



# Operating Instructions



Decentralized Motion and Logic Controller  
**MOVI-C® FIELD CONTROLLER standard/advanced**  
MFC1../FHX



## Table of contents

<b>1</b>	<b>General information.....</b>	<b>5</b>
1.1	About this documentation .....	5
1.2	Other applicable documentation .....	5
1.3	Structure of the safety notes .....	5
1.4	Decimal separator in numerical values .....	6
1.5	Rights to claim under limited warranty .....	6
1.6	Product names and trademarks .....	7
1.7	Copyright notice .....	7
<b>2</b>	<b>Safety notes .....</b>	<b>8</b>
2.1	Preliminary information .....	8
2.2	Duties of the user .....	8
2.3	Target group .....	9
2.4	Designated use .....	10
2.5	Functional safety technology .....	10
2.6	Transportation .....	10
2.7	Installation/assembly .....	10
2.8	Protective separation .....	12
2.9	Electrical installation .....	12
2.10	Startup/operation .....	13
<b>3</b>	<b>Device structure .....</b>	<b>14</b>
3.1	MOVI-C® FIELD CONTROLLER standard/advanced .....	14
3.2	Cable entry position .....	15
3.3	Nameplate position .....	16
3.4	Example nameplate and type designation .....	17
3.5	Examples for the optional nameplate "Plug connector positions" .....	19
3.6	Electronics .....	20
3.7	Example nameplate and type designation of the electronics .....	22
3.8	Example nameplate and type designation of the connection unit .....	23
<b>4</b>	<b>Mechanical installation .....</b>	<b>24</b>
4.1	Installation notes .....	24
4.2	Required tools and resources .....	24
4.3	Tolerances for torque ratings .....	24
4.4	Installation requirements .....	24
4.5	Installing the device .....	25
4.6	Mounting the device .....	28
4.7	Mounting the device with spacers .....	29
4.8	Tightening torques .....	30
<b>5</b>	<b>Electrical installation.....</b>	<b>33</b>
5.1	Installation planning taking EMC aspects into account .....	33
5.2	Equipotential bonding at the connection box .....	35
5.3	Installation instructions .....	36
5.4	Installation topology (example: standard installation) .....	42
5.5	Terminal assignment .....	43

5.6	Connection diagram.....	45
5.7	Cable routing and cable shielding.....	46
5.8	EMC cable glands.....	47
5.9	Plug connectors.....	48
5.10	Assignment of the optional plug connectors.....	60
5.11	Assignment of the plug connectors in the connection unit.....	91
5.12	Plug connector assignment at the electronics cover.....	92
5.13	PC connection.....	95
<b>6</b>	<b>Startup.....</b>	<b>97</b>
6.1	Startup notes.....	97
6.2	Startup requirements.....	98
6.3	DIP switch.....	99
<b>7</b>	<b>Service.....</b>	<b>100</b>
7.1	Evaluating fault messages.....	100
7.2	Resetting fault messages.....	100
7.3	Description of status and operating displays.....	101
7.4	Fault/error table.....	106
7.5	Device replacement.....	108
7.6	SEW-EURODRIVE Service.....	111
7.7	Shutdown.....	111
7.8	Storage.....	111
7.9	Extended storage.....	112
7.10	Waste disposal.....	113
<b>8</b>	<b>Inspection and maintenance.....</b>	<b>114</b>
8.1	Inspection and maintenance work.....	114
<b>9</b>	<b>Technical data and dimension sheets.....</b>	<b>119</b>
9.1	Conformity.....	119
9.2	General information.....	120
9.3	Technical data.....	120
9.4	Screw fittings.....	127
9.5	Mounting positions.....	129
9.6	Device dimension drawings.....	130
9.7	Dimension drawings of plug connectors in the electronics cover.....	131
9.8	Dimension drawings of plug connectors in the connection box.....	132
9.9	Spacer dimension drawings.....	134
	<b>Index.....</b>	<b>135</b>



## 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

Observe the corresponding documentation for all additional components.

### 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
<b>▲ DANGER</b>	Imminent hazard	Severe or fatal injuries
<b>▲ WARNING</b>	Possible dangerous situation	Severe or fatal injuries
<b>▲ CAUTION</b>	Possible dangerous situation	Minor injuries
<b>NOTICE</b>	Possible damage to property	Damage to the product or its environment
<b>INFORMATION</b>	Useful information or tip: Simplifies handling of the product.	

#### 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 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.

### 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.

### 1.6.1 Trademark of Beckhoff Automation GmbH

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.



## 1.7 Copyright notice

© 2020 SEW-EURODRIVE. All rights reserved. Unauthorized reproduction, modification, distribution or any other use of the whole or any part of this documentation is strictly prohibited.

## 2 Safety notes

### 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 may be 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	<p>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:</p> <ul style="list-style-type: none"> <li>• Qualifications in the field of mechanics in accordance with the national regulations</li> <li>• Familiarity with this documentation</li> </ul>
Specialist for electrotechnical work	<p>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:</p> <ul style="list-style-type: none"> <li>• Qualifications in the field of electrical engineering in accordance with the national regulations</li> <li>• Familiarity with this documentation</li> </ul>
Additional qualifications	<p>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.</p> <p>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.</p>
Instructed persons	<p>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.</p>

## 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.

## 2.5 Functional safety technology

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

## 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.

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.
- Before transportation, cover the connections with the supplied protection caps.
- Only place the product on the cooling fins or on the side without connectors during transportation.

If necessary, use suitable, sufficiently dimensioned handling equipment.

Observe the information on climatic conditions in chapter "Technical data" of the documentation.

## 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.

## 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	<ul style="list-style-type: none"><li>• Ground connection</li></ul>

## 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.

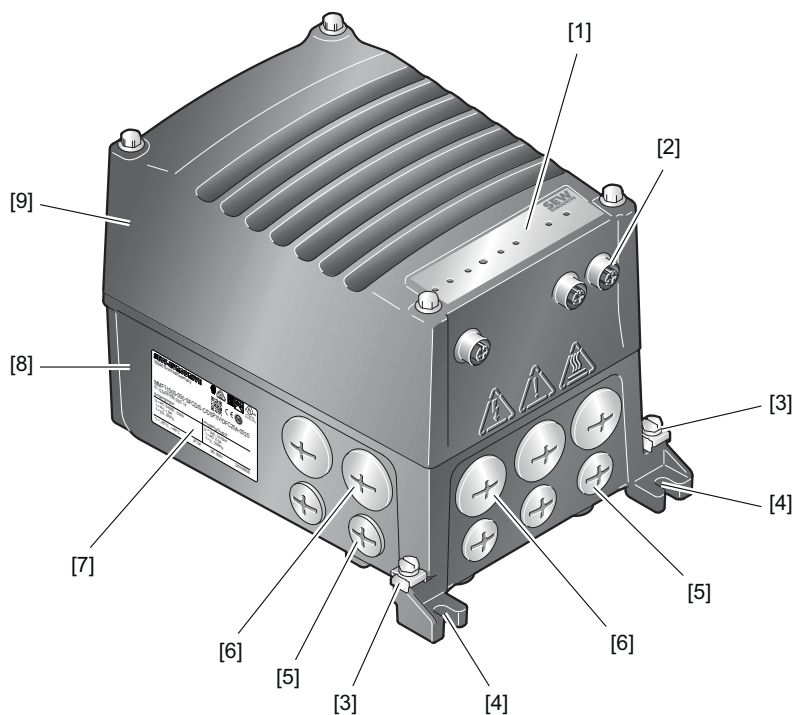
Mechanical blocking or internal protective functions of the product can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically. If, for safety reasons, this is not permitted for the drive-controlled machine, first disconnect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

### 3 Device structure

#### 3.1 MOVI-C® FIELD CONTROLLER standard/advanced

The MOVI-C® FIELD CONTROLLER standard/advanced is a decentralized motion and logic controller for drive units. It consists of 2 core components: the electronics cover (controller) and the connection box (see the following figure).



28775973131

- [1] LED displays
- [2] Plug connector M12
- [3] Screws for PE connection
- [4] Mounting lug
- [5] Cable glands M16
- [6] Cable glands M25
- [7] Nameplate
- [8] Connection box with connection unit
- [9] Electronics cover (controller)

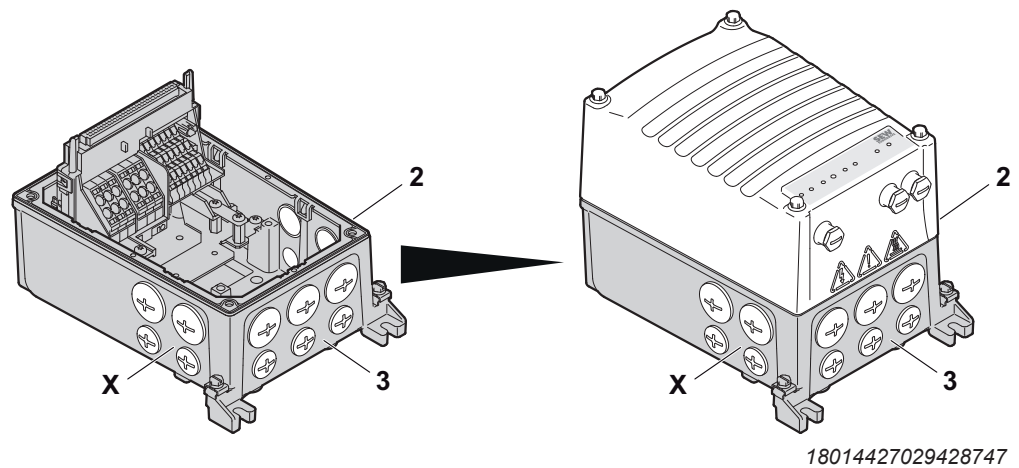
## 3.2 Cable entry position

### 3.2.1 MFC1.. design

The following cables entries are possible for the device:

- Position X + 2 + 3
  - X:  $2 \times M25 \times 1.5 + 2 \times M16 \times 1.5$
  - 2:  $2 \times M25 \times 1.5 + 2 \times M16 \times 1.5$
  - 3:  $3 \times M25 \times 1.5 + 3 \times M16 \times 1.5$

The following figure shows the possible cable entries:



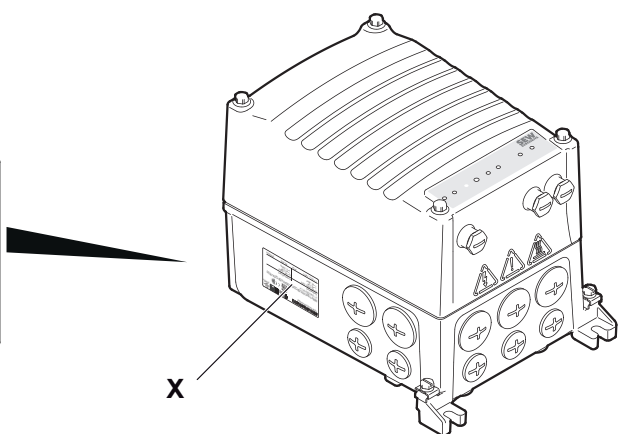
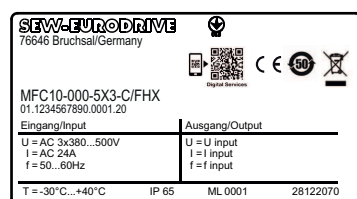
### 3.3 Nameplate position

#### 3.3.1 MFC1.. design

The following nameplate positions are possible for the device:

- Nameplate of the complete device: Position X
- Optional nameplate: Position 2

The following figure shows the position of the nameplate:



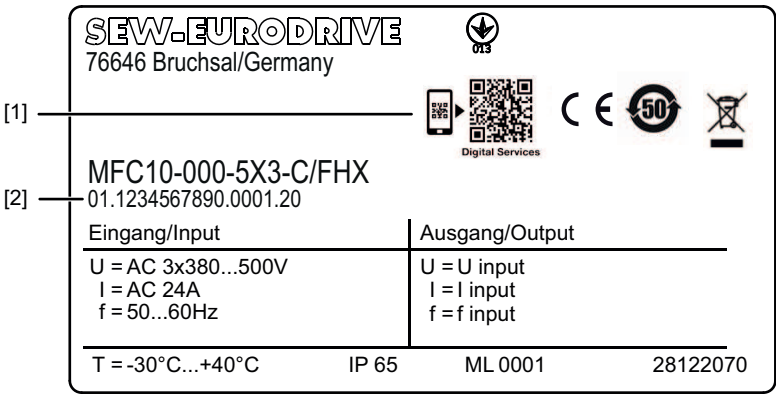
32812735883



3.4 Example nameplate and type designation

3.4.1 Nameplate

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



32812794635

- [1] The QR code on the nameplate indicates the unique serial number.
- [2] Unique serial number

### 3.4.2 Type designation

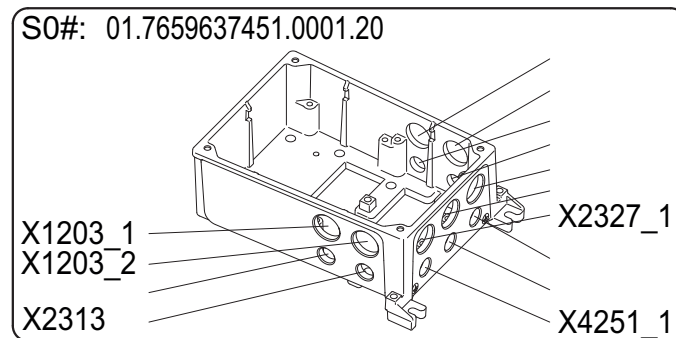
The following table shows the type designation of the MOVI-C® FIELD CONTROLLER standard/advanced:

<b>MFC</b>	<b>Product family</b> MFC = MOVI-C® FIELD CONTROLLER
<b>1</b>	<b>Variant</b> 1 = Device variant 1 for EtherCAT®/SBus <sup>PLUS</sup> devices
<b>0</b>	<b>Front module</b> 0 = Closed
<b>–</b>	
<b>000</b>	<b>Switch disconnecter and line protection</b> 000 = Without switching element
<b>–</b>	
<b>5</b>	<b>Power connection</b> 5 = 380 – 500 V <sub>ac</sub>
<b>X</b>	<b>Interference suppression</b> X = Without basic interference suppression
<b>3</b>	<b>Connection type</b> 3 = 3-phase
<b>–</b>	
<b>C</b>	<b>Version</b>
<b>/</b>	
<b>FHX</b>	<b>Electronics cover (controller) design</b> See chapter "Type designation of the electronics cover (controller)"
<b>/</b>	
<b>IV</b>	<b>Options</b> IV = Plug connector PE = Pressure compensation fitting

### 3.5 Examples for the optional nameplate "Plug connector positions"

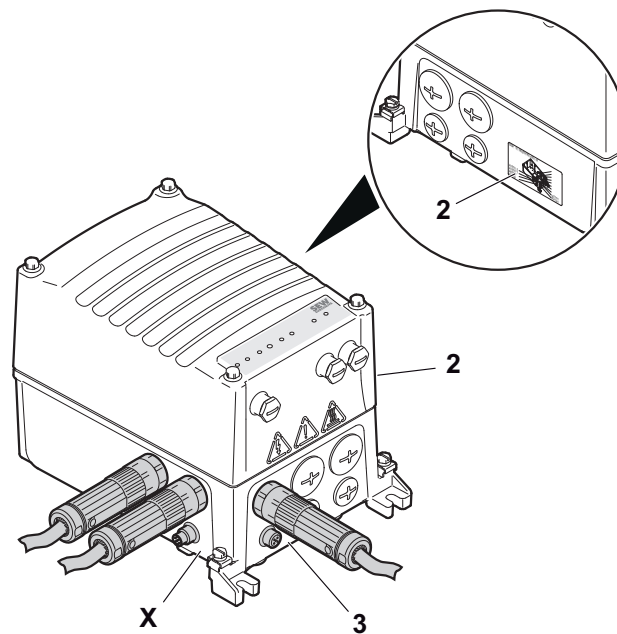
#### 3.5.1 MFC1.. design

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



31659772811

The nameplate shows the designations and positions of the plug connectors at the connection box. This nameplate can be installed in position 2.



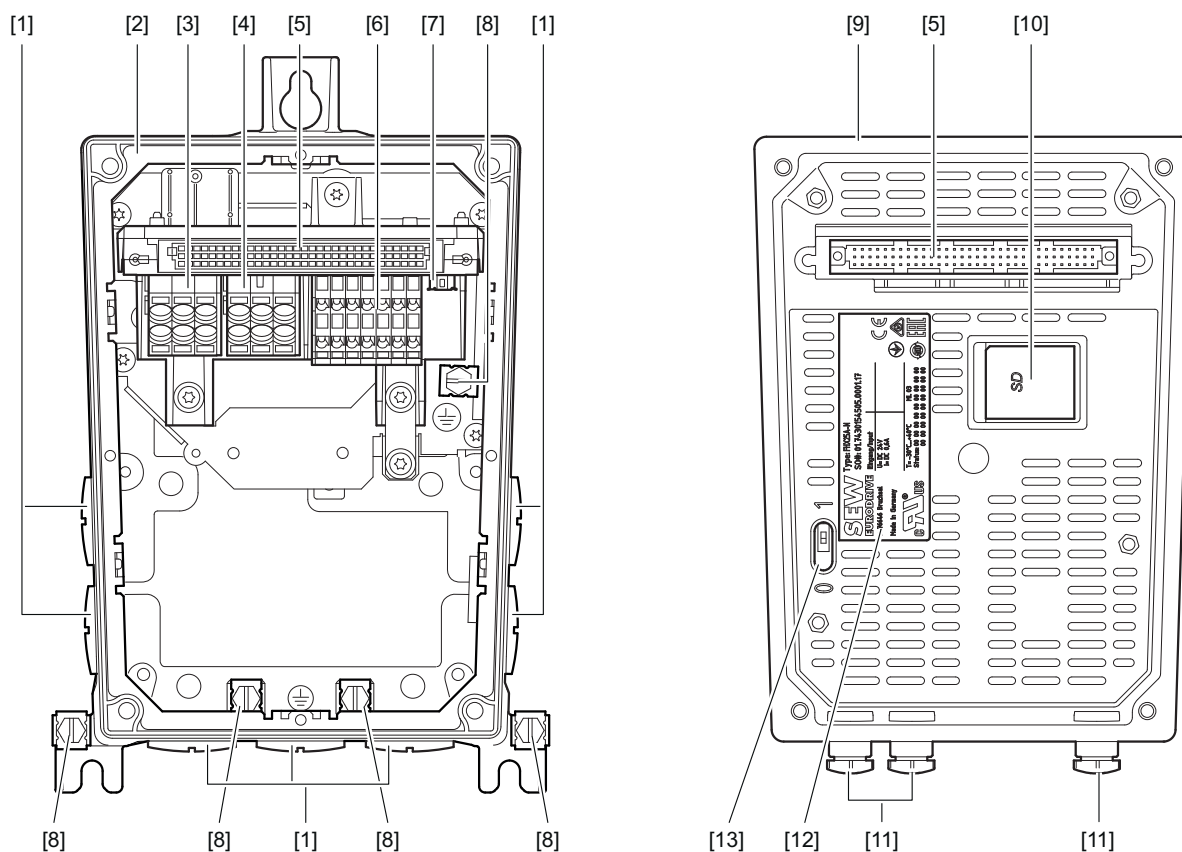
9007227938476043

### 3.6 Electronics

#### 3.6.1 Electronics cover (inside) and connection box

##### MFC1.. design

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

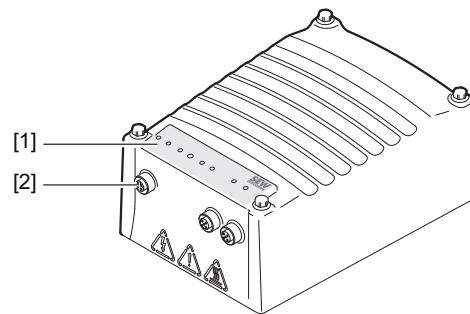


9007228030710027

- [1] Cable glands
- [2] Connection box
- [3] Connection for supply system
- [4] Line connection of drive units
- [5] Connector of connection unit for electronics cover (controller)
- [6] Electronics terminal strip
- [7] EtherCAT®/SBus<sup>PLUS</sup> system bus connection
- [8] Screws for PE connection
- [9] Electronics cover (controller)
- [10] SD memory card
- [11] Plug connectors
- [12] Nameplate of electronics cover (controller)
- [13] DIP switch S3

### 3.6.2 Electronics cover (outside)

The following figure shows an example of the electronics cover (controller) design:



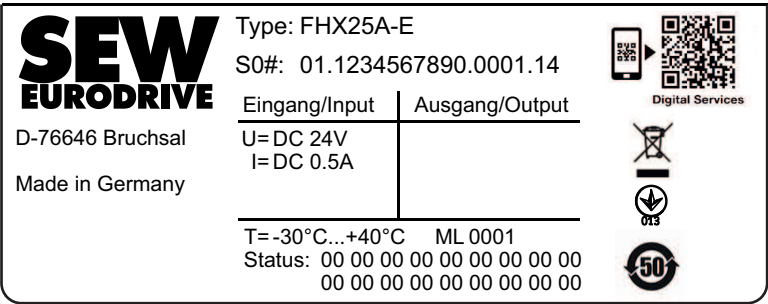
9007227776741899

- [1] LED displays
- [2] Plug connectors

### 3.7 Example nameplate and type designation of the electronics

#### 3.7.1 Nameplate

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



9007228725676555

#### 3.7.2 Type designation of the electronics cover (controller)

The following table shows the type designation of the electronics cover (controller):

<b>FHX</b>	<b>Product family</b> FHX = MOVI-C® FIELD CONTROLLER
<b>25</b>	<b>Power class of controller</b> 25 = standard 45 = advanced
<b>A</b>	<b>Communication version</b>
<b>-</b>	
<b>E</b>	<b>Communication type</b> E = EtherNet/IP™, Modbus TCP N = PROFINET IO



### 3.8 Example nameplate and type designation of the connection unit

#### 3.8.1 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".

Type: CUF1S-FHX-5X3-C  
S0#: 01.1234567890.0001.14  
00 00 00 00 00 00 00 00

9007228875314187

#### 3.8.2 Type designation of the connection unit

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

<b>CU</b>	<b>Product family</b> CU = Connection unit
<b>F</b>	<b>Hardware design</b> F = Design for decentralized controller (FHX)
<b>1</b>	<b>Size of the electronics cover</b> 1 = Suitable for electronics cover (controller)
<b>S</b>	<b>Fieldbus connection configuration</b> S = Fieldbus via M12 in the electronics cover (controller), system bus via MINI I/O plug connector
<b>–</b>	
<b>FHX</b>	<b>Variant</b> FHX = Decentralized controller
<b>–</b>	
<b>5</b>	<b>Connection voltage</b> 5 = AC 500 V
<b>X</b>	<b>Interference suppression</b> X = Without basic interference suppression
<b>3</b>	<b>Connection type</b> 3 = 3-phase
<b>–</b>	
<b>C</b>	<b>Version</b>

## 4 Mechanical installation

### 4.1 Installation notes



#### INFORMATION

Adhere to the safety notes during installation.



#### ⚠ WARNING

Improper installation/disassembly of the device and mount-on components.  
Serious injuries.

- Adhere to the notes about installation and disassembly.

### 4.2 Required tools and resources

- Set of wrenches, set of screwdrivers, set of socket wrenches
- Torque wrench
- Compensation elements (washers and spacing rings), if necessary
- Standard parts are not included in the delivery

### 4.3 Tolerances for torque ratings

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

### 4.4 Installation requirements

Check that the following conditions have been met:

- The information on the nameplate of the device corresponds to the line voltage.
- The device is undamaged (no damage caused by transport or storage).
- The ambient temperature corresponds to the operating instructions and nameplate.
- The device must not be installed in the following ambient conditions:
  - Potentially explosive atmosphere
  - Oils
  - Acids
  - Gases
  - Vapors
  - Radiation
- For special designs: The device is designed in accordance with the actual ambient conditions.

## 4.5 Installing the device

### 4.5.1 Notes

- Only install the device on a level, low-vibration, and torsionally rigid support structure.
- Check the validity of the degree of protection using the information in the operating instructions and the data on the nameplate.
- Ensure that cooling air supply is unobstructed and that air discharged by other units does not influence cooling.
- Use suitable cable glands for the supply leads (use reducing adapters if necessary).
- Seal the cable entries properly.
- Clean the sealing surfaces of the cover before reinstalling it.
- Observe the information of Directive VDI 2230-1 on determining the tightening torques for mounting the drive unit to the application.

### 4.5.2 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.

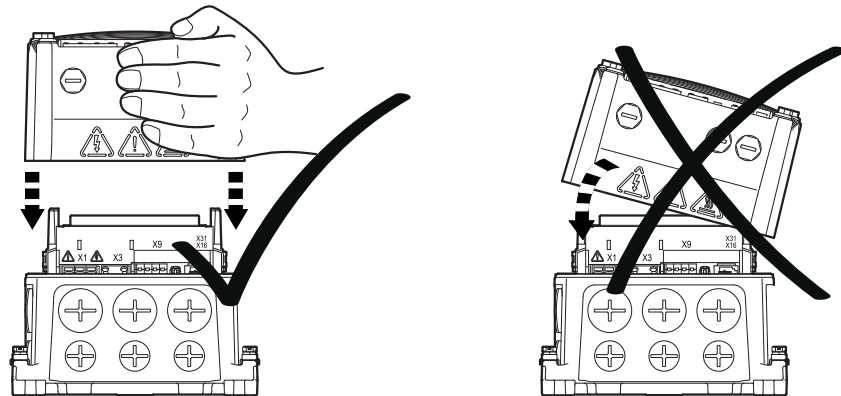
- When the cover is removed from the connection box, you have to protect the cover and the wiring space from humidity, dust or foreign particles.
- Make sure that the cover is mounted properly.

### 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.

#### MFC1.. design

The following figure shows how to correctly place the electronics cover onto the connection box:



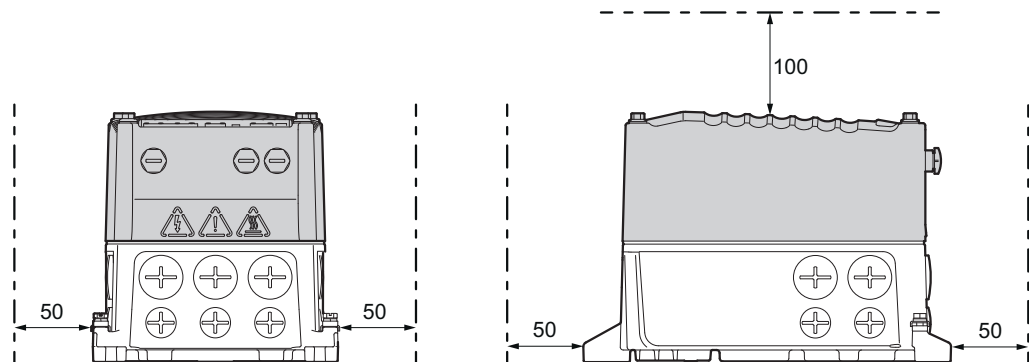
28776924683

### Minimum installation clearance

Note the minimum installation clearance required to remove the electronics cover. For detailed dimension drawings, see chapter "Technical data and dimension sheets".

#### MFC1.. design

The following figure shows the minimum clearances when installing the device:

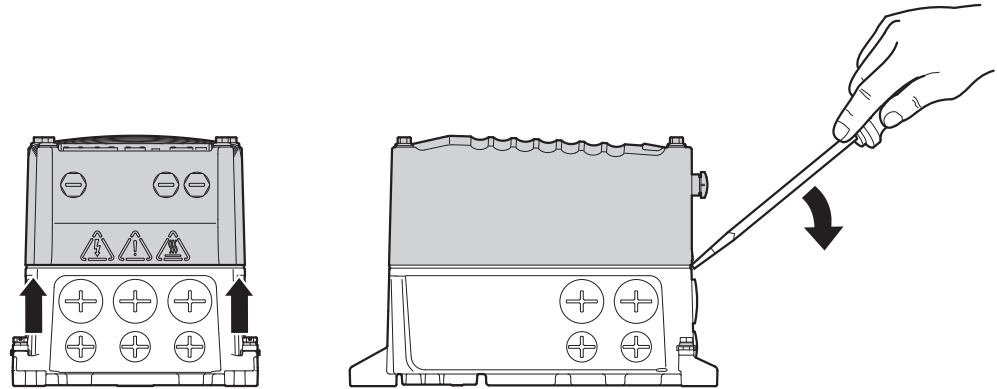


32834203659

### Removing the electronics cover

*MFC1.. design*

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

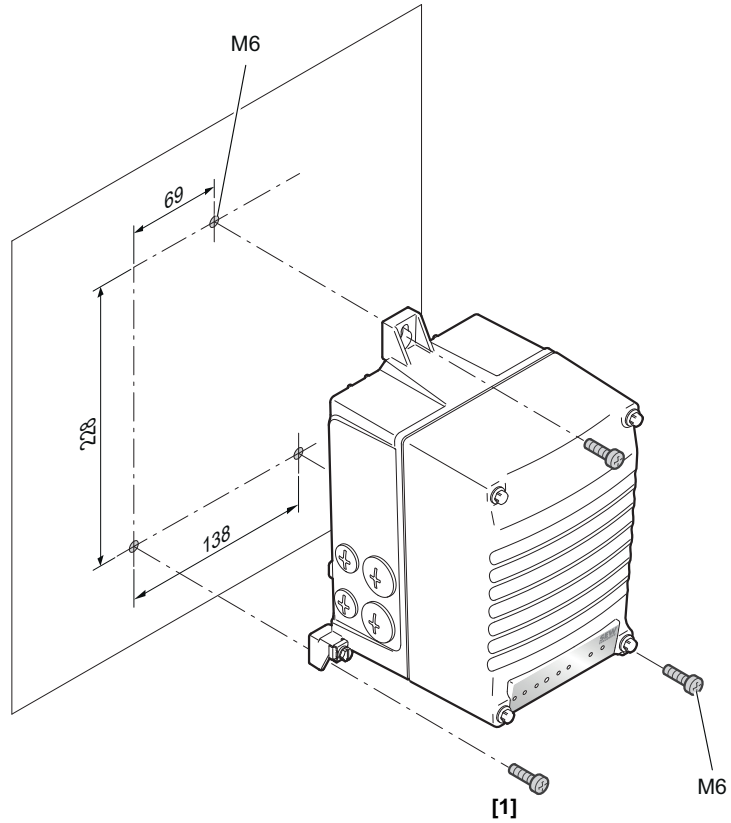


28776928523

## 4.6 Mounting the device

### 4.6.1 MFC1.. design

The following figure shows the mounting dimensions for the device:



[1] Hex head screws 3 × M6 (torque: 10 Nm)

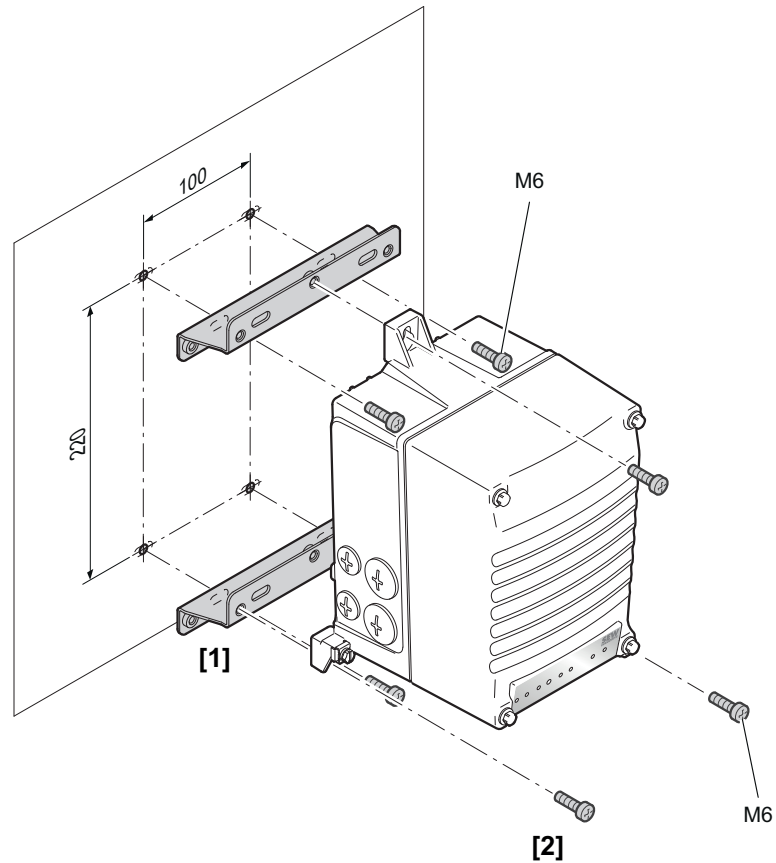
32522307211



## 4.7 Mounting the device with spacers

### 4.7.1 MFC1.. design

The following figure shows the mounting dimensions for the device with spacers:



31263212171

- [1] Spacers (stainless steel)  
(available for delivery from SEW-EURODRIVE, part number: 28266129,  
scope of delivery: 2 spacers, 4 hex head screws M6 × 20,  
stainless steel)
- [2] Hex head screws 4 × M6 (torque: 8.5 Nm)

## 4.8 Tightening torques



### ⚠ WARNING

Risk of burns due to hot surfaces.

Serious injuries.

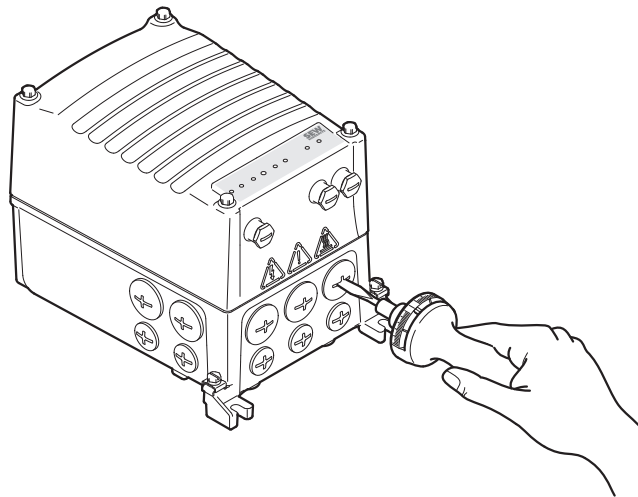
- Let the devices cool down before touching them.

### 4.8.1 Blanking plugs

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

#### MFC1.. design

The following figure shows the blanking plugs for the device:



9007227787152651

#### 4.8.2 Cable glands

##### Tightening torques

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

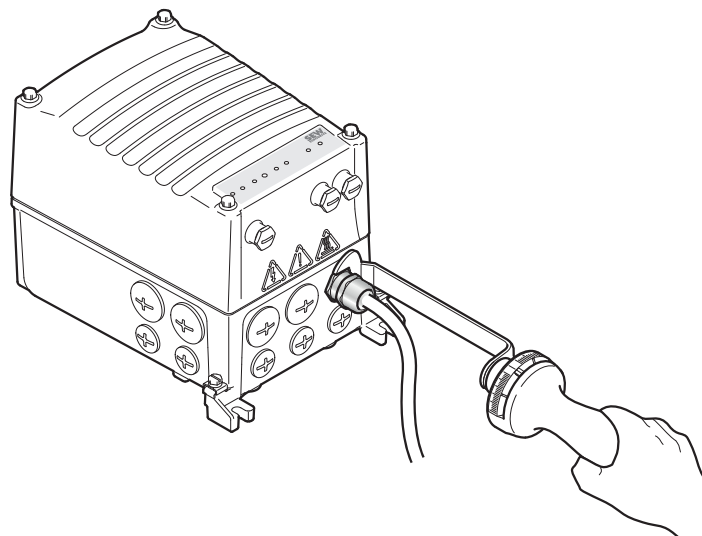
Screw fitting	Part number	Content	Size	Outer cable diameter	Tightening torque
<b>EMC cable glands (nickel-plated brass)</b>	18204783	10 pieces	M16 × 1.5	5 to 9 mm	4.0 Nm
	18204805	10 pieces	M25 × 1.5	11 to 16 mm	7.0 Nm
<b>EMC cable glands (stainless steel)</b>	18216366	10 pieces	M16 × 1.5	5 to 9 mm	4.0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

##### MFC1.. design

The following figure shows the cable glands of the device:



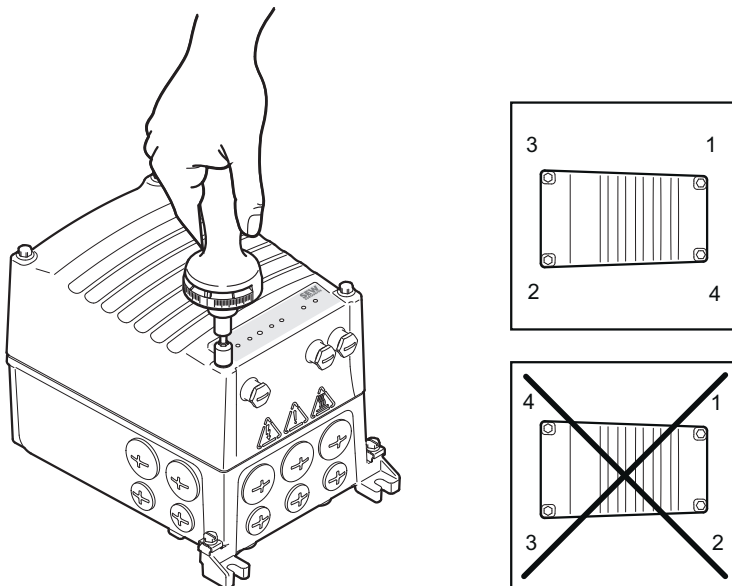
9007227787431051

### 4.8.3 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.

#### MFC1.. design

The following figure shows how to screw on the electronics cover:



9007227787439499

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

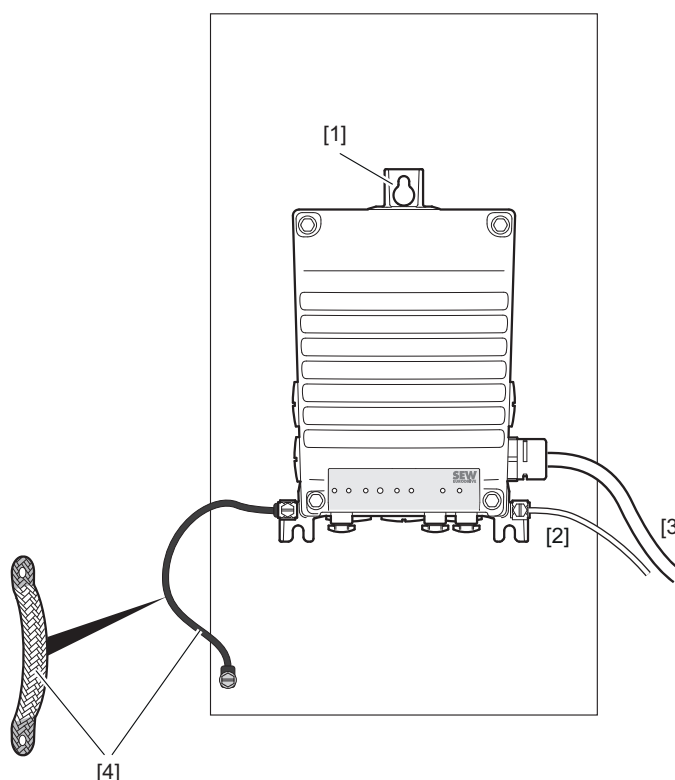
## INFORMATION



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

### MFC1.. design

The following figure shows a connection over a wide surface area between the mounting plate and the device:

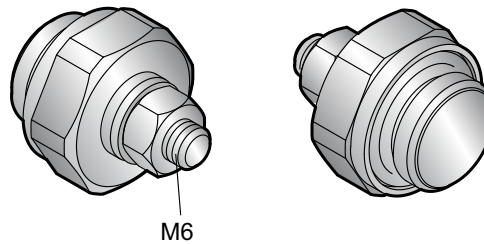


28713959179

- [1] Conductive connection over a wide surface between the device and the mounting plate, in case the entire contact surface is conductive (e.g. unpainted).
- [2] Second PE conductor via separate terminals (optional)
- [3] PE conductor in the supply system cable
- [4] EMC-compliant equipotential bonding, for example using a ground strap (HF litz wire). The contact surfaces must be conductive (free of paint).

## 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:



3884960907

	Tightening torque of the cable gland	Tightening torque of the M6 nut for stud bolt	Part number
<b>M16 cable gland with M6 stud bolt</b>	4.0 Nm	3.0 Nm	08189234
<b>M25 cable gland with M6 stud bolt</b>	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	Can be used without restrictions
IT systems – voltage systems with non-grounded star point	Contact SEW-EURODRIVE
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\_a, X1\_b

Observe the permitted cable cross sections for installation:

Line terminals X1_a, X1_b	Without conductor end sleeve	With conductor end sleeve (with or without plastic collar)
Connection cross sec- tion	0.5 mm <sup>2</sup> – 6 mm <sup>2</sup>	0.5 mm <sup>2</sup> – 6 mm <sup>2</sup>
Stripping length	13 mm – 15 mm	

#### Control terminals X9

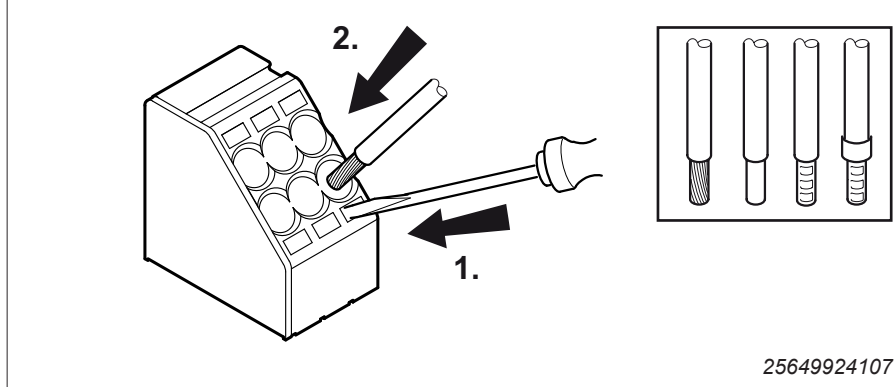
Observe the permitted cable cross sections for installation:

Control terminals X9	Without conductor end sleeve	With conductor end sleeve (without plastic collar)	With conductor end sleeves (with plastic collar)
Connection cross sec- tion	0.08 mm <sup>2</sup> – 2.5 mm <sup>2</sup>	0.25 mm <sup>2</sup> – 2.5 mm <sup>2</sup>	0.25 mm <sup>2</sup> – 1.5 mm <sup>2</sup>
Stripping length	5 mm – 6 mm		

### 5.3.4 Actuating the line terminals X1\_a, X1\_b

Adhere to the following sequence when actuating the line terminals X1\_a and X1\_b:

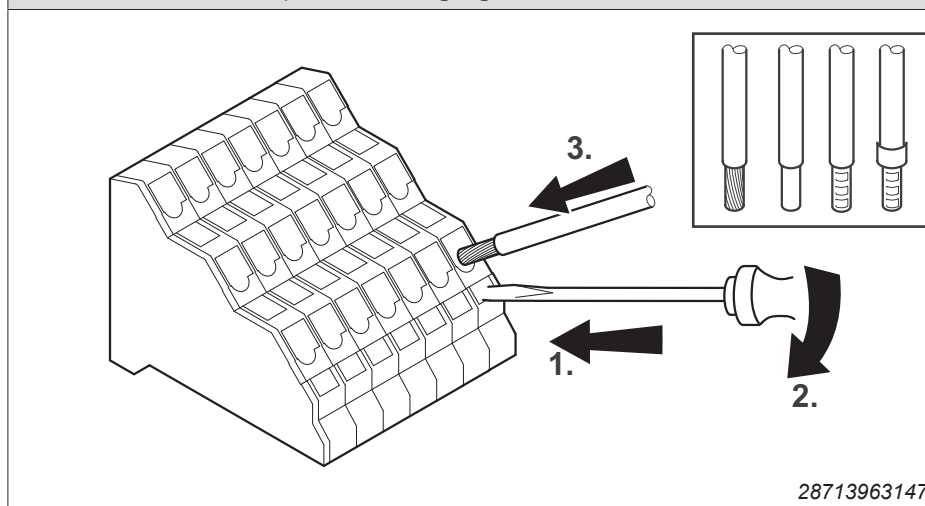
**Line terminals X1\_a and X1\_b**  
(the following figure shows a schematic illustration)



### 5.3.5 Actuating control terminals X9

Adhere to the following sequence when actuating the X9 control terminals:

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



### 5.3.6 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.

### 5.3.7 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 AC-3 (EN 60947-4-1) as a line contactor.

## 5.3.8 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 <sup>1)</sup> Permitted for all cross sections	Assembly with solid connecting wire <sup>1)</sup> Permitted for cross sections up to max. 2.5 mm <sup>2</sup>

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.

### 5.3.9 Installation above 1000 m asl

You can install the drive units at altitudes from 1000 m to a maximum of 3800 m above sea level provided that the following conditions are met.<sup>1)</sup>

- The nominal 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 dielectric strength due to the lower air density.

### 5.3.10 Protection devices

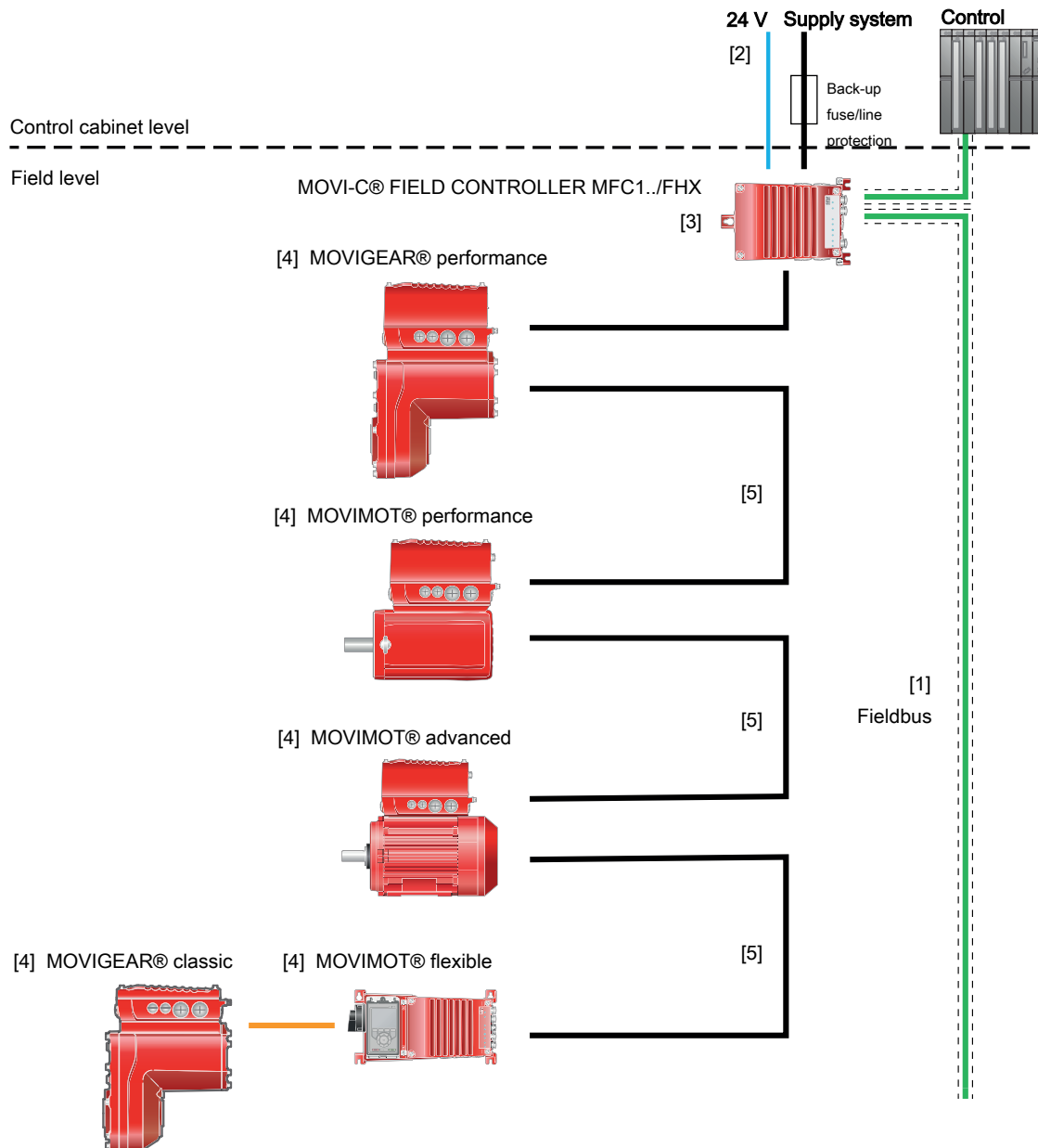
- The units come equipped with integrated protection devices against overload.
- Cable protection for the power cable must be implemented using external overload devices.
- Observe the relevant standards concerning the cable cross section, voltage drop and installation type.

### 5.3.11 UL-compliant installation (in preparation)

The UL and cUL approval for the MOVI-C® FIELD CONTROLLER standard/advanced device series is in preparation.

## 5.4 Installation topology (example: standard installation)

The following figure shows a basic installation topology with the device:

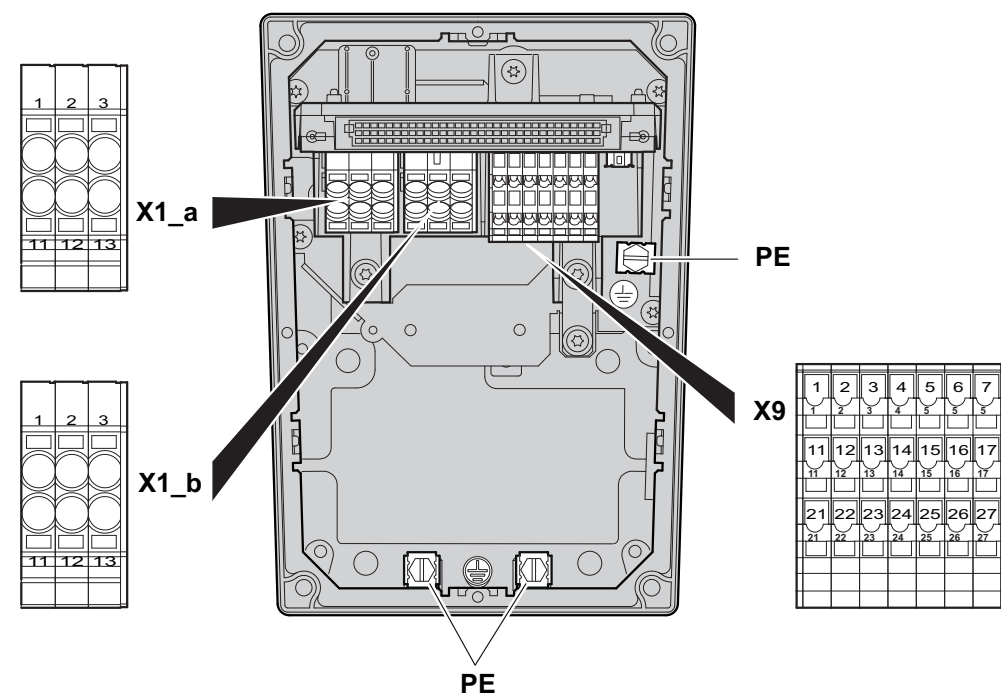


27021626478764555

- [1] The maximum permitted cable length between the controller (PLC) and the MOVI-C® FIELD CONTROLLER is 100 m. The cable length may be reduced due to the technical data of the controller (PLC).
- [2] The MOVI-C® FIELD CONTROLLER is not equipped with an integrated DC 24 V supply. The electronics must be supplied externally with DC 24 V.
- [3] Decentralized motion and logic controller
- [4] MOVI-C® decentralized drive technology
- [5] PAC hybrid cable for 400 V power supply, DC 24 V supply and EtherCAT®/SBus<sup>PLUS</sup> communication

5.5 Terminal assignment

The following figure shows the terminal assignment in the connection box of the device:



32854784011

Assignment				
Terminal	No.	Name	Marking	Function
X1_a line terminals	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
X1_b line terminals (in connection with switch disconnecter disconnectable)	1	L1	Brown	Line connection of drive units, phase L1
	2	L2	Black	Line connection of drive units, phase L2
	3	L3	Gray	Line connection of drive units, phase L3
	11	L1	Brown	Line connection of drive units, phase L1
	12	L2	Black	Line connection of drive units, phase L2
	13	L3	Gray	Line connection of drive units, phase L3
⏏	–	PE	–	PE connection

29186668/EN – 07/2020

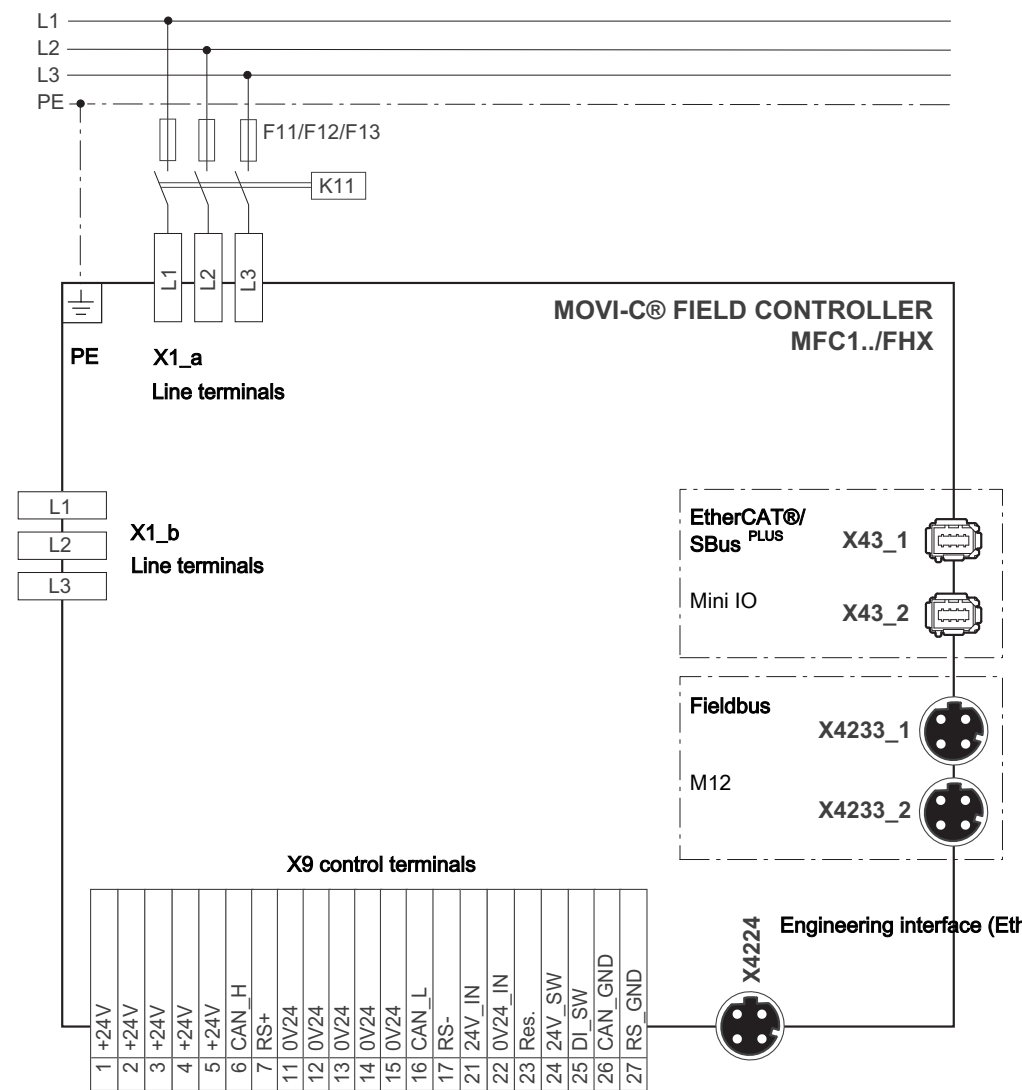
Assignment				
Terminal	No.	Name	Marking	Function
<b>X9 control terminals</b>	1	+24V	–	DC 24 V voltage
	2	+24V	–	DC 24 V voltage
	3	+24V	–	DC 24 V voltage
	4	+24V	–	DC 24 V voltage
	5	+24V	–	DC 24 V voltage
	6	CAN_H	–	CAN data cable (high), electrically isolated
	7	RS+	–	RS485 data cable (+), electrically isolated
	11	0V24	–	0V24 reference potential
	12	0V24	–	0V24 reference potential
	13	0V24	–	0V24 reference potential
	14	0V24	–	0V24 reference potential
	15	0V24	–	0V24 reference potential
	16	CAN_L	–	CAN data cable (low), electrically isolated
	17	RS-	–	RS485 data cable (-), electrically isolated
	21	24V_IN	–	DC 24 V voltage (IN)
	22	0V24_IN	–	0V24 reference potential (IN)
	23	res.	–	Reserved for internal connection <sup>1)</sup>
	24	24V_SW	–	Reserved for internal connection <sup>1)</sup> DC 24 V for feedback contact of switch dis- connector
	25	DI_SW	–	Reserved for internal connection <sup>1)</sup> input, feedback contact of switch discon- nector
	26	CAN_GND	–	Reference potential for CAN data cable, electrically isolated
	27	RS_GND	–	Reference potential for RS485 data cable, electrically isolated

1) Only for internal wiring. The signal is not approved for connection or use at the customer site.



5.6 Connection diagram

The following figure shows the connections of the device:



18014427652706443

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

## 5.7 Cable routing and cable shielding

### 5.7.1 Installation with separately routed Ethernet cable

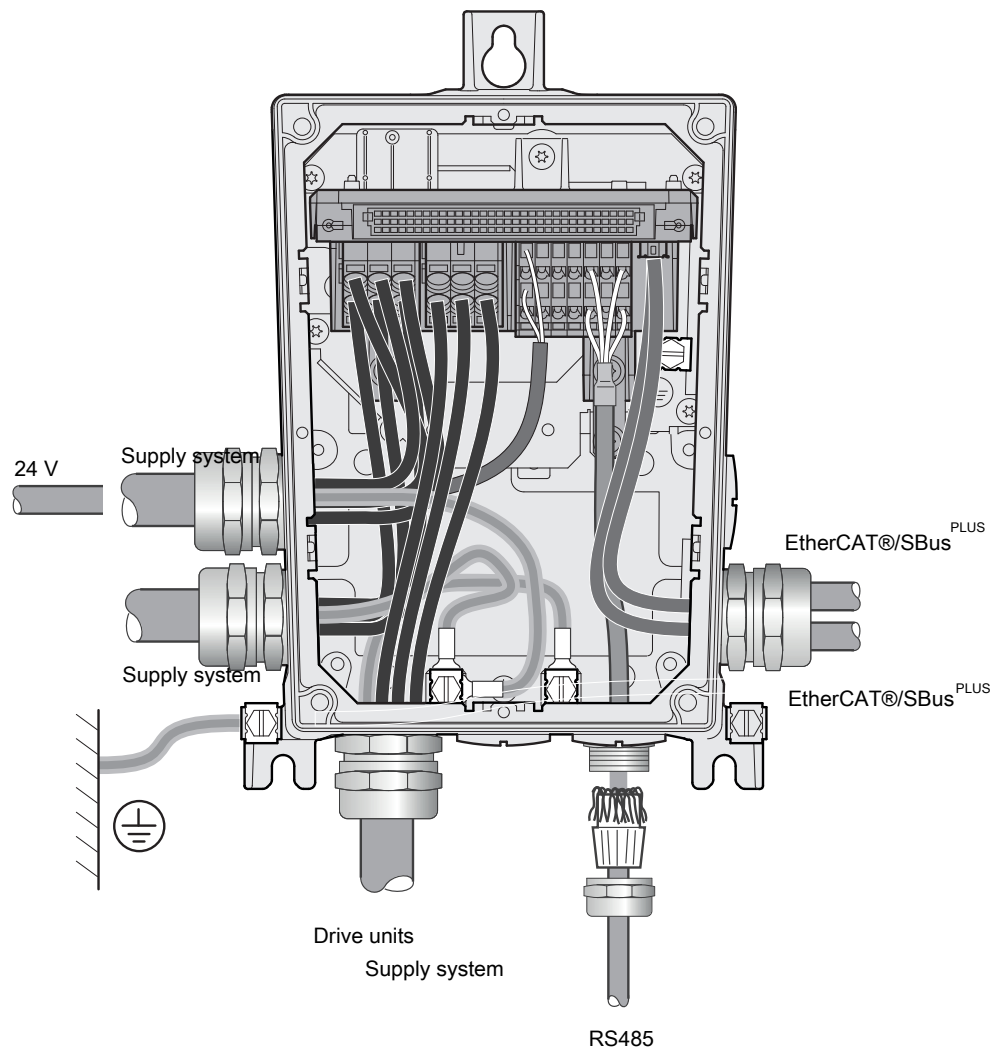
#### Notes on cable routing and shielding – Recommended cable routing

Note the following when routing and shielding the cables:

- Cable selection
  - For cable selection, note the chapter "Technical data and dimension sheets/ specification of recommended Ethernet connection cable" in the operating instructions.
  - You can use unshielded connection cables for the supply system connection.
- Cable shielding
  - Connect the cable shields to the optionally available EMC cable glands, see chapter "Cable glands".
- Observe the permitted bending radii of the installed cables for cable routing.

#### Connections

The following figure shows the connections of the device:



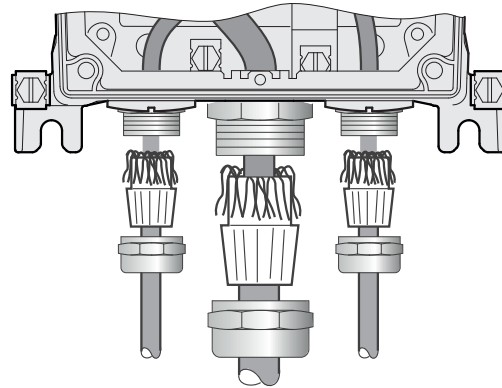
32455333131

29186668/EN – 07/2020

## 5.8 EMC cable glands

### 5.8.1 Cable shielding

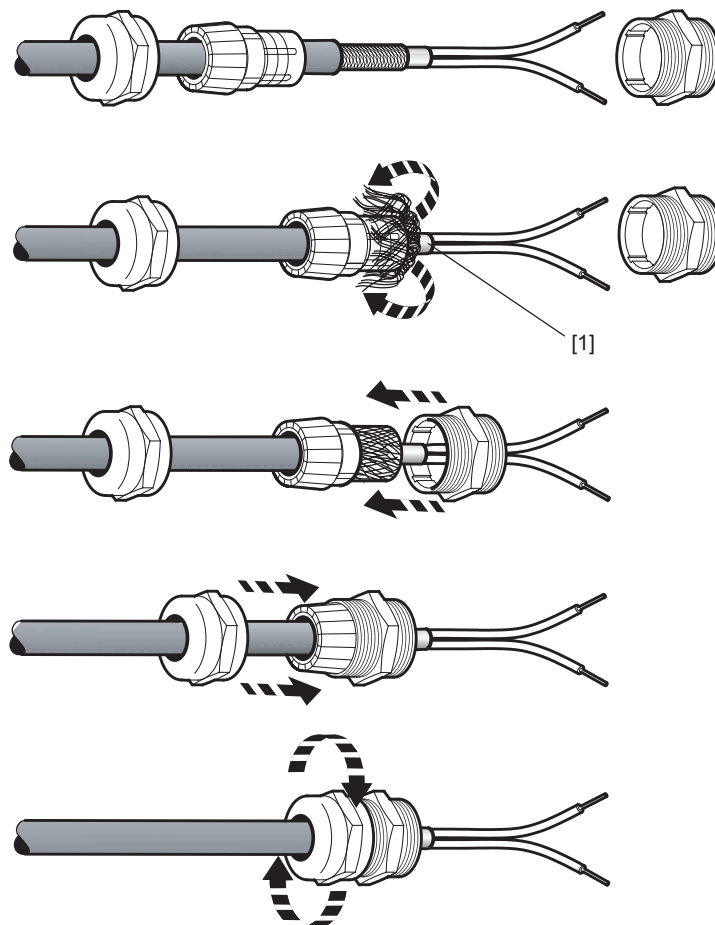
For shielded cables, it is best to use EMC cable glands to connect the shield. EMC cable glands are available as option.



31658642315

### 5.8.2 Assembly of EMC cable glands

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



18014401170670731

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

### 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:

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

### 5.9.3 Connection cables

## INFORMATION



For more information about cable types, see 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:

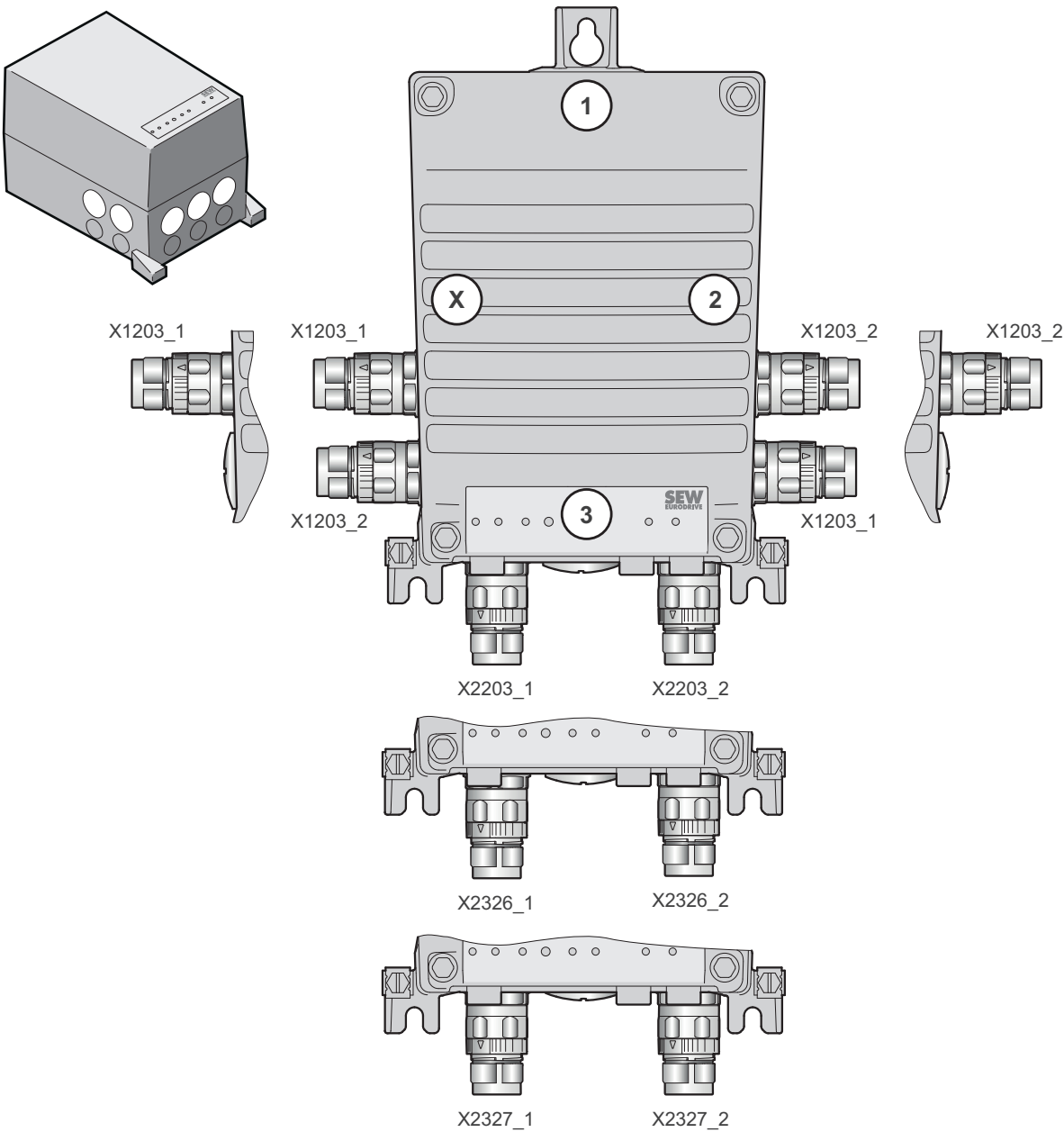
- IEC 60309
- IEC 61984

5.9.4 Plug connector positions at the connection box

MFC1.. design

Cable entries M25

The following figure depicts the possible plug connector positions for the M25 cable entries:



9007228086482059

Plug connectors				Not together at a position with the plug connector:
Designation	Coding ring/ color	Function	Position	
X1203_1	Black	AC 400 V connection <sup>1)</sup>	X or 2	–
X1203_2	Black	AC 400 V connection	X or 2	–

29186668/EN – 07/2020

Plug connectors				Not together at a position with the plug connector:
Designation	Coding ring/ color	Function	Position	
X2203_1	Black	AC 400 V connection drive units <sup>2)</sup>	3	<ul style="list-style-type: none"> <li>• X2326_1</li> <li>• X2327_1</li> </ul>
X2203_2	Black	AC 400 V connection drive units	3	<ul style="list-style-type: none"> <li>• X2326_2</li> <li>• X2327_2</li> </ul>
X2326_1	Gray/green	PAC hybrid connection(OUT) drive units AC 400 V connection DC 24 V backup voltage and Ethernet <sup>3)</sup>	3	<ul style="list-style-type: none"> <li>• X2203_1</li> <li>• X2327_1</li> </ul>
X2326_2	Gray/green	PAC hybrid connection(OUT) drive units AC 400 V connection DC 24 V backup voltage and Ethernet	3	<ul style="list-style-type: none"> <li>• X2203_2</li> <li>• X2327_2</li> </ul>
X2327_1	Black/green	PA hybrid connection(OUT) drive units AC 400 V connection DC 24 V backup voltage and Ethernet <sup>4)</sup>	3	<ul style="list-style-type: none"> <li>• X2203_1</li> <li>• X2326_1</li> </ul>
X2327_2	Black/green	PA hybrid connection(OUT) drive units AC 400 V connection DC 24 V backup voltage and Ethernet	3	<ul style="list-style-type: none"> <li>• X2203_2</li> <li>• X2326_2</li> </ul>

1) Plug connector X1203\_1 can also be ordered individually (i.e. without plug connector X1203\_2).

2) Plug connector X2203\_1 can also be ordered individually (i.e. without plug connector X2203\_2).

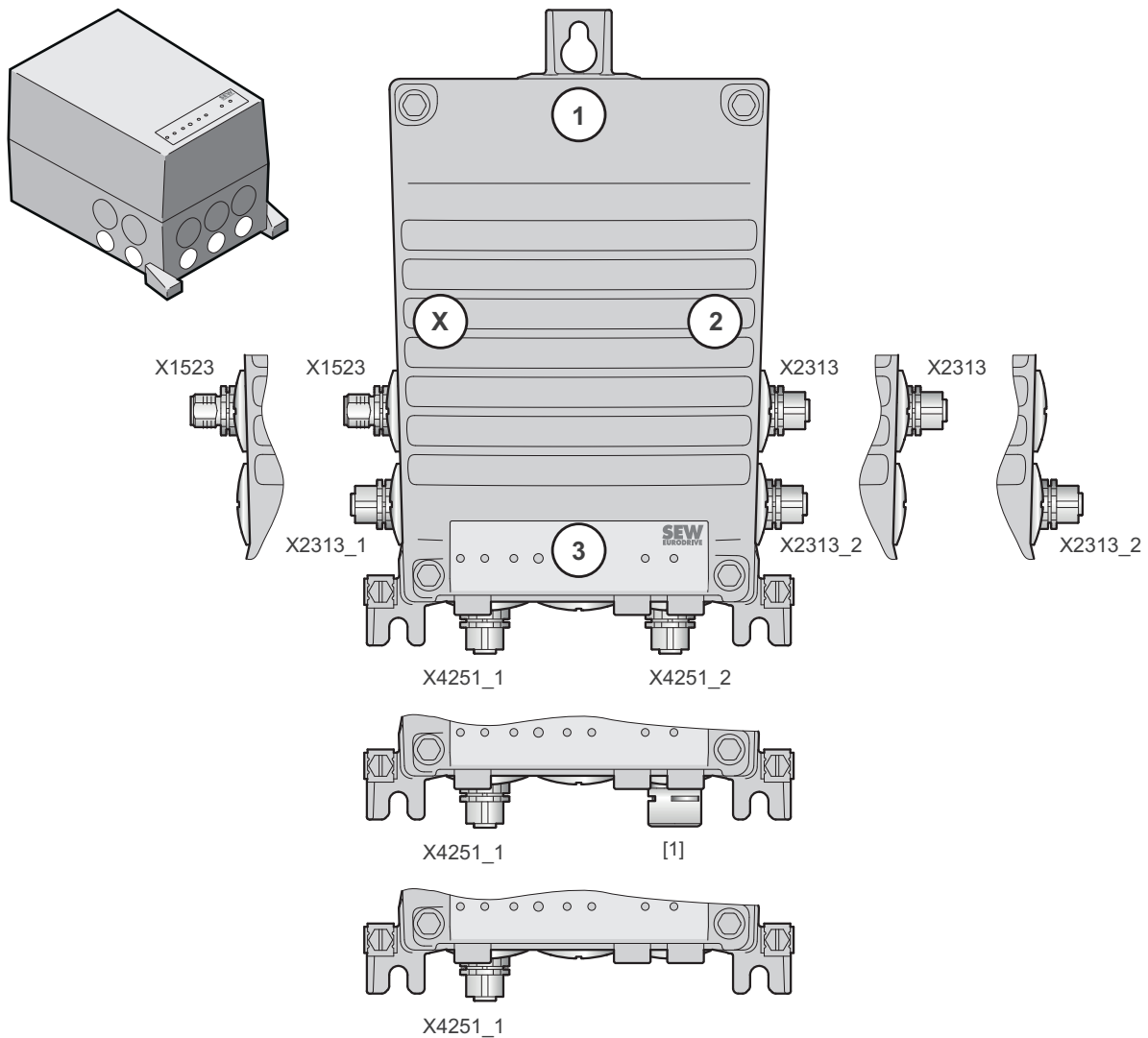
3) Plug connector X2326\_1 can also be ordered individually (i.e. without plug connector X2326\_2).

4) Plug connector X2327\_1 can also be ordered individually (i.e. without plug connector X2327\_2).



### Cable entries M16

The following figure depicts the possible plug connector positions for the M16 cable entries:



32826186379

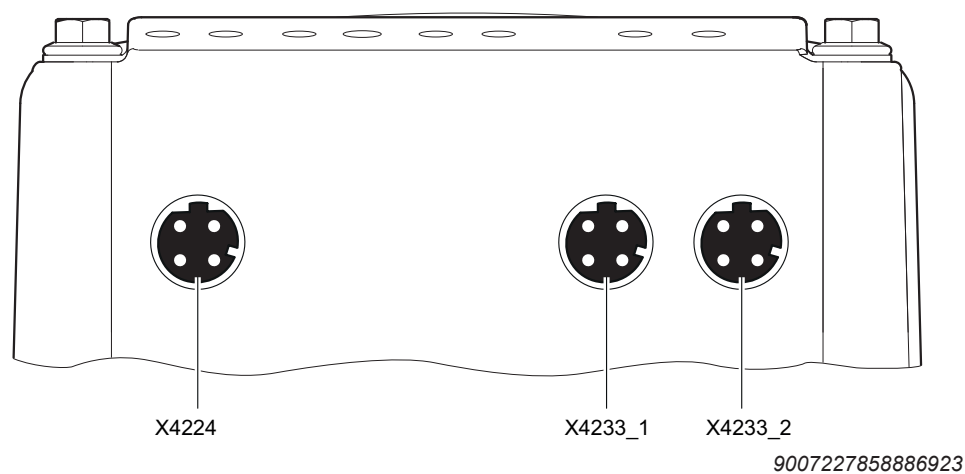
Plug connectors				Not together at a position with the plug connector:
Designation	Coding ring/ color	Function	Position	
X1523	Black	DC 24 V backup voltage - input <sup>1)</sup>	X	—
X2313	Black	DC 24 V backup voltage - output (for further looping)	2	—
X2313_1	Black	DC 24 V backup voltage - output connection of drive units <sup>2)</sup>	X	—
X2313_2	Black	DC 24 V backup voltage - output connection of drive units	2	—
X4251_1	—	EtherCAT®/SBus <sup>PLUS</sup> connection of drive units <sup>3)</sup>	3	—

Plug connectors				Not together at a position with the plug connector:
Designation	Coding ring/ color	Function	Position	
X4251_2	–	EtherCAT®/SBus <sup>PLUS</sup> connection of drive units	3	Optional pressure compensation
–	–	[1] Optional pressure compensation	3	X4251_2

- 1) Plug connector X1523 can also be ordered individually (i.e. without plug connector X2313).
- 2) Plug connector X2313\_1 can also be ordered individually (i.e. without plug connector X2313\_2).
- 3) Plug connector X4251\_1 can also be ordered individually (i.e. without plug connector X4251\_2).

### 5.9.5 Plug connector positions at the electronics cover

The following figure shows the plug connector positions on the electronics cover:



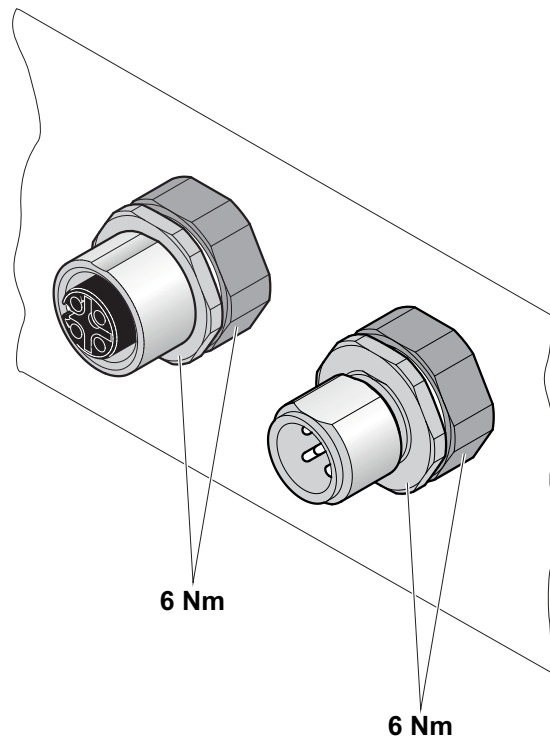
Plug connectors	Function
X4224	Engineering interface (Ethernet)
X4233_1	Fieldbus/Ethernet interface, port 1
X4233_2	Fieldbus/Ethernet interface, port 2

### 5.9.6 Plug connector variants

#### M12 plug connector at the connection box

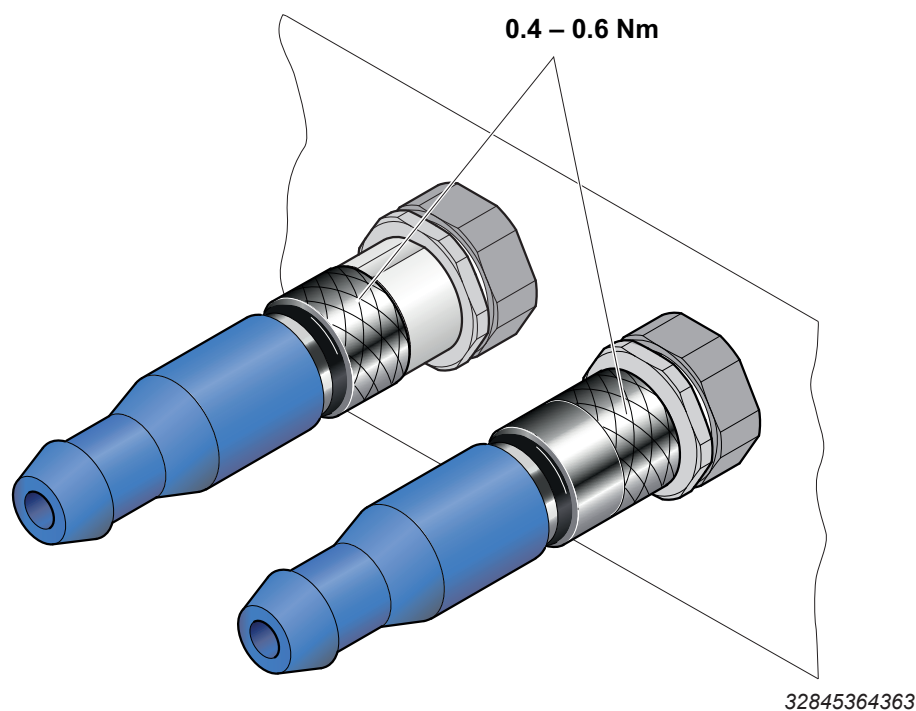
M12 plug connectors at the connection box are pre-installed so they match the connection cables provided by SEW-EURODRIVE. Customers can adjust the orientation of plug connectors if required.

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



19443420299

## M12 plug connector with mating connector



## INFORMATION



The M12 plug connectors are usually tightened with a torque of 0.4 – 0.6 Nm. Observe the data sheet of the used prefabricated cables.

## M23 plug connector



### ⚠ CAUTION

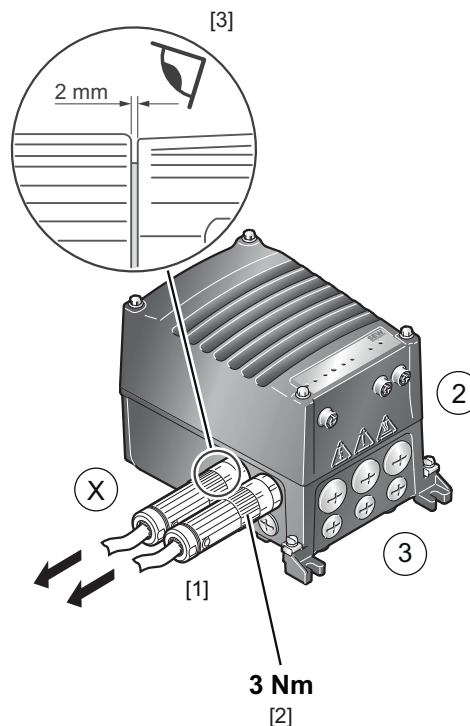
Loss of the guaranteed degree of protection.

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.

M23 plug connectors are available in the plug connector design "Straight".

## MFC1.. design



31391558155

[1] "Straight" design

[2] The tightening torque for the union nut is 3 Nm.

You can order suitable tools from TE Connectivity - Intercontec products using the following purchase order number:

- Torque wrench 3 Nm, 1/4" external square driver: C1.020.00
- Spanner wrench 1/4" square socket, suitable to the 923/723 series with SpeedTec equipment: C6.216.00

[3] There is a gap of 2 mm between plug connector and socket

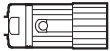
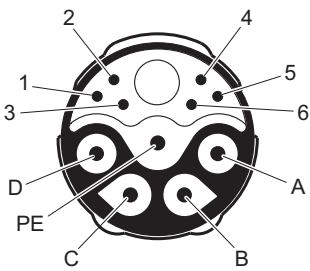
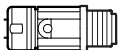
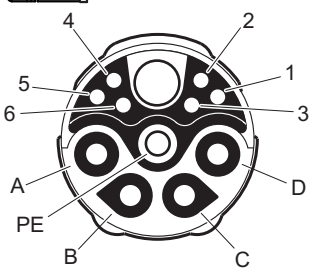
### 5.9.7 Using plug connectors assembled by yourself

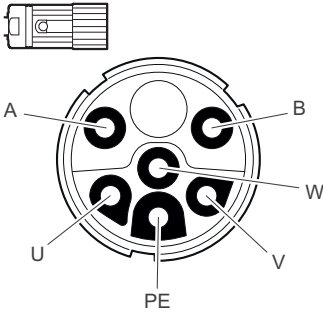
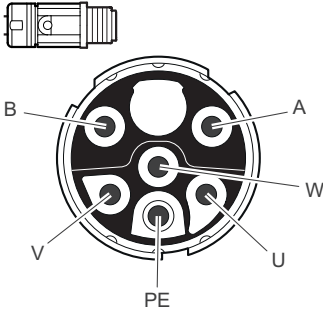
The power plug connectors for assembling connection cables yourself, and the corresponding assembly tool set is available for order from TE Connectivity - Intercontec products.

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 mm <sup>2</sup> - 4.0 mm <sup>2</sup>	H 51 A 019 MR 02 59 0102 000
	Cable socket (female/male thread)  	9.5 mm - 14.5 mm / 2.5 mm <sup>2</sup> - 4.0 mm <sup>2</sup>	H 51 A 019 MR 02 42 0102 000
		9.5 mm - 14.5 mm / 0.35 mm <sup>2</sup> - 2.5 mm <sup>2</sup>	H 52 A 013 FR 17 42 0102 000
		14 mm - 17 mm / 2.5 mm <sup>2</sup> - 4.0 mm <sup>2</sup>	H 52 A 013 FR 02 59 0102 000
		9.5 mm - 14.5 mm / 2.5 mm <sup>2</sup> - 4.0 mm <sup>2</sup>	H 52 A 013 FR 02 42 0102 000
		9.5 mm - 14.5 mm / 0.35 mm <sup>2</sup> - 2.5 mm <sup>2</sup>	H 51 A 019 MR 12 42 0102 000
PAC hybrid plug con- nector Coding ring: Gray/ green		—	Not approved for assembly by customer

Plug connector type		Cable outer diameter/ core cross section of crimp contacts	Designation for order from the supplier TE Connectivity - Intercontec products
PA hybrid plug connector  Coding ring: Black/ green	Cable socket (female/ union nut) 	14 mm - 17 mm / 2.5 mm <sup>2</sup> - 4.0 mm <sup>2</sup> 0.35 mm <sup>2</sup> - 2.5 mm <sup>2</sup>	H 51 A 655 FR 20 92 0113 000
		14 mm - 17 mm / 0.35 mm <sup>2</sup> - 2.5 mm <sup>2</sup>	H 51 A 655 FR 23 59 0113 000
	Cable plug (male/male thread) 	14 mm - 17 mm / 2.5 mm <sup>2</sup> - 4.0 mm <sup>2</sup> 0.35 mm <sup>2</sup> - 2.5 mm <sup>2</sup>	H 52 A 656 MR 24 92 0113 000
		14 mm - 17 mm / 0.35 mm <sup>2</sup> - 2.5 mm <sup>2</sup>	H 52 A 656 MR 23 59 0113 000

## 5.10 Assignment of the optional plug connectors



### ⚠ 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:

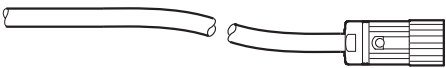

Function		
AC 400 V connection for supplying the device/for looping through		
Connection type		
M23, SEW insert, 723 series, SpeedTec-capable, company: TE/Intercontec, female, coding ring: black, protected against contact		
Connection diagram		
Assignment		
Contact	Signal	Description
A	L1	Line connection, 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



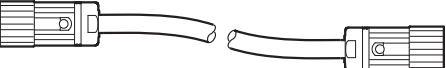

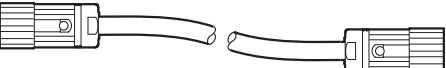
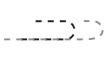
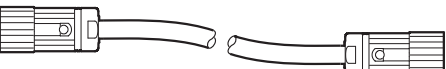

## Connection cables

The following tables list the cables available for this connection:

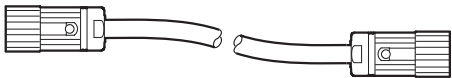
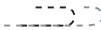
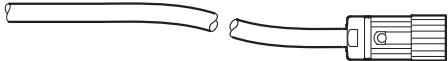

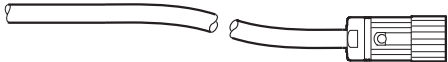

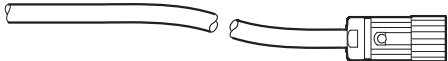

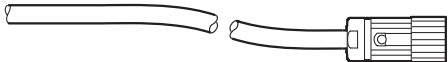

### Cable cross section 1.5 mm<sup>2</sup>

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>Open</p> <p>M23, coding ring: black, male</p>	CE: 18180094	HELUKABEL® JZ-600	Variable 	1.5 mm <sup>2</sup> / AC 500 V

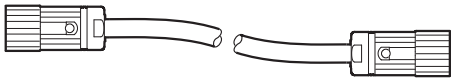

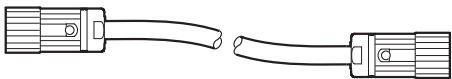
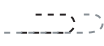
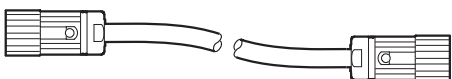

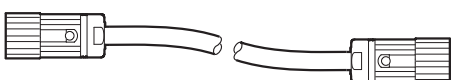
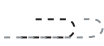
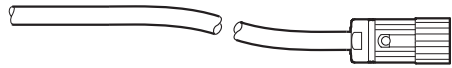

### Cable cross section 2.5 mm<sup>2</sup>

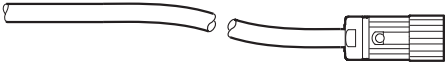
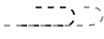
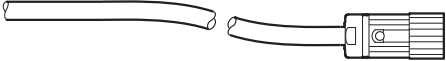


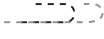
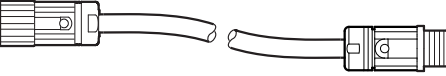
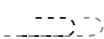
Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, male</p>	CE: 18127460	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, male</p>	CE: 18133959	HELUKABEL® TOPFLEX® – 611-PUR (halogen-free)	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, male</p>	UL: 18153267	HELUKABEL® – JZ-602	Variable 	2.5 mm <sup>2</sup> / AC 500 V

29186668/EN – 07/2020

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, male</p>	UL: 18153275	HELUKABEL® MULTIFLEX® – 512	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	CE: 18127479	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	CE: 18133967	HELUKABEL® TOPFLEX® – 611-PUR (halogen-free)	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	UL: 18153283	HELUKABEL® – JZ-602	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	UL: 18153291	HELUKABEL® MULTIFLEX® – 512	Variable 	2.5 mm <sup>2</sup> / AC 500 V


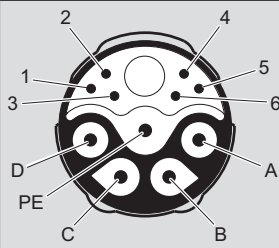
Cable cross section 4.0 mm<sup>2</sup>

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross-sec- tion/operat- ing voltage
 M23, coding ring: black, male M23, coding ring: black, male	CE: 18127487 CE: 18133975	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	4 mm <sup>2</sup> / AC 500 V
 M23, coding ring: black, male M23, coding ring: black, male	CE: 18133975	HELUKABEL® TOPFLEX® – 611-PUR (Halogen-free)	Variable 	4 mm <sup>2</sup> / AC 500 V
 M23, coding ring: black, male M23, coding ring: black, male	UL: 18153305	HELUKABEL® – JZ-602	Variable 	4 mm <sup>2</sup> / AC 500 V
 M23, coding ring: black, male M23, coding ring: black, male	UL: 18153313	HELUKABEL® MULTIFLEX® – 512	Variable 	4 mm <sup>2</sup> / AC 500 V
 Open M23, coding ring: black, male	CE: 18127495	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	4 mm <sup>2</sup> / AC 500 V

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross-sec- tion/operat- ing voltage
 <p>Open</p> <p>M23, coding ring: black, male</p>	CE: 18133983	HELUKABEL® TOPFLEX® – 611-PUR (Halogen-free)	Variable 	4 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	UL: 18153321	HELUKABEL® – JZ-602	Variable 	4 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	UL: 18153348	HELUKABEL® MULTIFLEX® – 512	Variable 	4 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, female</p>	UL: 18166318	HELUKABEL® MULTIFLEX® – 512	Variable 	4 mm <sup>2</sup> / AC 500 V

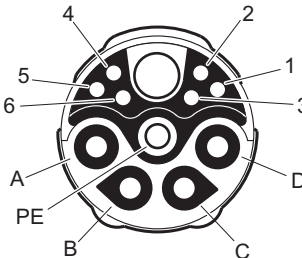
### Connection of cables with open end

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 mm <sup>2</sup> 2.5 mm <sup>2</sup>	1	Not pre- fabricated	Line connection, phase L1	L1	A
Black 1.5 mm <sup>2</sup> 2.5 mm <sup>2</sup>	2	Not pre- fabricated	Line connection, phase L2	L2	B
Black 1.5 mm <sup>2</sup> 2.5 mm <sup>2</sup>	3	Not pre- fabricated	Line connection, phase L3	L3	C
Green/yel- low 1.5 mm <sup>2</sup> 2.5 mm <sup>2</sup>	—	Not pre- fabricated	PE connection	PE	PE

## 5.10.2 X2203\_1 and X2203\_2: AC 400 V connection

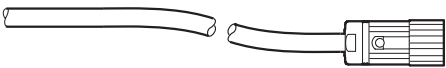

The following table shows information about this connection:

Function		
AC 400 V connection for supplying connected devices and drive units.		
Connection type		
M23, SEW insert, 723 series, SpeedTec equipment, company: TE Connectivity - Intercontec products, female, coding ring: black, protected against contact		
Connection diagram		
		
Assignment		
Contact	Signal	Description
A	L1	Line connection of drive units, phase L1
B	L2	Line connection of drive units, phase L2
C	L3	Line connection of drive units, 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

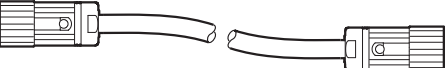

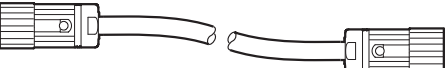
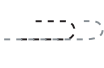
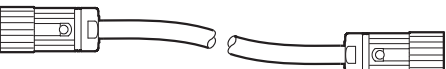

## Connection cables

The following tables list the cables available for this connection:

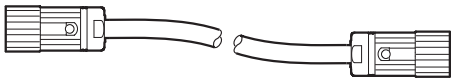
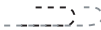
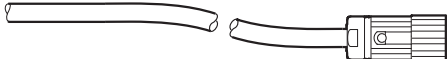


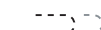



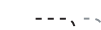
### Cable cross section 1.5 mm<sup>2</sup>

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>Open</p> <p>M23, coding ring: black, male</p>	CE: 18180094	HELUKABEL® JZ-600	Variable 	1.5 mm <sup>2</sup> / AC 500 V

### Cable cross section 2.5 mm<sup>2</sup>

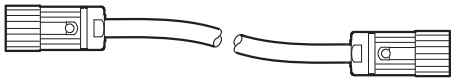

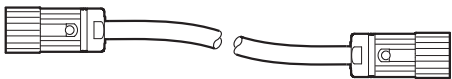
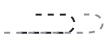
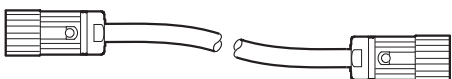

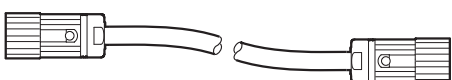
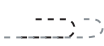
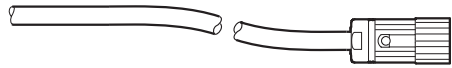

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, male</p>	CE: 18127460	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, male</p>	CE: 18133959	HELUKABEL® TOPFLEX® – 611-PUR (halogen-free)	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, male</p>	UL: 18153267	HELUKABEL® – JZ-602	Variable 	2.5 mm <sup>2</sup> / AC 500 V

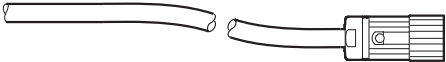
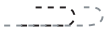
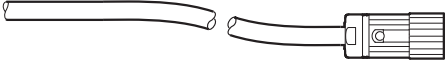


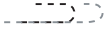
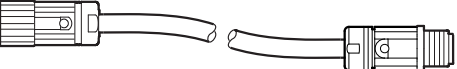
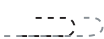
29186668/EN – 07/2020

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, male</p>	UL: 18153275	HELUKABEL® MULTIFLEX® – 512	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	CE: 18127479	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	CE: 18133967	HELUKABEL® TOPFLEX® – 611-PUR (halogen-free)	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	UL: 18153283	HELUKABEL® – JZ-602	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	UL: 18153291	HELUKABEL® MULTIFLEX® – 512	Variable 	2.5 mm <sup>2</sup> / AC 500 V




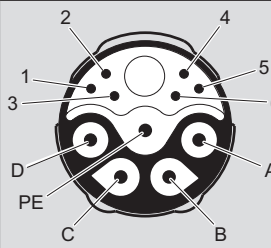
Cable cross section 4.0 mm<sup>2</sup>

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross-sec- tion/operat- ing voltage
 M23, coding ring: black, male M23, coding ring: black, male	CE: 18127487 CE: 18133975	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	4 mm <sup>2</sup> / AC 500 V
 M23, coding ring: black, male M23, coding ring: black, male	CE: 18133975	HELUKABEL® TOPFLEX® – 611-PUR (Halogen-free)	Variable 	4 mm <sup>2</sup> / AC 500 V
 M23, coding ring: black, male M23, coding ring: black, male	UL: 18153305	HELUKABEL® – JZ-602	Variable 	4 mm <sup>2</sup> / AC 500 V
 M23, coding ring: black, male M23, coding ring: black, male	UL: 18153313	HELUKABEL® MULTIFLEX® – 512	Variable 	4 mm <sup>2</sup> / AC 500 V
 Open M23, coding ring: black, male	CE: 18127495	HELUKABEL® TOPFLEX® – 600-PVC	Variable 	4 mm <sup>2</sup> / AC 500 V

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross-sec- tion/operat- ing voltage
 <p>Open</p> <p>M23, coding ring: black, male</p>	CE: 18133983	HELUKABEL® TOPFLEX® – 611-PUR (Halogen-free)	Variable 	4 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	UL: 18153321	HELUKABEL® – JZ-602	Variable 	4 mm <sup>2</sup> / AC 500 V
 <p>Open</p> <p>M23, coding ring: black, male</p>	UL: 18153348	HELUKABEL® MULTIFLEX® – 512	Variable 	4 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: black, male</p> <p>M23, coding ring: black, female</p>	UL: 18166318	HELUKABEL® MULTIFLEX® – 512	Variable 	4 mm <sup>2</sup> / AC 500 V

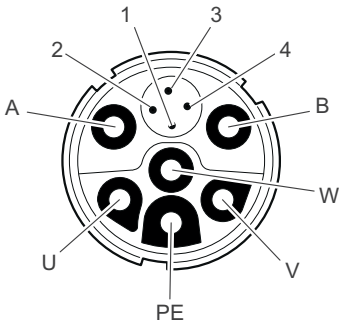
### Connection of cables with open end

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 mm <sup>2</sup> 2.5 mm <sup>2</sup>	1	Not pre- fabricated	Line connection, phase L1	L1	A
Black 1.5 mm <sup>2</sup> 2.5 mm <sup>2</sup>	2	Not pre- fabricated	Line connection, phase L2	L2	B
Black 1.5 mm <sup>2</sup> 2.5 mm <sup>2</sup>	3	Not pre- fabricated	Line connection, phase L3	L3	C
Green/yel- low 1.5 mm <sup>2</sup> 2.5 mm <sup>2</sup>	—	Not pre- fabricated	PE connection	PE	PE

### 5.10.3 X2326\_1 and X2326\_2: PAC connection for AC 400 V, DC 24 V backup voltage and communication, output

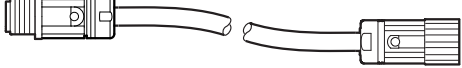



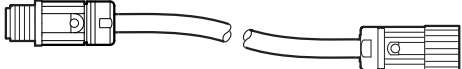
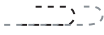
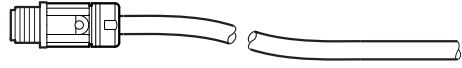
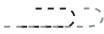
The following table shows information about this connection:

Function		
PAC connection for AC 400 V, DC 24 V backup voltage and Ethernet (OUT)		
Connection type		
M23, female, female thread with union nut, company: TE Connectivity - Intercontec products, SEW insert, series 723, SpeedTec equipment, coding ring: gray/green, protected against contact		
Connection diagram		
		
Assignment		
Contact	Signal	Description
U	L1	Line connection, phase L1 (OUT)
V	L2	Line connection, phase L2 (OUT)
W	L3	Line connection, phase L3 (OUT)
PE	PE	PE connection
A	+24V	DC 24 V input for backup mode (OUT)
B	0V24	0V24 reference potential for backup mode (OUT)
1	TX+	Ethernet TX+ (OUT)
2	TX-	Ethernet TX- (OUT)
3	RX+	Ethernet RX+ (OUT)
4	RX-	Ethernet RX- (OUT)

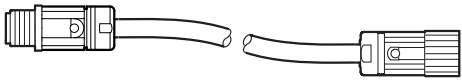



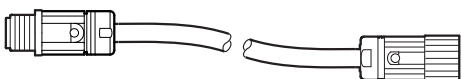
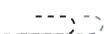
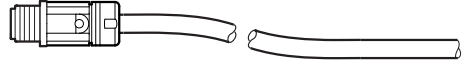
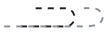
## Connection cables

The following tables list the cables available for this connection:

Cable cross section 2.5 mm<sup>2</sup>

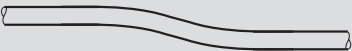
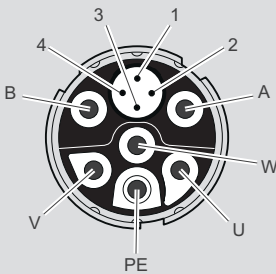
Connection cables	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M23, male, coding ring: gray/green</p> <p>Connection cable/exten- sion cable</p> <p>M23, female, coding ring: gray/green</p>	CE/UL: 28129296	HELUKABEL® Li9YYö	Variable 	2.5 mm <sup>2</sup> AC 500 V
 <p>M23, coding ring: gray/ green, male</p> <p>Connection cable</p> <p>Open</p>	CE/UL: 28113780	HELU- KABEL® Li9YYö	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: gray/ green, male</p> <p>Connection cable/exten- sion cable</p> <p>M23, coding ring: gray/ green, female</p>	CE/UL: 28113845	HELUKABEL® Li9Y11YHF	Variable 	2.5 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: gray/ green, male</p> <p>Connection cable</p> <p>Open</p>	CE/UL: 28113802	HELUKABEL® Li9Y11YHF	Variable 	2.5 mm <sup>2</sup> / AC 500 V

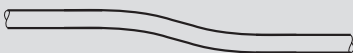
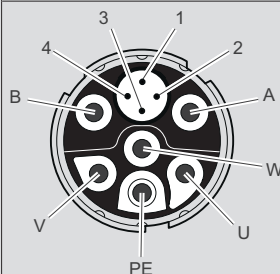
Cable cross section 4 mm<sup>2</sup>

Connection cables	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M23, male, coding ring: gray/green</p> <p><i>Connection cable/exten- sion cable</i></p> <p>M23, female, coding ring: gray/green</p>	CE/UL: 28129318	HELUKABEL® Li9YYö	Variable 	4.0 mm <sup>2</sup> AC 500 V
 <p>M23, coding ring: gray/ green, male</p> <p><i>Connection cable</i></p> <p>Open</p>	CE/UL: 28113799	HELUKABEL® LiYYö	Variable 	4 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: gray/ green, male</p> <p><i>Connection cable/exten- sion cable</i></p> <p>M23, coding ring: gray/ green, female</p>	CE/UL: 28113853	HELUKABEL® LiY11YHF	Variable 	4.0 mm <sup>2</sup> / AC 500 V
 <p>M23, coding ring: gray/ green, male</p> <p><i>Connection cable</i></p> <p>Open</p>	CE/UL: 28113810	HELUKABEL® Li9Y11YHF	Variable 	4 mm <sup>2</sup> / AC 500 V

## Connection of cables with open end

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

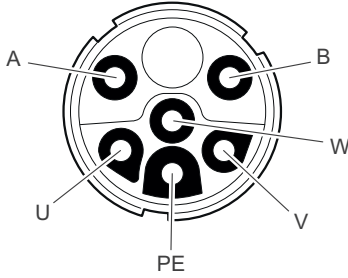
Part numbers					
28113780, 28113802, 28113799, 28113810					
Assembly					
Open cable end			Description	Prefabricated plug connectors	
				M23, male, male thread, coding ring: gray/green	
					
				Signal	Contact
Core color/core cross section	Identification	Assembly			
Brown 2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup>	L1	Not pre-fabricated	Line phase L1 connection	L1	U
Black 2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup>	L2	Not pre-fabricated	Connection of line phase L2	L2	V
Grey 2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup>	L3	Not pre-fabricated	Connection of line phase L3	L3	W
Green/yel-low 2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup>	-	Not pre-fabricated	PE connection	PE	PE
Brown 2.5 mm <sup>2</sup>	-	Not pre-fabricated	+24VDC	+24V	A
Blue 2.5 mm <sup>2</sup>	-	Not pre-fabricated	0V24	0V24	W
White 0.34 mm <sup>2</sup>	-	Not pre-fabricated	Ethernet TX+	TX+	1
Blue 0.34 mm <sup>2</sup>	-	Not pre-fabricated	Ethernet TX-	TX-	2
Yellow 0.34 mm <sup>2</sup>	-	Not pre-fabricated	Ethernet RX+	RX+	3

Assembly					
Open cable end			Description	Prefabricated plug connectors	
				M23, male, male thread, coding ring: gray/green	
					
Core color/core cross section	Identification	Assembly		Signal	Contact
Orange 0.34 mm <sup>2</sup>	-	Not pre-fabricated	Ethernet RX-	RX-	4



#### 5.10.4 X2327\_1 and X2327\_2: PA connection for AC 400 V and DC 24 V backup voltage, output

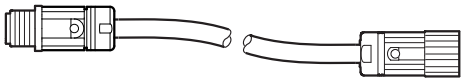



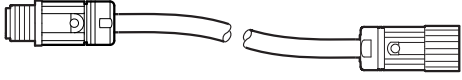
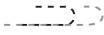
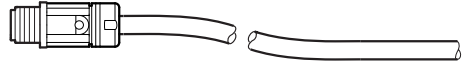
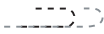
The following table shows information about this connection:

Function		
PA connection for AC 400 V and 24 V backup voltage (OUT)		
Connection type		
M23, female, female thread with union nut, SEW insert, 723 series, SpeedTec equipment, company: TE Connectivity – Intercontec products, male, coding ring: black/green, protected against contact		
Connection diagram		
		
Assignment		
Contact	Signal	Description
U	L1	Line connection, phase L1 (OUT)
V	L2	Line connection, phase L2 (OUT)
W	L3	Line connection, phase L3 (OUT)
PE	PE	PE connection
A	+24V	DC 24 V output for backup mode (OUT)
B	0V24	0V24 reference potential for backup mode (OUT)

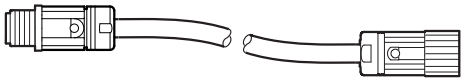



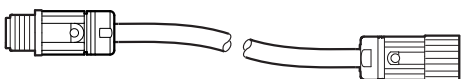
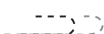

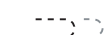
## Connection cables

The following tables list the cables available for this connection:

Cable cross section 2.5 mm<sup>2</sup>


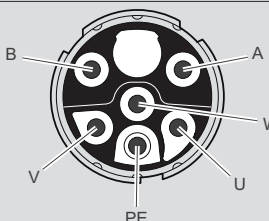
Connection cable	Conformity/ part number	Cable type	Length/in- stallation type	Cable cross section/operat- ing voltage
 <p>M23, male, coding ring: black/green</p> <p>M23, female, coding ring: black/green</p>	CE/UL: 28129326	HELUKABEL® Li9YYö	Variable 	2.5 mm <sup>2</sup> AC 500 V
 <p>M23, male, coding ring: black/green</p> <p>Open</p>	CE/UL: 28114426	HELUKABEL® Li9YYö	Variable 	2.5 mm <sup>2</sup> AC 500 V
 <p>M23, male, coding ring: black/green</p> <p>M23, female, coding ring: black/green</p>	CE/UL: 28114396	HELUKABEL® Li9YYö	Variable 	2.5 mm <sup>2</sup> AC 500 V
 <p>M23, male, coding ring: black/green</p> <p>Open</p>	CE/UL: 28114442	HELUKABEL® Li9YYö	Variable 	2.5 mm <sup>2</sup> AC 500 V

Cable cross section 4 mm<sup>2</sup>

Connection cable	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 M23, male, coding ring: black/green M23, female, coding ring: black/green	CE/UL: 28129334	HELUKABEL® Li9YYö	Variable 	4.0 mm <sup>2</sup> AC 500 V
 M23, male, coding ring: black/green Open	CE/UL: 28114434	HELUKABEL® Li9YYö	Variable 	4.0 mm <sup>2</sup> AC 500 V
 M23, male, coding ring: black/green M23, female, coding ring: black/green	CE/UL: 28114418	HELUKABEL® Li9YYö	Variable 	4.0 mm <sup>2</sup> AC 500 V
 M23, male, coding ring: black/green Open	CE/UL: 28114450	HELUKABEL® Li9YYö	Variable 	4.0 mm <sup>2</sup> AC 500 V

## Connection of cables with open end

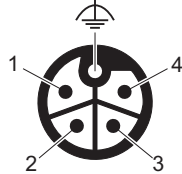

The following table shows the core assignment of cables with the following part numbers:

Part numbers					
28114426, 28114442, 28114434, 28114450					
Assembly					
Open cable end			Description	Prefabricated plug connectors	
					
Core color/core cross section	Identification	Assembly		Signal	Contact
Brown 2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup>	L1	Not pre-fabricated	Line connection, phase L1	L1	U
Black 2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup>	L2	Not pre-fabricated	Line connection, phase L2	L2	V
Grey 2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup>	L3	Not pre-fabricated	Line connection, phase L3	L3	W
Green/yel- low 2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup>	—	Not pre-fabricated	PE connection	PE	PE
Brown 2.5 mm <sup>2</sup>	—	Not pre-fabricated	DC 24 V output	+24V	A
Blue 2.5 mm <sup>2</sup>	—	Not pre-fabricated	0V24 reference potential	0V24	B
White 0.34 mm <sup>2</sup>	—	Not pre-fabricated	Reserved <sup>1)</sup>	Res.	—
Yellow 0.34 mm <sup>2</sup>	—	Not pre-fabricated	Reserved <sup>1)</sup>	Res.	—
Blue 0.34 mm <sup>2</sup>	—	Not pre-fabricated	Reserved <sup>1)</sup>	Res.	—
Orange 0.34 mm <sup>2</sup>	—	Not pre-fabricated	Reserved <sup>1)</sup>	Res.	—

1) Reserved wires must be isolated and fixed in the connection box.

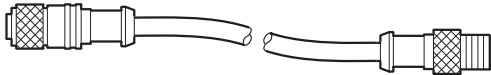



### 5.10.5 X1523: DC 24 V backup voltage, input

The following table shows information about this connection:

Function		
DC 24 V backup voltage input		
Connection type		
M12, 5-pin, male, L-coded, color: light gray		
Connection diagram		
		
Assignment		
Contact	Signal	Description
1	+24V/L1	DC 24 V input/L1 (for backup mode)
2	0V24/N2	0V24 reference potential/N2 (for DC 24 V /BES brake rectifier)
3	0V24/N1	0V24 reference potential/N1 (for backup mode)
4	+24V/L2	DC 24 V connection/L2 (for DC 24 V /BES brake rectifier)
	FE	Functional earth


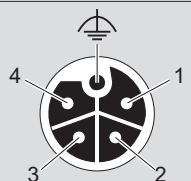

## Connection cables

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

Connection cables	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M12, 5-pin, L-coded, female</p> <p>M12, 5-pin, L-coded, male</p>	CE/UL: 28114345	HELUKABEL® JZ-500	Variable 	5 × 2.5 mm <sup>2</sup> / DC 60 V
 <p>M12, 5-pin, L-coded, female</p> <p>Open</p>	CE/UL: 28117786	HELUKABEL® JZ-500	Variable 	5 × 2.5 mm <sup>2</sup> / DC 60 V

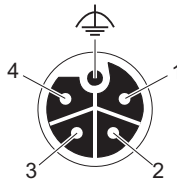

### Connection of cables with open end

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

Part numbers					
28117786					
Assembly					
Open cable end			Description	Prefabricated plug connectors	
					
Core color/ Core cross section	Identification	Assembly		Signal	Contact
Black 2.5 mm <sup>2</sup>	1	Not pre-fabricated	DC 24 V output/L1 (for backup voltage/supply)	+24V/L1	1
Black 2.5 mm <sup>2</sup>	2	Not pre-fabricated	0V24 reference potential/N2 (for DC 24 V /BES brake rectifier)	0V24/N2	2
Black 2.5 mm <sup>2</sup>	3	Not pre-fabricated	0V24 reference potential/N1 (for backup voltage/supply)	0V24/N1	3
Black 2.5 mm <sup>2</sup>	4	Not pre-fabricated	DC 24 V output/L2 (for DC 24 V /BES brake rectifier)	+24V/L2	4
Black 2.5 mm <sup>2</sup>	5	Not pre-fabricated	Functional earth	FE	

## 5.10.6 X2313: DC 24 V output backup voltage

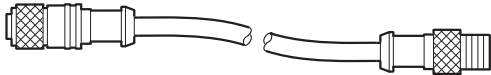

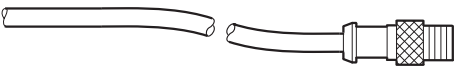

The following table shows information about this connection:

Function		
DC 24 V output backup voltage		
Connection type		
M12, 5-pin, female, L-coded, color: light gray		
Connection diagram		
		
Assignment		
Contact	Signal	Description
1	+24V/L1	DC 24 V output/L1 (for backup mode)
2	0V24/N2	0V24 reference potential/N2 (for DC 24 V /BES brake rectifier)
3	0V24/N1	0V24 reference potential/N1 (for backup mode)
4	+24V/L2	DC 24 V connection/L2 (for DC 24 V /BES brake rectifier)
	FE	Functional earth




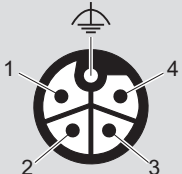

## Connection cables

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

Connection cables	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M12, 5-pin, L-coded, female</p> <p>M12, 5-pin, L-coded, male</p>	CE/UL: 28114345	HELUKABEL® JZ-500	Variable 	5 × 2.5 mm <sup>2</sup> / DC 60 V
 <p>Open</p> <p>M12, 5-pin, L-coded, male</p>	CE/UL: 28117751	HELUKABEL® JZ-500	Variable 	5 × 2.5 mm <sup>2</sup> / DC 60 V

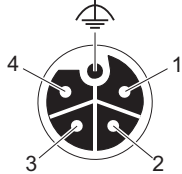

## Connection of cables with open end

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

Part numbers					
28117751					
Assembly					
Open cable end			Description	Prefabricated plug connectors	
					
Core color/ Core cross section	Identi- fication	Assembly		Signal	Contact
Black 2.5 mm <sup>2</sup>	1	Not pre-fabricated	DC 24 V output/L1 (for backup voltage/supply)	+24V/L1	1
Black 2.5 mm <sup>2</sup>	2	Not pre-fabricated	0V24 reference potential/N2 (for DC 24 V /BES brake rectifier)	0V24/N2	2
Black 2.5 mm <sup>2</sup>	3	Not pre-fabricated	0V24 reference potential/N1 (for backup voltage/supply)	0V24/N1	3
Black 2.5 mm <sup>2</sup>	4	Not pre-fabricated	DC 24 V output/L2 (for DC 24 V /BES brake rectifier)	+24V/L2	4
Black 2.5 mm <sup>2</sup>	5	Not pre-fabricated	Functional earth	FE	

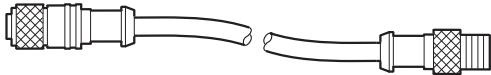

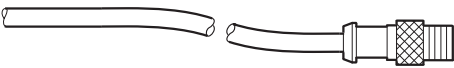

### 5.10.7 X2313\_1 and X2313\_2: DC 24 V backup voltage, output

The following table shows information about this connection:

Function		
DC 24 V output backup voltage		
Connection type		
M12, 5-pin, female, L-coded, color: light gray		
Connection diagram		
		
Assignment		
Contact	Signal	Description
1	+24V/L1	DC 24 V output/L1 (for backup mode)
2	0V24/N2	0V24 reference potential/N2 (for DC 24 V /BES brake rectifier)
3	0V24/N1	0V24 reference potential/N1 (for backup mode)
4	+24V/L2	DC 24 V connection/L2 (for DC 24 V /BES brake rectifier)
	FE	Functional earth


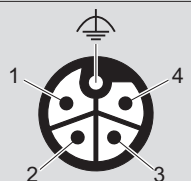

## Connection cables

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

Connection cables	Conformity/ part num- ber	Cable type	Length/in- stallation type	Cable cross sec- tion/operat- ing voltage
 <p>M12, 5-pin, L-coded, female</p> <p>M12, 5-pin, L-coded, male</p>	CE/UL: 28114345	HELUKABEL® JZ-500	Variable 	5 × 2.5 mm <sup>2</sup> / DC 60 V
 <p>Open</p> <p>M12, 5-pin, L-coded, male</p>	CE/UL: 28117751	HELUKABEL® JZ-500	Variable 	5 × 2.5 mm <sup>2</sup> / DC 60 V

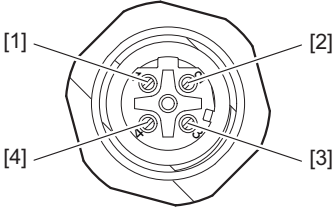
### Connection of cables with open end

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

Part numbers					
28117751					
Assembly					
Open cable end			Description	Prefabricated plug connectors	
					
Core color/ Core cross section	Identi- fication	Assembly		Signal	Contact
Black 2.5 mm <sup>2</sup>	1	Not pre-fabricated	DC 24 V output/L1 (for backup voltage/supply)	+24V/L1	1
Black 2.5 mm <sup>2</sup>	2	Not pre-fabricated	0V24 reference potential/N2 (for DC 24 V /BES brake rectifier)	0V24/N2	2
Black 2.5 mm <sup>2</sup>	3	Not pre-fabricated	0V24 reference potential/N1 (for backup voltage/supply)	0V24/N1	3
Black 2.5 mm <sup>2</sup>	4	Not pre-fabricated	DC 24 V output/L2 (for DC 24 V /BES brake rectifier)	+24V/L2	4
Black 2.5 mm <sup>2</sup>	5	Not pre-fabricated	Functional earth	FE	

5.10.8 X4251\_1 and X4251\_2: EtherCAT®/SBus<sup>PLUS</sup>, output

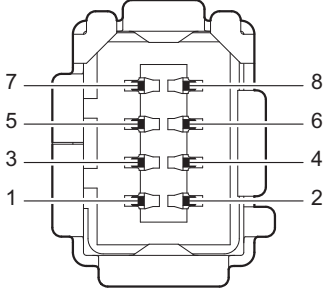
The following table shows information about this connection:

Function		
Output EtherCAT®/SBus <sup>PLUS</sup>		
Connection type		
M12, female, D-coded, female thread, Speedcon, protected against contact, color: turquoise		
Connection diagram		
		
Assignment		
Contact	Signal	Description
1	TX+	Transmit line+
2	TX-	Transmit line-
3	RX+	Receive line+
4	RX-	Receive line-

## 5.11 Assignment of the plug connectors in the connection unit

### 5.11.1 X43\_1 and X43\_2: Connection of EtherCAT®/SBus<sup>PLUS</sup> for drive units (subnetwork)

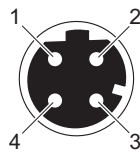
The following table shows information about this connection:

Function		
Connection for Ethernet-based fieldbus or subnetwork		
Connection type		
Industrial MINI I/O, socket block (male), type 1		
Connection diagram		
		
Assignment		
Contact	Signal	Description
1	TX+	Transmit line (+)
2	TX-	Transmit line (-)
3	RX+	Receive line (+)
4	Res.	Reserved
5	Res.	Reserved
6	RX-	Receive line (-)
7	Res.	Reserved
8	Res.	Reserved

## 5.12 Plug connector assignment at the electronics cover

### 5.12.1 X4224: Engineering interface (Ethernet)

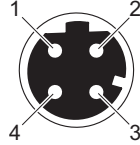
The following table shows information about this connection:

Function		
Engineering interface (Ethernet)		
Connection type		
M12, 4-pin, female, D-coded, color: black		
Connection diagram		
		
Assignment		
No.	Name	Function
1	TX+	Transmit line (+)
2	RX+	Receive line (+)
3	TX-	Transmit line (-)
4	RX-	Receive line (-)



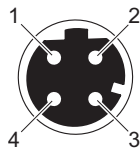
### 5.12.2 X4233\_1: Fieldbus/Ethernet interface, port 1

The following table shows information about this connection:

Function		
Fieldbus/Ethernet interface, port 1		
Connection type		
M12, 4-pin, female, D-coded, color: black		
Connection diagram		
		
Assignment		
Contact	Signal	Description
1	TX+	Transmit line (+)
2	RX+	Receive line (+)
3	TX-	Transmit line (-)
4	RX-	Receive line (-)

## 5.12.3 X4233\_2: Fieldbus/Ethernet interface, port 2

The following table shows information about this connection:

Function		
Fieldbus/Ethernet interface, port 2		
Connection type		
M12, 4-pin, female, D-coded, color: black		
Connection diagram		
		
Assignment		
Contact	Signal	Description
1	TX+	Transmit line (+)
2	RX+	Receive line (+)
3	TX-	Transmit line (-)
4	RX-	Receive line (-)

## 5.13 PC connection

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

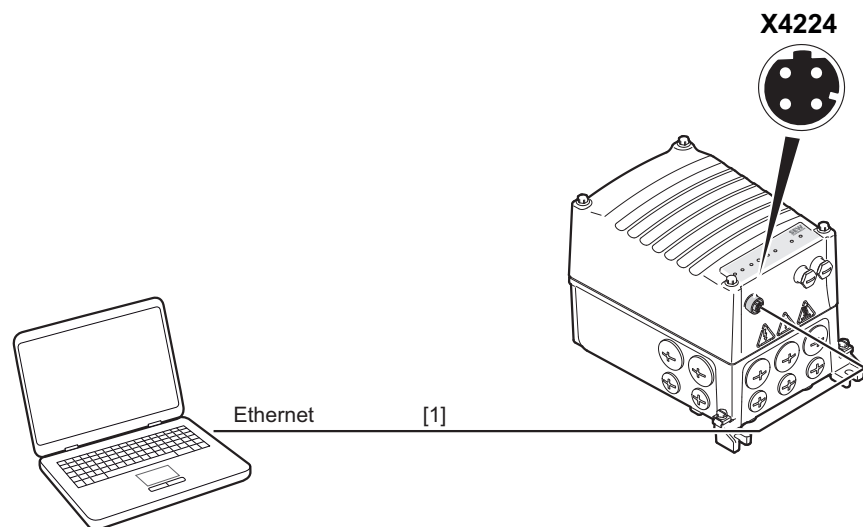
You have several options to connect a PC to the device.

### 5.13.1 Connection via Ethernet

You can establish a connection between PC and device using Ethernet.

#### Connection to X4224 (M12 at the electronics cover)

The following illustration shows how to connect the PC to the device:



28695623819

- [1] Ethernet connection cable RJ45/M12 (commercial)  
With M12 plug connector, 4-pin, male, D-coded

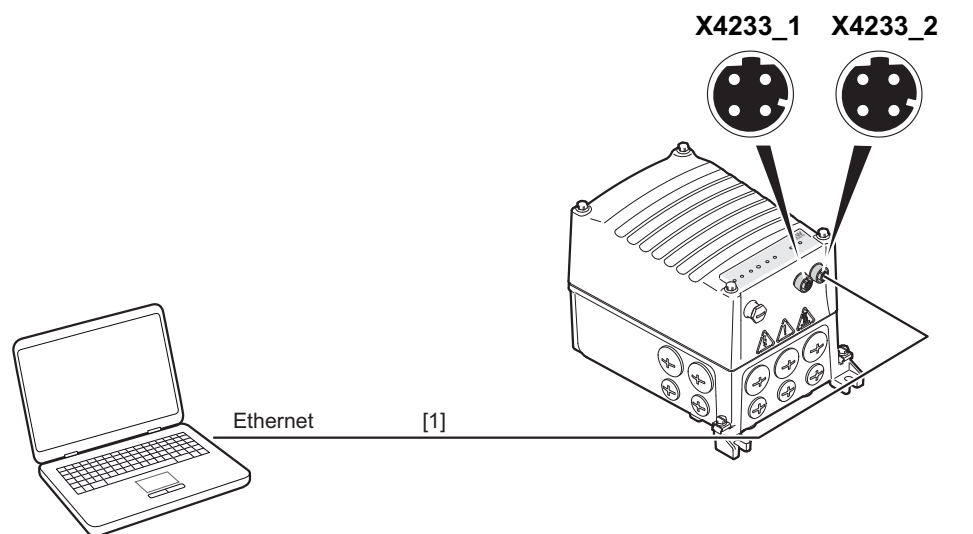


## INFORMATION

For information on the IP address, see chapter "Startup" > "DIP switch S3".

### Connection to X4233\_1 or X4233\_2 (M12 at the electronics cover)

The following illustration shows how to connect the PC to the device:



9007227859445515

- [1] Ethernet connection cable RJ45/M12 (commercial)  
With M12 plug connector, 4-pin, male, D-coded

## 6 Startup

### 6.1 Startup notes



#### INFORMATION

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



#### ⚠ WARNING

Electric shock caused by dangerous voltages in the connection box.

Severe or fatal injuries.

- Before removing the connection box cover, de-energize unit via a suitable external disconnection device.
- Secure the device against unintended re-connection of the voltage supply.



#### ⚠ 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.



#### 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.

## 6.2 Startup requirements

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".

Required software:

- Engineering software MOVISUITE® standard by SEW-EURODRIVE.

6.3 DIP switch

6.3.1 Overview



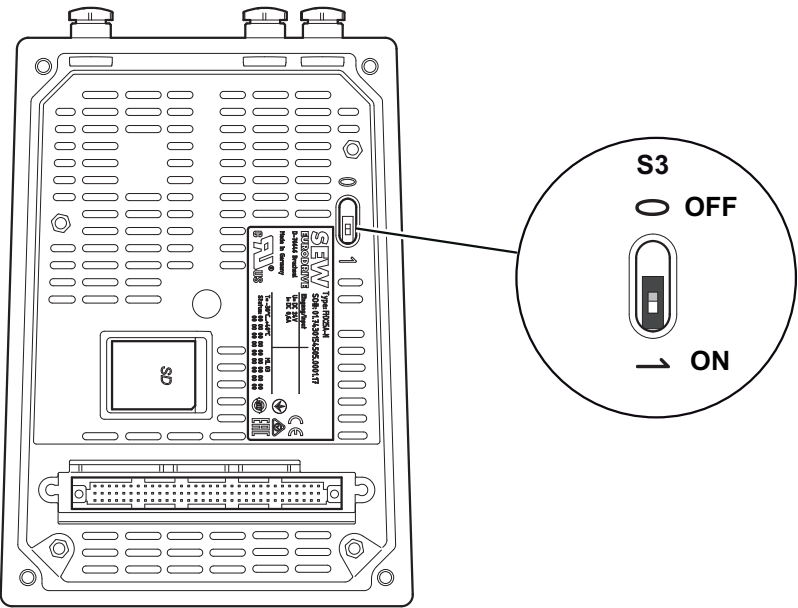
NOTICE

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 switch of the device:



32167773835

DIP switch S3

DIP switch	Position	Meaning
S3	ON = "1"	IP address on the SD memory card set by user (standard IP address of the X4224 engineering interface on delivery: 192.168.10.4)
	OFF = "0"	Standard IP address of the X4224 engineering interface: 192.168.10.4 (cannot be changed)

## 7 Service

### 7.1 Evaluating fault messages

#### 7.1.1 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 [1], select the "Status" node.
  - ⇒ The **current fault messages** can be found in the "Fault status" [3] group.
  - ⇒ **Additional information** on the causes for the "Not ready" status can be found in the "Device status" [2] group.



28739616395

[1] Status

[2] Device status

[3] Fault status

[4] Fault status of the main component

[5] Fault status of the subcomponent

### 7.2 Resetting fault messages



#### ⚠ WARNING

Removing the source of the malfunction or performing a reset can result in an automatic restart of the connected drives.

Severe or fatal injuries.

- Prevent unintended startup.

Acknowledge fault message by:

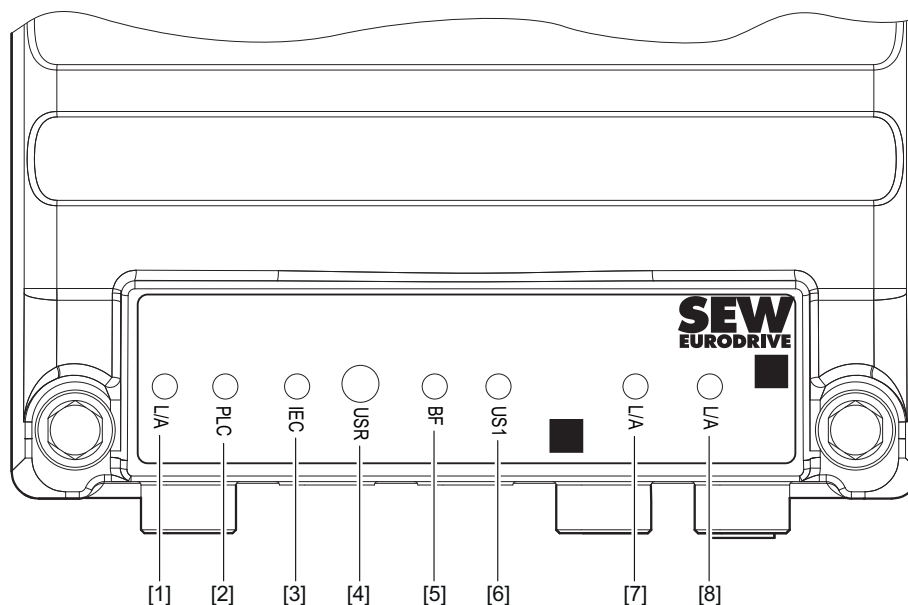
- Switch the supply system off and on again.
- Via the controller/PLC: Send "reset command".



## 7.3 Description of status and operating displays

### 7.3.1 PROFINET IO LED displays

The following figure shows the LEDs of the PROFINET IO design:

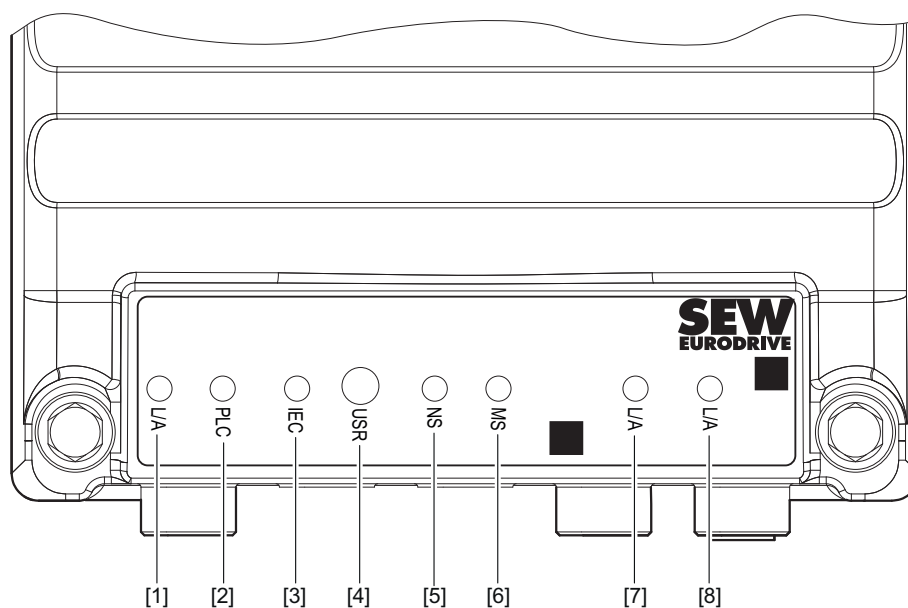


27021626388519051

- |                             |               |                         |
|-----------------------------|---------------|-------------------------|
| [1] LED "L/A" (X43_1/X43_2) | [4] "USR" LED | [7] LED "L/A" (X4233_1) |
| [2] LED "PLC"               | [5] "BF" LED  | [8] LED "L/A" (X4233_2) |
| [3] LED "IEC"               | [6] "US1" LED |                         |

### 7.3.2 LEDs for EtherNet/IP™, Modbus TCP

The following figure shows the LEDs of the EtherNet/IP™, Modbus TCP design:



27021626388702219

- |                             |               |                         |
|-----------------------------|---------------|-------------------------|
| [1] LED "L/A" (X43_1/X43_2) | [4] "USR" LED | [7] LED "L/A" (X4233_1) |
| [2] LED "PLC"               | [5] "NS" LED  | [8] LED "L/A" (X4233_2) |
| [3] LED "IEC"               | [6] "MS" LED  |                         |

## 7.3.3 General LEDs

## Status LED "L/A" (X43\_1/X43\_2)

Status LED	Meaning
Green, illuminated	Ethernet connection with the EtherCAT®/ SBus <sup>PLUS</sup> interface without bus activity.
Green, flashing with 10 Hz	Ethernet connection with the EtherCAT®/ SBus <sup>PLUS</sup> interface with bus activity.
Off	No Ethernet connection with the EtherCAT®/ SBus <sup>PLUS</sup> interface.

## Status LED "L/A" (X4233\_1)

Status LED	Meaning
Green	There is an Ethernet connection.
Orange, flashing	Data is currently being exchanged via the fieldbus interface.
Off	There is no Ethernet connection.

## Status LED "L/A" (X4233\_2)

Status LED	Meaning
Green	There is an Ethernet connection.
Orange, flashing	Data is currently being exchanged via the fieldbus interface.
Off	There is no Ethernet connection.

## "PLC" status LED

## During boot phase

Status	Possible cause	Measure
Red	The firmware of the device fails to boot.	Contact SEW-EURODRIVE service.
Orange	The SD memory card is not inserted.	Insert a SD memory card into the device.
	The data system of the SD memory card is corrupt.	Contact SEW-EURODRIVE service.
Green	The SD memory card has faulty contents.	Contact SEW-EURODRIVE service.
Red, flashing with 1 Hz	The SD memory card has faulty contents.	Contact SEW-EURODRIVE service.
	The firmware of the device is faulty.	

**During operation**

Status	Possible cause	Measure
Green, flashing with 0.5 Hz	Firmware of the device is running properly.	—
Red, flashing with 0.5 Hz	The firmware of the device is faulty.	Contact SEW-EURODRIVE service.

**"IEC" status LED**

Status	Meaning	Measure
Off	No IEC program loaded.	Load an IEC program on the device.
Orange, flashing with 0.5 Hz	Program has stopped running.	Start the IEC program.
Red, flashing with 0.5 Hz	The IEC program is faulty.	Check and correct the IEC program.
Green, flashing with 0.5 Hz	IEC program is running correctly.	—

**"USR" status LED**

LED	Meaning
<b>Off, illuminated, or flashes</b>	<p>The function of the status LED is determined by the loaded application program.</p> <p>More information can be found in the manuals of the application programs.</p>

## 7.3.4 Bus-specific LEDs for PROFINET IO

## "BF" LED

LED	Meaning	Measure
– Off	The unit has detected a connection to the PROFINET master.	–
Red Illuminated	The connection to the PROFINET master has failed.	• Check the PROFINET connection of the unit.
	The device detects no connection to the PROFINET master (bus error).	• Check all the cables in the PROFINET network.
	The PROFINET master is not in operation.	• Check the PROFINET master.
	Faulty process data configuration.	• Check the process data configuration.

## "US1" LED

LED	Meaning	Measure
Yellow Flashing	The device is in the initialization phase.	• Wait for initialization to be completed.
Green Illuminated	The device works in normal operation.	–
Green Flashing	Reserved	–
Red Illuminated	The device has detected an internal fault.	• Observe the instructions in chapter "Fault table".

### 7.3.5 Bus-specific LEDs for EtherNet/IP™ and Modbus TCP

#### "NS" LED

LED	Meaning	Measure
– Off	Device is switched off.	• Check the DC 24 V voltage supply.
	No DC 24 V supply.	• Switch on the device again.
	The IP address is not set.	• Set the IP address.
Green Flashing	The connection to the Ethernet master has failed.  The device detects no connection to the Ethernet master (bus error).	• Check the Ethernet connection of the device. • Check the Ethernet connection.
Green Illuminated	The IP address is set. The Ethernet connection has been established.	–
Red Flashing	Timeout delay of the controlling connection has expired.  The state is reset by restarting communication.	• Check the bus connection. • Check the master/scanner. • Check the Ethernet connection.
Red Illuminated	Conflict detected while assigning the IP address.  Another station in the network uses the same IP address.	• Check whether there is a unit with the same IP address within the network. • Change the IP address of the device. • Check the DHCP settings for assigning an IP address of the DHCP server (only when a DHCP server is used).
Red/green Flashing	The device performs an LED test.  This status may only be active for a short time during startup.	–

**"MS" LED**

LED	Meaning	Measure
– Off	No line or DC 24 V supply.	<ul style="list-style-type: none"> <li>Check the voltage supply.</li> </ul>
Green Flashing	The device has not been configured yet.	<ul style="list-style-type: none"> <li>Configure the device.</li> <li>Check the DHCP server connection (only if DHCP is activated and the status continues).</li> </ul>
Green Illuminated	The component hardware is OK.	–
Red Flashing	A correctable fault has occurred at the component hardware.	<ul style="list-style-type: none"> <li>Check whether there is a device with the same IP address within the network.</li> <li>Change the IP address of the device.</li> <li>Check the DHCP settings for assigning an IP address of the DHCP server (only when a DHCP server is used).</li> </ul>
Red Illuminated	A non-correctable fault has occurred at the component hardware.	<ul style="list-style-type: none"> <li>Switch on the device again.</li> <li>Reset the device to the factory settings.</li> <li>If this fault occurs repeatedly, replace the device or contact SEW-EURODRIVE Service.</li> </ul>
Red/green Flashing	The device performs an LED test. This status may only be active for a short time during startup.	–

**7.4 Fault/error table****7.4.1 Fault 150 Controller firmware – general device fault**

Subfault: 150.1		
Description: Unknown fault		
	Response: No response	
	Cause	Measure
	MOVI-C® CONTROLLER firmware detected severe fault that cannot be assigned to exact device fault.	<p>Check the log files for new entries with the severity "fault" or "exception" for further information.</p> <p>It might be necessary to activate the storage area of the log files in the file system of the MOVI-C® CONTROLLER. Acknowledging the fault will restart the MOVI-C® CONTROLLER.</p> <p>If the problem is still present, contact SEW-EURODRIVE Service.</p>

**Subfault: 150.2****Description: Restart after exception handling**

Response: No response		
Cause		Measure
The MOVI-C® CONTROLLER performed an exception handling followed by a restart. This can be caused by impermissible memory access, for example.		During exception handling, the MOVI-C® CONTROLLER stored a log file in the file system with further details on the exception. You can use the log file to eliminate the fault or use the information of the log file when contacting SEW-EURODRIVE Service.  Acknowledging the fault will restart the MOVI-C® CONTROLLER.

**Subfault: 150.3****Description: Faulty booting**

Response: No response		
Cause		Measure
Failed to start the MOVI-C® CONTROLLER properly. The configuration of the MOVI-C® CONTROLLER firmware might be wrong or corrupt.		Check the log files for new entries with the severity "fault" or "exception" for further information. It might be necessary to activate the storage area of the log files in the file system of the MOVI-C® CONTROLLER. Acknowledging the fault will restart the MOVI-C® CONTROLLER. If the problem is still present, contact SEW-EURODRIVE Service.

**Subfault: 150.4****Description: Fault in early booting phase**

Response: No response		
Cause		Measure
Failed to start the MOVI-C® CONTROLLER properly in the early booting phase due to faults.		Check the log files for new entries with the severity "fault" or "exception" for further information. It might be necessary to activate the storage area of the log files in the file system of the MOVI-C® CONTROLLER. If the software packages are corrupt, load original SEW-EURODRIVE software packages onto the removable storage device again. Acknowledging the fault will restart the MOVI-C® CONTROLLER. If the problem is still present, contact SEW-EURODRIVE Service.

**7.4.2 Fault 151 controller firmware – License Manager fault****Subfault: 151.1****Description: License Manager not working properly**

Response: No response		
Cause		Measure
Internal software error		Contact SEW-EURODRIVE Service.

## 7.5 Device replacement

### 7.5.1 Notes



#### **⚠ WARNING**

Electric shock caused by dangerous voltages in the connection box.

Severe or fatal injuries.

- Before removing the connection box cover, de-energize unit via a suitable external disconnection device.
- Secure the device against unintended re-connection of the voltage supply.

### 7.5.2 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.

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 SD memory card from the previous electronics cover. Insert this SD memory card 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.



### 7.5.3 Replacing the SD memory card

1. Observe the safety notes.
2. Loosen the screws and take off the electronics cover from the connection box.
3. Remove the SD memory card from the electronics cover.
4. Compare the type designation of the SD memory card.

#### INFORMATION



The new SD memory card must have the same type designation as the previous SD memory card.

5. Insert the new SD memory card in the electronics cover.
6. Check the startup of the device.
  - ⇒ If required, perform startup again or load the saved startup to the device.

#### INFORMATION



The variable values stored permanently on the MOVI-C® FIELD CONTROLLER are not stored on the SD memory card by default.

- ✓ Select one of the following procedures to store the variable values on the SD memory card:
    - Program the application (IEC program) accordingly.
    - Load the data backup into the engineering software MOVISUITE® via the project management (in preparation).
7. Place the electronics cover onto the connection box and screw it on.
  8. Supply the device with voltage.
  9. Check the new electronics cover for proper functioning.

#### 7.5.4 Device replacement

1. Observe the safety notes.
2. When you replace the device including the electronics cover, you also have to carry out the steps described in chapter "Replacing the electronics cover".
3. Remove the defective device. Observe the notes in chapter "Mechanical Installation".
4. Compare the data on the nameplate of the old device with the nameplate data of the new device.

### INFORMATION



Always replace the decentralized controller with a decentralized controller that has the same properties.

---

5. Install the device. Observe chapter "Mechanical installation".
6. Perform the installation according to the "Electrical installation" chapter.
7. Remove the SD memory card from the previous electronics cover. Insert this SD memory card in the new electronics cover.
8. Place the electronics cover onto the connection box and screw it on.
9. Supply the device with voltage.
10. Check the new device for proper functioning.

## 7.6 SEW-EURODRIVE Service

### 7.6.1 Sending in a device 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.

## 7.7 Shutdown



### **⚠ WARNING**

Electric shock caused by dangerous voltages in the connection box.

Severe or fatal injuries.

- Before removing the connection box cover, de-energize unit via a suitable external disconnection device.
- Secure the device against unintended re-connection of the voltage supply.

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

## 7.8 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".

## 7.9 Extended storage

### 7.9.1 Storage conditions

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

Climate zone	Packaging <sup>1)</sup>	Storage location <sup>2)</sup>	Storage duration
<b>Temperate (Europe, USA, Canada, China and Russia, excluding tropical zones)</b>	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.
<b>Tropical (Asia, Africa, Central and South America, Australia, New Zealand excluding temperate zones)</b>	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.

### 7.9.2 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.

### 7.10 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
- Rechargeable batteries
- Batteries

#### 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.

#### Waste disposal according to the Battery Directive 2006/66/EC



This product contains batteries or accumulators. Dispose this product and the batteries or accumulators separately from the municipal waste according to the national regulations.

## 8 Inspection and maintenance

### 8.1 Inspection and maintenance work

#### 8.1.1 Preliminary work regarding inspection and maintenance

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



#### **⚠ WARNING**

Electric shock caused by dangerous voltages in the connection box.

Severe or fatal injuries.

- Before removing the connection box cover, de-energize unit via a suitable external disconnection device.
- Secure the device against unintended re-connection of the voltage supply.



#### **⚠ WARNING**

Risk of burns due to hot surfaces.

Serious injuries.

- Let the devices cool down before touching them.

#### 8.1.2 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.

### 8.1.3 Replacing the gasket between connection box and electronics cover

#### Steps



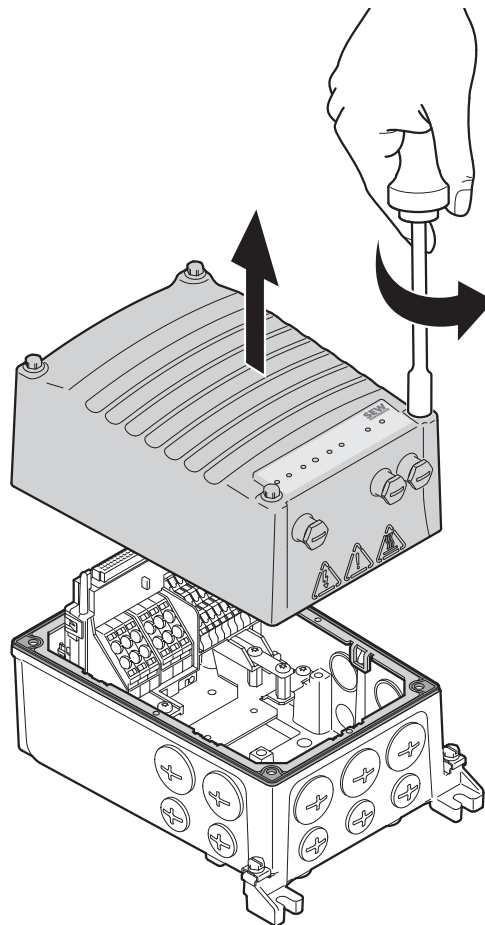
#### NOTICE

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.

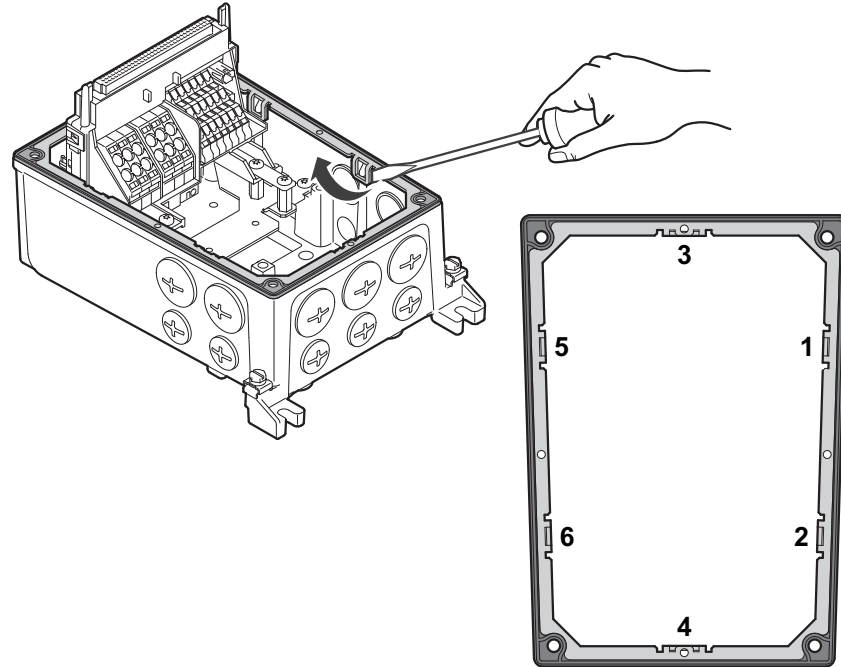
1. Observe the notes in chapter "Preliminary work for inspection and maintenance".
2. Loosen the screws of the electronics cover and remove it.



9007227972124939

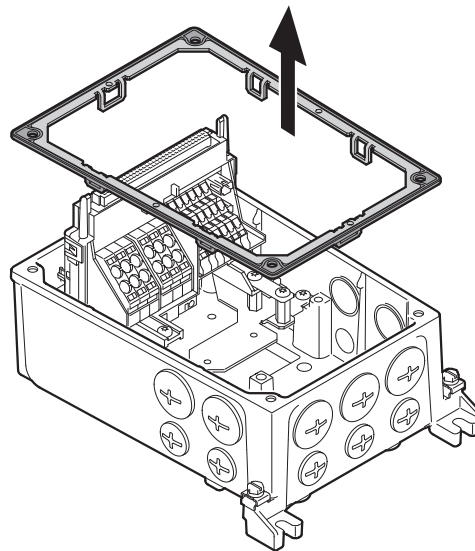
3. **NOTICE!** Loss of the guaranteed degree of protection. Possible damage to property. Make sure not to damage the sealing surfaces when removing the gasket. Loosen the used gasket by levering it off the retaining cams.

⇒ Doing so will be easier if you adhere to the sequence shown in the figure below.



9007227972128523

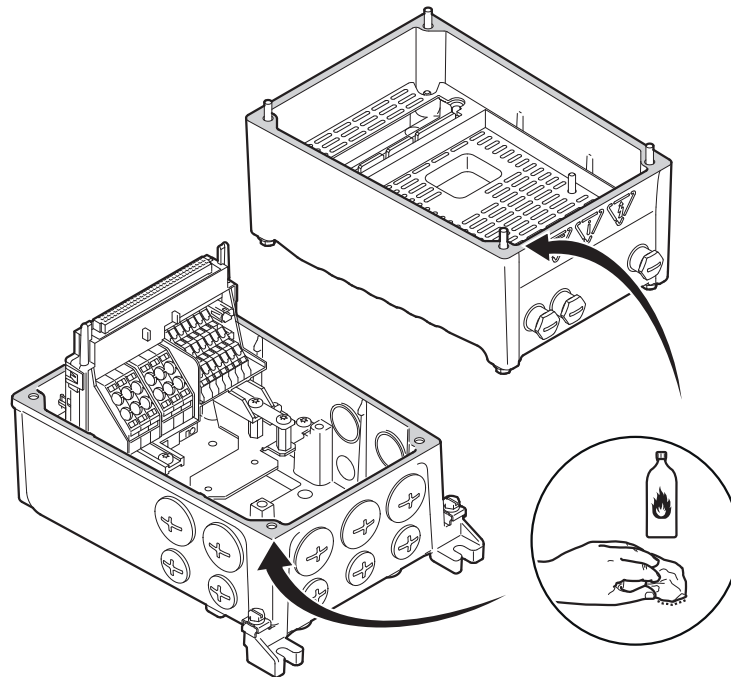
4. Remove the old gasket completely from the connection box.



9007227972132107

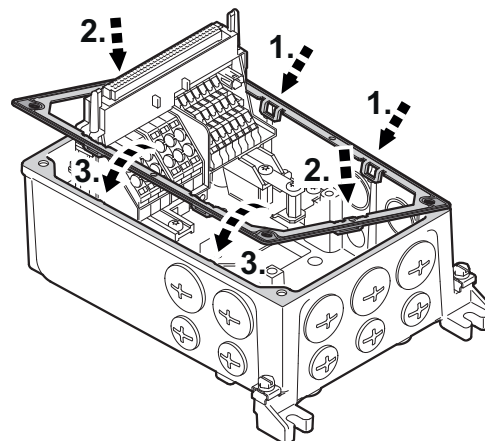


5. **⚠ CAUTION!** Risk of injury due to sharp edges. Risk of cutting injuries. Use protective gloves for cleaning. Work may only be carried out by qualified personnel. Clean the sealing surfaces of the connection box and the electronics cover carefully.



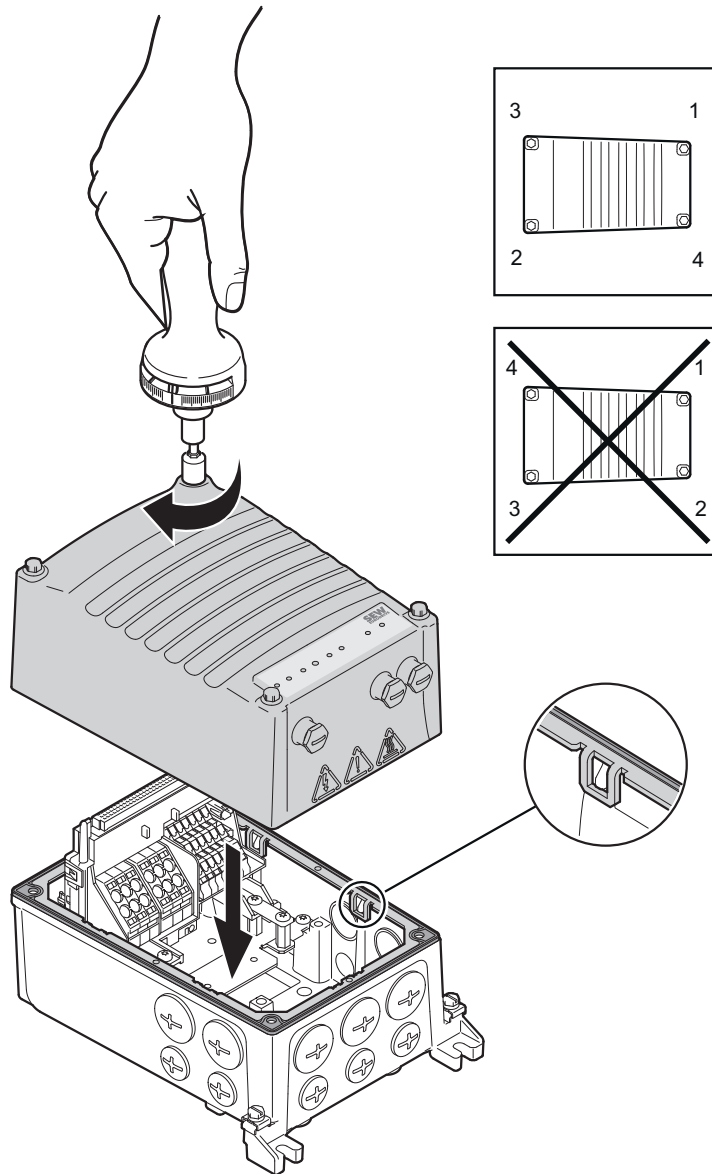
9007227976922891

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.



9007227976926475

7. Check the installation and startup of the device 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.



9007227976930059

## 9 Technical data and dimension sheets

### 9.1 Conformity

#### 9.1.1 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.

#### 9.1.2 UL approval (in preparation)



The certification mark UL Listed on the nameplate confirms the UL and cUL approval (USA). cUL is equal to the approval according to CSA.

#### 9.1.3 EAC (in preparation)



The documented device series fulfills the requirements of the technical regulations of the Customs Union of Russia, Kazakhstan, and Belarus.

The EAC marking on the nameplate certifies the conformity with the safety requirements of the Custom Union.

#### 9.1.4 UA.TR (Declaration of conformity to Technical Regulation of Ukraine)



The UA.TR mark on the nameplate certifies adherence to the technical regulations of Ukraine for the documented device series.

#### 9.1.5 RCM approval (in preparation)



The RCM approval has been granted for the documented unit series.

The RCM mark on the nameplate certifies the conformity with ACMA (Australian Communication and Media Authority).

## 9.2 General information

### 9.2.1 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.

## 9.3 Technical data

### 9.3.1 General technical data

#### Input

MOVI-C® FIELD CONTROLLER			MFC1..			
Electronics cover (controller)			FHX25A-N	FHX25A-E	FHX45A-N	FHX45A-E
Voltage supply for connected drive units						
	Nominal supply voltage AC (to EN 50160)	V <sub>line</sub>	3 × AC 380 V – 500 V			
	Nominal line current AC	I <sub>line</sub>	≤ 24 A			
	Line frequency	f <sub>line</sub>	50 – 60 Hz ± 10%			
Voltage supply for electronics cover (controller)						
	Nominal voltage DC (according to IEC 61131-2)	V <sub>DC</sub>	24 V (-15% – +20%)			
	Nominal current DC	I <sub>MAX</sub>	500 mA			

#### Output

MOVI-C® FIELD CONTROLLER		MFC1..			
Electronics cover (controller)		FHX25A-N	FHX25A-E	FHX45A-N	FHX45A-E
Output voltage	$V_{OUT}$	Matches the nominal line voltage $V_{line}$			
Output frequency	$f_{OUT}$	Matches the line frequency $f_{line}$			
Nominal output current	$I_N$	≤ 24 A			

Electronics cover (controller)

MOVI-C® FIELD CONTROLLER		MFC1..			
Electronics cover (controller)		FHX25A-N	FHX25A-E	FHX45A-N	FHX45A-E
Memory		<ul style="list-style-type: none"> <li>Retain data: 32 kB</li> <li>Retain persistent: 2 kB</li> <li>Data memory: 6 MB</li> <li>Program memory: 2 MB for application, including libraries</li> </ul>			
OMH45A SD memory card in the XM SD card slot		<ul style="list-style-type: none"> <li>PC-readable</li> <li>Contents: <ul style="list-style-type: none"> <li>Firmware</li> <li>IEC program</li> <li>Application data</li> </ul> </li> <li>512 MB memory</li> </ul>			

Installation location

MOVI-C® FIELD CONTROLLER		MFC1..			
Electronics cover (controller)		FHX25A-N	FHX25A-E	FHX45A-N	FHX45A-E
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	<p>Up to <math>h \leq 1000</math> m: without restrictions</p> <p>The following restrictions apply to altitudes <math>&gt; 1000</math> m:</p> <ul style="list-style-type: none"> <li>From 1000 m to maximum 3800 m: <math>I_N</math> reduction by 1% per 100 m</li> <li>From 2000 m to maximum 3800 m: To maintain protective separation and the air gaps and creepage distances according to EN 61800-5-1, an overvoltage protection device must be connected upstream to reduce the overvoltages from category III to category II.</li> </ul>			
Proof of mechanical strength		3M7/5M2 according to DIN EN 60721-3-3/5			

## General information

MOVI-C® FIELD CONTROLLER		MFC1..			
Electronics cover (controller)		FHX25A-N	FHX25A-E	FHX45A-N	FHX45A-E
Power loss	P <sub>v</sub>	12 W			
Operating mode		S1, DB according to EN 60034-1			
Type of cooling		Natural cooling to DIN 41751 and EN 61800-5-1			
Signaling functions		Display elements on housing to indicate the unit state			
Required preventive measure	h	Grounding the device			
Current carrying capacity of terminals		<ul style="list-style-type: none"> <li>• See chapter "Current carrying capacity of the terminals".</li> <li>• For more information, refer to chapter "Electrical installation" &gt; "Installation instructions" &gt; "Permitted cable cross section of terminals".</li> </ul>			
Interference immunity		EN 61800-3; 2. Environment (industrial environment)			
Interference emission		EN61800-3; category C3			
Mass		3.7 kg			

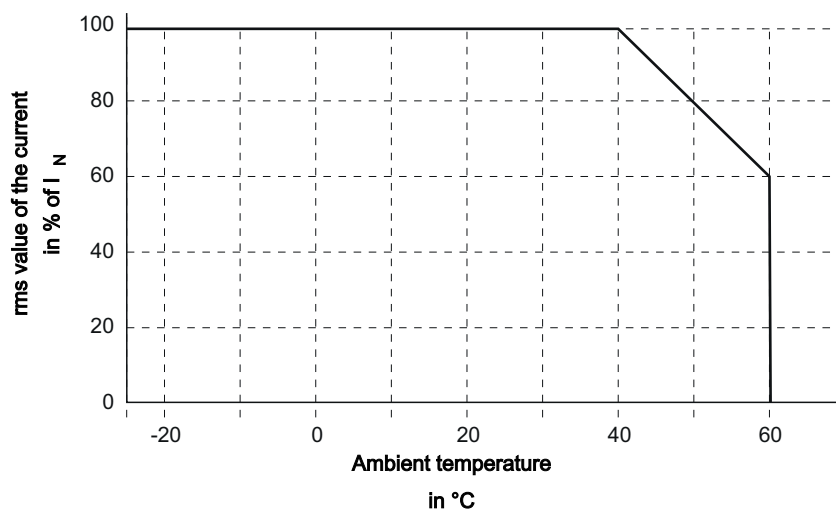
### 9.3.2 Environmental conditions

Environmental conditions	
<b>Climatic conditions</b>	<ul style="list-style-type: none"> <li>Extended storage: EN 60721-3-1 class 1K2 ambient temperature -25 °C to +70 °C</li> <li>Transportation: EN 60721-3-2 class 2K3 ambient temperature -25 °C to +70 °C</li> <li>Operation (fixed installation, weatherproof): EN 60721-3-3 class 3K3 ambient temperature -25 °C to +60 °C Non-condensing, no moisture condensation. <math>I_N</math> reduction: 2% <math>I_N</math> per K at +40 °C to +60 °C</li> </ul>
<b>Chemically active substances</b>	<ul style="list-style-type: none"> <li>Extended storage: EN 60721-3-1 class 1C2</li> <li>Transportation: EN 60721-3-2 class 2C2</li> <li>Operation (fixed installation, weatherproof): EN 60721-3-3 class 3C2</li> </ul>
<b>Mechanically active substances</b>	<ul style="list-style-type: none"> <li>Extended storage: EN 60721-3-1 class 1S1</li> <li>Transportation: EN 60721-3-1 class 2S1</li> <li>Operation (fixed installation, weatherproof): EN 60721-3-3 class 3S1</li> </ul>

### 9.3.3 Derating factors

#### Derating depending on the ambient temperature

The following figure shows the  $I_N$  reduction depending on the ambient temperature:



9007228236725387

$I_N$  reduction: 2%  $I_N$  per K at 40 °C to 60 °C

#### Derating depending on the installation altitude

Observe the information on the installation altitude in chapter "Technical data and dimension sheets" > "Technical data" > "General technical data" > "Installation location" > "Installation altitude".

#### Notes



### INFORMATION

Derating is based on typical operating conditions with a supply voltage of 24 V.

### 9.3.4 Current carrying capacity of terminals

Current carrying capacity of terminals		
Line terminals	X1_a X1_b	24 A (max. loop-through current)
Control terminals	X9	10 A (max. loop-through current)



### 9.3.5 Technical data for PROFINET IO interface

PROFINET IO	
<b>Manufacturer ID</b>	010A <sub>hex</sub>
<b>Device ID</b>	15 <sub>dec</sub>
<b>Connection technology</b>	M12 plug connector
<b>Baud rate</b>	100 MBd (full duplex)
<b>Application protocols</b>	PROFINET IO, HTTP, SNMP, SEW Application Services
<b>Port numbers used</b>	80, 161, 310, PROFINET DCE/RPC Ports (dynamic via End Point Mapper)
<b>Conformance class</b>	C
Real time class	RT (Real Time), IRT (Isochronous Real Time)
Netload class	3
Topology detection	Yes (LLDP)
Auto addressing	Yes (LLDP, DCP)
I&M	1 – 5
<b>Media redundancy</b>	MRP
<b>Shared device</b>	Yes
<b>Ethernet switch</b>	2 ports, integrated
Technology	Cut Through, Store and Forward
Latency period Cut Through	5.5 µs
Latency period Store and Forward	Depending on package size
<b>Application profiles</b>	PROFIsafe, PROFIenergy
<b>Permitted cable types</b>	Category 5 and higher, class D according to IEC 11801
<b>Maximum cable length</b> (from switch to switch)	100 m
<b>GSD file name</b>	GSDML-Vx.yz-SEW-MOVI-C-CONTROLLER-FHX25-FHX45-jjjjmmdd-hhmmss
<b>Bitmap file name</b>	GSDML-010A-000F-SEW-MOVI-C-FHXx5.bmp

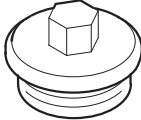
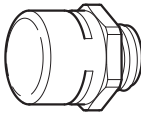
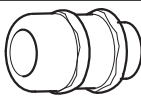
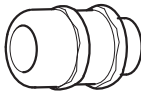
## 9.3.6 Technical data of EtherNet/IP™, Modbus TCP interface

EtherNet/IP™, Modbus TCP	
<b>Manufacturer ID</b>	013B <sub>hex</sub>
<b>Device ID</b>	<ul style="list-style-type: none"> <li>FHX25A: 1A<sub>hex</sub></li> <li>FHX45A: 1B<sub>hex</sub></li> </ul>
<b>Connection technology</b>	M12 plug connector
<b>Supported baud rate</b>	100 MBd/10 MBd (full duplex, half duplex)
<b>Application protocols</b>	EtherNet/IP™, Modbus TCP, HTTP, SNMP, DHCP, SEW Application Services
<b>Port numbers used</b>	67/68, 80, 161, 310, 502, 2222, 44818
<b>Application profiles</b>	CIP Safety (in preparation)
<b>Permitted cable types</b>	Category 5 and higher, class D according to IEC 11801
<b>Maximum cable length</b> (from switch to switch)	100 m
<b>EDS file name</b>	<ul style="list-style-type: none"> <li>FHX25A: SEW MOVI-C CONTROLLER FHX25A.eds</li> <li>FHX45A: SEW MOVI-C CONTROLLER FHX45A.eds</li> </ul>

## 9.4 Screw fittings

The following tables show the screw fittings available from SEW-EURODRIVE:

### 9.4.1 Cable glands / screw plugs / pressure compensation

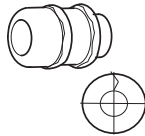
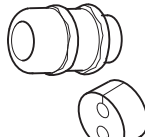
Type of screw fitting	Image	Content	Size	Tightening torque <sup>1)</sup>	Outer cable diameter	Part number
<b>Screw plugs external hexagon (made of stainless steel)</b>		10 pieces	M16 × 1.5	6.8 Nm	–	18247342
		10 pieces	M25 × 1.5	6.8 Nm	–	18247350
<b>Pressure compensation screw fittings (made of stainless steel)</b>		1 piece	M16 × 1.5	4 Nm	–	28214617
<b>EMC-compliant cable gland (brass, nickel-plated)</b>		10 pieces	M16 × 1.5	4 Nm	5 to 9 mm	18204783
		10 pieces	M25 × 1.5	7 Nm	11 to 16 mm	18204805
<b>EMC-compliant cable gland (made of stainless steel)</b>		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

## 9.4.2 Cable glands, Ethernet cable

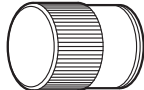


Type of screw fitting	Image	Content	Size	Tightening torque <sup>1)</sup>	Outer cable diameter	Part number
Cable gland for externally routed Ethernet cable with mini IO plug connector (brass, nickel-plated)		10 pieces	M25 × 1.5	7 Nm	1 x 6.5 mm	25676040
		10 pieces	M25 × 1.5	7 Nm	2 x 6.5 mm	25676032

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

## 9.4.3 Screw fittings: Plug connectors

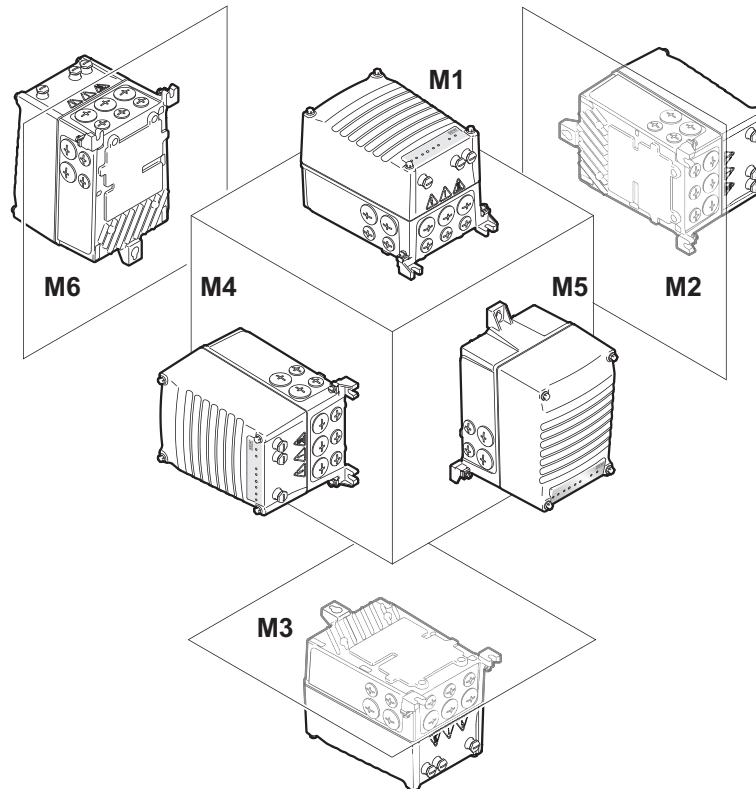
Type of screw fitting	Figure	Content	Size	Tightening torque <sup>1)</sup>	Part number
M23 plug (made of stainless steel)		1 piece	M23 × 1.5	Tighten fully	19094558
M12 plug for plug connector with male thread (made of stainless steel)		10 pcs	M12 × 1.0	2.3 Nm	18202799
M12 plug for plug connector with 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%.

## 9.5 Mounting positions

### 9.5.1 MFC1.. design

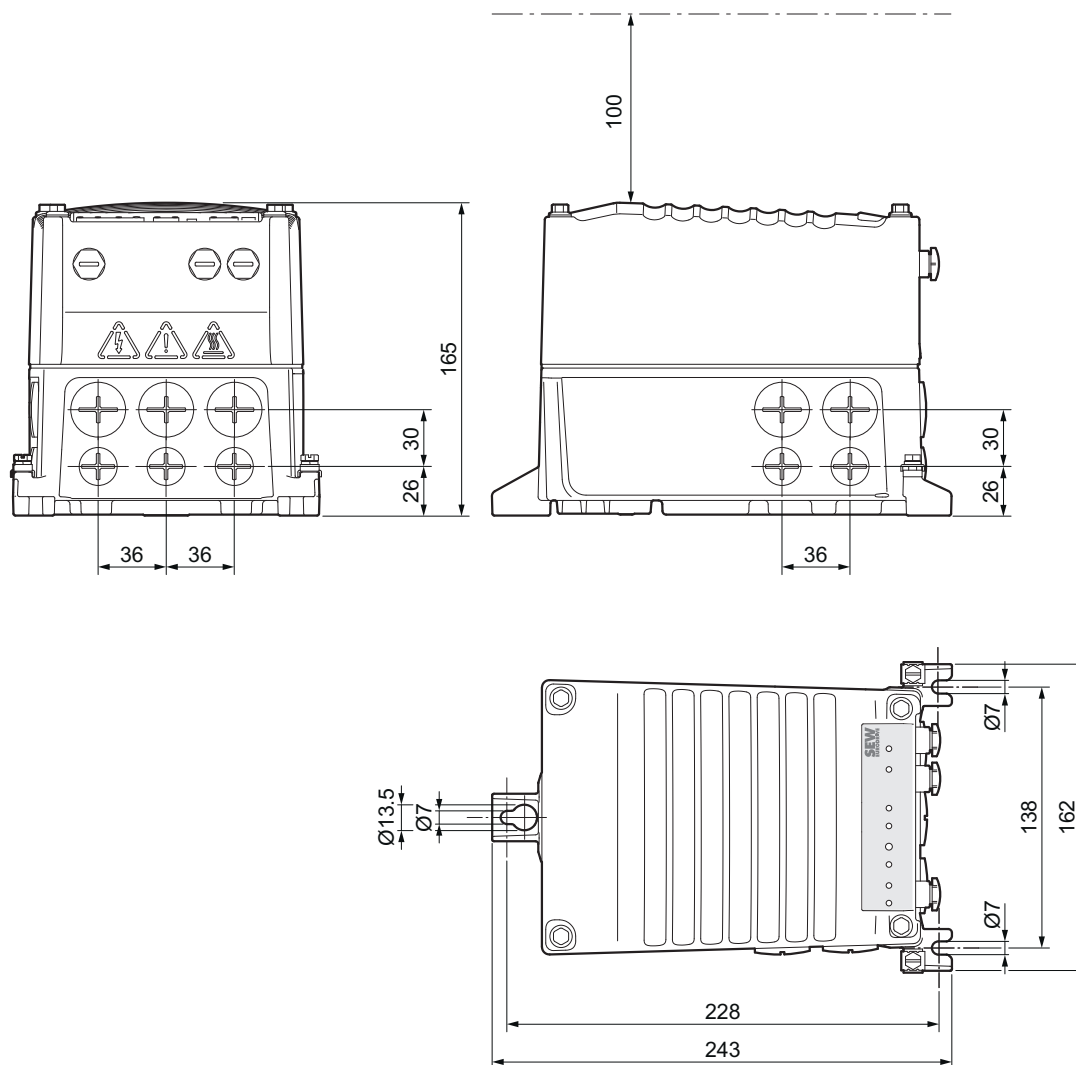
The following mounting positions are possible for the device:



32168219787

## 9.6 Device dimension drawings

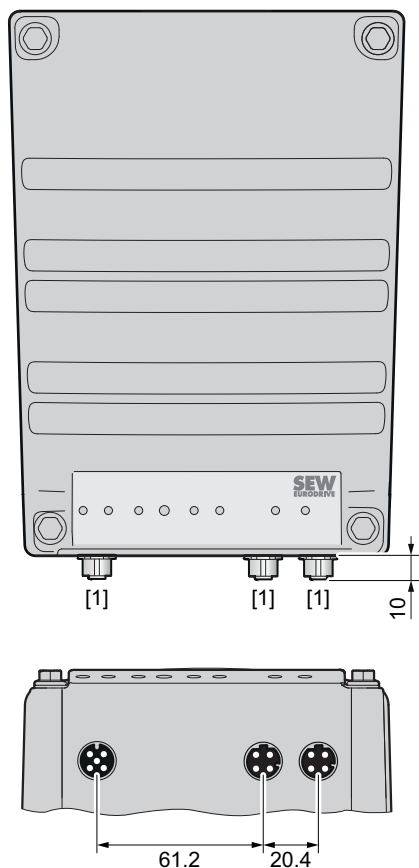
### 9.6.1 MFC1.. design



32823816331

## 9.7 Dimension drawings of plug connectors in the electronics cover

The following figure shows the additional dimensions of the plug connectors.



32168309387

[1] M12 plug connector design, female

## 9.8 Dimension drawings of plug connectors in the connection box

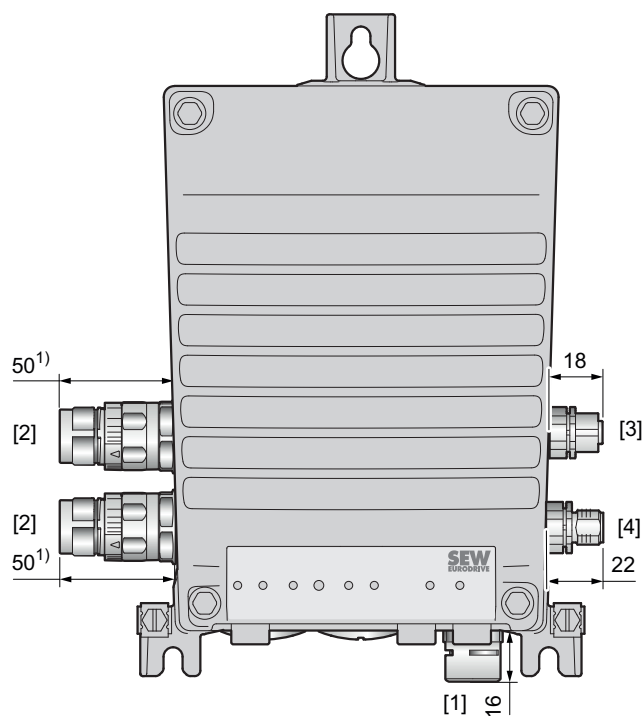
### 9.8.1 MFC1.. design

#### Plug connector



### 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".



28692454795

- [1] Optional pressure compensation
- [2] M23 plug connector design, female
- [3] M12 plug connector design, female
- [4] M12 plug connector design, male

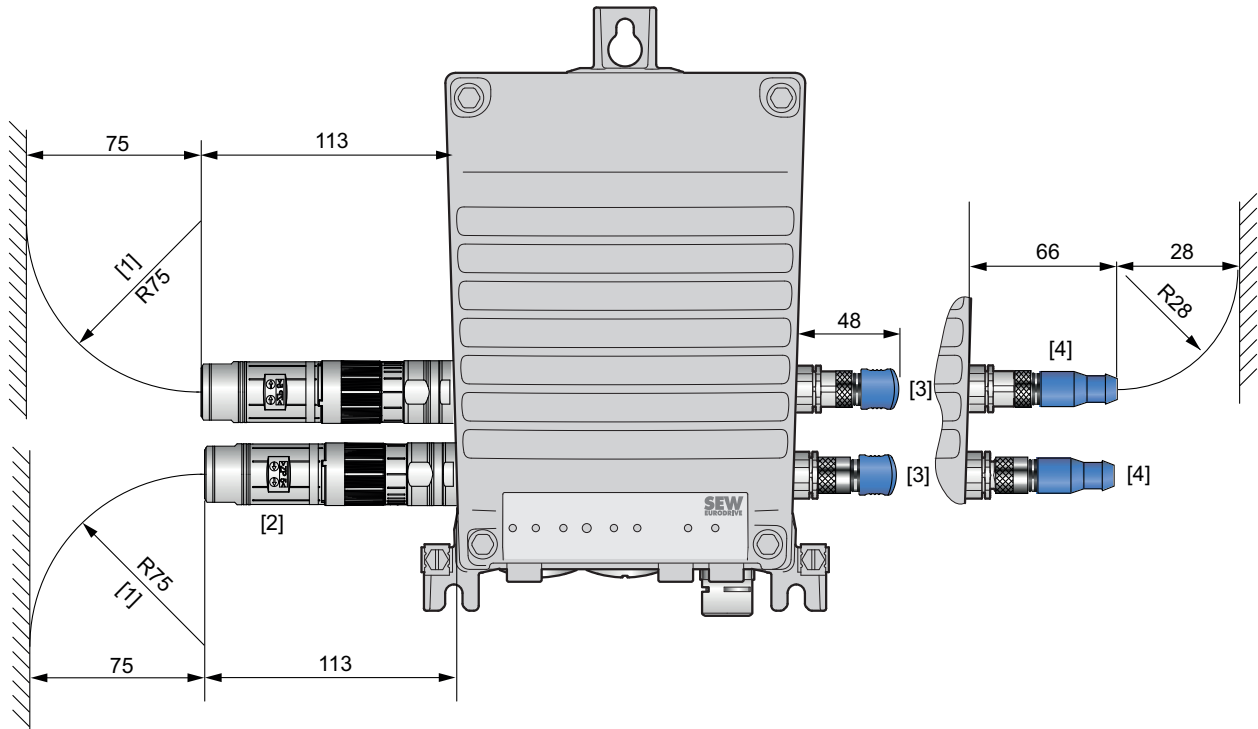


Plug connector including mating connector

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".

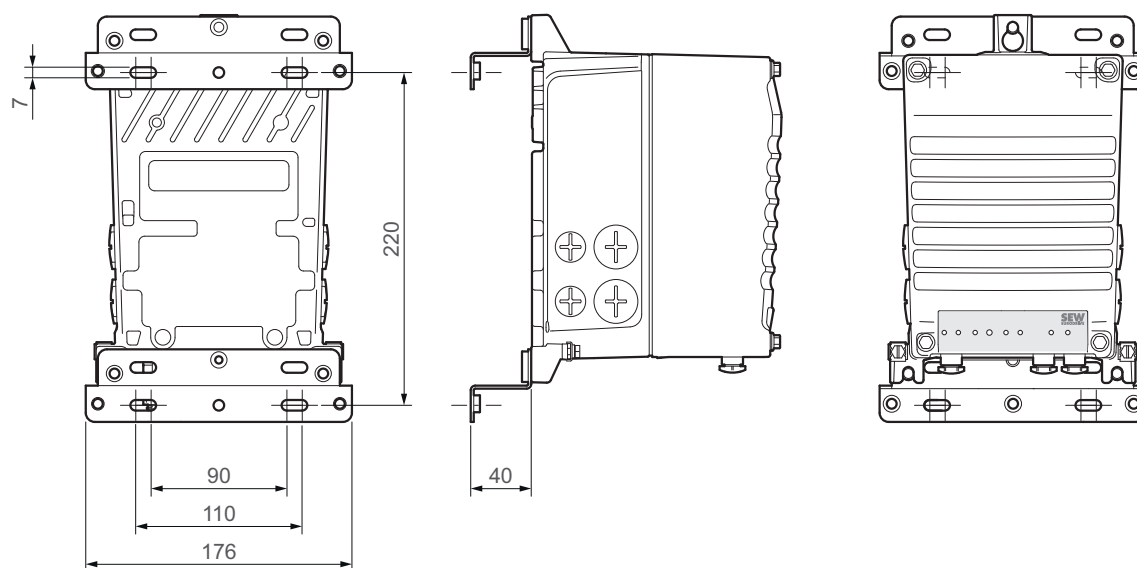


28692451211

- [1] Bending radius
- [2] "Straight" M23 plug connector design
- [3] "Right-angle" M12 plug connector design
- [4] "Straight" M12 plug connector design

## 9.9 Spacer dimension drawings

### 9.9.1 MFC1.. design



32168416907

## Index

### A

Air admission and accessibility .....	120
Ambient temperature .....	123
Assembly	
Requirements .....	24
Safety notes .....	10

### C

Cable cross section	
Control terminals X9 .....	37
Line terminals X1_a .....	37
Line terminals X1_b .....	37
Cable entries .....	15
Cable glands .....	127, 128
Cable routing .....	33, 46
Cable shielding .....	33, 46
CE marking .....	119
Circuit breaker .....	38
Connection	
Cable routing .....	46
Cable shielding .....	46
Connection diagram .....	45
Ethernet .....	46
Installation topology .....	42
PC .....	95
Plug connector .....	48
STO .....	46
Supply system .....	46
Terminal assignment .....	43
Connection box .....	20
Connection cable	
Notes .....	49
Connection cables	
Cable routing .....	49
Cable types .....	49
Inspection and maintenance .....	114
Prefabricated cables with plug connectors .....	50
Third-party cable with plug connector .....	50
Connection unit	
Nameplate .....	23
Type designation .....	23
Cooling	
Derating .....	11

Installation altitude .....	11
Copyright notice .....	7
Cover	
External .....	21
Internal .....	20
CSA .....	119
cUL .....	119

### D

Decimal separator .....	6
Derating .....	11
Derating depending on	
Ambient temperature .....	124
Installation altitude .....	124
Derating factors .....	124
Description of mounting positions .....	129
Device	
Installing .....	25
Mounting .....	28
Mounting with spacers .....	29
Replacing .....	110
Device replacement .....	108
Device structure .....	14
Cable entry positions .....	15
Connection unit nameplate .....	23
Electronics .....	20
Electronics nameplate .....	22
Nameplate device .....	17
Nameplate plug connector positions .....	19
Nameplate positions .....	16
Diagnostics	
Fault messages .....	100
LED displays .....	101
MOVISUITE® .....	100
Dimension drawings	
Device .....	130
Plug connector with mating connector .....	133
Plug connectors .....	132
Spacer .....	134
Dimension drawings of plug connectors	
At the electronics cover .....	131
In the connection box .....	132
DIP switch	
Overview .....	99

## E

EAC .....	119
Electrical installation .....	12
Safety notes .....	12
Electronics .....	
Connection box .....	20
Electronics cover (inside) .....	20
Nameplate .....	22
Type designation .....	22
Electronics cover .....	
Minimum installation clearance .....	26
Mounting .....	26
Removing .....	27
Embedded safety notes .....	6
EMC .....	33
EMC cable glands .....	
Cable shielding .....	47
Installation .....	47
EMC-compliant cable glands .....	
Overview .....	127
Equipotential bonding .....	34
At the connection box (option) .....	35
EtherCAT® .....	
Beckhoff trademark .....	7
Ethernet .....	
PC connection to X4224 .....	95
PC connection to X4233_1 or X4233_2 .....	96
Ethernet cable .....	
Cable routing .....	46
Cable selection .....	46
Cable shielding .....	46
EtherNet/IP™ .....	
Bus-specific LEDs .....	105
LED displays .....	101
Technical data .....	126
Extended storage .....	112

## F

Fault .....	
Fault messages .....	100
Reset .....	100
Fault messages .....	
Evaluating .....	100
Functional safety technology .....	
Safety note .....	10

## H

Hazard symbols .....	
Meaning .....	6

## I

Inspection .....	
Connection cables .....	114
Preliminary work .....	114
Installation .....	
Blanking plugs .....	30
Device .....	25
Electronics cover .....	25, 32
EMC cable glands .....	31
Fastening dimensions .....	28
Mounting clearances .....	28
Spacer .....	29
Installation (electrical) .....	33
Cable routing .....	33, 46
Cable selection .....	46
Cable shielding .....	33, 46
Connection diagram .....	45
EMC-compliant installation .....	33
Equipotential bonding .....	34
Ethernet cable .....	46
Installation altitude .....	41
Installation instructions .....	36
Installation topology .....	42
Line contactor .....	39
Line protection .....	38
PC connection .....	95
PE connection .....	40
Plug connector .....	48
Plug connector assignment .....	60, 92
Protection devices .....	41
Residual current device .....	38
Supply system cables .....	36
Terminal actuation .....	38
Terminal assignment .....	43
Installation (mechanical) .....	28
Installation notes .....	24
Installing the device .....	25
Installing the electronics cover .....	25
Removing the electronics cover .....	25
Required tools and resources .....	24
Requirements .....	24

Tightening torques.....	30
Installation altitude.....	41
Installation instructions .....	36
Installation notes	
Derating.....	11
Installation altitude > 1000 m .....	11
Installation topology.....	42

## L

LED displays .....	101
"BF" LED .....	104
"IEC" LED .....	103
"L/A" LED .....	102
"MS" LED .....	106
"NS" LED .....	105
"PLC" LED .....	102
"US1" LED .....	104
"USR" LED .....	103
LED "L/A" (X4233_1).....	102
LED "L/A" (X4233_2).....	102
Line contactor .....	39
Line protection.....	38

## M

Maintenance	
Connection cables.....	114
Preliminary work.....	114
Modbus TCP	
Bus-specific LEDs .....	105
LED displays .....	101
Technical data .....	126
Mounting positions .....	129
MOVISUITE®	
Diagnostics.....	100
Evaluating fault messages .....	100

## N

Nameplate	
Connection unit .....	23
Device .....	17
Electronics.....	22
Position.....	16
Notes	
Cable routing and cable shielding .....	46
Derating.....	124
Designation in the documentation .....	5

Installation .....	24
Installing the device.....	25
Installing the electronics cover .....	26
Meaning of the hazard symbols .....	6
PE connection .....	40
Removing the electronics cover .....	27
Replacing the device .....	108

## O

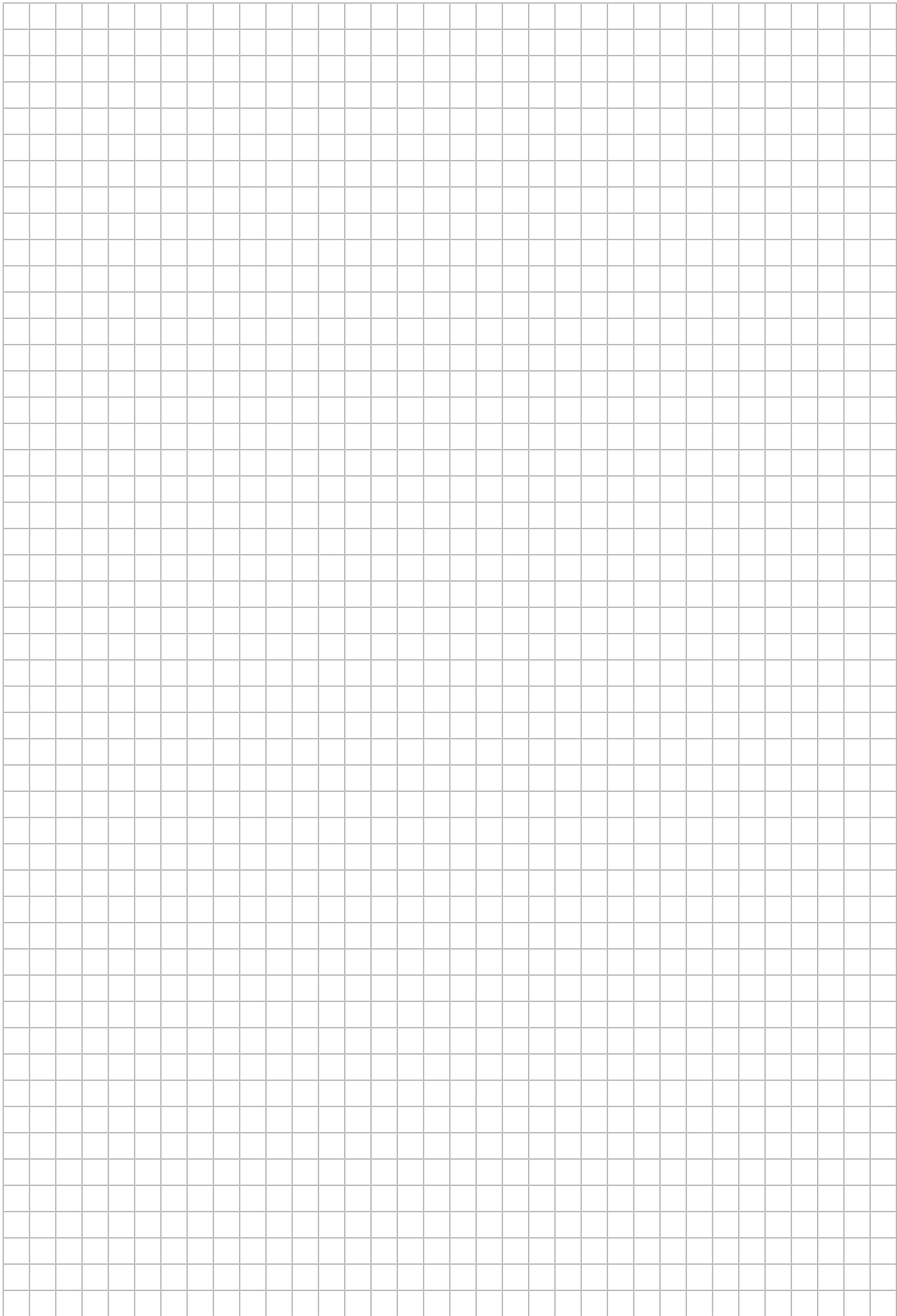
Operation	
Safety notes .....	13

## P

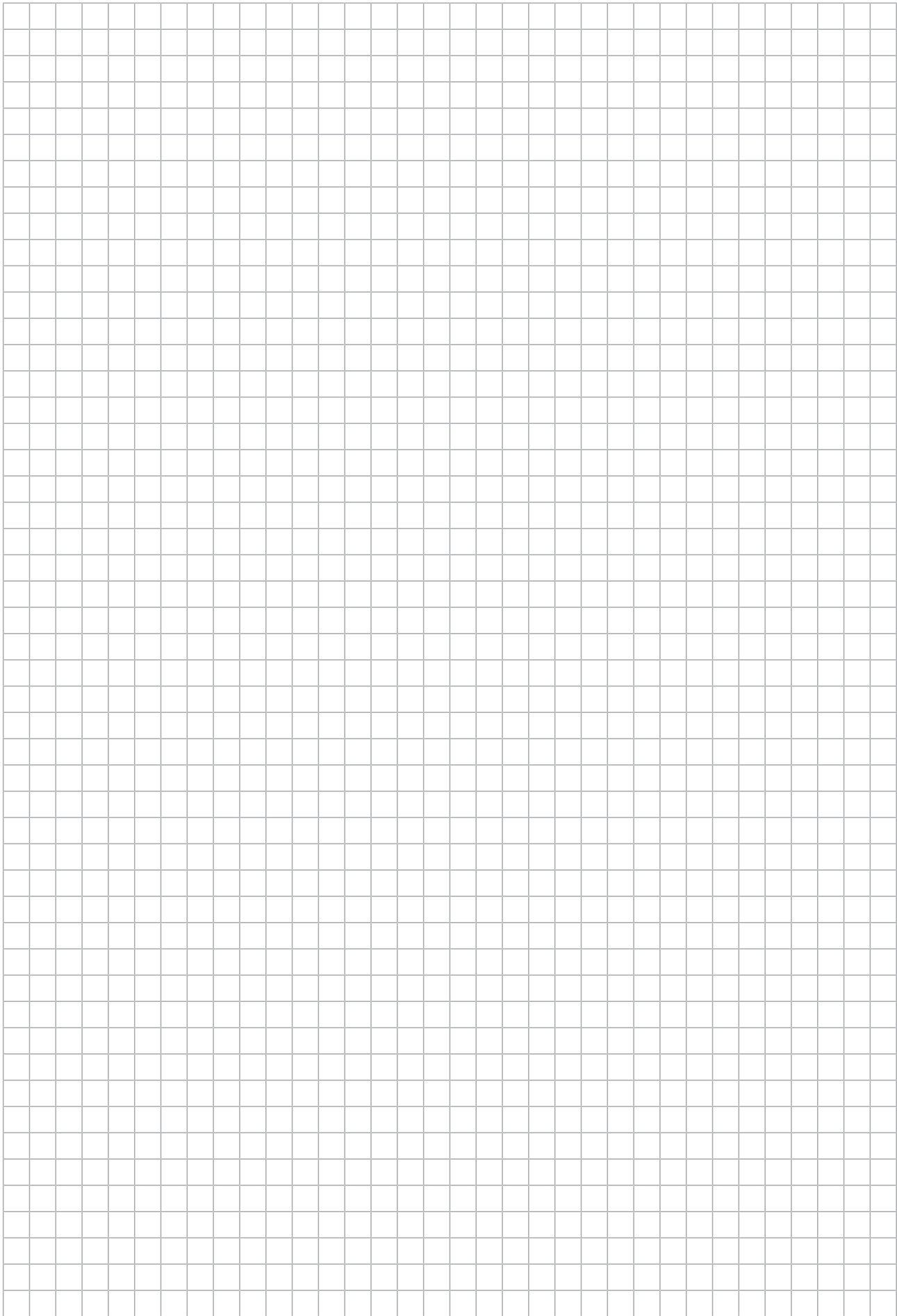
Paint protection cap.....	97
Paint protection film.....	97
PC connection	
To X4224.....	95
to X4233_1 or X4233_2 .....	96
Via Ethernet.....	95
PE connection	
Installation .....	40
Notes .....	40
Plug connector .....	48
Assignment.....	60, 92
Designation key.....	48
Plug connector positions .....	19, 51
Plug connector variant.....	55
Self-assembled plug connectors .....	58
Plug connector positions	
At the electronics cover .....	54
Plug connectors	
Connection cable.....	49
Dimension drawing.....	132, 133
Plug connector positions .....	54
Plug connectors dimension drawing	
In the connection box .....	132
Plug connectors, dimension drawing	
At the electronics cover .....	131
Position	
Cable entries .....	15
Nameplates .....	16
Product names .....	7
PROFINET	
Bus-specific LEDs .....	104
LED displays .....	101
Technical data .....	125

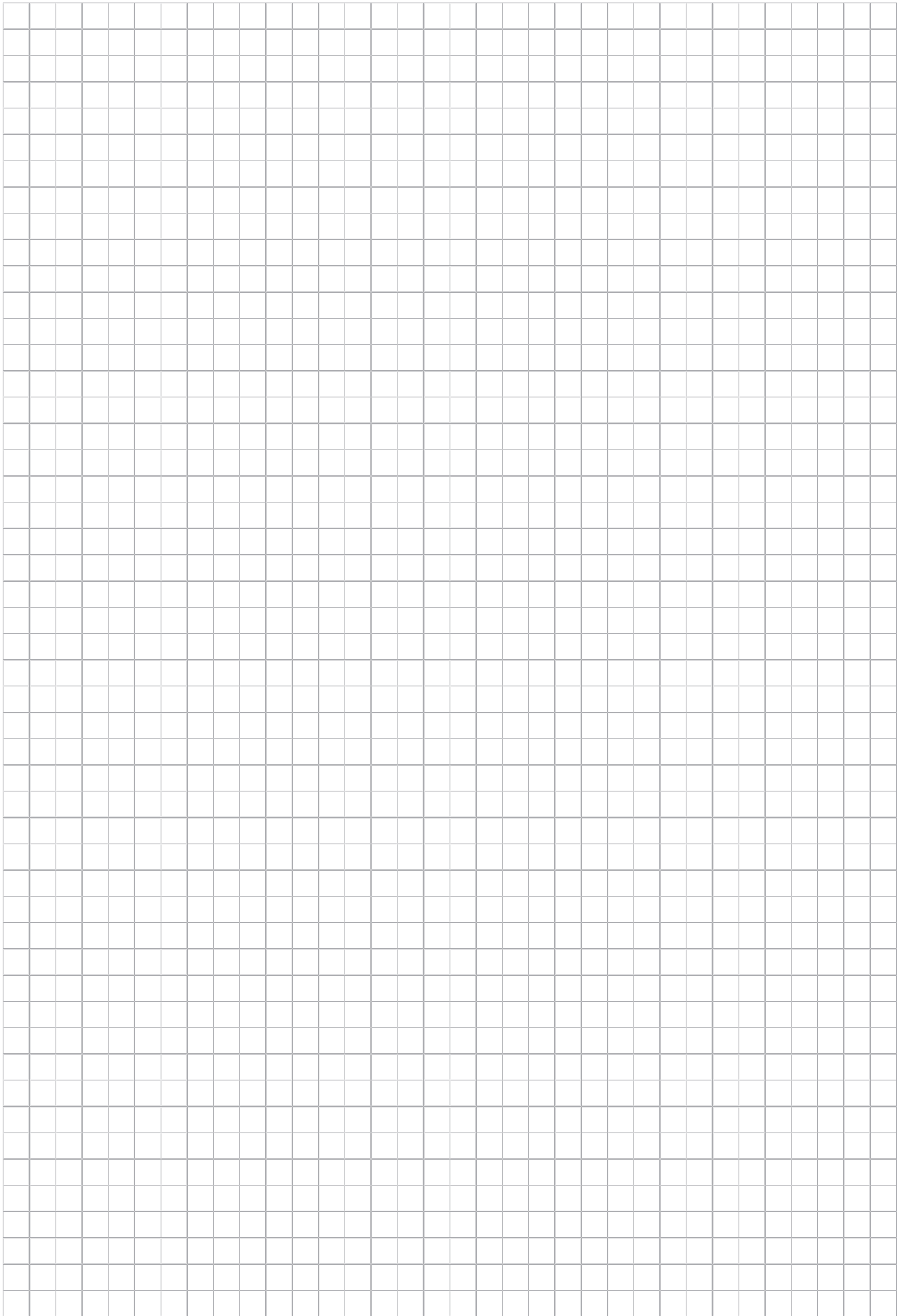
Protection devices .....	41	Signal words in safety notes .....	5
Protective separation .....	12	Spacer	
<b>R</b>		Dimension drawings .....	134
RCM .....	119	Part number .....	29
Repair .....	111	Scope of delivery .....	29
Replace the gaskets .....	115	Startup	
Replacement		DIP switch .....	99
Device .....	110	Requirements for startup .....	98
Electronics cover .....	108	Safety notes .....	13
SD memory card .....	109	Startup notes .....	97
Required tools and resources .....	24	Storage .....	111
Reset .....	100	Storage conditions .....	112
Residual current device .....	38	Supply system cables .....	36
Restriction of use .....	11	<b>T</b>	
Rights to claim under limited warranty .....	6	Target group .....	9
<b>S</b>		Technical data	
Safety functions .....	10	Ambient conditions .....	123
Safety notes		Current carrying capacity of terminals .....	124
Assembly .....	10	Derating factors .....	124
Designation in the documentation .....	5	Description of mounting positions .....	129
Installation .....	10	Electronics cover (controller) .....	121
Installation altitude > 1000 m .....	11	EtherNet/IP™ interface .....	126
Meaning of the hazard symbols .....	6	General .....	122
Operation .....	13	General technical data .....	120
Preliminary information .....	8	Input .....	120
Startup .....	13	Installation location .....	121
Structure of embedded .....	6	Modbus TCP interface .....	126
Structure of section-related .....	5	Mounting positions .....	129
Transportation .....	10	Output .....	120
Screw fittings .....	127	PROFINET interface .....	125
Ethernet cable .....	128	Screw fittings .....	127
Plug connector .....	128	Terminal actuation .....	38
Pressure compensation .....	127	Control terminals X9 .....	38
Screw plugs .....	127	Line terminals X1 .....	38
Section-related safety notes .....	5	Terminal assignment .....	43
Separation, protective .....	12	Tightening torques .....	30
Service		Blanking plugs .....	30
Device replacement .....	108	Electronics cover .....	32
Fault messages .....	100	EMC cable glands .....	31
LED displays .....	101	Torque specifications .....	24
MOVISUITE® .....	100	Trademarks .....	7
Resetting fault messages .....	100	Type designation	
SEW-EURODRIVE Service .....	111	Connection unit .....	23
Shutdown .....	111	Device .....	17
		Electronics .....	22

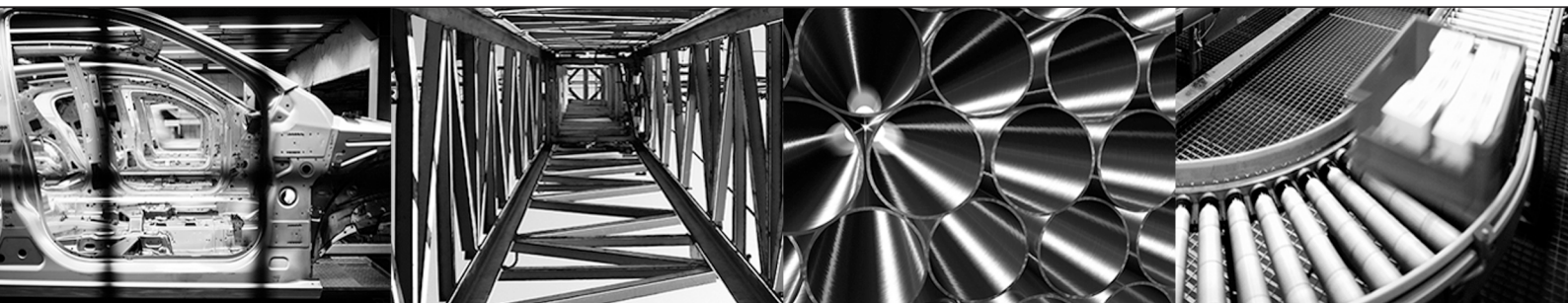
Plug connector .....	48	Connection diagram .....	66
<b>U</b>		X2313	
UA.TR.....	119	Assignment.....	84, 87
UL approval .....	119	Connection cables.....	85, 88
UL-compliant installation (in preparation).....	41	X2327	
<b>W</b>		Assignment.....	72, 77
Waste disposal .....	113	X4224	
<b>X</b>		Assignment.....	92
X1203_1		Connection diagram .....	92
Assignment.....	60	X4233_1	
Connection cable.....	73, 78	Assignment.....	93
Connection cables.....	61, 67	Connection diagram .....	93
X1203_2		X4233_2	
Assignment.....	60	Assignment.....	94
Connection cable.....	73, 78	Connection diagram .....	94
Connection cables.....	61, 67	X4251_1	
X1523		Assignment.....	90
Assignment.....	81	Connection diagram .....	90
Connection cables.....	82	X4251_2	
X2203_1		Assignment.....	90
Assignment.....	66	Connection diagram .....	90
Connection diagram .....	66	X43_1	
X2203_2		Assignment.....	91
Assignment.....	66	Connection diagram .....	91
		X43_2	
		Assignment.....	91
		Connection diagram .....	91

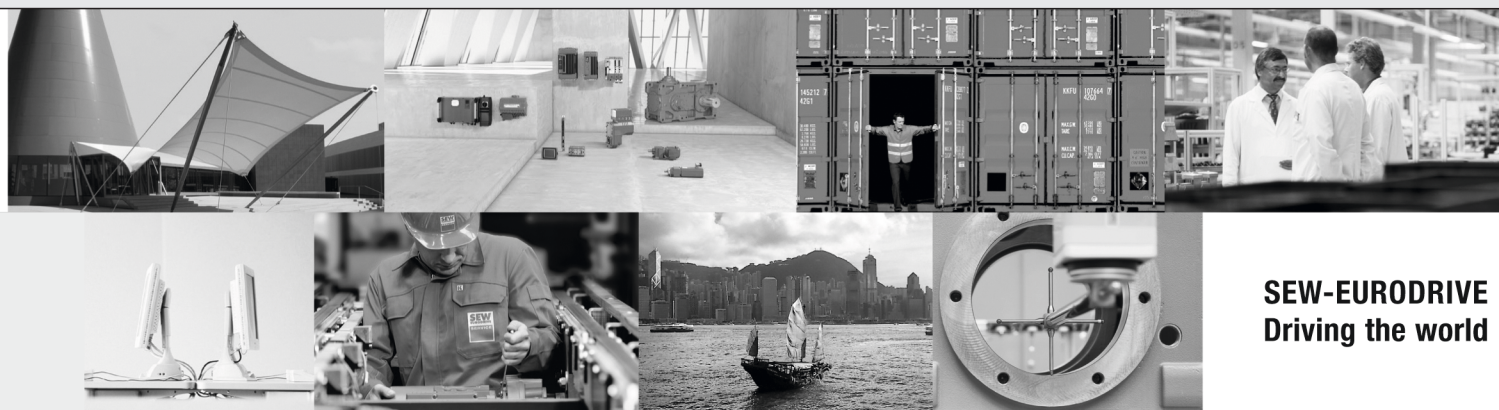












**SEW-EURODRIVE**  
Driving the world

**SEW**  
**EURODRIVE**

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](http://www.sew-eurodrive.com)