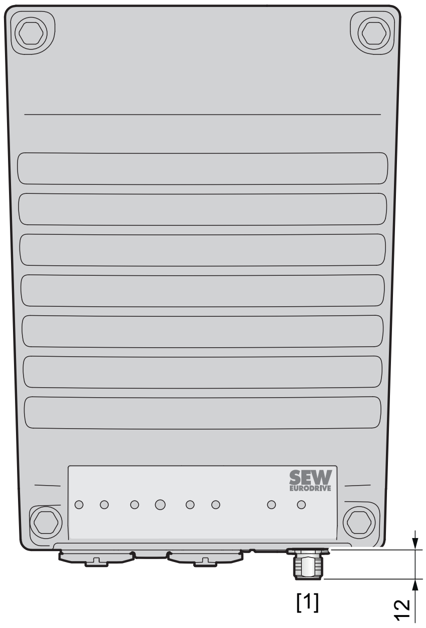
11.12 Dimension drawings of plug connectors in the electronics cover

The following figure shows the additional dimensions of the plug connector.



9007229877301643

[1] M12 plug connector, male

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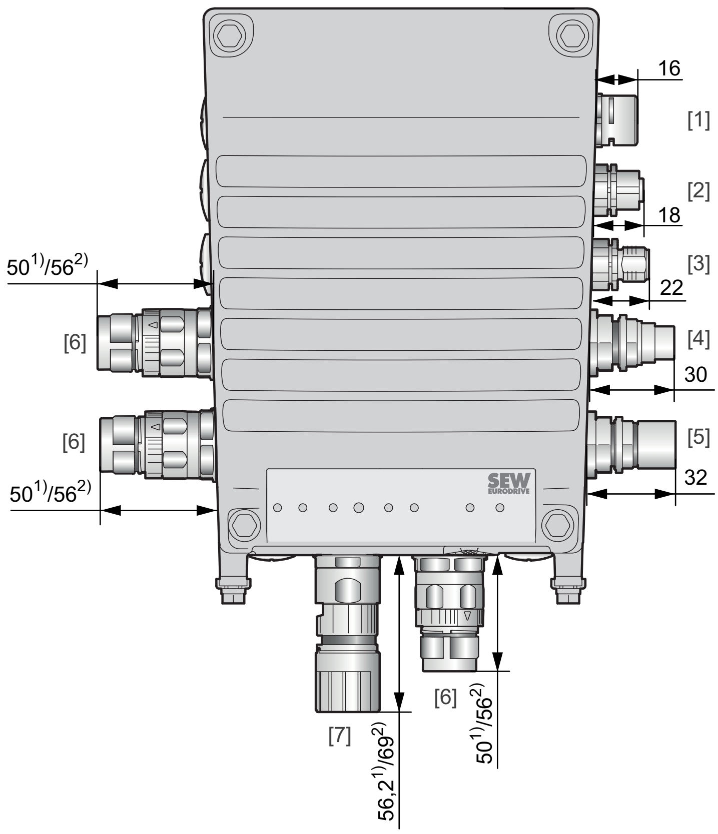
11.13 Dimension drawings of plug connectors in the connection box

11.13.1 Plug connectors

INFORMATION

- The following figure shows an example of the additional dimensions of the optional plug connectors for a possible plug connector configuration.
- For more information, refer to chapter "Plug connector positions".



32379545483

1) "Straight" plug connector variant
2) "Right-angle" plug connector variant
[1] Optional pressure compensation
[2] M12 plug connector, female
[3] M12 plug connector, male
[4] Plug connector design Murr Elektronik, MQ15-X-Power, male
[5] Plug connector design Murr Elektronik, MQ15-X-Power, female
[6] Plug connector design TE-Intercontec Products, M23, without union nut
[7] Plug connector design TE-Intercontec Products, M23, with union nut

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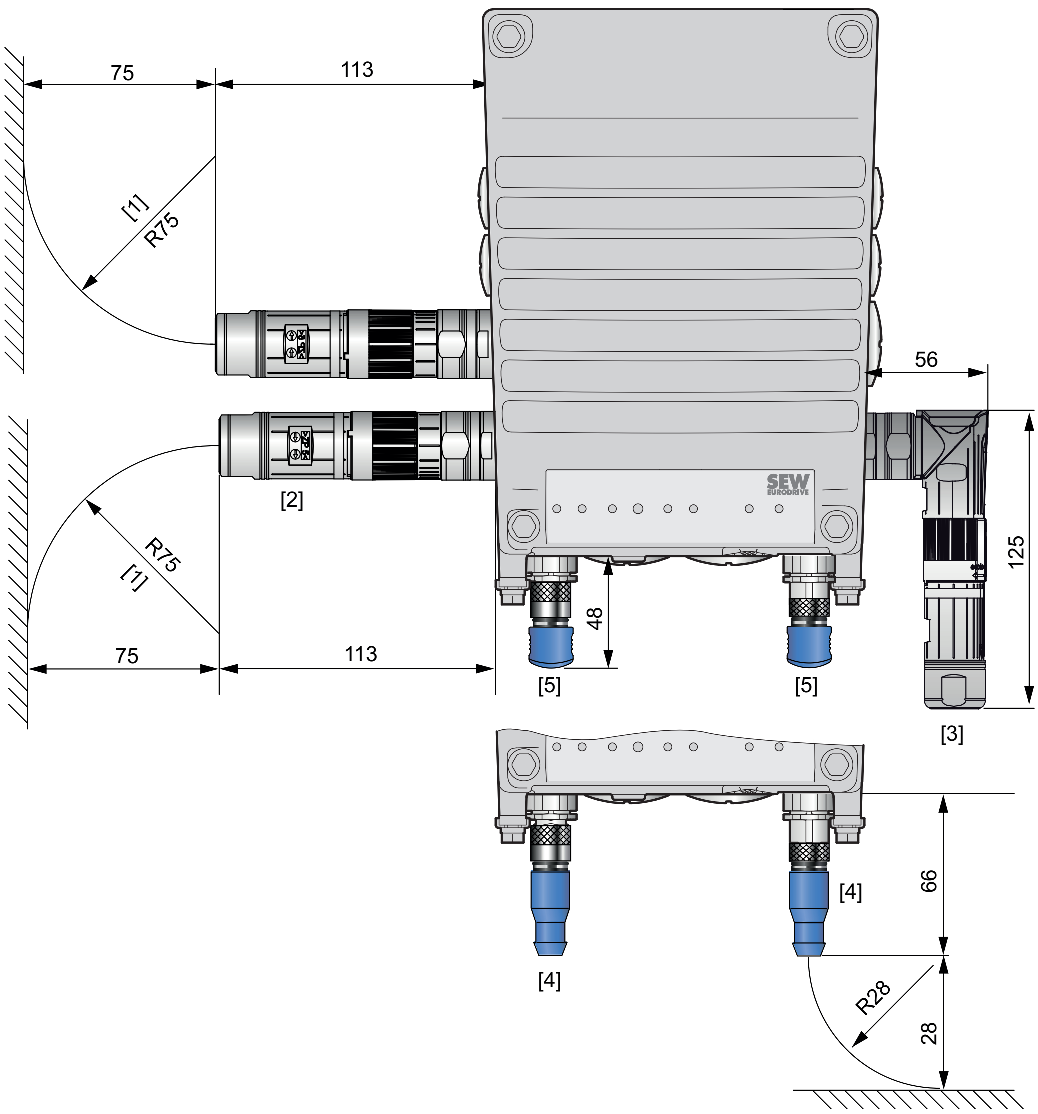
11.13.2 Plug connector including mating connector

INFORMATION

- The following figure shows the additional dimensions/bending radii of the optional plug connectors including mating connector in connection with prefabricated cables from SEW-EURODRIVE.
- For more information, refer to chapter "Plug connector positions".



18014423809168779

[1] Bending radius
[2] "Straight" plug connector variant M23
[3] "Right-angle" plug connector variant M23
[4] "Straight" plug connector variant M12
[5] "Right-angle" plug connector variant M12

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12 Functional safety

12.1 General information

12.1.1 Underlying standards

The safety assessment of the device is based on the following standards and safety classes:

Underlying standards	
Safety class/ underlying standard	• Performance Level (PL) according to EN ISO 13849-1 • Safety Integrity Level (SIL) according to EN 61800-5-2 • Safety Integrity Level Claim Limit (SIL_{CL}) according to EN 62061

Observe the versions of the applicable standards as specified on the declaration of conformity or on the TÜV certificate.

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12.2 Integrated Safety Technology

12.2.1 MOVIMOT® advanced

The safety technology of the drive unit described below has been developed and tested in accordance with the following safety requirements:

- Safety Integrity Level 3 according to EN 61800-5-2, EN 61508.
- PL e according to EN ISO 13849-1

This was certified by TÜV Rheinland. Copies of the TÜV certificate and the corresponding report are available from SEW-EURODRIVE on request.

12.2.2 Safe condition

For safety-related operation of the drive unit, Safe Torque Off is defined as safe state (see STO drive safety function). The safety concept is based on this definition.

12.2.3 Safety concept

The drive unit is supposed to be able to perform the drive safety function "Safe Torque Off" according to EN 61800-5-2:

- The drive unit can be connected to an external safety controller or safety relay. This external safety controller/safety relay disconnects the safety-related STO input via a 2-pole 24 V switching signal (sourcing/sinking) when a connected command device (e.g. emergency stop button with latching function) is activated. This activates the STO function of the drive unit.
- An internal, dual-channel structure with diagnostics prevents the generation of pulse trains at the power output stage (IGBT).
- Instead of galvanic isolation of the drive from the supply system by means of contactors or switches, the disconnection of the STO input described here safely prevents the control of the power semiconductors in the output stage. The rotary-field generation for the respective motor is deactivated even though the line voltage is still present.
- When the STO drive safety function is activated, the PWM signals generated by the drive unit are interrupted and not transmitted to the IGBTs.
- If the STO function detects a discrepancy between both channels, the PWM signals are inhibited. The inhibit can be revoked by a 24 V reset, or by a device reset if F_STO_P1 and F_STO_P2 are not controlled with 24 V.
- The STO drive safety function can be activated externally e.g. via an external safety device via the STO input.

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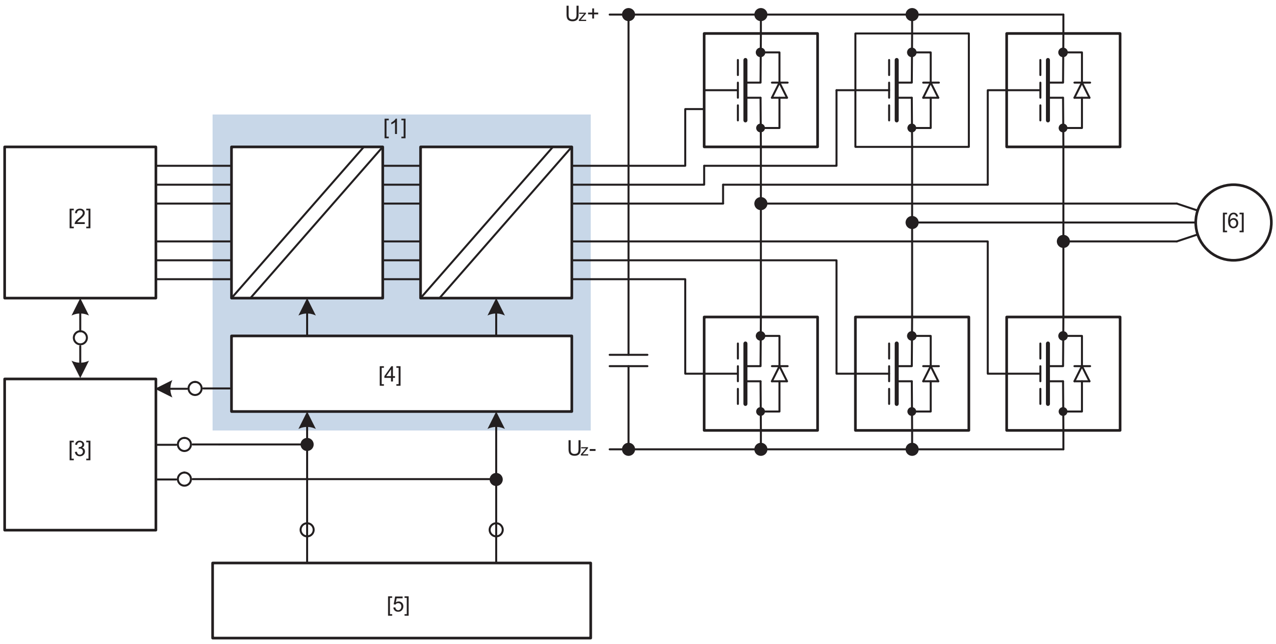
12.2.4 Schematic representation of the safety concept



23543720971

[1] STO function
[2] Drive control
[3] Internal safety card (optional)
[4] Diagnostics and inhibiting unit
[5] External safety controller (optional)
[6] Motor

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12.2.5 Drive safety functions

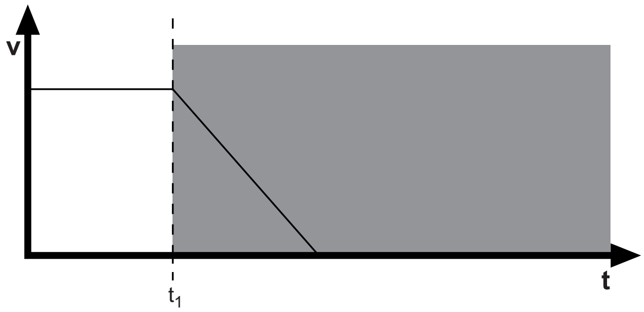
The following drive-related safety functions can be used:

- **STO** (Safe Torque Off according to EN 61800-5-2) by disconnecting the STO input.

  If the STO function is activated, the frequency inverter no longer supplies power to the motor for generating torque. This drive safety function corresponds to a non-controlled stop according to EN 60204-1, stop category 0.

  The STO input must be disabled by a suitable external safety controller/safety relay.

  The following figure shows the STO function:



2463228171

v	Speed
t	Time
t_1	Point of time when STO is triggered
	Disconnection range

- **SS1(c) (SS1-t)** (safe stop 1, with time control according to EN 61800-5-2) by means of suitable external control (e.g. safety relay with delayed disconnection).

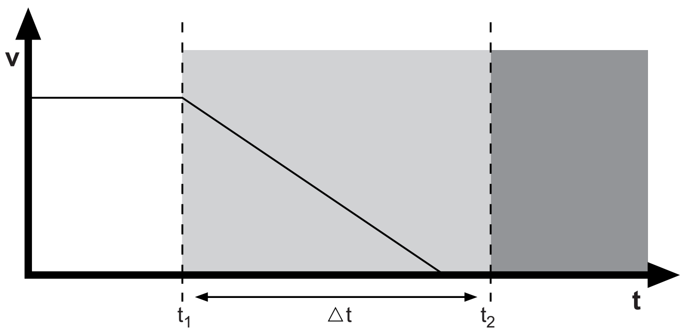
  The following sequence is mandatory:

  – Decelerate the drive using an appropriate deceleration ramp specified via setpoints.

  – Disconnect the STO input (= triggering the STO function) after a specified safety-related time delay.

  This drive safety function corresponds to a controlled stop according to EN 60204-1, stop category 1.

  The following figure illustrates the SS1(c) function (SS1-t):



2463226251

v	Speed

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t	Time
t_1	Point of time when brake ramp is initiated
t_2	Point of time when STO is triggered
Δt	Delay time until STO is triggered
	Safe time delay range
	Disconnection range

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12.2.6 Restrictions

- Note that if the drive does not have a mechanical brake, or if the brake is defective, the drive may coast to a halt (depending on the friction and mass moment of inertia of the system). In the event of regenerative loads, or with axes that are loaded with gravitational forces or driven externally, the drive can even accelerate. This must be taken into account in a risk assessment of the system/machine. Additional safety measures might have to be implemented (e.g. safety brake system).

  The drive unit cannot be used without an additional brake system for application-specific drive safety functions that require active deceleration (braking) of the dangerous movement.
- When using the SS1(c) (SS1-t) function as described in chapter "Functional safety" > "Integrated safety technology" > "Drive safety functions", the brake deceleration ramp of the drive is not monitored with respect to safety. In the event of a fault, deceleration may fail during the delay time or, in the worst-case scenario, there might be an acceleration. In this case, the STO function is only activated after the set time delay has expired. The resulting danger must be taken into account in the risk assessment of the system/machine. Additional safety measures might have to be implemented.
- The STO function cannot prevent a possible jerk or DC braking.

⚠ WARNING

The safety concept is suitable only for performing mechanical work on driven system/machine components.

Severe or fatal injuries.

Hazardous voltages are present in the connection box when the STO signal is disconnected.

- Before working on the electric part of the drive system, disconnect it from the supply voltage using an appropriate external disconnecting device, and secure it against unintentional reconnection to the voltage supply.

⚠ WARNING

Electric shock due to incompletely discharged capacitors.

Severe or fatal injuries.

- Observe a minimum switch-off time of 5 minutes after disconnecting the power supply.

INFORMATION

The brake and DynaStop® are not safety-related. If the parameter *Apply brake/ DynaStop® in STO state (Index 8501.3)* is enabled, the following happens when the STO function is triggered:

- The brake is applied.
- DynaStop® is activated.

12.3 Safety conditions

The requirement for safe operation is that the drive safety functions of the drive unit are properly integrated into an application-specific higher-level drive safety function. A system/machine-specific risk assessment must be carried out by the system/machine manufacturer and taken into account for the use of the drive system with the drive unit.

The system/machine manufacturer and the operator are responsible for compliance of the system/machine with applicable safety regulations.

The following requirements are mandatory when installing and operating the drive unit in safety-related applications:

- Approved devices.
- Installation requirements.
- Requirements on external safety controllers and safety relays.
- Startup requirements.
- Operation requirements.

12.3.1 Approved devices

The following device variants are permitted for safety-related applications:

Drive unit	Nominal output current
MOVIMOT® advanced	2.0 – 5.5 A

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12.3.2 Requirements on the installation

- The wiring technology used must comply with the standard EN 60204-1.
- The STO control cables must be routed according to EMC guidelines and as follows:
  - Inside an electrical installation space: Single conductors can be routed.
  - Outside a closed installation space: Shielded cables must be routed permanently (fixed) and protected against external damage, or equivalent measures must be taken.
  - Adhere to the regulations in force for the application.
  - The sinking and sourcing cables from the external safety device to the axis must be routed right next to each other with a cable length of ≤ 100 m.
  - The sinking and sourcing cables from the external safety device to the axis must have the same cable length. A difference in length ≤ 3% of the two cables is permitted.
  - Using suitable measures. the user must ensure that STO control cables are routed separately from the power lines of the drive. This does not apply to cables approved by SEW-EURODRIVE specifically for this application case.
- The STO function does not detect short circuits or interference voltage in the supply line. For this reason, one of the following 2 requirements must always be met:
  - No parasitic voltages can occur in the STO control cables
  - The external safety controller can detect a crossfault from an external potential to the STO control lines.
- Observe without fail the values specified for safety components when designing the safety circuits.
- The STO signal (F_STO_P1, F_STO_P2, and F_STO_M) must not be used for feedback.
- For safety controller/safety relays, you must only use grounded voltage sources with protective electrical separation (PELV) in accordance with EN 61131-2 and EN 60204-1.
- If several voltage sources are used, each voltage source must be connected to a PE system.
- When planning the installation, observe the technical data of the devices.
- Do not use the port 24 V_OUT of the device for safety-related applications. This voltage is only permitted to supply the M12 plug connector X5504 when the STO jumper is plugged in.
- When the STO control cables are routed to Terminal X9 in the electronics cover, the cable ends must be covered with conductor end sleeves and the cables must be fixed close to the terminal X9 using cable ties. Other low-voltage signals can be bundled together with the STO signals.
- To use the drive unit in safety-related applications, remove the jumpers labeled with "Caution, remove jumper for safety operation" from the STO terminal X9. No labeled jumpers are available for those designs where the STO connection is performed using plug connectors. The installed jumper is relevant to the function.

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12.3.3 Requirements on the external safety controller

A safety relay can be used as an alternative to a safety controller. The following requirements apply analogously.

- The safety controller and all other safety-related subsystems must be approved for at least the safety class that is required in the overall system for the respective application-related drive safety function.

  The following table shows an example of the required safety class of the safety controller:

Application	Safety controller requirements
Performance level d according to EN ISO 13849-1, SIL 2 according to EN 62062	Performance level d according to EN ISO 13849-1 SIL 2 according to EN 61508
Performance level e according to EN ISO 13849-1, SIL 3 according to EN 62061	Performance level e according to EN ISO 13849-1, SIL 3 according to EN 61508

- The wiring of the safety controller must be suitable for the required safety class (see manufacturer documentation). The STO input of the device can be switched with 2 poles (sourcing output, sourcing/sinking, or serial sourcing), or with 1 pole (sourcing).
- The values specified for the safety controller must be strictly adhered to when designing the circuit.
- Electro-sensitive protective equipment (such as light grid or scanner) according to EN 61496-1 and emergency stop buttons must not be directly connected to the STO input. The connection must be made using safety relays, safety controllers, etc.
- To ensure protection against unintended restart in accordance with EN ISO 14118, the safe control system must be designed and connected in such a way that resetting the command device alone does not lead to a restart. A restart may only be carried out after a manual reset of the safety circuit.
- If no fault exclusion is used for the STO wiring according to EN ISO 13849-2 or DIN EN 61800-5-2, the external safety device must detect the following faults in the STO wiring within 20 s depending on the connection type:
  - 2-pole sourcing output:

    Short circuit of 24 V at F_STO_P1 or F_STO_P2 (Stuck-at 1)

    Crossfault between F_STO_P1 and F_STO_P2
  - 2-pole sourcing/sinking:

    Short circuit of 24 V at F_STO_P1 (Stuck-at 1)

    Short circuit of 0 V at F_STO_M (Stuck-at 0)
  - 2-pole serial sourcing:

    Fault exclusion is mandatory
  - 1-pole sourcing output:

    Short circuit of 24 V at F_STO_P (Stuck-at 1)

2-pole sourcing output:

- Test pulses can be used when the device is switched on or off.
  - The test pulses on both sourcing channels must be switched with a time delay. However, additional switch-off test pulses may occur simultaneously.

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  - The test pulses in both sourcing channels must not exceed 1 ms.
  - The next switch-off test pulse in one sourcing channel must only occur after a 2 ms time period.
  - A maximum of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
  - The signal levels must be read back by the safety controller and compared to the expected value.
  - The signal levels may have a maximum temporal discrepancy of 130 ms. In case of a larger temporal discrepancy, the device changes to the STO fault state (F20.11).

2-pole sourcing/sinking:

- Test pulses can be used when the device is switched on or off.
  - The test pulses in the sourcing and sinking channel must not exceed 1 ms.
  - The next switch-off test pulse in the sourcing or sinking channel must only occur after a 2 ms time period.
  - A maximum of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
  - The signal levels must be read back by the safety controller and compared to the expected value.

2-pole serial sourcing:

- Fault exclusion in the connection lead is mandatory if no external test pulses are possible.

1-pole sourcing output:

- Test pulses can be used when the device is switched on or off.
  - The test pulse in the sourcing channel must not exceed 1 ms.
  - The next switch-off test pulse may only occur after a time period of 2 ms at the earliest.
  - A maximum of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
  - The signal levels must be read back by the safety controller and compared to the expected value.

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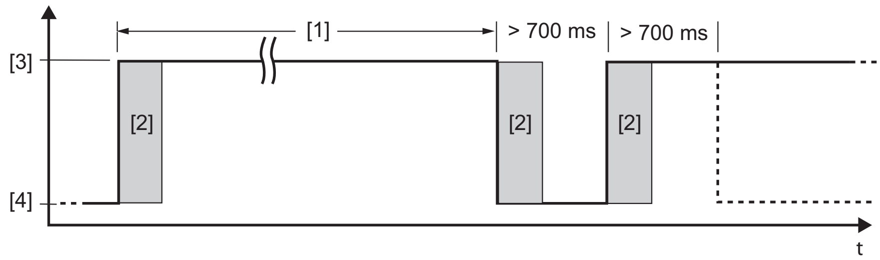
12.3.4 Requirements on startup

- To validate the implemented drive safety functions, they must be documented and checked after successful startup.
- Observe the restrictions for drive safety functions in chapter "Restrictions" for the validation of the safety functions. Non-safety-related parts and components that affect the result of the test (e.g. motor brake) must be deactivated, if necessary.
- For using the drive unit in safety-relevant applications, it is essential that you perform and record startup checks for the disconnecting device and correct wiring.

12.3.5 Requirements on operation

- Operation is only allowed within the limits specified in the data sheets. This principle applies to the external safety controller as well as to the drive unit.
- The built-in diagnostic function is limited in case of a permanently enabled or permanently disabled STO input. Only with a level change of the STO signal, extended diagnostic functions are performed. This is why the drive safety function via STO input must be triggered with connected line voltage at least once every 12 months for PL d according to EN ISO 13849-1 and SIL 2 according to EN 61800-5-2, and at least once every 3 months for PL e according to EN ISO 13849-1 and SIL 3 according to EN 61800-5-2 to achieve a complete test coverage. Adhere to the following test procedure.



15205932683

[1] Maximum 12 months with PL d/SIL 2

Maximum 3 months with PL e/SIL 3

[2] Internal diagnostics

[3] High: No STO

[4] Low: STO active

- To achieve complete test coverage after a device reset (e.g. after connecting the line voltage), the test transition (STO active → not active) can only be started > 700 ms later. The device signals "ready for operation" or "STO – Safe Torque Off" if it is not in fault state.
- A detected hardware fault in the internal switch-off channels for STO will lead to a locking fault state of the drive unit. If the fault is reset (e.g. by switching the line voltage on/off or by a low level at the STO input for at least 30 ms), a complete test with internal diagnostics according to the above mentions test procedure must be performed. If the fault occurs again, replace the device or contact the SEW-EURODRIVE Service.

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12.4 Connections variants

12.4.1 General information

Generally, all the connection variants listed in this documentation are permitted for safety-relevant applications as long as the basic safety concept is met. This means you have to make sure that the DC 24 V safety inputs are operated by an external safety relay or a safety controller, in this way preventing an automatic restart.

All the safety conditions stipulated in the chapters "Integrated safety technology", "Safety conditions", and "Connection variants" must be satisfied on a primary basis for the basic selection, installation, and application of the safety components such as safety relay, emergency stop switch, and the approved connection variants.

The wiring diagrams are block diagrams whose only purpose is to show the drive safety function(s) with the relevant components. For reasons of clarity, circuit-related measures that usually always have to be implemented are not shown in the diagram. These measures are e.g.:

- Ensuring the availability of touch guards.
- Handling overvoltages and undervoltages.
- Avoiding installation errors.
- Detecting ground faults or short circuits in externally installed lines.
- Guaranteeing the required interference immunity against electromagnetic interference.

12.4.2 Requirements

Using safety relays

The requirements of the manufacturers of safety relays (such as protecting the output contacts against welding) or of other safety components must be strictly observed. For cable routing, the basic requirements apply as described in this documentation.

For connecting the drive unit with the safety relays, observe the installation requirements in chapter "Functional safety" > "Safety conditions" > "Installation requirements".

All instructions by the manufacturer of the safety relay used in the particular application must be observed.

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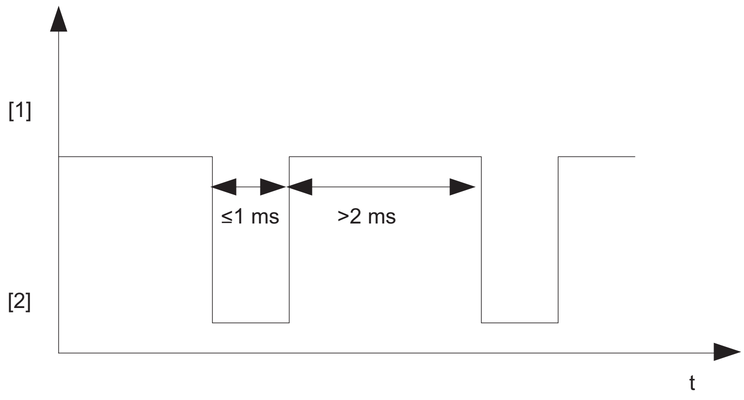
Using safety controllers

The switch-off test pulse of the used safe digital outputs (F-DO) must be ≤ 1 ms and another switch-off test pulse must only occur 2 ms later at the earliest.



15214338827

[1] High

[2] Low

INFORMATION

If the safety-related control voltage plug at the STO input is switched off (STO activated), you must observe chapter "Functional safety" > "Safety conditions" > "Requirements for the external safety controller" with regard to the test pulses.

INFORMATION

If F_STO_P1, F_STO_P2 are connected to DC 24 V, and F_STO_M is connected to GND, STO is deactivated.

Switching off the STO signal for several drive units (STO group disconnection)

The STO signal for several drive units can be provided by a single safety relay. The following requirements must be met:

- The total cable length is limited to max. 100 m. Any other instructions published by the manufacturer on the use of the safety device (for the respective application) must also be observed.
- The maximum output current and the maximally permitted contact load of the safety device must be observed.
- You must comply with the permitted signal levels at the STO input and all other technical data of the device. The routing of the STO control cables and the voltage drop must be considered.
- Other requirements of the safety manufacturer (such as protecting the output contacts against welding) must be strictly observed. The basic requirements for cable routing also apply.
- A calculation based on the technical data of the device must be performed separately for each case of STO group disconnection.
- A maximum of 20 drive units may be used in one STO group disconnection.

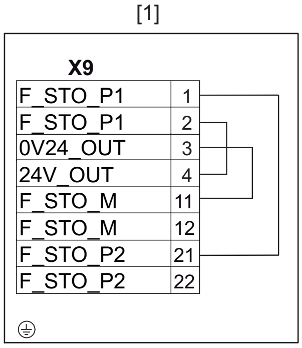
12.4.3 Connection via terminal X9

For detailed information on terminal X9, refer to chapter "Electrical Installation" > "Terminal assignment".

Wiring diagrams

Delivery state

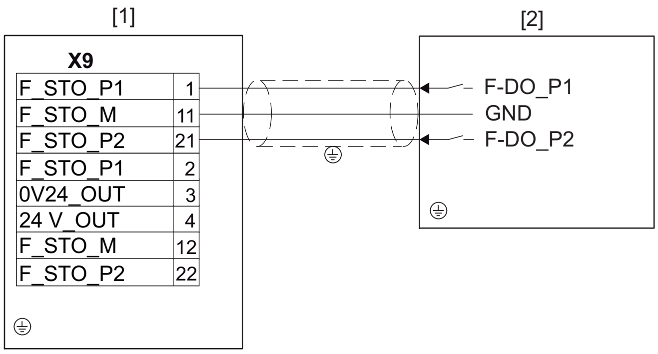
In delivery state, the terminals at the connection for safe disconnection X9 are jumpered. The jumpers are marked with the text "Caution, remove jumper for safety operation". To use the drive unit in safety-related applications, remove the jumpers from the STO terminal X9.



9007222815498379

[1] Drive unit

2-pole sourcing



9007222818851979

[1] Drive unit
[2] External safety device

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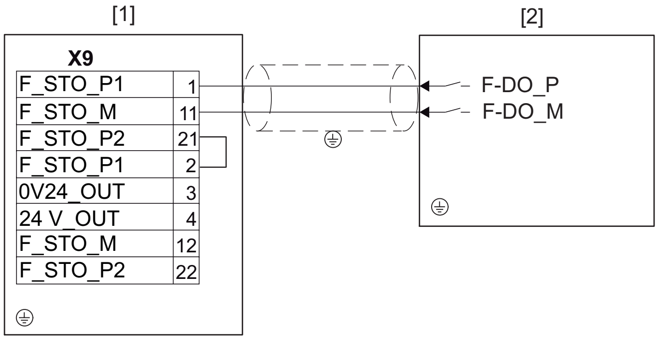
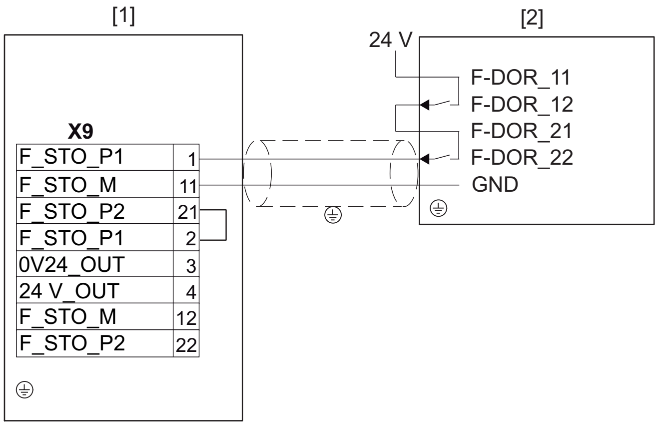
2-pole sourcing/sinking



9007222818872587

[1] Drive unit
[2] External safety device

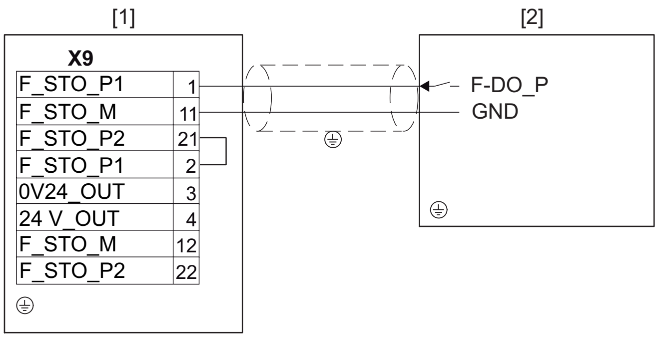
2-pole serial sourcing



9007222818944907

[1] Drive unit
[2] External safety device

1-pole sourcing



9007222819398155

[1] Drive unit
[2] External safety device

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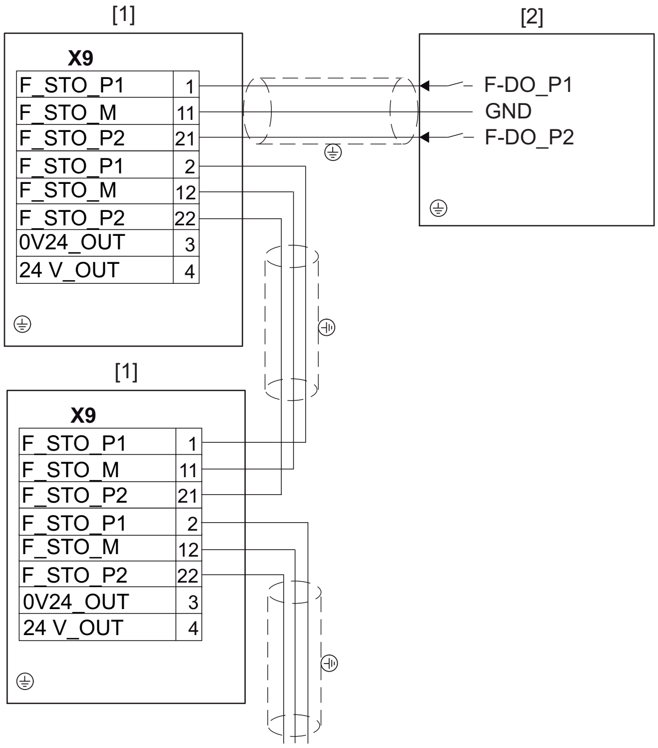
STO group disconnection, 2-pole, sourcing



25228151435

[1] Drive unit
[2] External safety controller

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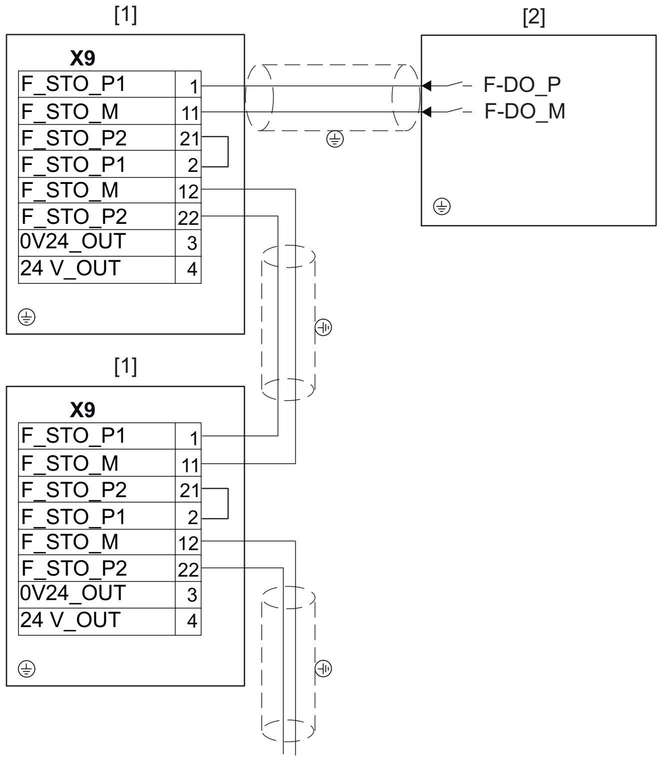
STO group disconnection, 2-pole, sourcing/sinking



25228157067

[1] Drive unit
[2] External safety controller

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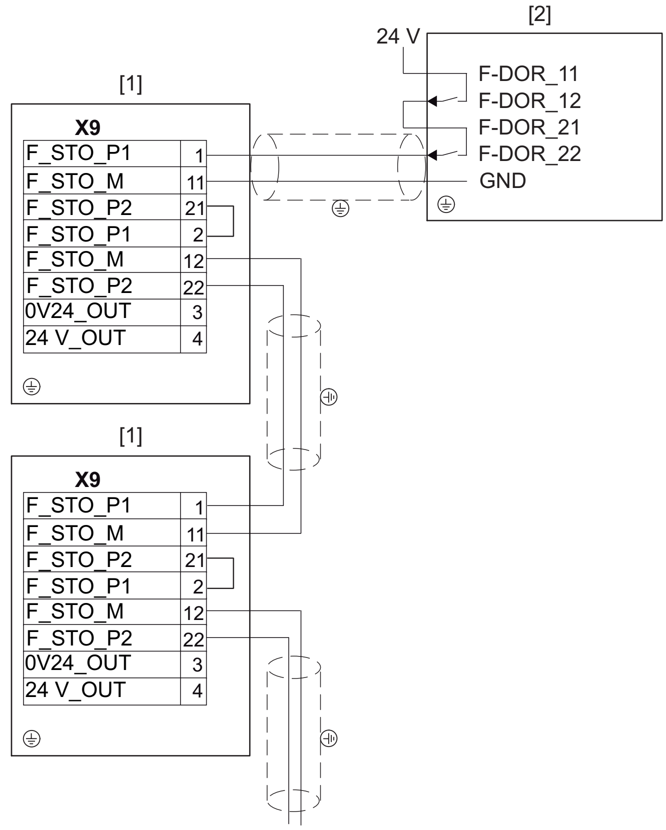
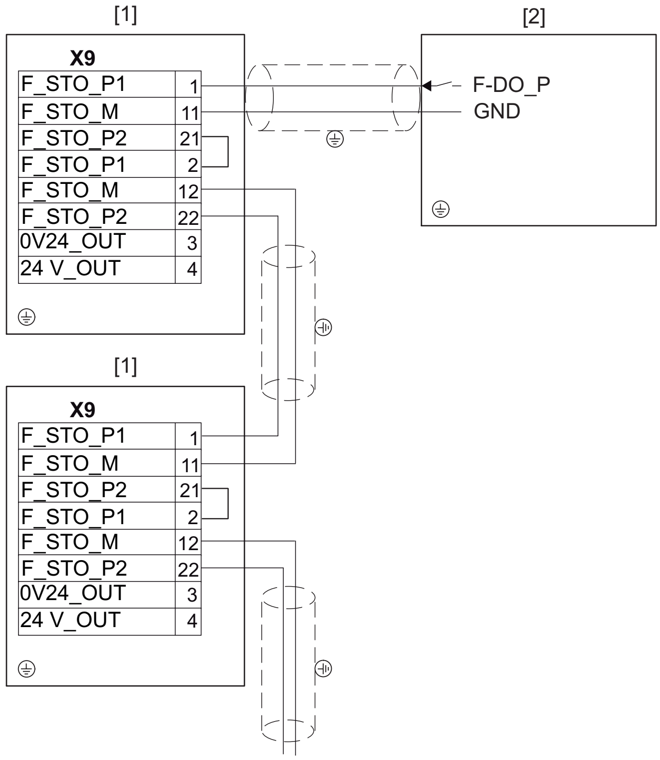
STO group disconnection, 2-pole, serial sourcing



25229441035

[1] Drive unit
[2] External safety controller

STO group disconnection, 1-pole, sourcing



25229445003

[1] Drive unit
[2] External safety controller

12.4.4 Connection via M12 plug connector X5504/X5505

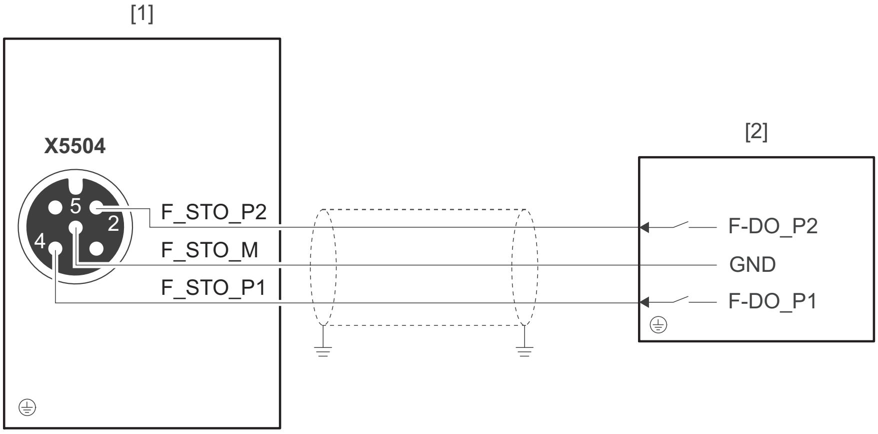
For further information on the connection of X5504/X5505, refer to chapter "Electrical installation" > "Assignment of optional plug connectors".

Wiring diagrams

Delivery state

In the delivery state, plug connector X5504 is not connected, this means the STO input is active. According to the safety concept, X5504 must be connected or temporarily jumpered using the optionally available STO jumper plug for staring up the unit.

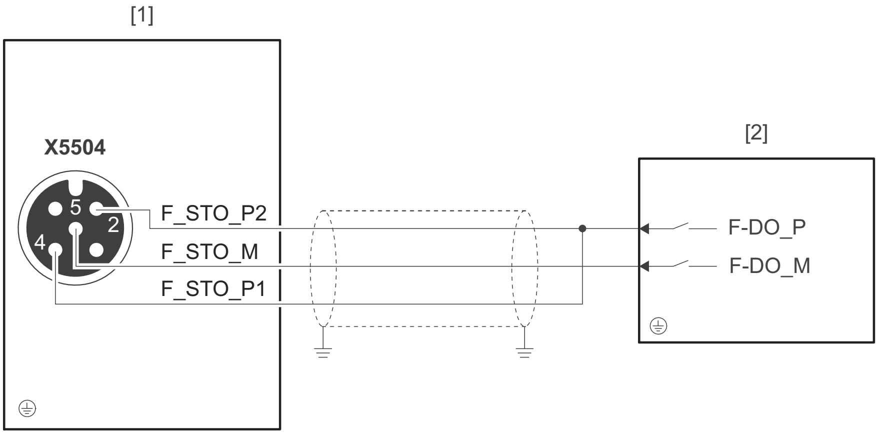
2-pole sourcing



23876274315

[1] Drive unit
[2] External safety device

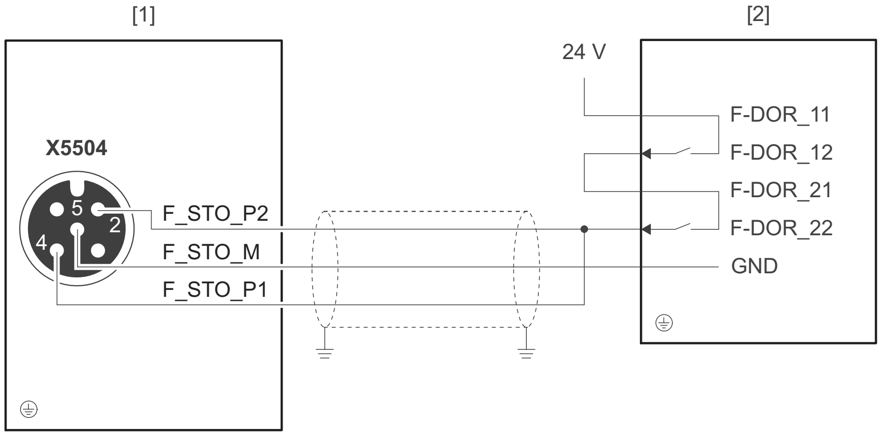
2-pole sourcing/sinking



23876260491

[1] Drive unit
[2] External safety device

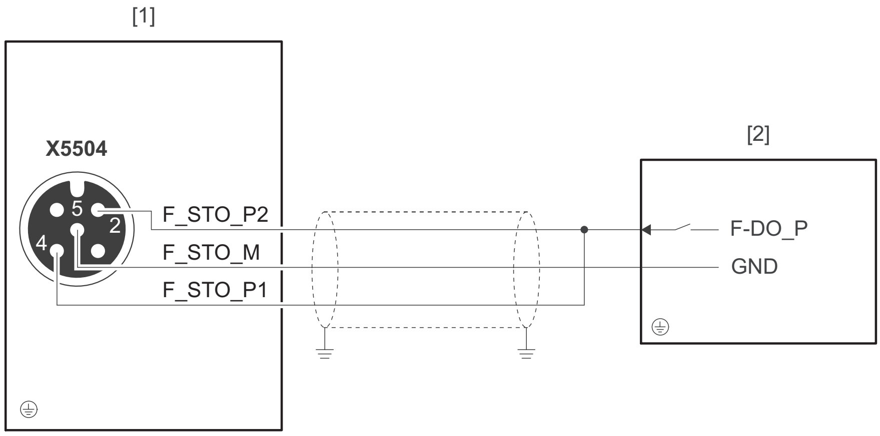
2-pole serial sourcing



23875551243

[1] Drive unit
[2] External safety device

1-pole sourcing



23875545995

[1] Drive unit
[2] External safety device

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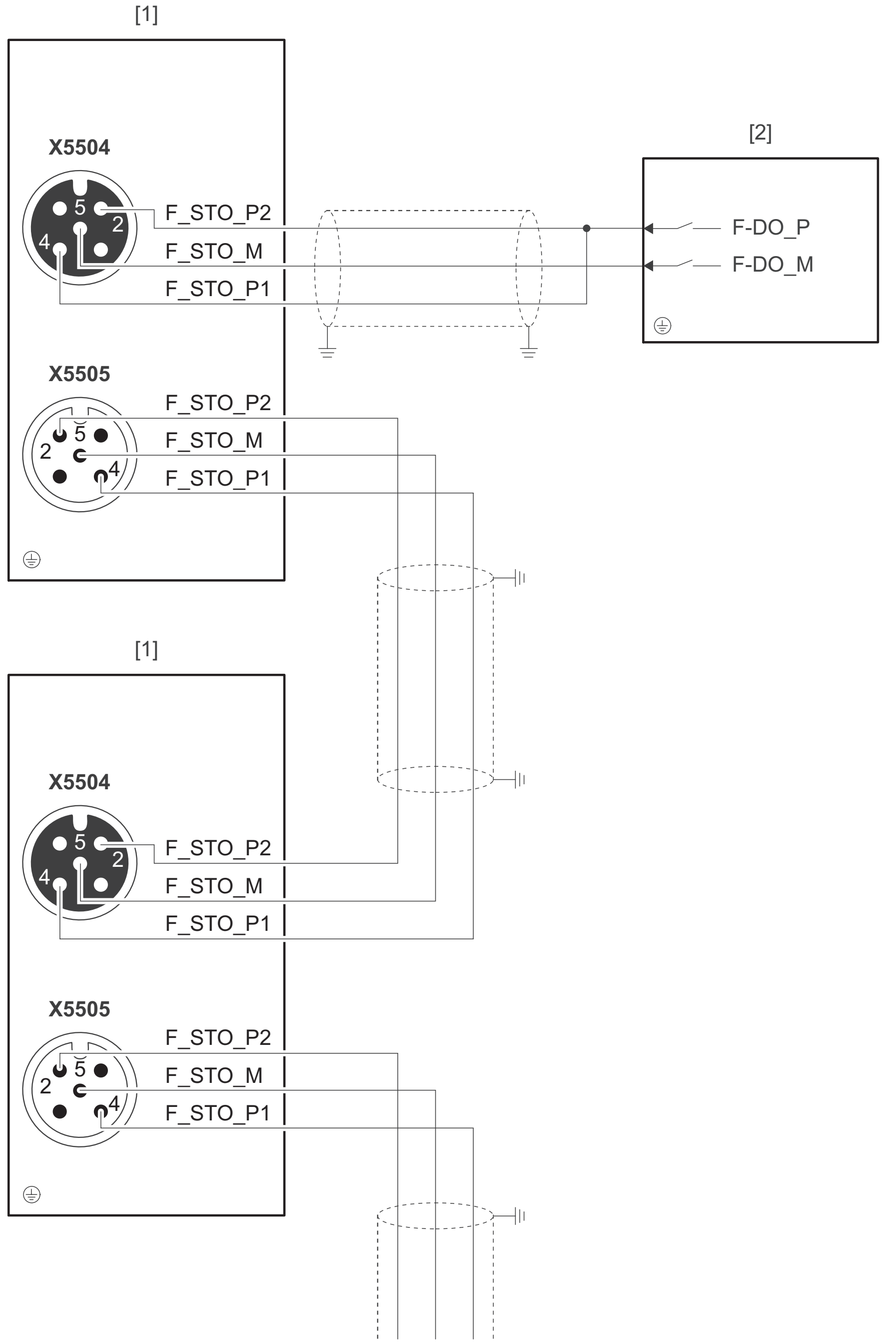
STO group disconnection, 2-pole, sourcing/sinking



9007223142162187

[1] Drive unit
[2] External safety device

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STO jumper plug

⚠ WARNING

Safe disconnection of the device is not possible when using the STO jumper plug.

Severe or fatal injuries.

- Only use use the STO jumper plug if the device is not used to fulfill any safety function.

⚠ WARNING

Disabling of the safety-related disconnection of further devices due to parasitic voltages when using an STO jumper plug.

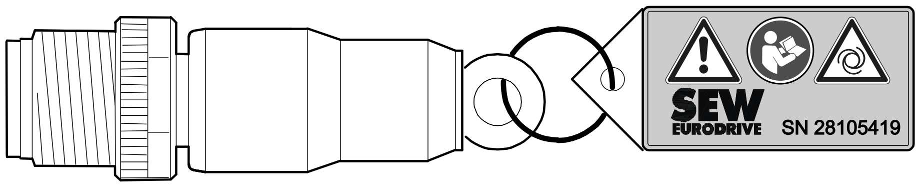
Severe or fatal injuries.

- Only use the STO jumper plug when all incoming and outgoing STO connections have been removed from the device.

A printed red tag is attached to the STO jumper plug.

The STO jumper plug can be connected to the STO plug connector X5504 of the device. The STO jumper plug deactivates the safety functions of the device.

The following figure shows the STO jumper plug with the printed **red** tag, part number 28105419:



25247142411

12.5 Safety characteristics

	Characteristic values according to	
	EN 61800-5-2	EN ISO 13849-1
Tested safety class/underlying standards	Safety integrity level 3	Performance level e
Probability of a dangerous failure per hour (PFH value)	2.5×10^{-9} 1/h	
Service life	20 years, after which the component must be replaced with a new one.	
Proof test interval	> 20 years	-
Safe state	Safe Torque Off (STO)	
Drive safety function	STO, SS1[1)] according to EN 61800-5-2	

1) With suitable external control

INFORMATION

With 1-pole wiring, the realizable performance level according to EN ISO 13849 is reduced to PL d. For the wiring between safety relay and STO input, an fault exclusion is necessary.

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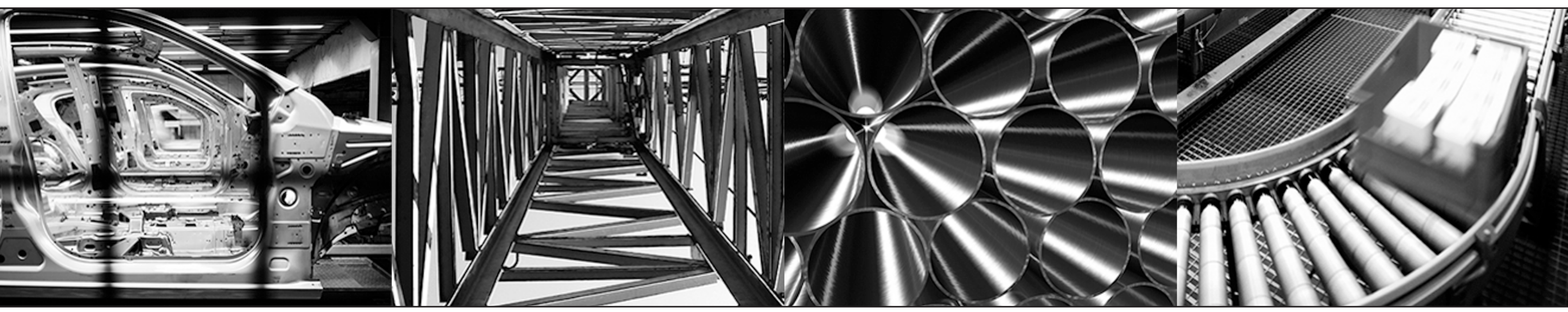

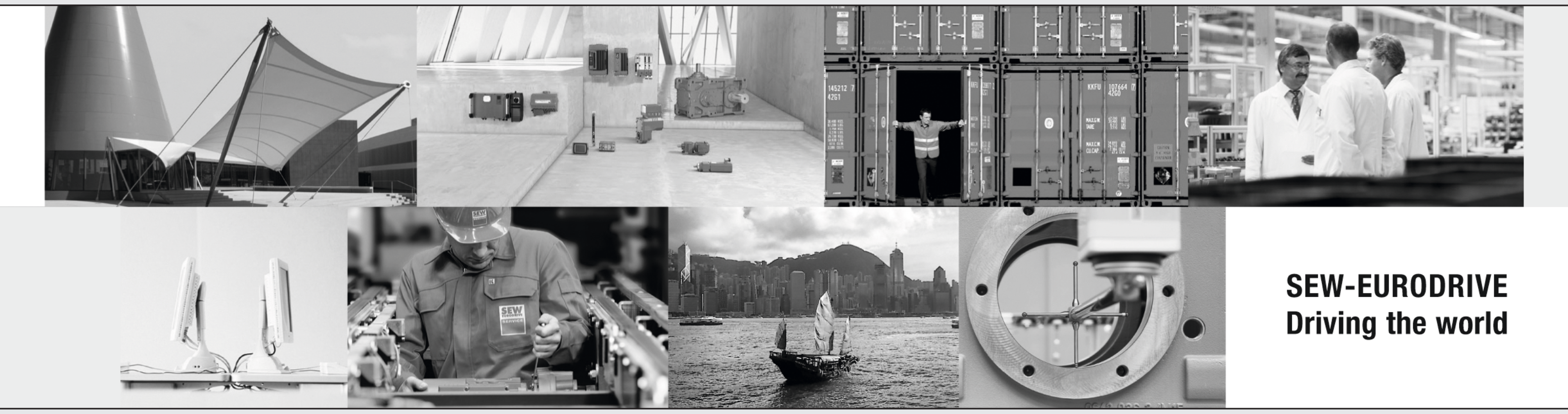

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Str. 42
76646 BRUCHSAL
GERMANY
Tel. +49 7251 75-0
Fax +49 7251 75-1970
sew@sew-eurodrive.com
➡ www.sew-eurodrive.com