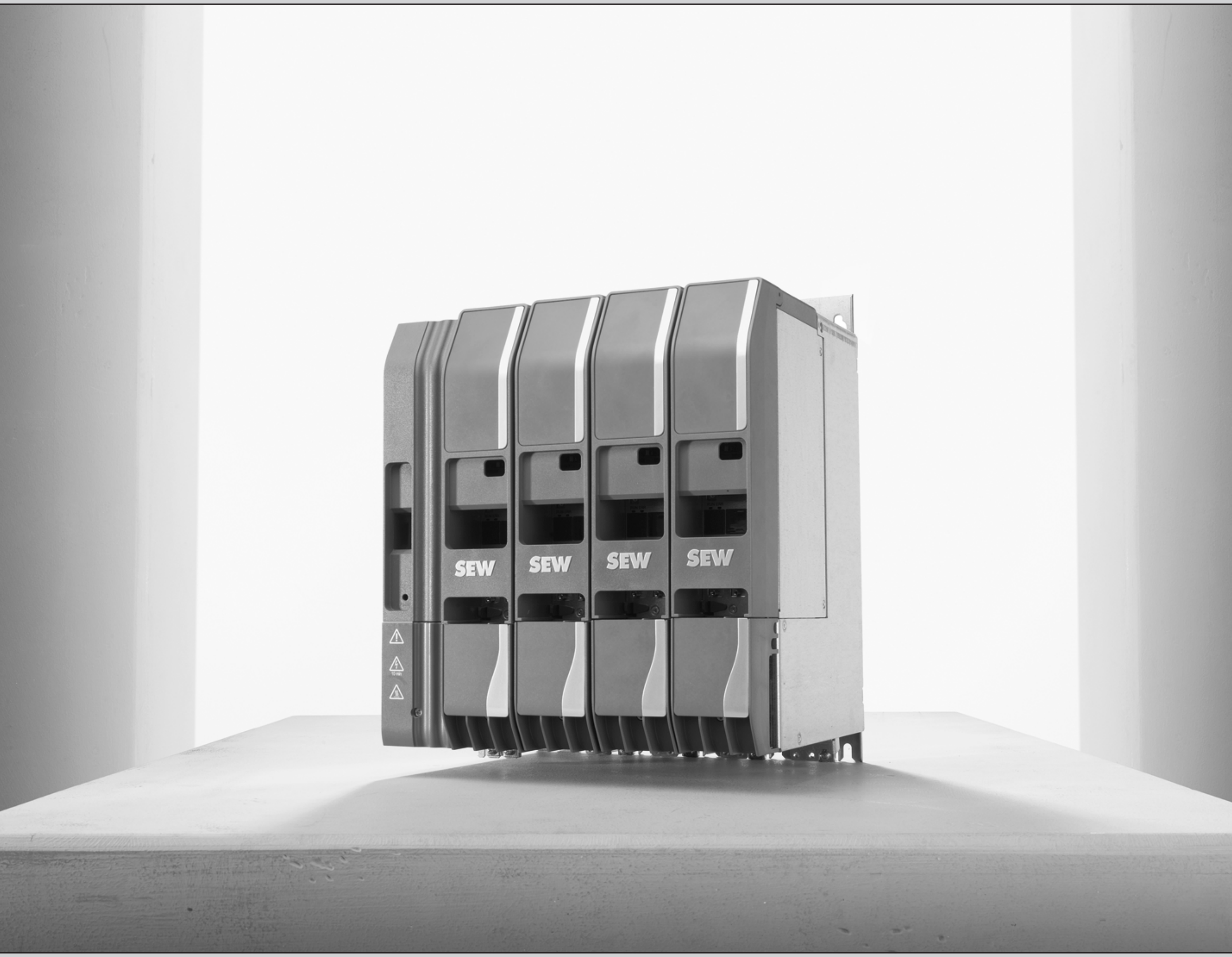
Operating Instructions



Application Inverter
MOVIDRIVE® modular

Edition 01/2020

25953079/EN

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1 General information

1.1 About this documentation

The documentation at hand is the original.

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

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

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

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

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

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1.2.2 Structure of section-related safety notes

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

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

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

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

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

1.2.3 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.

1.3 Decimal separator in numerical values

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

Example: 30.5 kg

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1.4 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.

1.5 Content of the documentation

This documentation contains additional safety-related information and conditions for operation in safety-related applications.

1.6 Other applicable documentation

Observe the corresponding documentation for all further components.

1.7 Product names and trademarks

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

1.7.1 Trademark of Beckhoff Automation GmbH

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

1.8 Copyright notice

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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 is carried out only by qualified specialists:

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

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

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

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

2.3 Target group

Specialist for mechanical work

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

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

Specialist for electrotechnical work

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

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

Additional qualifications

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

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

Instructed persons

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

2.4 Designated use

The product is intended for control cabinet 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.

The systems can be mobile or stationary.

Do not connect any other loads to the product. Never connect capacitive loads to the product.

The product can be used to operate the following motors in industrial and commercial systems:

- AC asynchronous motors with squirrel-cage rotor
- Permanent-field AC synchronous motors

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.

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2.4.1 Hoist applications

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

- Use mechanical protection devices.

Application in ELSM® control mode

When the inverter is operated in ELSM® control mode, using it in lifting applications is not permitted. In this control mode only applications of horizontal materials handling are permitted.

2.4.2 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 Transport

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.

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 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).

2.8.1 Required preventive measure

Make sure that the product is correctly attached to the ground connection.

2.8.2 Stationary application

Necessary preventive measure for the product is:

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

2.8.3 Regenerative operation

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

2.9 Protective separation

The product meets all requirements for protective separation of power and electronics connections in accordance with EN 61800-5-1. To ensure protective separation, all connected circuits must also meet the requirements for protective separation.

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.

Risk of burns due to arcing: Do not disconnect power connections during operation. Do not connect power connections during operation.

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:

10 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.

2.10.1 Energy storage unit

Products with a connected energy storage unit are not necessarily de-energized when they have been disconnected from the supply system. Usually, the energy storage unit stores sufficient energy to continue operation of the connected motors for a limited period of time. It is not sufficient to observe a minimum switch-off time.

Perform a shutdown as described in the documentation in the chapter "Service" > "Shutdown".

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3 Device structure, axis system structure

3.1 Connection variants

The MOVIDRIVE® modular application inverter can be used in the following connection variants:

- As axis system in connection with a MOVI-C® CONTROLLER power/power eco
- As axis system in connection with a master module UHX45A/MDM90A
- As axis system in connection with a MOVI-C® CONTROLLER advanced
- As axis system in connection with a MOVI-C® CONTROLLER standard

In one axis system, up to 15 axis modules can be used, both as single-axis modules and double-axis modules.

NOTICE

Damage to the MOVIDRIVE® modular application inverter when opening the DC link (separate operation).

Separate operation of individual modules will damage the application inverter and is not permitted.

Only operate the application inverter when installed in a system as illustrated above.

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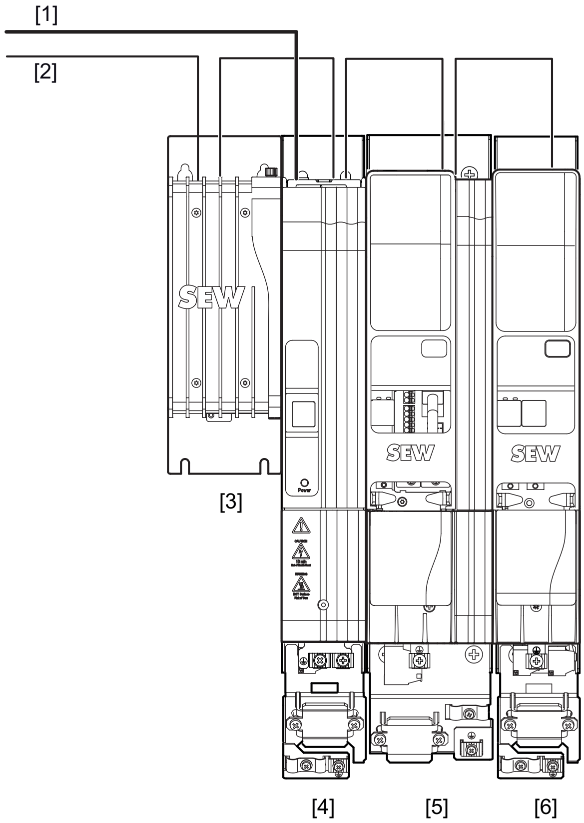
3.1.1 Axis system with MOVI-C® CONTROLLER power/power eco

MOVIDRIVE® modular



27021610677277835

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

[3] MOVI-C® CONTROLLER

[4] MOVIDRIVE® modular power supply module MDP..

[5] MOVIDRIVE® modular single-axis module MDA ..

[6] MOVIDRIVE® modular double-axis module MDD..

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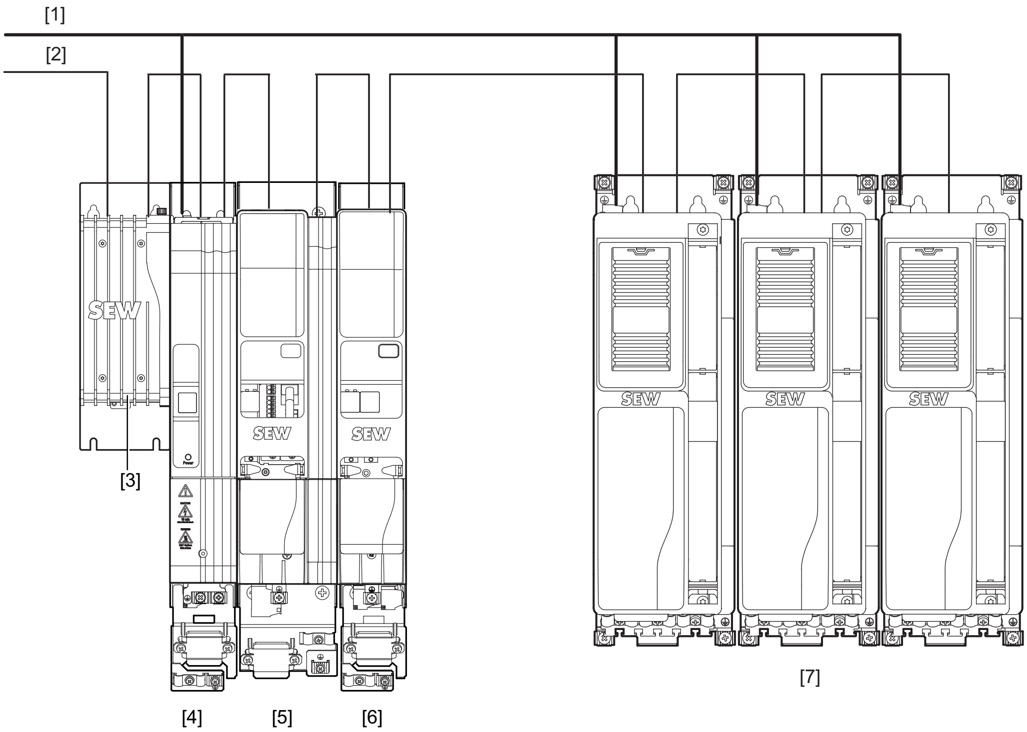
MOVIDRIVE® modular and MOVIDRIVE® system



27021613583815051

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

[3] MOVI-C® CONTROLLER

[4] MOVIDRIVE® modular power supply module MDP..

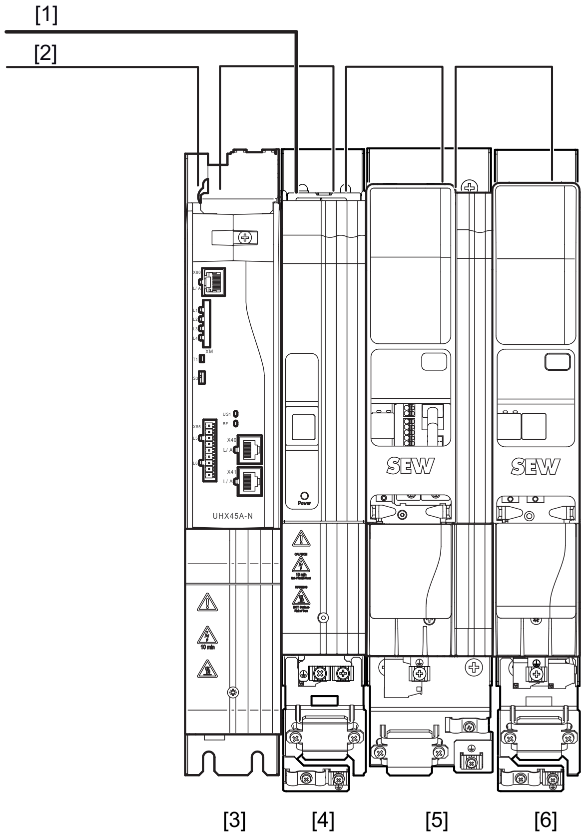
[5] MOVIDRIVE® modular single-axis module MDA ..

[6] MOVIDRIVE® modular double-axis module MDD..

[7] MOVIDRIVE® system

3.1.2 Axis system with master module UHX45A/MDM90A

MOVIDRIVE® modular



20841212939

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

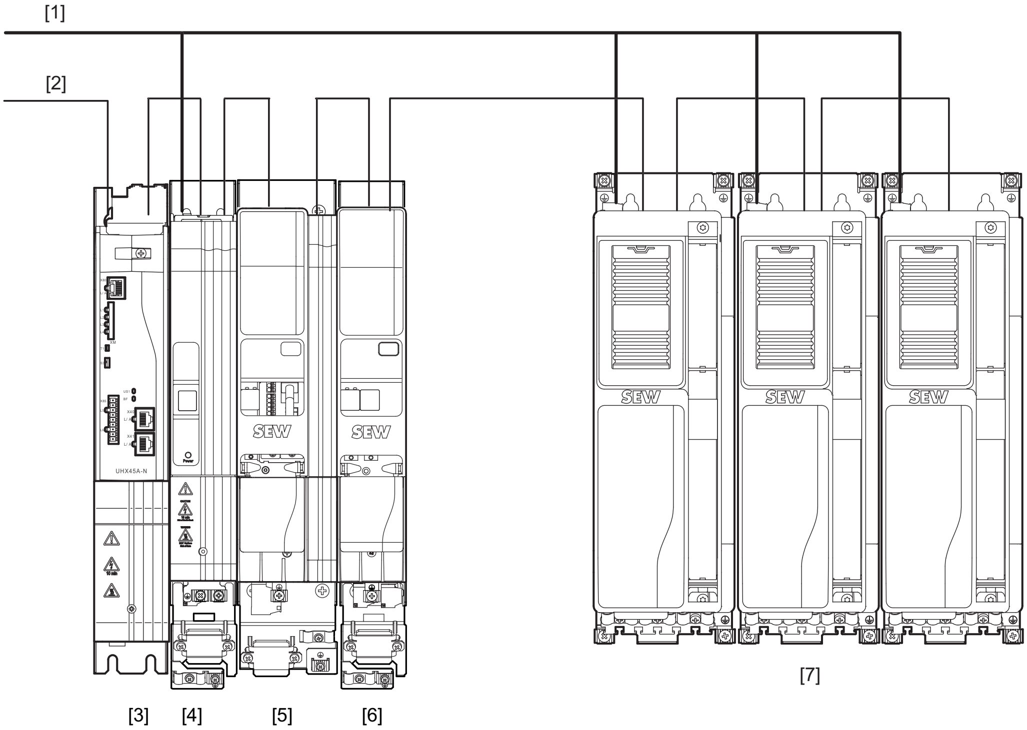
[3] MOVIDRIVE® modular master module UHX45A/MDM90A

[4] MOVIDRIVE® modular power supply module MDP..

[5] MOVIDRIVE® modular single-axis module MDA ..

[6] MOVIDRIVE® modular double-axis module MDD..

MOVIDRIVE® modular and MOVIDRIVE® system



20841205643

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

[3] MOVIDRIVE® modular master module UHX45A/MDM90A

[4] MOVIDRIVE® modular power supply module MDP..

[5] MOVIDRIVE® modular single-axis module MDA ..

[6] MOVIDRIVE® modular double-axis module MDD..

[7] MOVIDRIVE® system

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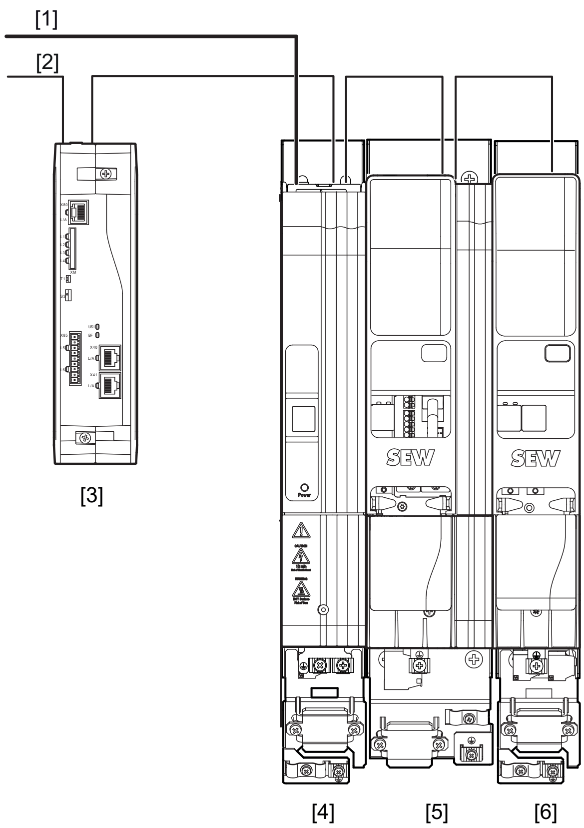
3.1.3 Axis system with MOVI-C® CONTROLLER advanced

MOVIDRIVE® modular



20841208075

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

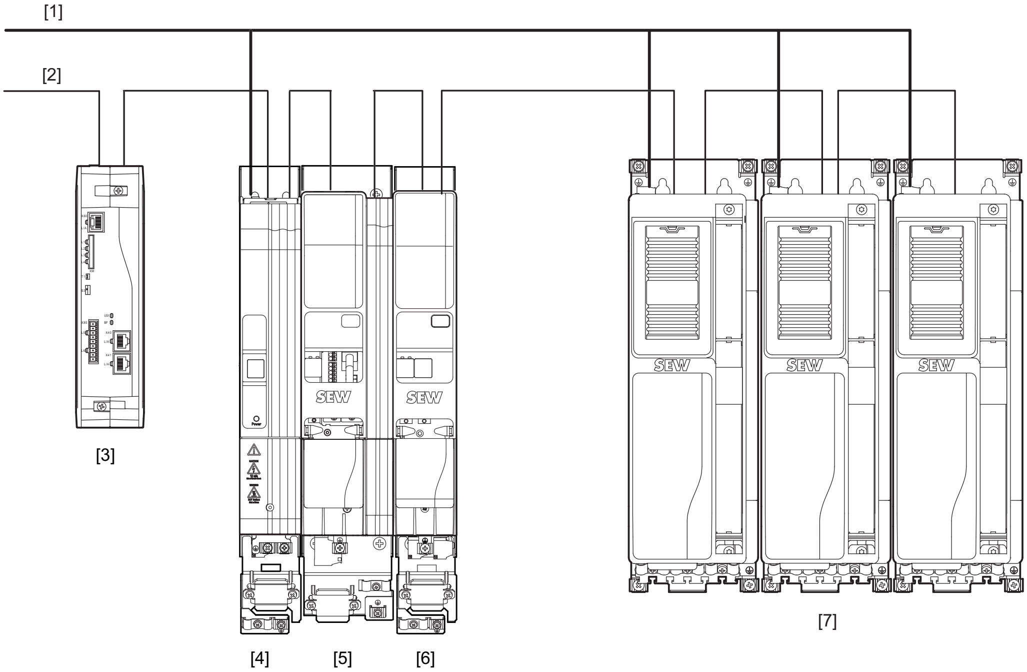
[3] MOVI-C® CONTROLLER advanced

[4] MOVIDRIVE® modular power supply module MDP..

[5] MOVIDRIVE® modular single-axis module MDA ..

[6] MOVIDRIVE® modular double-axis module MDD..

MOVIDRIVE® modular and MOVIDRIVE® system



20840829579

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial communication

[3] MOVI-C® CONTROLLER advanced

[4] MOVIDRIVE® modular power supply module MDP..

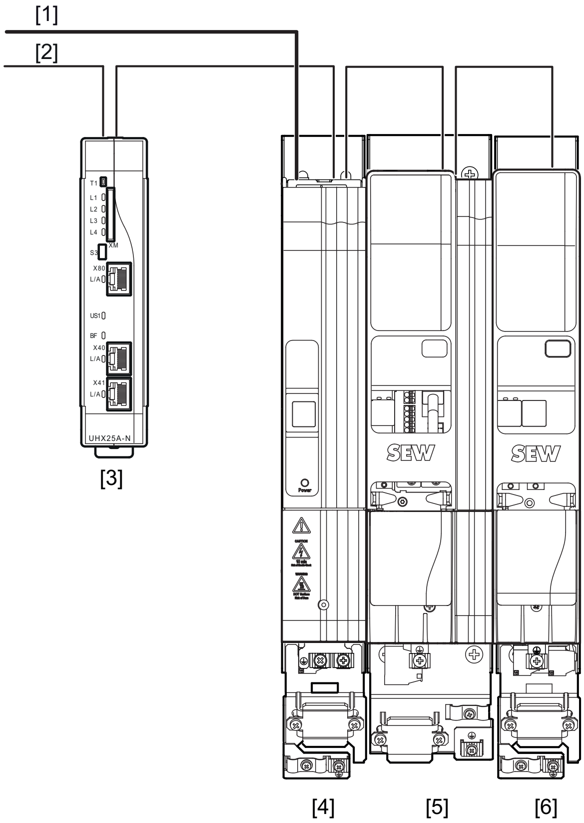
[5] MOVIDRIVE® modular single-axis module MDA.

[6] MOVIDRIVE® modular double-axis module MDD..

[7] MOVIDRIVE® system

3.1.4 Axis system with MOVI-C® CONTROLLER standard

MOVIDRIVE® modular



20841210507

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

[3] MOVI-C® CONTROLLER standard

[4] MOVIDRIVE® modular power supply module MDP..

[5] MOVIDRIVE® modular single-axis module MDA ..

[6] MOVIDRIVE® modular double-axis module MDD..

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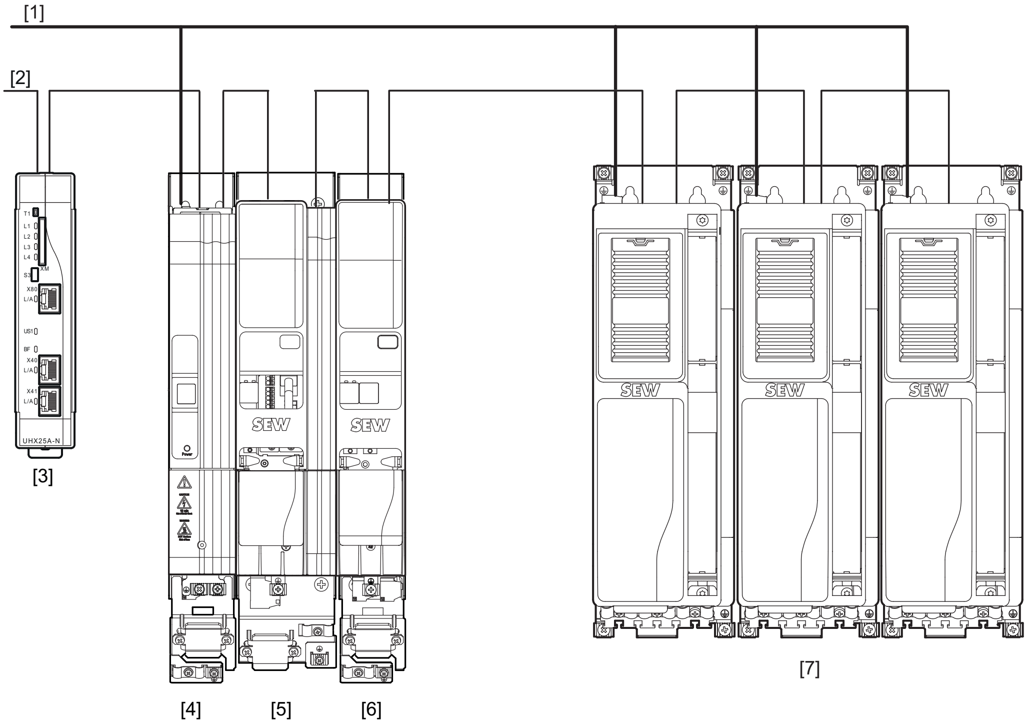
MOVIDRIVE® modular and MOVIDRIVE® system



20841203211

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

[3] MOVI-C® CONTROLLER standard

[4] MOVIDRIVE® modular power supply module MDP..

[5] MOVIDRIVE® modular single-axis module MDA.

[6] MOVIDRIVE® modular double-axis module MDD..

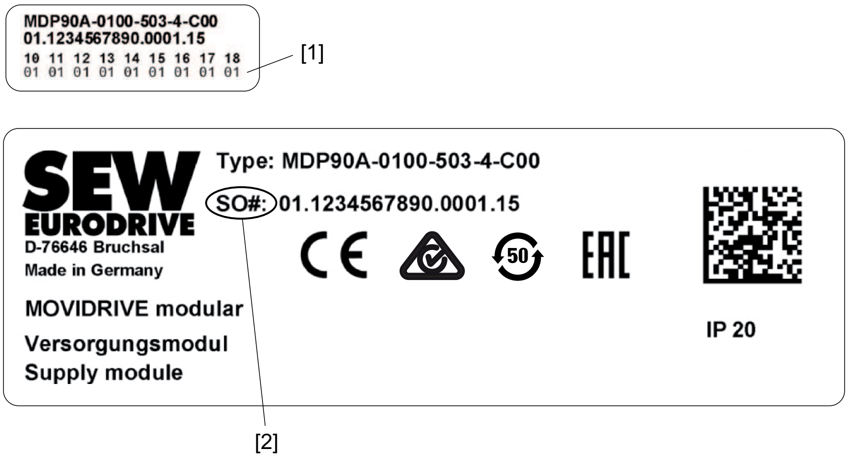
[7] MOVIDRIVE® system

3.2 MOVIDRIVE® modular nameplates

The nameplates are presented as an example.

3.2.1 Power supply module

System nameplate

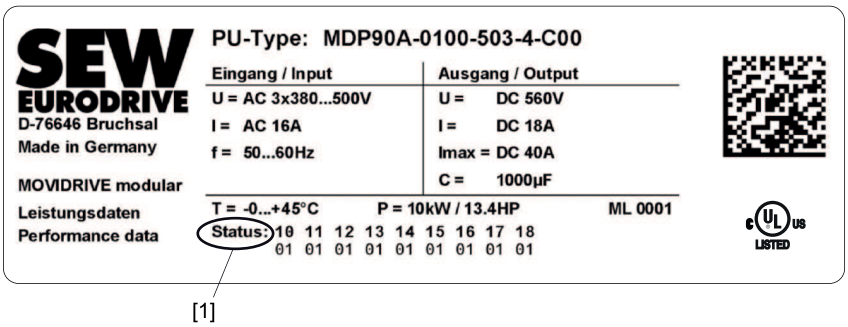


9007214313636491

[1] Device status

[2] Serial number

Performance data nameplate



9007214313645451

[1] Device status

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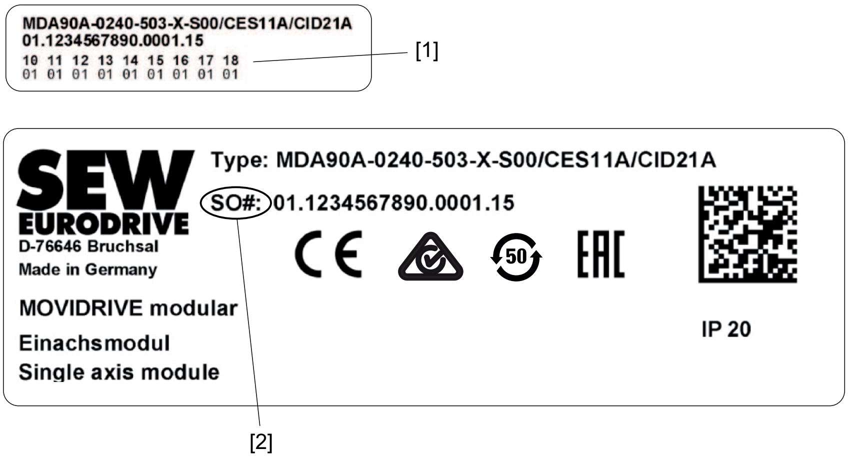
3.2.2 Single-axis module

System nameplate

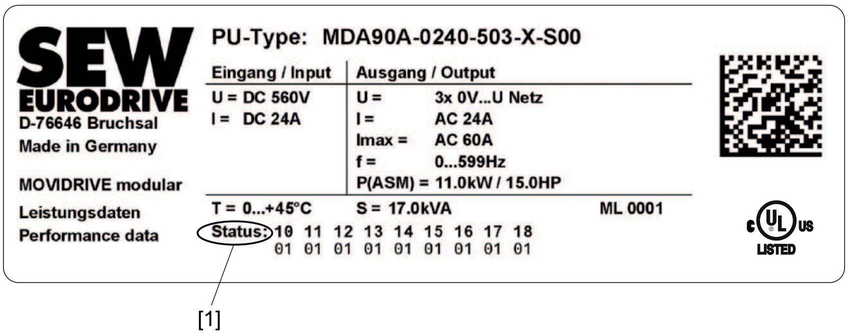


9007214313687563

[1] Device status

[2] Serial number

Performance data nameplate



9007214313691915

[1] Device status

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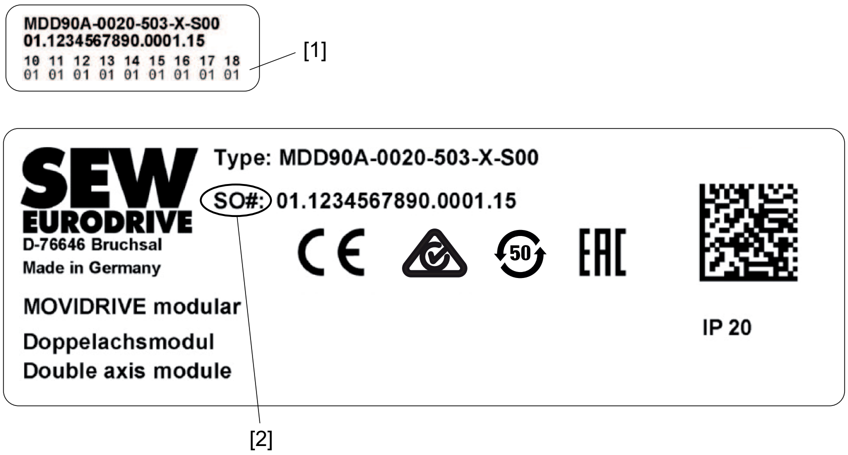
3.2.3 Double-axis module

System nameplate

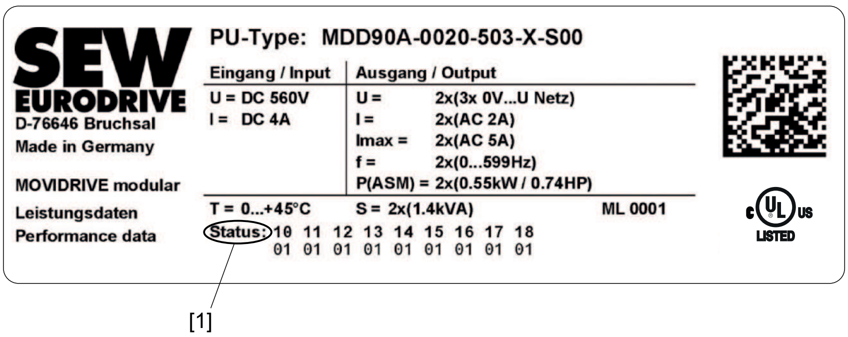


9007214313696523

[1] Device status

[2] Serial number

Performance data nameplate



9007214314814475

[1] Device status

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3.3 MOVIDRIVE® modular type code

The following type code applies to MOVIDRIVE® modular.

Example: MDA90A-0080-503-X-S00		
Product family	MD	• MD = MOVIDRIVE®
Device type	A	• A = Single-axis module • C = Capacitor module • D = Double-axis module • P = Power supply module with brake chopper • S = Switched-mode power supply module with AC and DC supply • M = Master module UHX45A/MDM90A
Series	90	• 90 = Standard design • 91 = Double-axis module with MOVILINK® DDI
Version	A	• A = Version status A
Performance class	0080	• MDA: Nominal output current – e.g. 0080 = 8 A • MDD: Nominal output current – e.g. 0020 = 2 × 2 A • MDP: Nominal power – e.g. 0100 = 10 kW • MDC: Nominal capacitance – e.g. 0120 = 11.7 mF
Connection voltage	5	• 5 = AC 380 – 500 V
EMC variants of the power section	0	• 0 = Basic interference suppression integrated
Connection type	3	• 3 = 3-phase connection type • X = Not relevant
Operating mode	X	• 4 = 4-quadrant operation (with brake chopper) • X = Not relevant
Device variant	0	• 0 = Not relevant • S = Control MOVI-C® CONTROLLER • C = Power supply module with integrated braking resistor and capacitor • E = Inverter with device profile CiA402
Designs	00	• 00 = Standard design
Options		• 01 = Axis module MDA90A-0640-.. in size 5 • /X = MOVIDRIVE® modular without card slots • /L = Design with coated printed circuit boards The following list serves as an example: • /CES11A = Multi-encoder card • /CID21A, /CIO21A = I/O expansion card • /CS..A = Safety card

3.4 Device structure of the MDP power supply module

⚠ WARNING

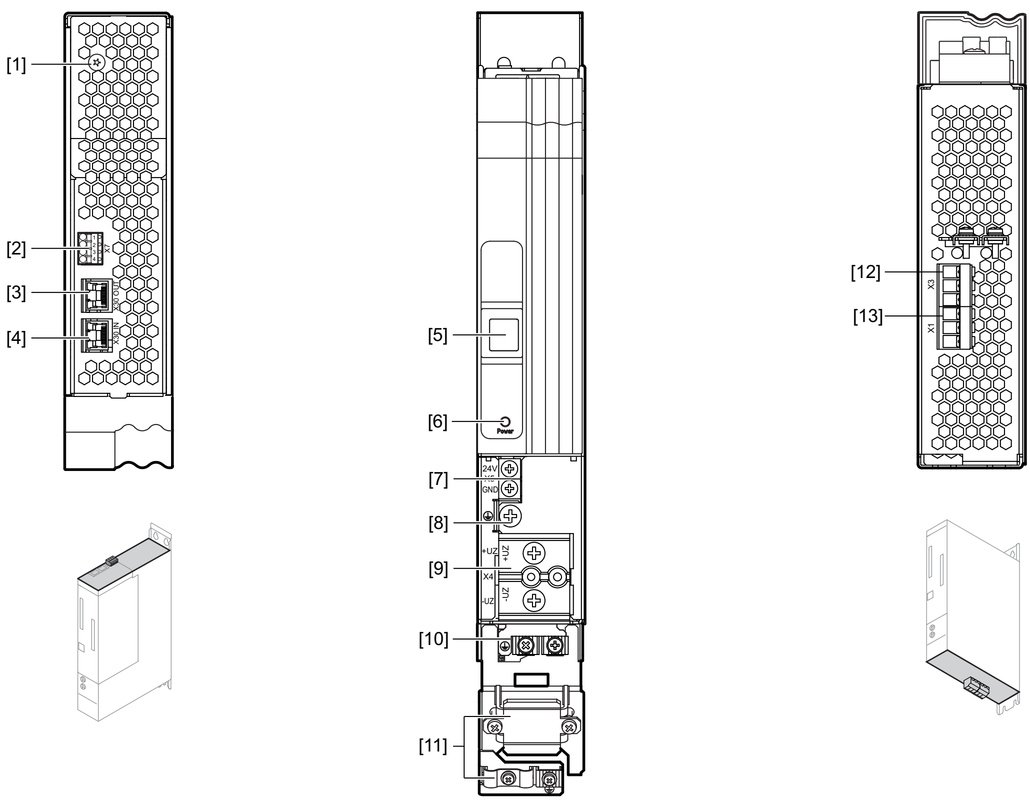
Uncovered power connections.

Some of the modules shown in this chapter are depicted without touch guards. Touch guards secure the live parts such as DC link, line connections and braking resistor connections.

Severe or fatal injuries from electric shock

- Never start up the application inverter without installed closed touch guards.

3.4.1 MDP90A-0100-.. (size 1)



18014411422564235

A: View from top

[1] Terminal screw for TN/TT systems
[2] X7: Braking resistor temperature monitoring
[3] X30 OUT: System bus
[4] X30 IN: System bus

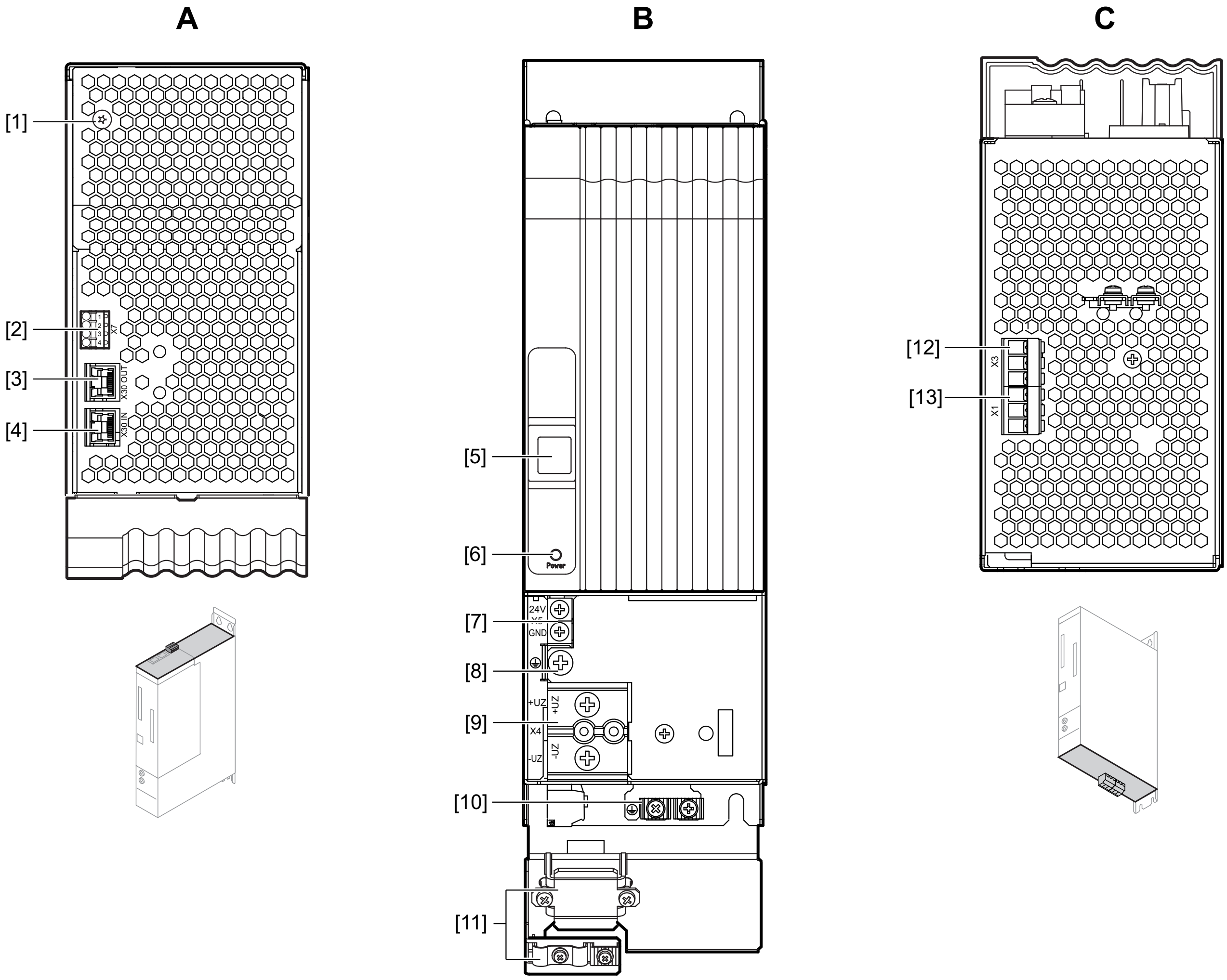
B: View from front

[5] 7-segment display
[6] Power: LED display DC link voltage
[7] X5: Connection +24 V supply voltage
[8] PE connection
[9] X4: DC link busbar
[10] PE connection housing
[11] Shield terminal

C: View from bottom

[12] X3: Braking resistor connection
[13] X1: Line connection

3.4.2 MDP90A-0100-.. with integrated braking resistance (size 1A)



18014411422566667

A: View from top

[1] Terminal screw for TN/TT systems

[2] X7: Braking resistor temperature monitoring

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] 7-segment display

[6] Power: LED display DC link voltage

[7] X5: Connection +24 V supply voltage

[8] PE connection

[9] X4: DC link busbar

[10] PE connection housing

[11] Shield terminal

C: View from bottom

[12] X3: Braking resistor connection

[13] X1: Line connection

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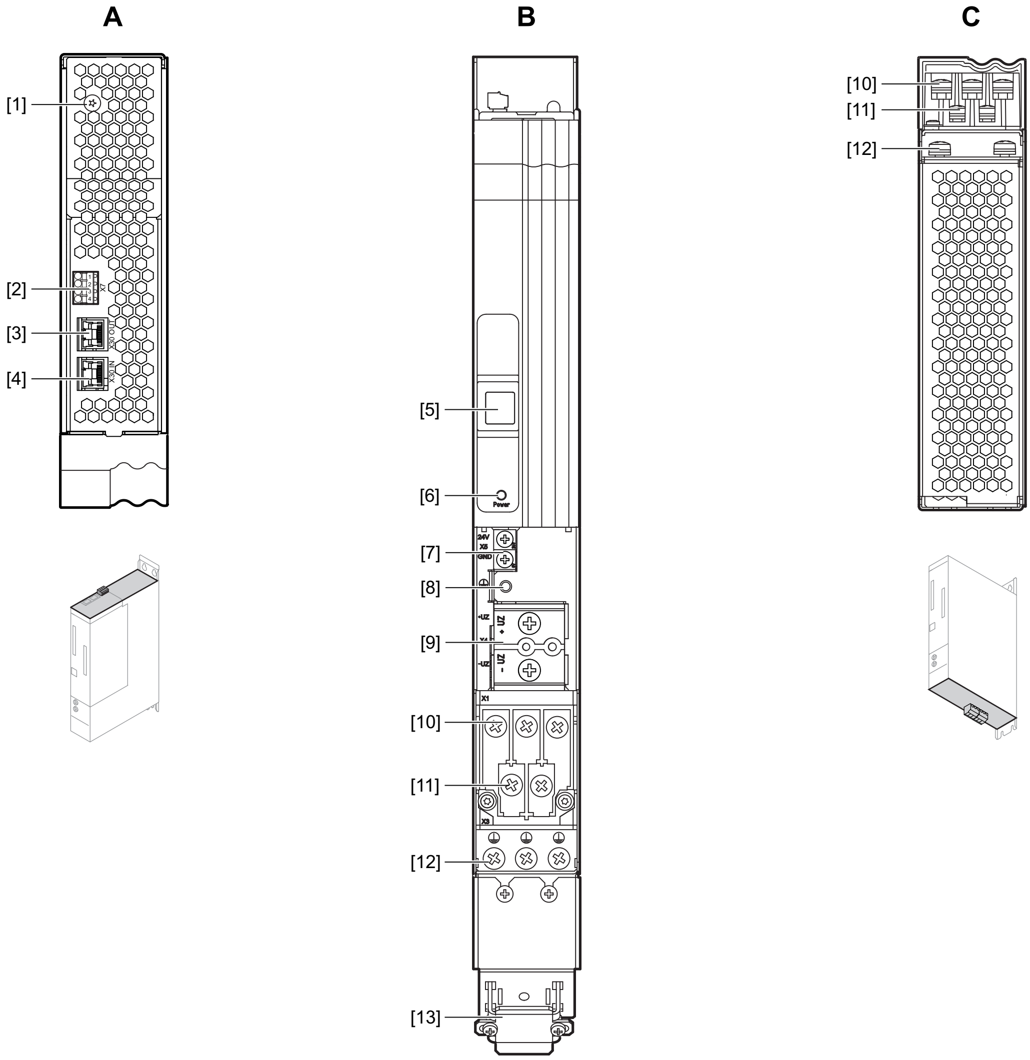
3.4.3 MDP90A-0250-.. (size 2)



18014411422569099

A: View from top

- [1] Terminal screw for TN/TT systems
- [2] X7: Control DC link discharge module, temperature monitoring braking resistor
- [3] X30 OUT: System bus
- [4] X30 IN: System bus

B: View from front

- [5] 7-segment display
- [6] Power: LED display DC link voltage
- [7] X5: Connection +24 V supply voltage
- [8] PE connection
- [9] X4: DC link busbar
- [10] X1: Line connection
- [11] X3: Braking resistor connection
- [12] 3× housing PE connection
- [13] Shield terminal

C: View from bottom

- [10] X1: Line connection
- [11] X3: Braking resistor connection
- [12] 3× housing PE connection

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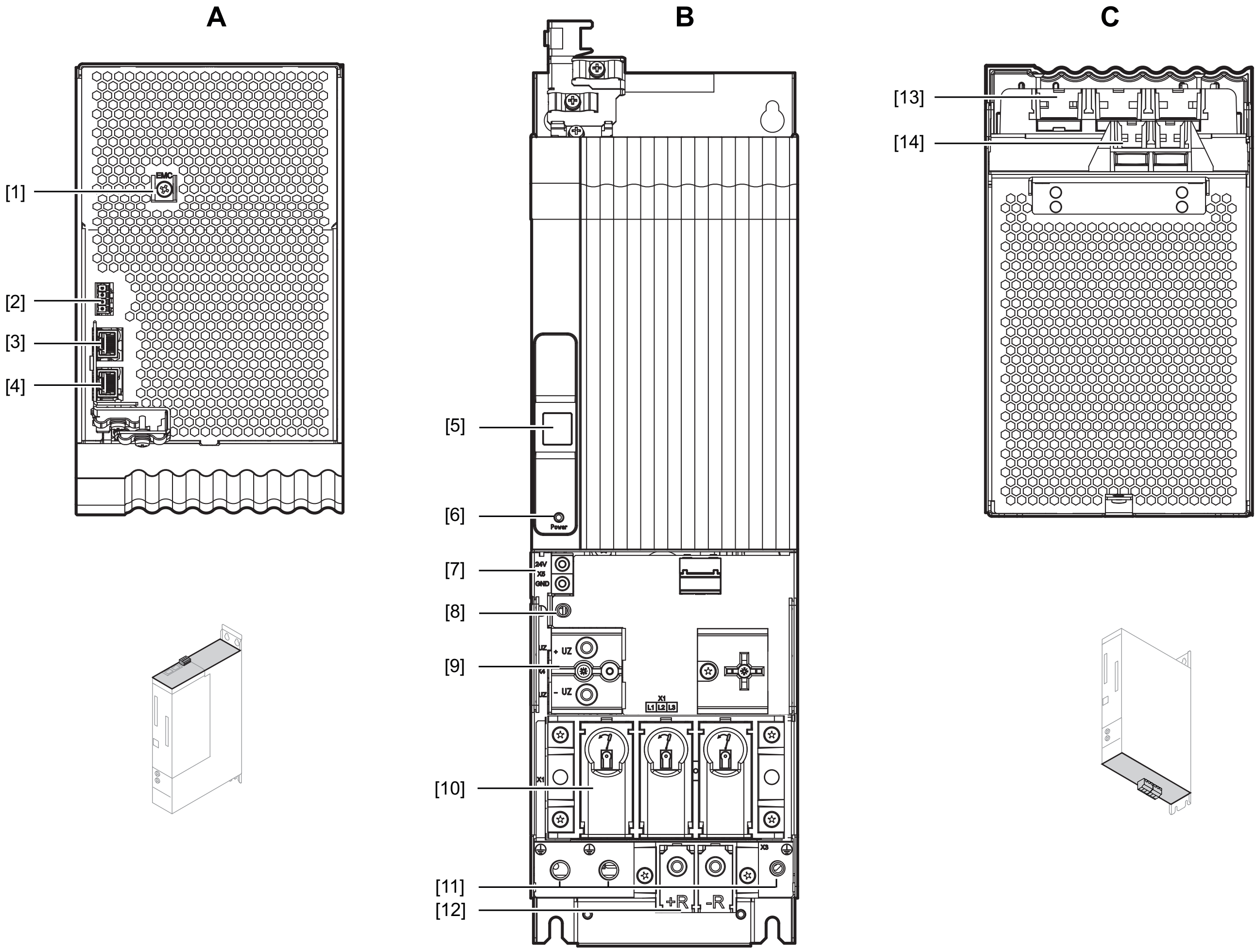
3.4.4 MDP90A-0500, 0750-.. (size 3)



9007219360767499

A: View from top

[1] Terminal screw for TN/TT systems

[2] X7: Control DC link discharge module, temperature monitoring braking resistor

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] 7-segment display

[6] Power: LED display DC link voltage

[7] X5: Connection +24 V supply voltage

[8] PE connection

[9] X4: DC link busbar

[10] X1: Line connection

[11] 3× housing PE connection

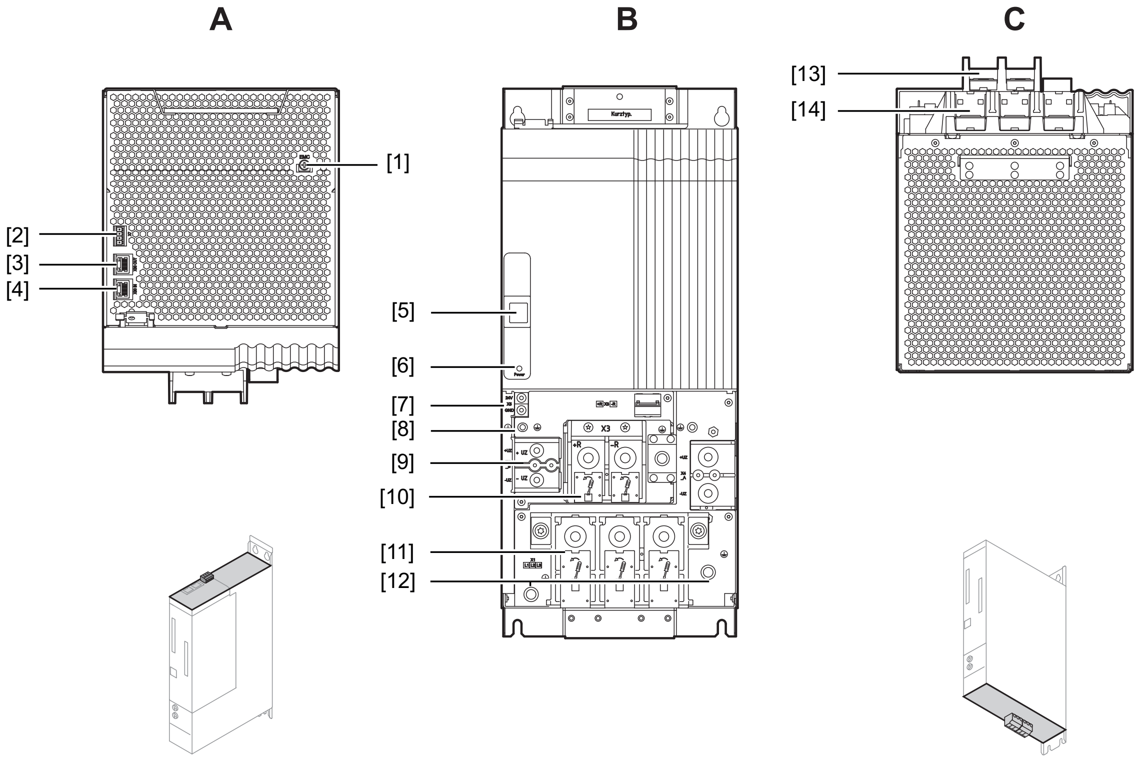
[12] X3: Braking resistor connection

C: View from bottom

[13] X1: Line connection

[14] X3: Braking resistor connection

3.4.5 MDP90A-1100-.. (size 4)



23352453259

A: View from top

[1] Terminal screw for TN/TT systems

[2] X7: Control DC link discharge module, temperature monitoring braking resistor

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] 7-segment display

[6] Power: LED display DC link voltage

[7] X5: Connection +24 V supply voltage

[8] PE connection

[9] X4: DC link busbar

[10] X3: Braking resistor connection

[11] X1: Line connection

[12] 2 × housing PE connection

C: View from bottom

[13] X3: Braking resistor connection

[14] X1: Line connection

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3.5 Device structure of the MDA and MDD axis modules

⚠ WARNING

Uncovered power connections.

Some of the modules shown in this chapter are depicted without touch guards. Touch guards secure the live parts such as DC link, line connections and braking resistor connections.

Severe or fatal injuries from electric shock

- Never start up the application inverter without installed closed touch guards.

MDA: Single-axis module

MDD: Double-axis module

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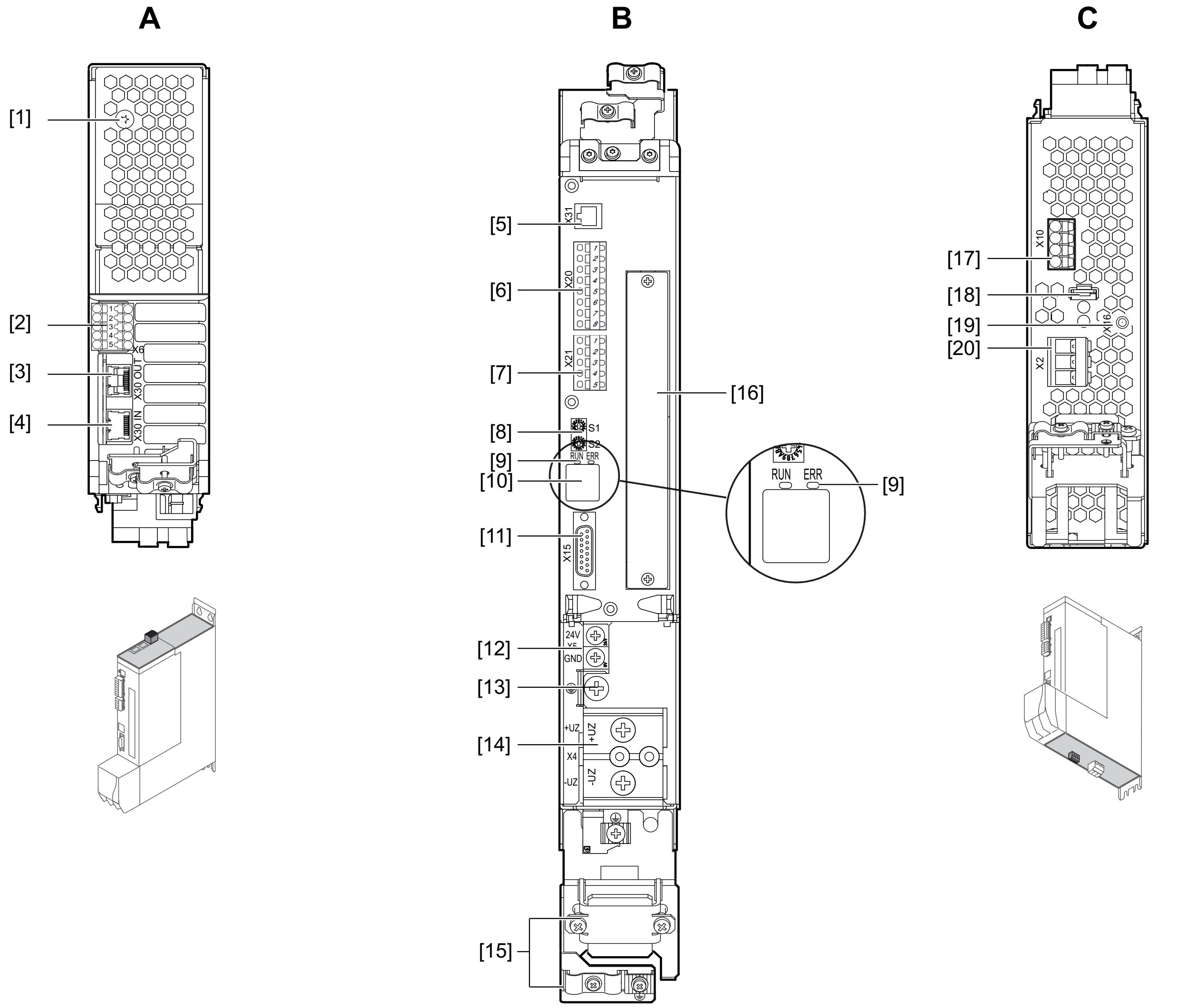
3.5.1 MDA90A-0020, 0040, 0080, 0120 (size 1) – Single-axis module



36028809932026123

A: View from top

[1] EMC: Terminal screw for TN/TT systems

[2] X6: Connection for Safe Torque Off (STO)

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] X31: SEW-EURODRIVE Service interface

[6] X20: Digital inputs

[7] X21: Digital outputs

[8] EtherCAT® ID switch

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERR"

[10] 7-segment display

[11] X15: Motor encoder connection

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link busbar

[15] Shield plate

[16] Card slot

C: View from bottom

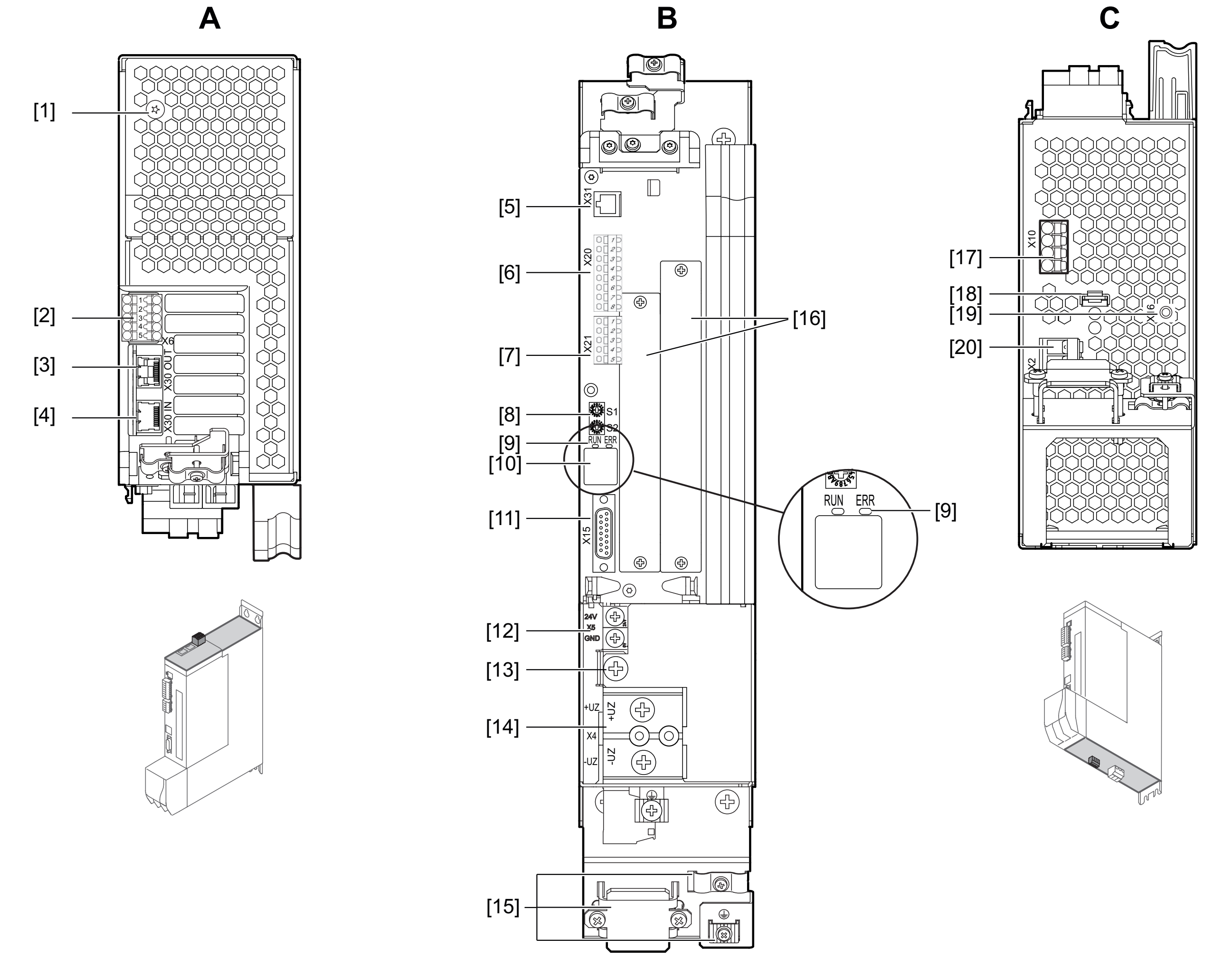
[17] X10: Brake control and motor temperature monitoring

[18] PE connection housing

[19] X16: MOVILINK® DDI connection

[20] X2: Motor connection

3.5.2 MDA90A-0160, 0240 (size 2) – Single-axis module



36028809932028555

A: View from top

[1] EMC: Terminal screw for TN/TT systems

[2] X6: Connection for Safe Torque Off (STO)

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] X31: SEW-EURODRIVE Service interface

[6] X20: Digital inputs

[7] X21: Digital outputs

[8] EtherCAT® ID switch

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERR"

[10] 7-segment display

[11] X15: Motor encoder connection

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link busbar

[15] Shield plate

[16] Card slots

C: View from bottom

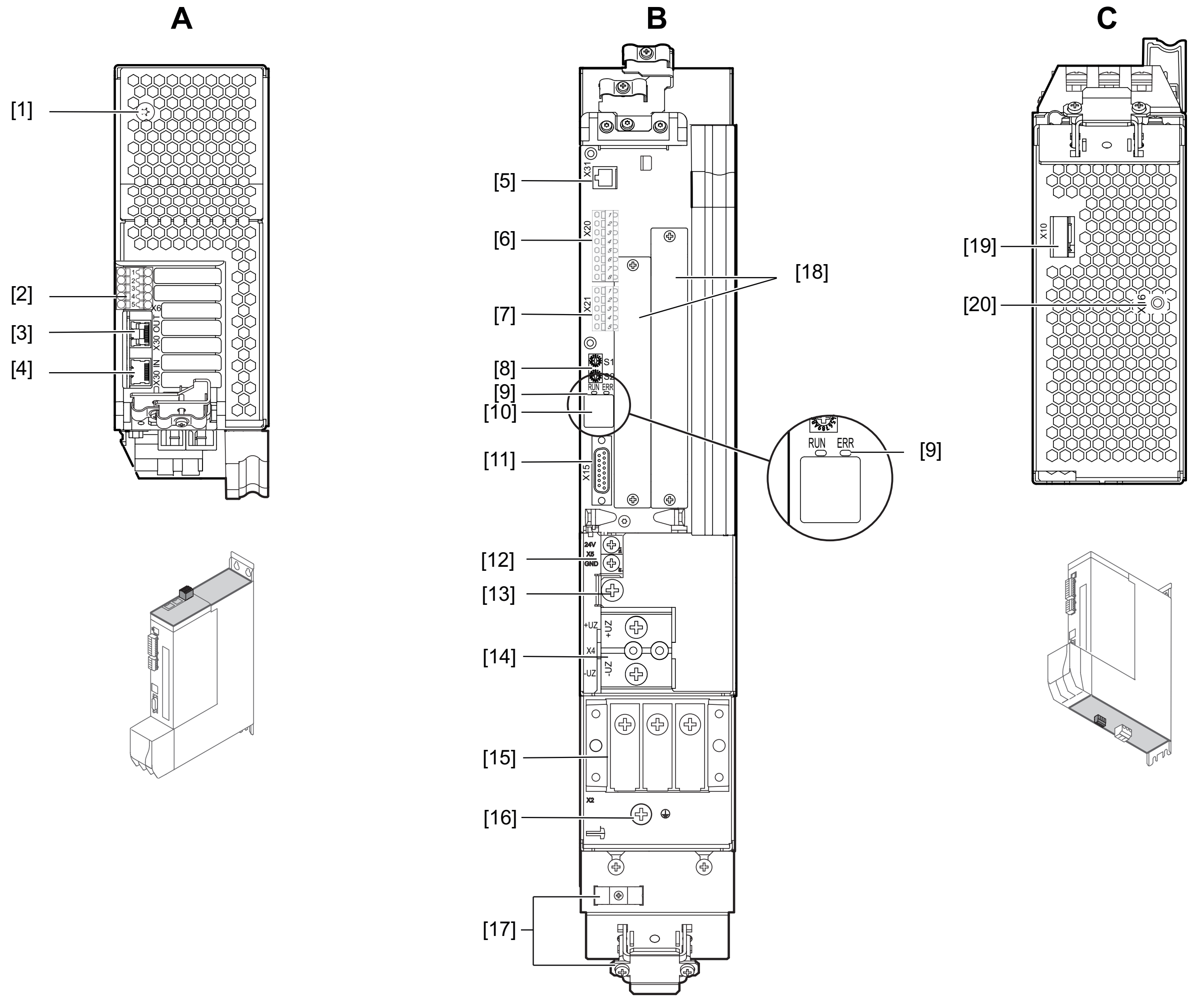
[17] X10: Brake control and motor temperature monitoring

[18] PE connection housing

[19] X16: MOVILINK® DDI connection

[20] X2: Motor connection

3.5.3 MDA90A0-320, 0480 (size 3) – Single-axis module



45036009186784779

A: View from top

[1] EMC: Terminal screw for TN/TT systems

[2] X6: Connection for Safe Torque Off (STO)

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] X31: SEW-EURODRIVE Service interface

[6] X20: Digital inputs

[7] X21: Digital outputs

[8] EtherCAT® ID switch

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERR"

[10] 7-segment display

[11] X15: Motor encoder connection

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link busbar

[15] X2: Motor connection

[16] PE connection housing

[17] Shield plate

[18] Card slots

C: View from bottom

[19] X10: Brake control and motor temperature monitoring

[20] X16: MOVILINK® DDI connection

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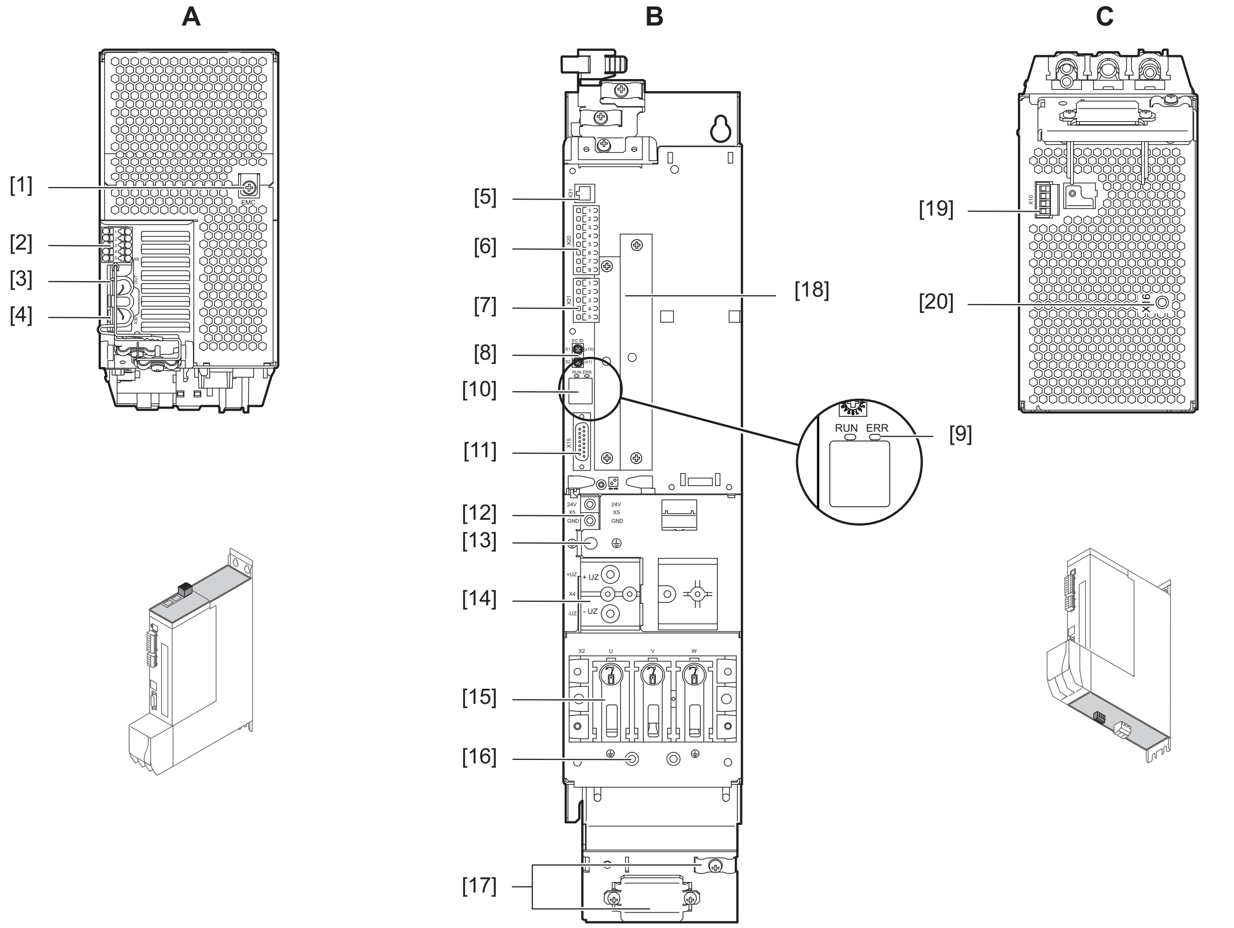
3.5.4 MDA90A0-0640 (size 4) – Single-axis module



9007223559673227

A: View from top

[1] EMC: Terminal screw for TN/TT systems

[2] X6: Connection for Safe Torque Off (STO)

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] X31: SEW-EURODRIVE Service interface

[6] X20: Digital inputs

[7] X21: Digital outputs

[8] EtherCAT® ID switch

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERR"

[10] 7-segment display

[11] X15: Motor encoder connection

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link busbar

[15] X2: Motor connection

[16] PE connection housing

[17] Shield plate

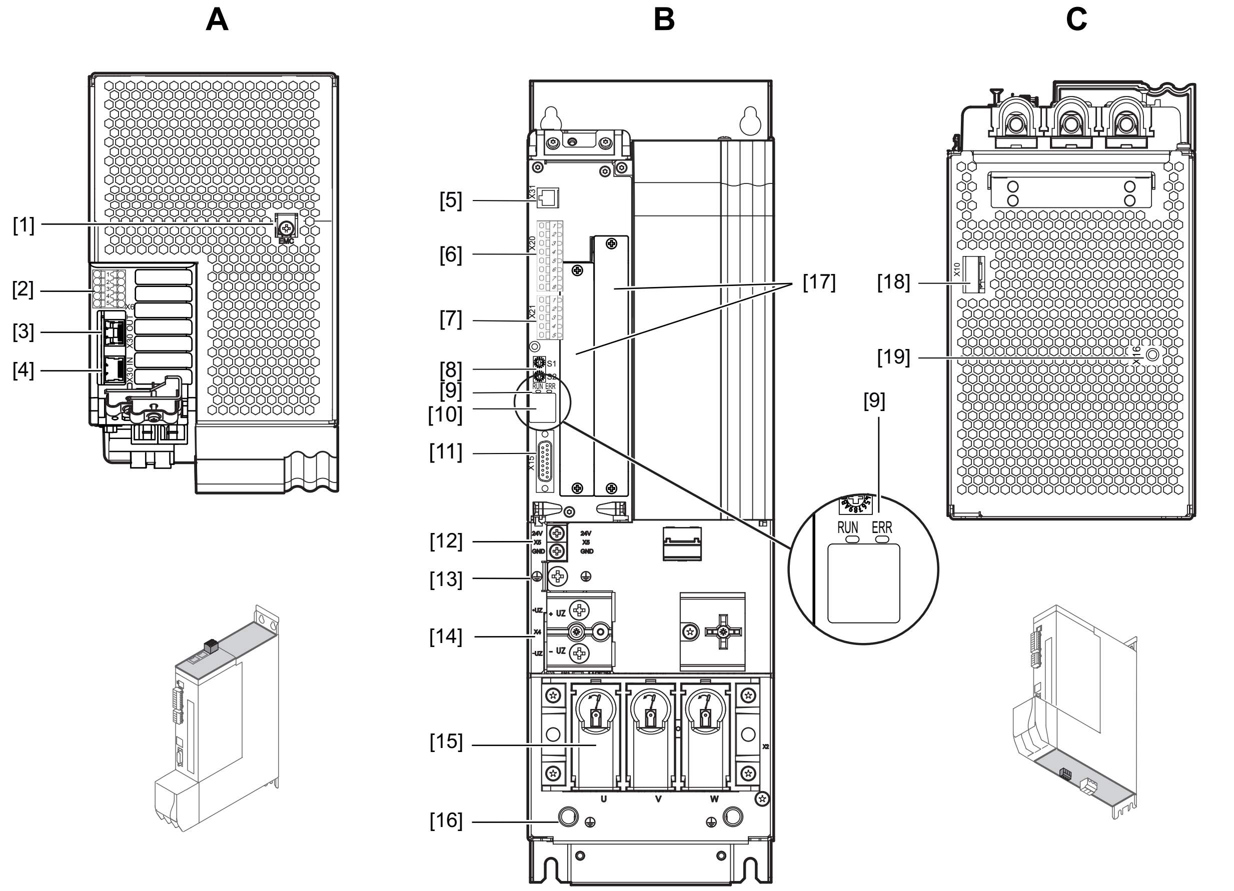
[18] Card slots

C: View from bottom

[19] X10: Brake control and motor temperature monitoring

[20] X16: MOVILINK® DDI connection

3.5.5 MDA90A-0640, 1000 (size 5) – Single-axis module



18014418615503627

A: View from top

[1] EMC: Terminal screw for TN/TT systems

[2] X6: Connection for Safe Torque Off (STO)

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] X31: SEW-EURODRIVE Service interface

[6] X20: Digital inputs

[7] X21: Digital outputs

[8] EtherCAT® ID switch

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERR"

[10] 7-segment display

[11] X15: Motor encoder connection

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link busbar

[15] X2: Motor connection

[16] PE connection housing

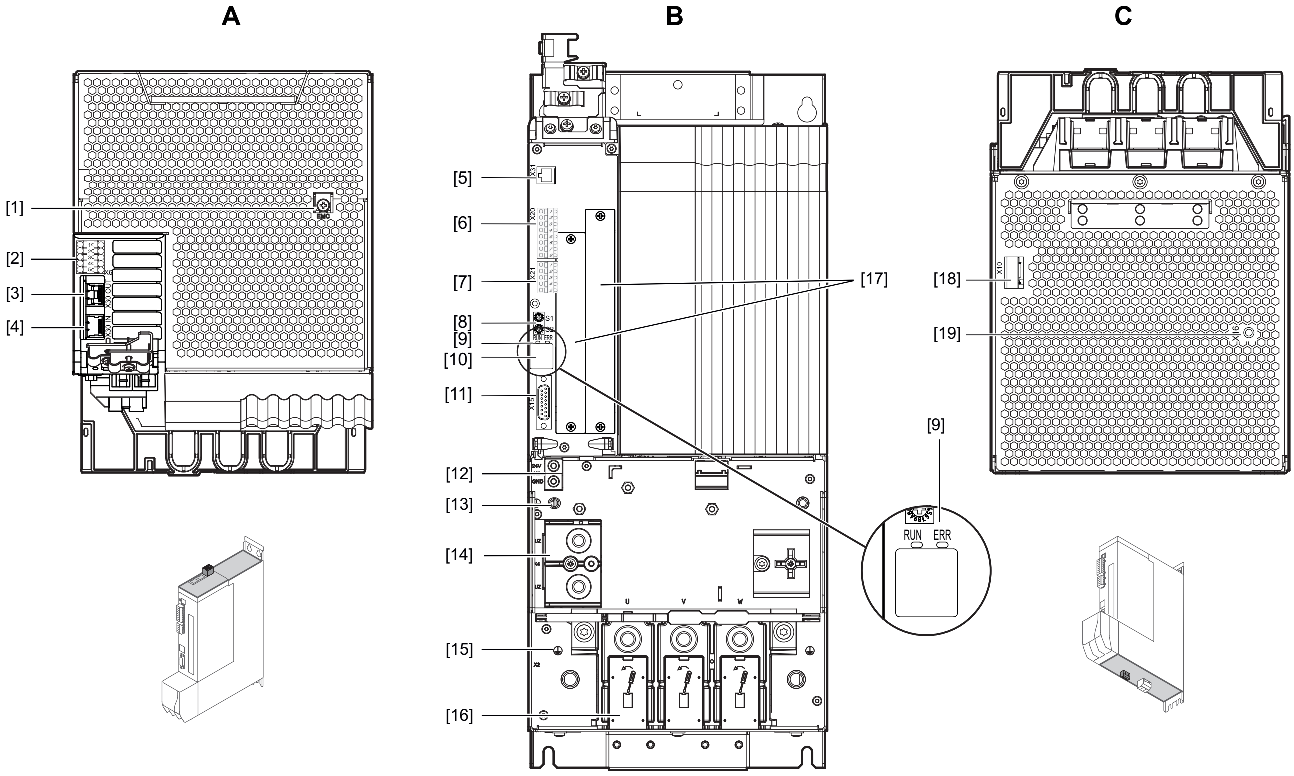
[17] Card slots

C: View from bottom

[18] X10: Brake control and motor temperature monitoring

[19] X16: MOVILINK® DDI connection

3.5.6 MDA90A-1400, 1800 (size 6) – Single-axis module



18014418615506059

A: View from top

[1] EMC: Terminal screw for TN/TT systems

[2] X6: Connection for Safe Torque Off (STO)

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] X31: SEW-EURODRIVE Service interface

[6] X20: Digital inputs

[7] X21: Digital outputs

[8] EtherCAT® ID switch

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERR"

[10] 7-segment display

[11] X15: Motor encoder connection

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link busbar

[15] PE connection housing

[16] X2: Motor connection

[17] Card slots

C: View from bottom

[18] X10: Brake control and motor temperature monitoring

[19] X16: MOVILINK® DDI connection

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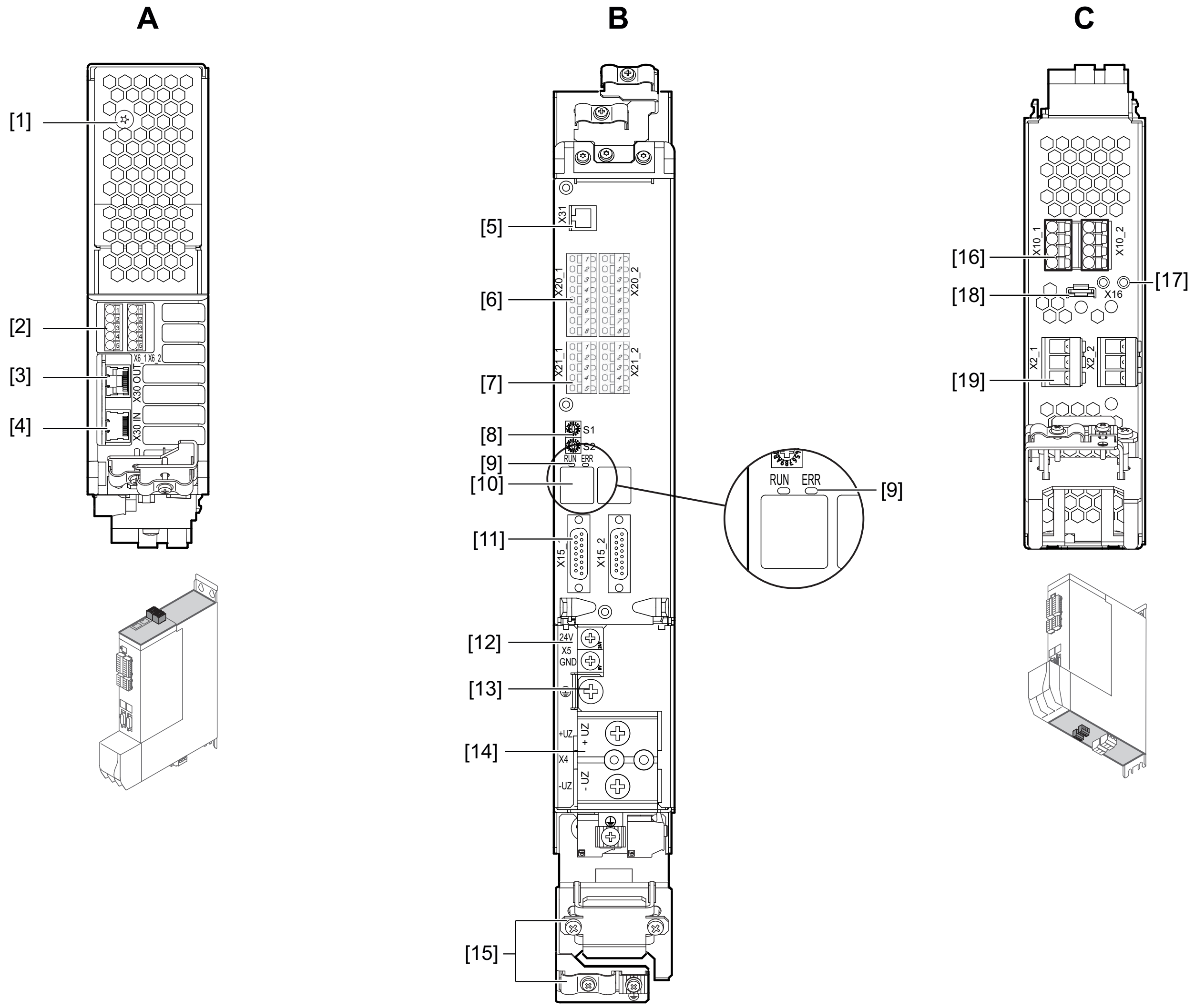
3.5.7 MDD9.A-0020, 0040 (size 1) – Double-axis module



45036009186762251

A: View from top

[1] EMC: Terminal screw for TN/TT systems

[2] X6: 2 × connection for safe disconnection (STO)

[3] X30 OUT: System bus

[4] X30 IN: System bus

B: View from front

[5] X31: SEW-EURODRIVE Service interface

[6] X20: 2 × digital inputs

[7] X21: 2 × digital outputs

[8] EtherCAT® ID switch

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERR"

[10] 2 × 7-segment display

[11] X15: 2 × motor encoder connection with MDD90A

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link busbar

[15] Shield plate

C: View from bottom

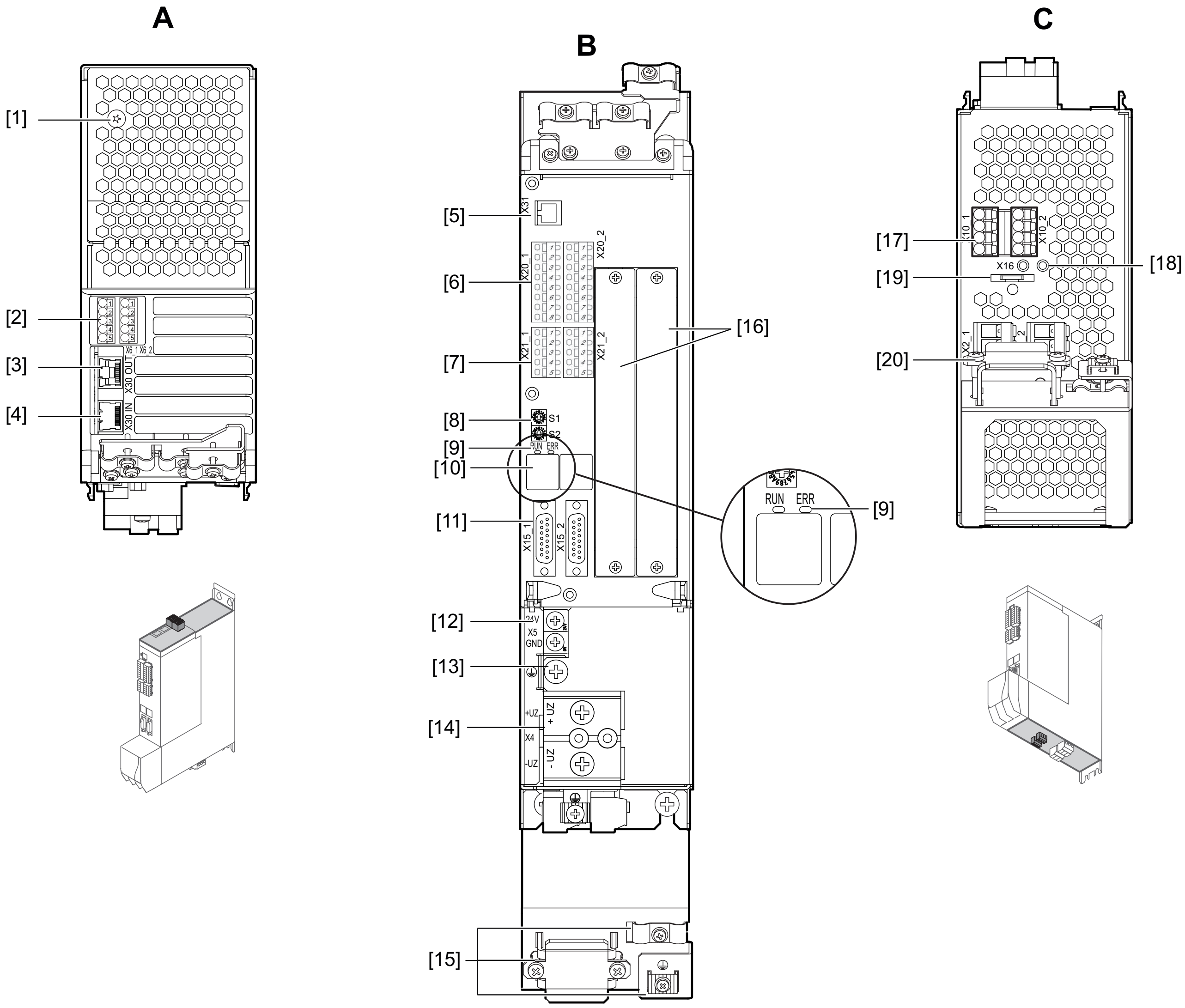
[16] X10: 2 × brake control and temperature monitoring motor

[17] X16: Connection MOVILINK® DDI with MDD91A

[18] PE connection housing

[19] X2: 2 × motor connection

3.5.8 MDD9.A-0020, 0040, 0080 (size 2) – Double-axis module



45036009186764683

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A: View from top

- [1] EMC: Terminal screw for TN/TT systems
- [2] X6: 2 × connection for safe disconnection (STO)
- [3] X30 OUT: System bus
- [4] X30 IN: System bus

B: View from front

- [5] X31: SEW-EURODRIVE Service interface
- [6] X20: 2 × digital inputs
- [7] X21: 2 × digital outputs
- [8] EtherCAT® ID switch
- [9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERR"
- [10] 2 × 7-segment display
- [11] X15: 2 × motor encoder connection with MDD90A
- [12] X5: Connection +24 V supply voltage
- [13] PE connection
- [14] X4: DC link busbar
- [15] Shield plate
- [16] Card slots

C: View from bottom

- [17] X10: 2 × brake control and temperature monitoring motor
- [18] X16: Connection MOVILINK® DDI with MDD91A
- [19] PE connection housing
- [20] X2: 2 × motor connection

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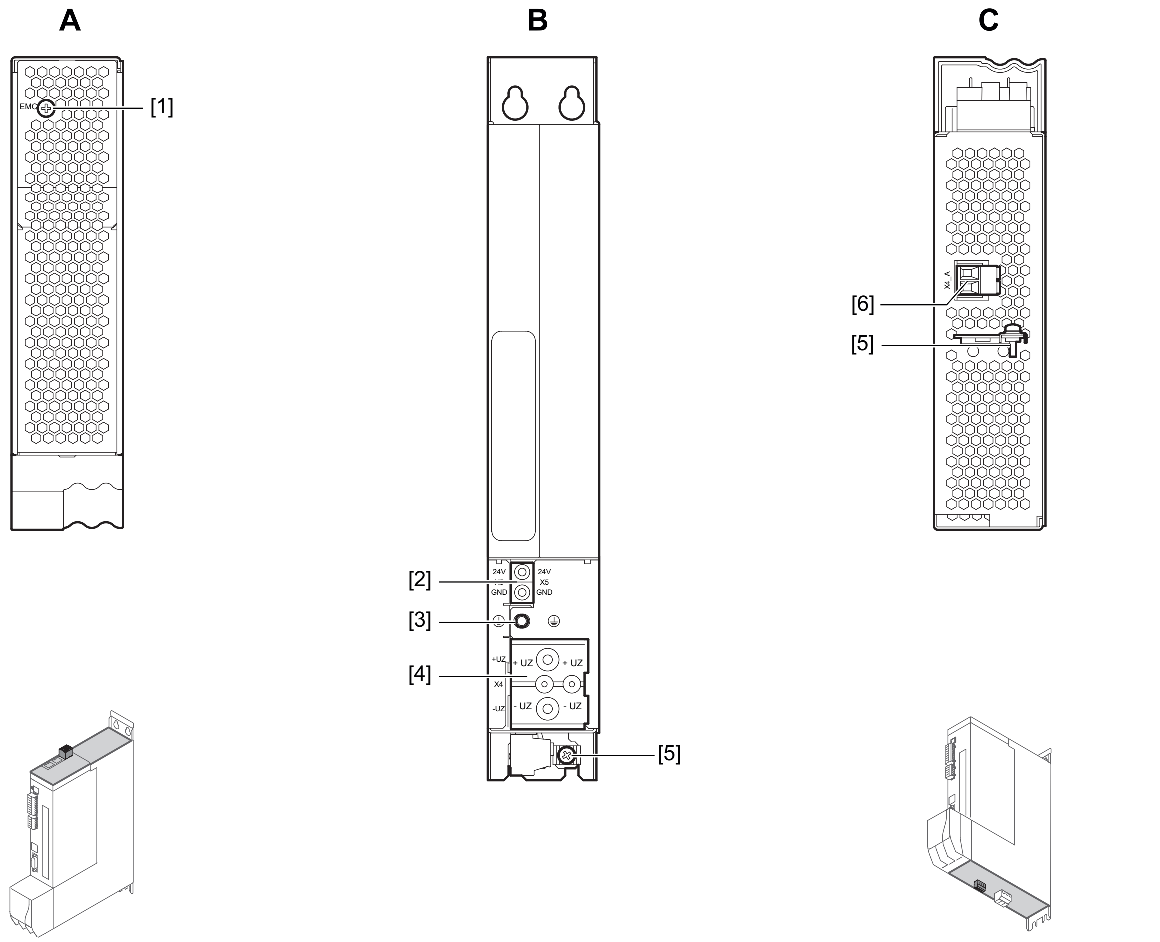
3.6 MDC capacitor module

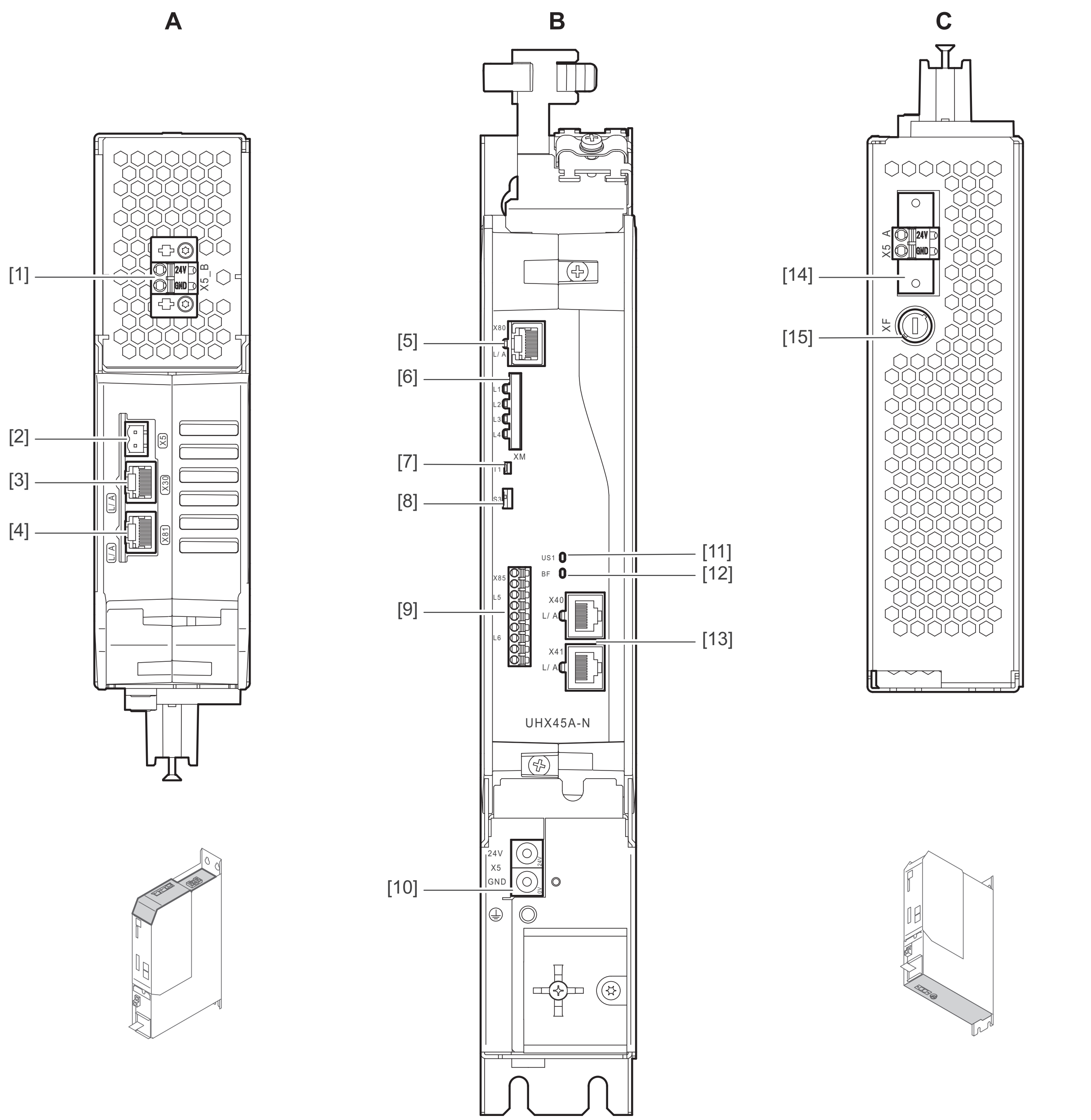
3.6.1 MDC90A-0001/0002-50X-X-000



31396911243

A: View from top	**B: View from front**	**C: View from bottom**
[1] Terminal screw for TN/TT systems	[2] X5: Connection +24 V supply voltage [3] PE connection [4] X4: DC link connection [5] PE connection	[6] Connection of safe brake module

3.7 Device structure of master module UHX45A/MDM90A



9007220061654411

A: View from top

- [1] X5_B: Output of DC 24 V supply voltage of MDM90A
- [2] X5: Input of DC 24 V supply voltage UHX45A
- [3] X30: EtherCAT®/SBus^{PLUS} master
- [4] X81: Ethernet port (reserved)

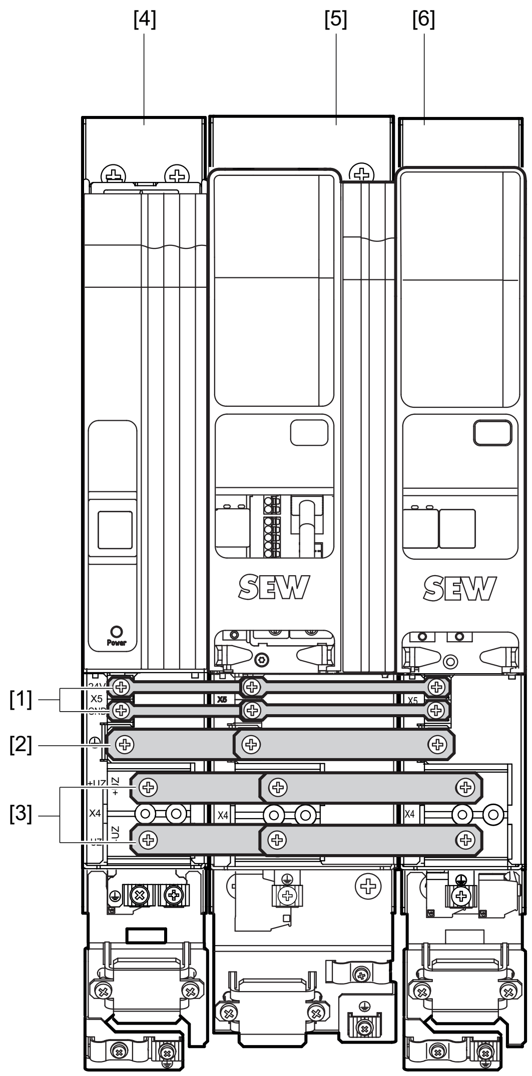
B: View from front

- [5] X80: Engineering via Ethernet
- [6] SD removable data storage
- [7] Reset of UHX45A
- [8] IP address of the engineering port
- [9] X85: CAN bus/RS485 interface
- [10] X5: Connection +24 V supply voltage
- [11] US1: Operating state of the fieldbus
- [12] BF: Bus error
- [13] X41: Fieldbus - slave interface

C: View from bottom

- [14] X5_A: External 24 V supply voltage
- [15] Fuse for DC 24 V supply UHX45A

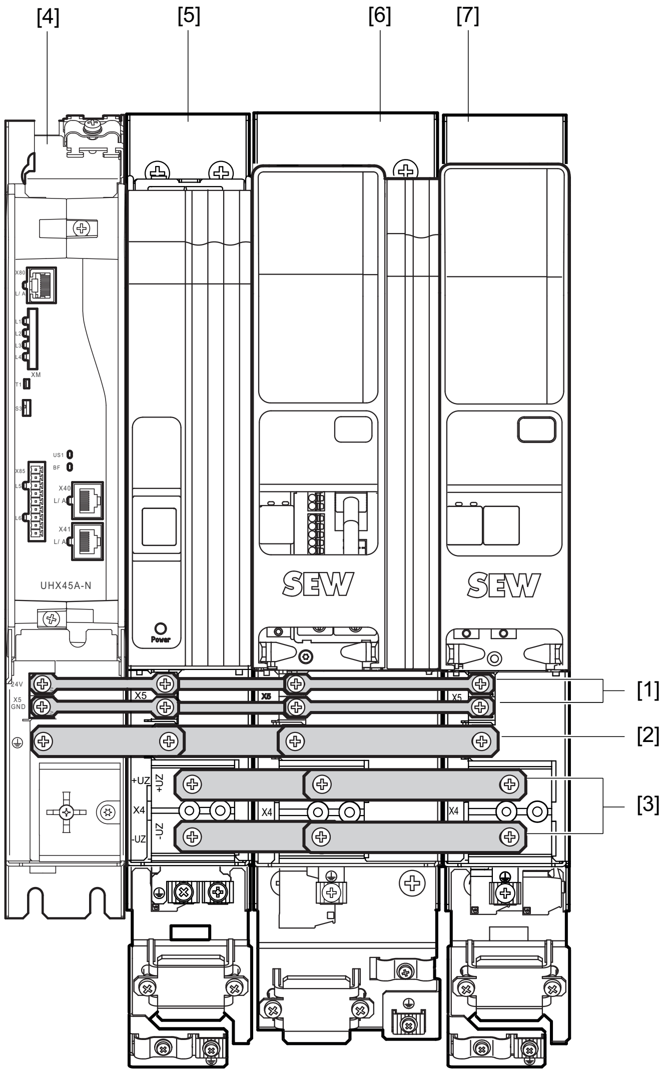
3.8 Example for axis system connection without master module



18014411422534411

[1] X5: Connection +24 V supply voltage
[2] PE connection
[3] X4: DC link connection
[4] MDP.. power supply module
[5] MDA.. single-axis module
[6] MDD.. double-axis module

3.9 Example for axis system connection with master module



20848770571

[1] X5: Connection +24 V supply voltage

[2] PE connection

[3] X4: DC link busbar

[4] Master module UHX45A/MDM90A

[5] MDP.. power supply module

[6] MDA.. single-axis module

[7] MDD.. double-axis module

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3.10 Card slots

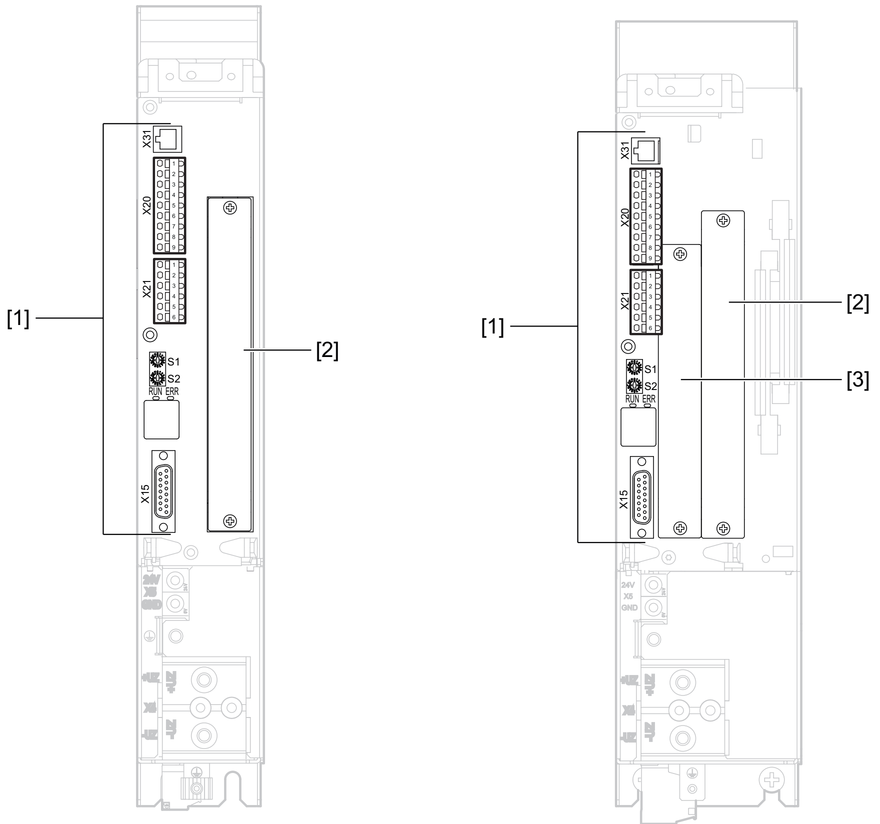
The application inverters can have up to 2 cards installed. The following section describes the assignment of the slots and possible combinations of cards.

Type designation	Description	Slot in			
		MDA90A-... single-axis module		MDD9.A-... double-axis module	
		0020 – 0120	0160 – 1800	0020 – 0040 (size 1)	0020 – 0080 (size 2)
CES11A	Multi-encoder card	[2]	[2]	–	–
CID21A, CIO21A	Input/output cards	–	[3]	–	–
CS.21A[1]	Safety card	[2]	[2]	–	[2]
CS.31A	Safety card	[2]	[2]	–	–

1) With the MDD91A-.. only the CSB21A card with the STO/SS1c function can be use.

3.10.1 Single-axis modules

MDA90A-0020, 0040, 0080, 0120 MDA90A-0160 – 1800



9007212169660939

[1] Connector panel of basic device

[2] Safety card/additional encoder slot

[3] I/O expansion slot

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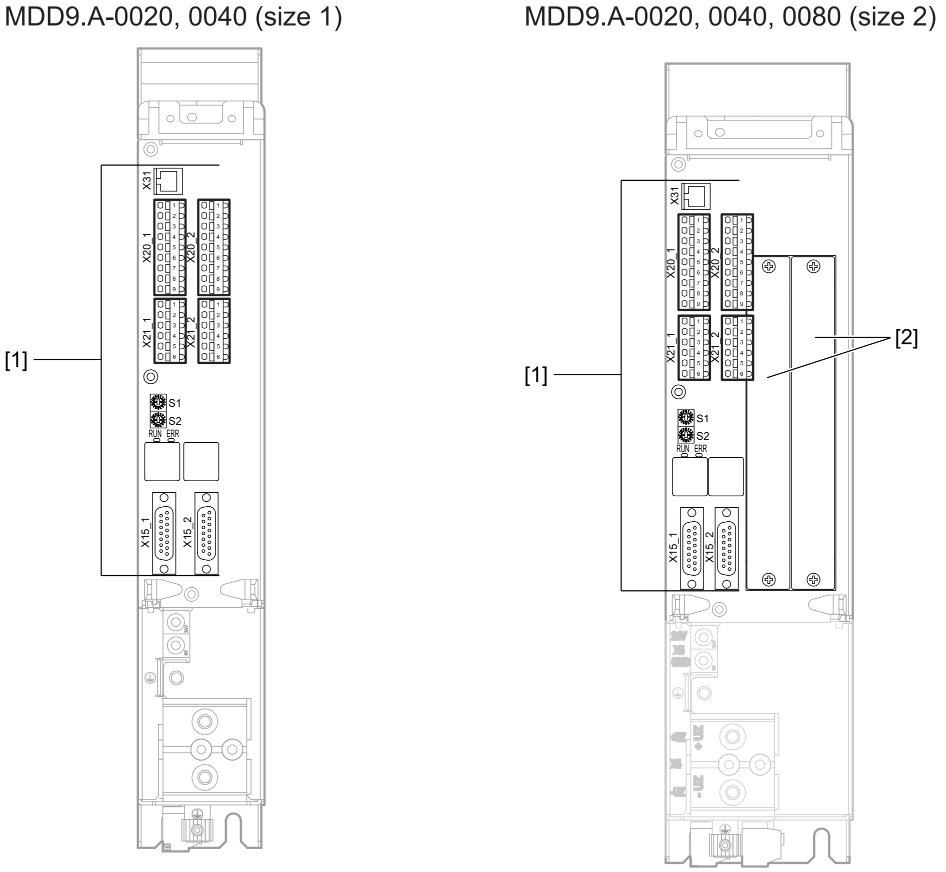
3.10.2 Double-axis modules



9007212170096139

[1] Connector panel of basic device for the 1st and 2nd axis

[2] Slot for safety card

4 Installation

MOVIDRIVE® modular application inverters are exclusively suitable for control cabinet installation according to the degree of protection.

4.1 Installation accessories

4.1.1 Standard accessories

The listed standard accessories are included in the scope of delivery.

Standard accessories – mechanical accessories

Type designation	Electronics shield clamps Quantity
Power supply modules	1
MDP90A-0100-.. – MDP90A-1100-..	
Single-axis modules	
MDA90A-0020-.. – MDA90A-1800-..	
Double-axis modules	
MDD9.A-0020-.. – MDD9.A-0080-..	
Capacitor module	
MDC90A-0001/0002-50X-X-000	
Master module	
MDM90A	
Type designation	**Power shield clamps Quantity**
Power supply modules	1
MDP90A-0100-.. – MDP90A-1100-..	
Single-axis modules	
MDA90A-0020-.. – MDA90A-1800-..	
Double-axis modules	
MDD9.A-0020-.. – MDD9.A-0080-..	
Capacitor module	
MDC90A-0001/0002-50X-X-000	

The mechanical accessories can be ordered with the following part numbers:

Type designation	Part number accessory pack
Power supply module	
MDP90A-0100-.. (size 1)	28223756
MDP90A-0100-.. (size 1A)	28223756
MDP90A-0250-..	28224507
MDP90A-0500-.. – MDP90A-0750-..	28232984
MDPA90A-1100-..	28234316
Single-axis modules	
MDA90A-0020-.. – MDA90A-0120-..	28223756
MDA90A-0160-.. – MDA90A-0240-..	28233530
MDA90A-0320-.. – MDA90A-0480-..	28220714
MDA90A-0640-..	28226151
MDA90A-1000-.. – MDA90A-1400-..	28231635
MDA90A-1800-..	28233190
Double-axis module	
MDD9.A-0020-.. – MDD9.A-0040-.. (size 1)	28223756

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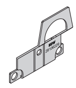
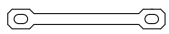
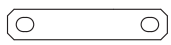
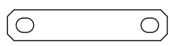
Type designation	Part number accessory pack
MDD9.A-0020-.. – MDD9.A-0080-.. (size 2)	28220455
Capacitor module	
MDC90A-0001/0002-50X-X-000	
Master module	
UHX45A/MDM90A	28244389

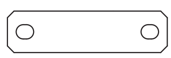
The following devices must be transported with a lifting eye:	Lifting eye	Designation	Part number
MDP90A-1100-..		CLH11A	28106229
MDA90A-1400/1800-..			

Standard accessories – electrical accessories

Type designation	Bar 24 V supply	Quantity
Power supply modules		2
MDP90A-0100-.. – MDP90A-1100-..		
Single-axis modules		
MDA90A-0020-.. – MDA90A-1800-..		
Double-axis modules		
MDD9.A-0020-.. – MDD9.A-0080-..		
Capacitor module		
MDC90A-0001/0002-50X-X-000		
Master module		
MDM90A		

Type designation	PE busbar	Quantity
Power supply modules		1
MDP90A-0100-.. – MDP90A-1100-..		
Single-axis modules		
MDA90A-0020-.. – MDA90A-1800-..		
Double-axis modules		
MDD9.A-0020-.. – MDD9.A-0080-..		
Capacitor module		
MDC90A-0001/0002-50X-X-000		
Master module		
MDM90A		

Type designation	DC link bar narrow	Quantity
Power supply modules		2
MDP90A-0100-.. – MDP90A-0750-..		
Single-axis modules		
MDA90A-0020-.. – MDA90A-1000-..		
Double-axis modules		
MDD9.A-0020-.. – MDD9.A-0080-..		
Capacitor module		
MDC90A-0001/0002-50X-X-000		

Type designation	DC link bar wide	Quantity
Power supply modules		2
MDP90A-1100-..		
Single-axis modules		
MDA90A-1400-.. – MDA90A-1800-..		

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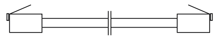
Type designation	8-pin module bus cable, system bus EtherCAT®/SBus[PLUS]	Quantity
Power supply modules		1
MDP90A-0100-.. – MDP90A-1100-..		
Single-axis modules		
MDA90A-0020-.. – MDA90A-1800-..		
Double-axis modules		
MDD9.A-0020-.. – MDD9.A-0080-..		
Type designation	**DC link closing cover**	**Quantity**
Power supply modules		2
MDP90A-0100-.. – MDP90A-1100-..		
Type designation	**Power connection closing cover**	**Quantity**
Power supply modules		1
MDP90A-0250-.. – MDP90A-1100-..		
Single-axis modules		
MDA90A-0480-.. – MDA90A-1800-..		

The electrical accessories can be ordered using the following part numbers:

Module	Part number	
	Accessory pack[1)]	Module bus cable
Power supply module		
MDP90A-0100-.. (size 1)	28224876	18166989
MDP90A-0100-.. (size 1A)	28225201	18167004
MDP90A-0250-..	8230027	18166989
MDP90A-0500-.. – MDP90A-0750-..	28232992	18167012
MDP90A-1100-..	28234324	18167020
Single-axis module		
MDA90A-0020-.. – MDA90A-0120-..	28223764	18166989
MDA90A-0160-.. – MDA90A-0240-..	28220463	18166997
MDA90A-0320-.. – MDA90A-0480-..	28225236	18167004
MDA90A-0640-.. – MDA90A-1000-..	28231643	18167012
MDA90A-1400-.. – MDA90A-1800-..	28233212	18167020
Double-axis module		
MDD9.A-0020-.. – MDD9.A-0040-.. (size 1)	28223764	18166989
MDD9.A-0020-.. – MDD9.A-0080-.. (size 2)	28220463	18166997
Capacitor module		
MDC90A-0001/0002-50X-X-000		
Master module		
UHX45A/MDM90A	28244397	18166989

1) Accessory pack contains module bus cable

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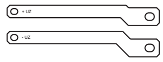
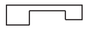
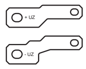
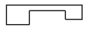
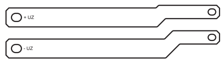
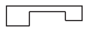
4.1.2 Available accessories

Adapter connectors of the DC link connection

To be able to establish an axis system in which modules with DC link bars of different widths are used, adapter connectors must be used at the transition from wide to narrow or narrow to wide. These adapter connectors are listed in the following table.

The necessary closing covers are included with the adapter connectors.

From module	To module	Adapter connectors/ closing covers	Part number
MDP90A-0750-..	MDA90A-1400-..		28244052
			18181716
MDP90A-1100-..	• MDA90A-0020-.. – MDA90A-1000-.. • MDD9.A-0020.. – MDD9.A-0080-..		28244079
			18151884
MDA90A-1400-.. – MDA90A-1800-..	• MDA90A-0020-.. – MDA90A-1000-.. • MDD9.A-0020.. – MDD9.A-0080-..		28244060
			18151884
			18183751

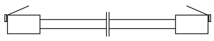
The closing cover 18181716 is included with the adapter connectors 28244052.

The closing cover 18151884 is included with the adapter connectors 28244079.

The closing covers 18151884 and 18183751 are included with the adapter connectors 28244060.

Adapter connectors are not included in the scope of delivery and must be ordered.

Cable

Designation	Length	Connector	Part number
			
4-pole system bus cable, system bus EtherCAT®/SBus^{PLUS}	• 0.75 m • 1.5 m • 3 m • 5 m • 10 m	2 × RJ45	• 18167039 • 18179975 • 18167047 • 18179983 • 18179991

4.2 Permitted tightening torques

Screw connection		Tightening torque in Nm				
		MDP90A-				
		0100 (size 1)	0100 (size 1A)	0250	0500, 0750	1100
Line connection	X1	0.5 – 0.6		3 – 4	18 – 22	
Braking resistor connection	X3	0.5 – 0.6		3 – 4		11 – 12
DC link connection	X4	3 – 4				–
	X4_A	–				11 – 12
	X4_B	–				3 – 4
PE connection	X4	3 – 4				
Connection 24 V voltage supply	X5	1.2 – 1.5				
Terminal screw for TN/IT systems	EMC	1 – 1.2				
Safety cover		0.6 – 0.8				1 – 1.2

Screw connection		Tightening torque in Nm									
		MDA90A-. single-axis module						Double-axis module MDD9.A-		MDC90A capacitor module	Master module MDM90A
		0020, 0040, 0080, 0120	0160, 0240	0320, 0480	0640	0640, 1000	1400, 1800	0020, 0040 (size 1)	0020, 0040, 0080 (size 2)	0001	
Motor connection	X2	0.5 – 0.6	1.5 – 1.7	3 – 4		18 – 22		0.5 – 0.6		–	–
DC link connection	X4	3 – 4					11 – 12	3 – 4		3 – 4	–
PE connection	X4	3 – 4						3 – 4		3 – 4	3 – 4
Connection 24 V voltage supply	X5	1.2 – 1.5						1.2 – 1.5		1.2 – 1.5	–
	X5_A	–									
	X5_B	–									1.2 – 1.5
Terminal screw for TN/TT systems	EMC	1 – 1.2						1 – 1.2		1 – 1.2	–
PE connections - M4 - M6		 1 – 1.2 3 – 4						 1 – 1.2 3 – 4			–
Safety cover		0.8					1 – 1.2	0.8		0.8	0.8
Fastening the cards		0.6 – 0.8						0.6 – 0.8		–	–

NOTICE

Non-compliance with the stipulated tightening torques.

Possible damage to the application inverter.

- Always adhere to the stipulated tightening torques. Otherwise, excessive heat can develop which would damage the application inverter.
- An excessively high tightening torque may cause damage.

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4.3 Special aspects when transporting the devices

NOTICE

Incorrect lifting and transporting of the inverter.

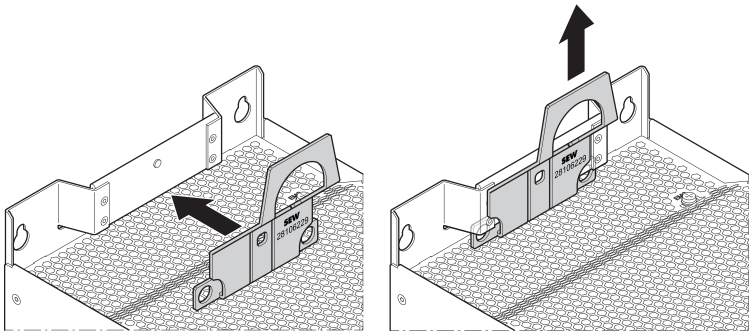
Inverter damage.

- When you lift or transport the inverter, use only the intended handling points for transportation to avoid any damage. Do not grip the inverter at any plastic parts or covers when lifting it. Only grip the inverter at metallic parts or use the lifting eye for transportation.

Due to the weight, the following devices are to be transported with a lifting eye:

- MDP90A-1100-..
- MDA90A-1400/1800-..

The lifting eye is attached to the top of the housing, see the following figure.



24550948491

The lifting eye can be attached to assembly stations using suitable slings.

The lifting eye is included in the delivery of the affected products.

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4.4 Mechanical installation

⚠ CAUTION

Risk of injury to persons and damage to property.

Never install defective or damaged application inverters.

- Before installing modules, check them for external damage. Replace any damaged modules.

NOTICE

Risk of damage to property due to mounting surface with poor conductivity.

Damage to the application inverter.

- The mounting plate in the control cabinet must be conductive over a large area for the mounting surface of the application inverter (metallically pure, good conductivity). EMC compliant installation of the application inverter can only be accomplished with a mounting plate that is conductive over a large area.

4.4.1 Hole pattern

Preparing the control cabinet

You can prepare the control cabinet for the installation of differently assembled axis systems by drilling tapped holes every 30 mm for mounting the modules. The modules can be attached to this grid irrespective of their width, see figure below.

Dimensions
Device base plate

Modules	Dimensions of the device base plate in mm							
	A	B	C	D	E	F	G	H
MDP90A-0100 (size 1)	60	30	355	383	19	15	7	13
MDP90A-0100 (size 1a)	120	90	355	383	19	15	7	13
MDP90A-0250 (size 2)	60	30	455	483	19	15	7	13
MDP90A-0500, 0750 (size 3)	150	120	455	483	19	15	7	13
MDP90A-1100 (size 4)	210	180	455	483	19	15	7	13
MDA90A-0020, 0040, 0080, 0120 (size 1)	60	30	355	383	19	15	7	13
MDA90A-0160, 0240 (size 2)	90	60	355	383	19	15	7	13
MDA90A-0320, 0480 (size 3)	90	60	455	483	19	15	7	13
MDA90A-0640 (size 4)	120	90	455	483	19	15	7	13
MDA90A-0640, 1000 (size 5)	150	120	455	483	19	15	7	13
MDA90A-1400, 1800 (size 6)	210	180	455	483	19	15	7	13
MDD9.A-0020, 0040 (size 1)	60	30	355	383	19	15	7	13
MDD9.A0020, 0040, 0080 (size 2)	90	60	355	383	19	15	7	13
MDC90A-0001/0002-50X-X-000	60	30	355	383	19	15	7	13
MDM90A	60	30	355	383	19	15	7	13

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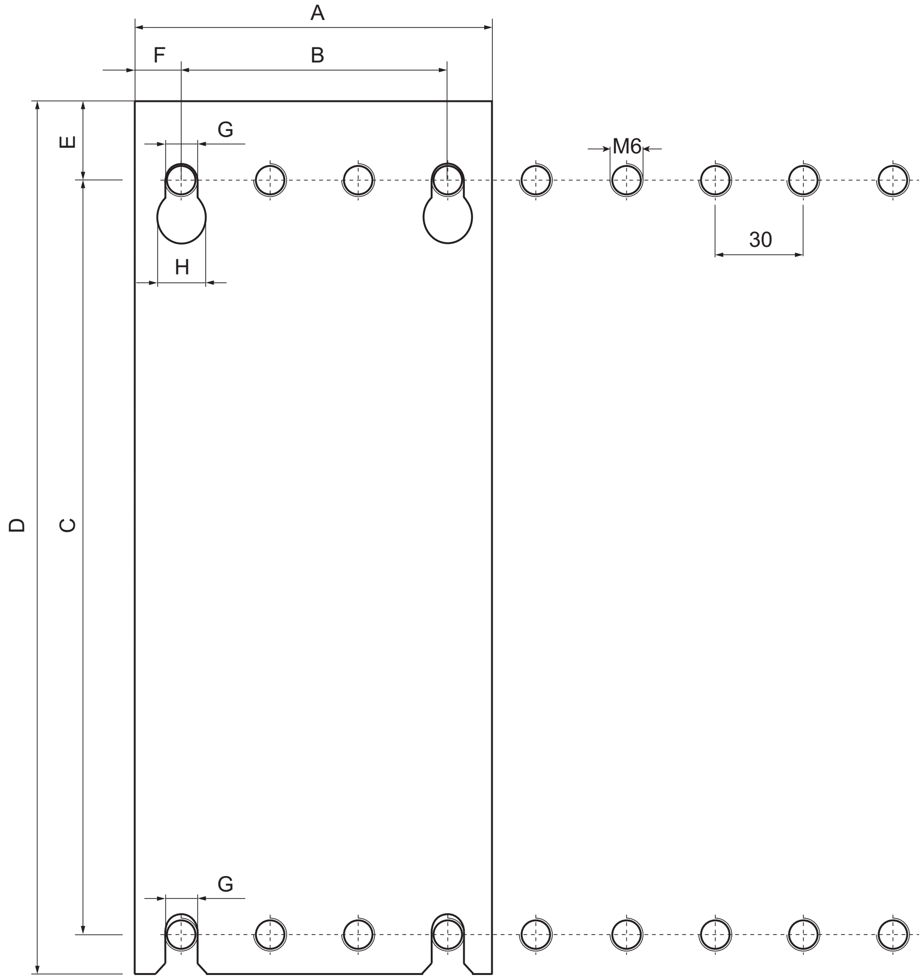
Mounting grid



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For dimension sheets of the application inverters, refer to chapter "Technical data".

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4.4.2 Minimum clearance and mounting position

When installing the modules in the control cabinet, observe the following:

- To ensure unobstructed cooling, leave a minimum clearance of 100 mm above and below the module housings. Make sure air circulation in the clearance is not impaired by cables or other installation equipment.
- Make sure that the devices are not subjected to heated exhaust air from nearby components.
- The axis system must be assembled without gaps.
- Install the modules only vertically. You must not install them horizontally, tilted or upside down.

INFORMATION

Special bending spaces are required according to EN 61800-5-1 for cables with a cross section of 10 mm^2 and larger. This means the clearance must be increased if required.

4.5 Covers

For transportation, the safety covers of the power supply modules MDP90A 25 kW and larger, and of the axis modules MDA90A 64 A and larger are protected with cardboard.

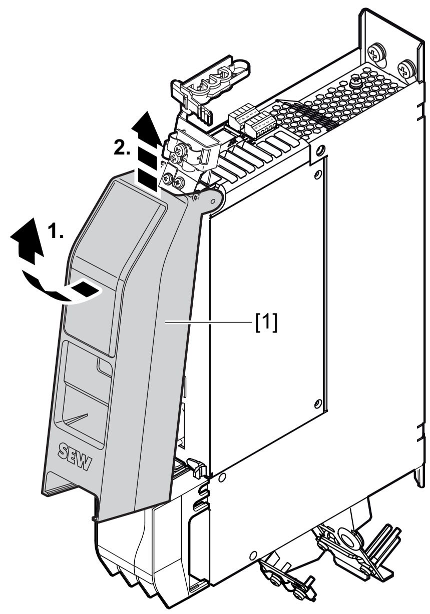
Remove this protection before startup.

Observe that the devices must not be gripped at the safety covers when lifting the devices.

4.5.1 Covers

All MDA and MDD axis modules of the application inverter are equipped with a safety cover [1], see following figures.

Removing the safety cover



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1. The safety cover [1] has a latching mechanism at the bottom. Put your finger in one of the openings of the safety cover and pull it away from the application inverter to unlatch it.
2. Pivot the safety cover forward and lift it to remove it from the application inverter.

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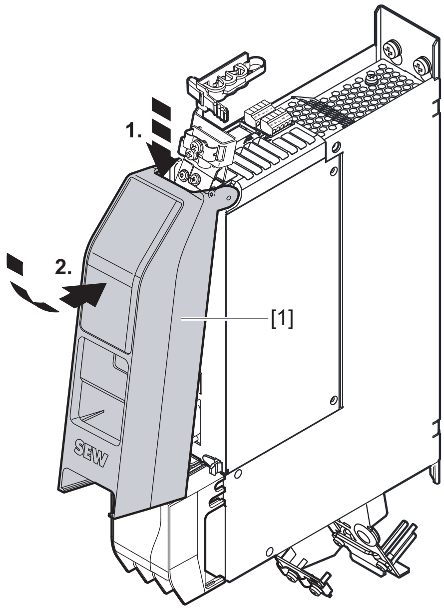
Installing the safety cover



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- Place the safety cover [1] into the upper recess and move it towards the application inverter until it clicks into place.

Reinstall all safety covers [1] after installation work.

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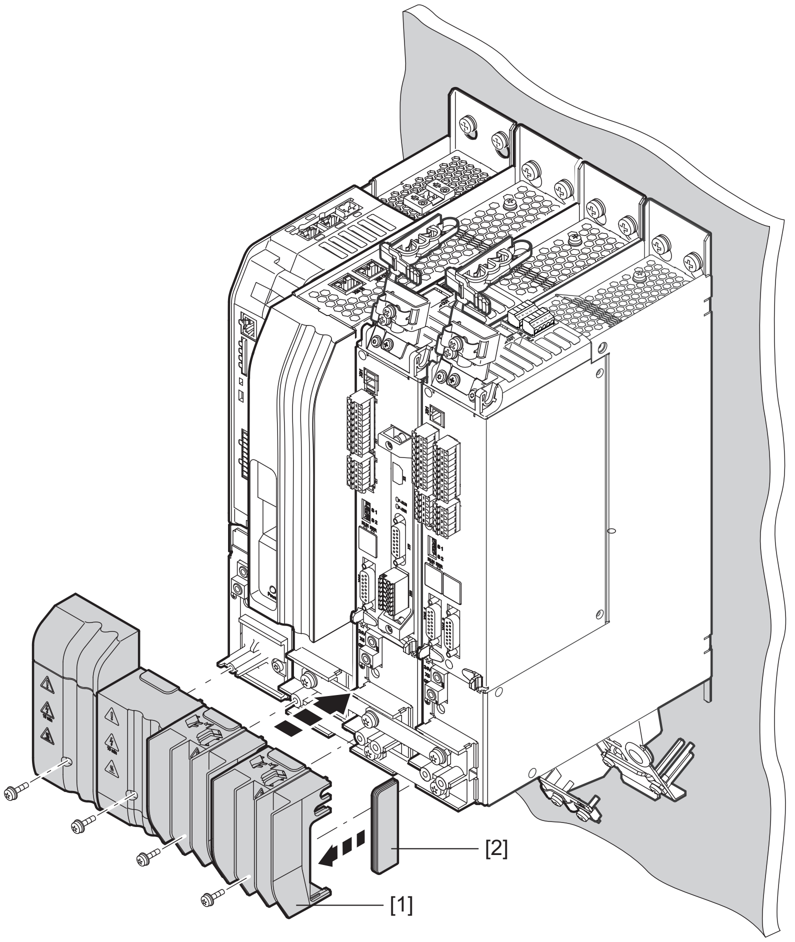
4.5.2 Touch guards

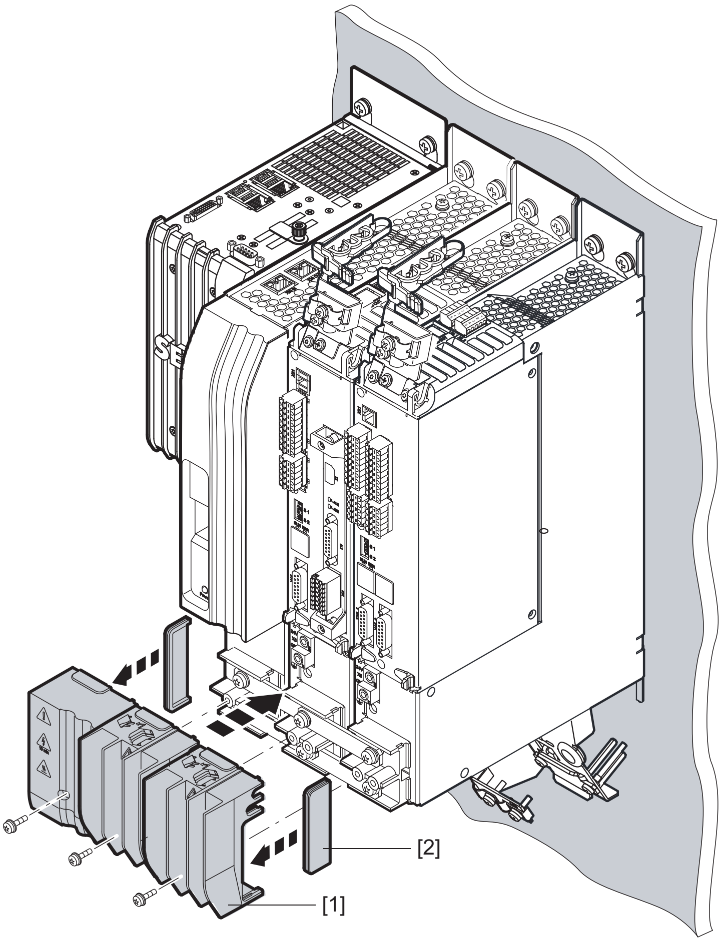
Axis system with master module



20918974091

1. Insert the closing covers [2] into the touch guards covers [1] of the first and last module in the axis system.
2. Attach the touch guard covers [1] to the modules. Insert the screws and tighten them securely with the specified tightening torque (→ 🗎 57).

Axis system without master module



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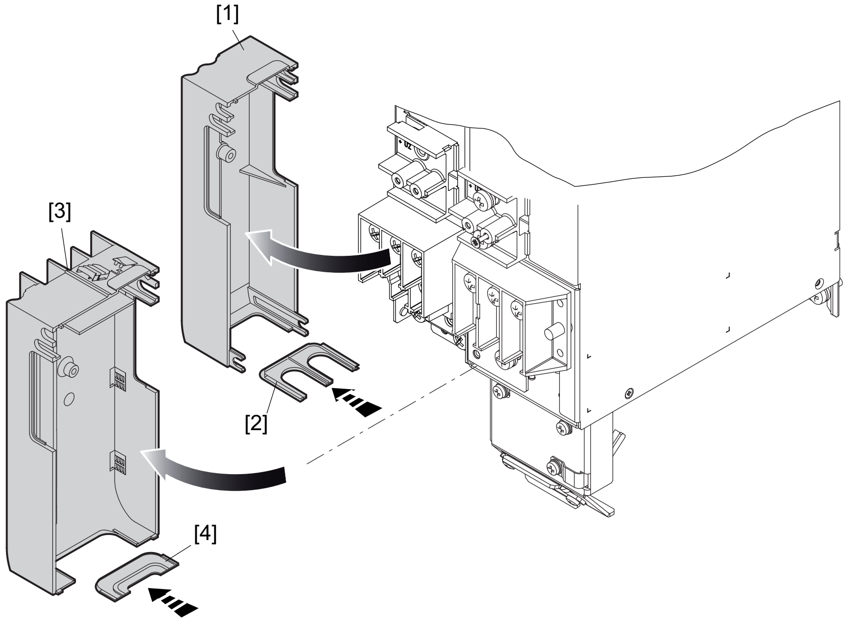
1. Insert closing covers [2] into the touch guards covers [1] of the first and last module in the axis system.
2. Attach the touch guard covers [1] to the modules. Insert the screws and tighten them securely with the specified tightening torque (→ 🗎 57).

4.5.3 Power connection closing cover

To achieve degree of protection IP20 according to EN 60529 with the following modules, a closing cover must be inserted into the touch guard at the power connection.

- Power supply module MDP90A-0250-.. (X1 connection)
- Axis modules MDA90A-0320-.. and MDA90A-0480-.. (X2 connection)



18948602891

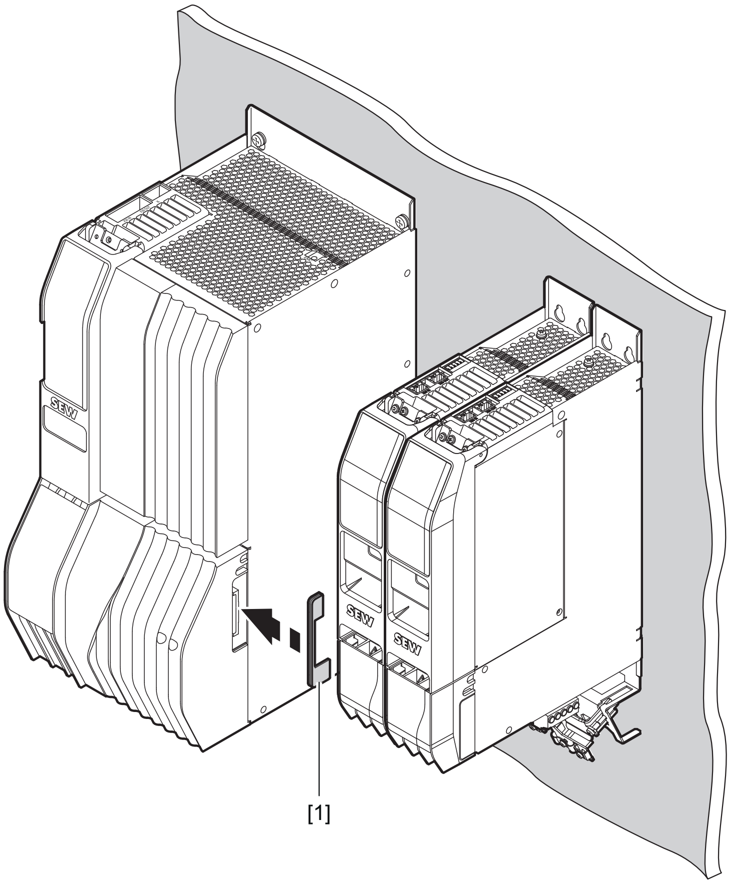
[1] Power supply module touch guard
[2] Power supply module closing cover
[3] Axis module touch guard
[4] Axis module closing cover

1. Remove the touch guard [1], [3] from the respective module.
2. Insert the closing cover [2], [4] into the touch guard.
3. Install the touch guard on the respective module. Insert the screws and tighten them securely with the specified tightening torque (→ 🗎 57).

The closing covers are included in the delivery.

4.5.4 Closing cover between MDA90A-1400 – 1800-.. and MDA90A-0020 – 0240-..

If a MDA90A-0020 – 0240-.. axis module comes after a MDA90A-1400 – 1800-.. axis module, a gap arises at the touch guard of the MDA90A-1400 – 1800, which must be closed with the closing cover [1]. The closing cover is included with the adapter connectors of the DC link connection.



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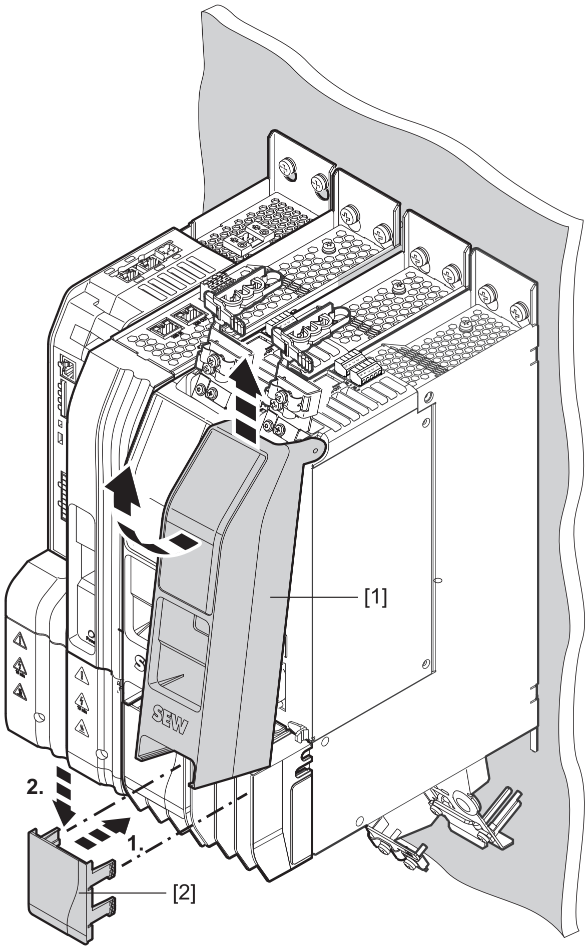
To achieve the degree of protection IP20, the gap must be closed using the closing cover.

4.5.5 Front cover



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1. Remove the safety cover [1].
2. Push the front cover [2] forwards and downwards.
3. Re-install the safety cover [1].

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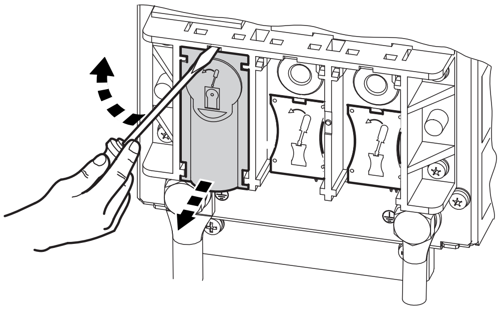
4.5.6 Protection caps

To achieve degree of protection IP20 according to EN 60529 with the following modules, a protection cap must be used to secure the connectors against being touched. The protection caps are included in the accessory bag.

- Power supply modules MDP90A-0500-.. and larger, line connection X1, braking resistor connection X3
- MDP92A-0250-.. power supply modules: Energy storage unit connection X4_B
- DC/DC converter MDE90A-0750-..: Energy storage unit connection X13
- Power supply modules with energy recovery, MDR91A-0500-.. and larger: Line connection X1, braking resistor connection X3
- Axis modules MDA90A-0640-.. and larger: Motor connection X2

Attached protection caps can be remove as depicted in the following figures.

Line connection, motor connection



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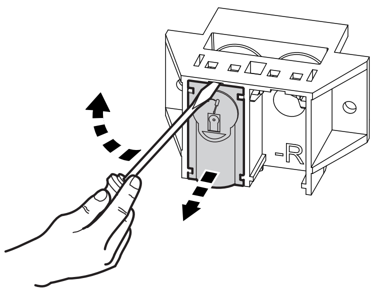
Braking resistor connection



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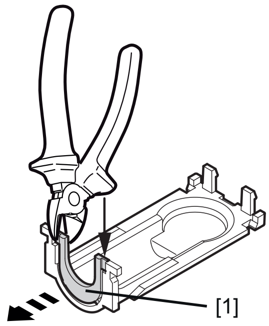
To ensure degree of protection IP20, the protection caps must be replaced after connecting the cables.

Breaking out templates

In order to attach the protection caps in case of cables with large cross section or in case of connection with 2 cables, the template in the protection caps must be broken out.

- Cut out the plastic templates [1] in the protection cap using diagonal cutting pliers as depitcted in the figure.



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4.6 Control cabinet installation

The following steps are depicted at the example of an axis system with 1 power supply module, several axis modules, and 1 master module.

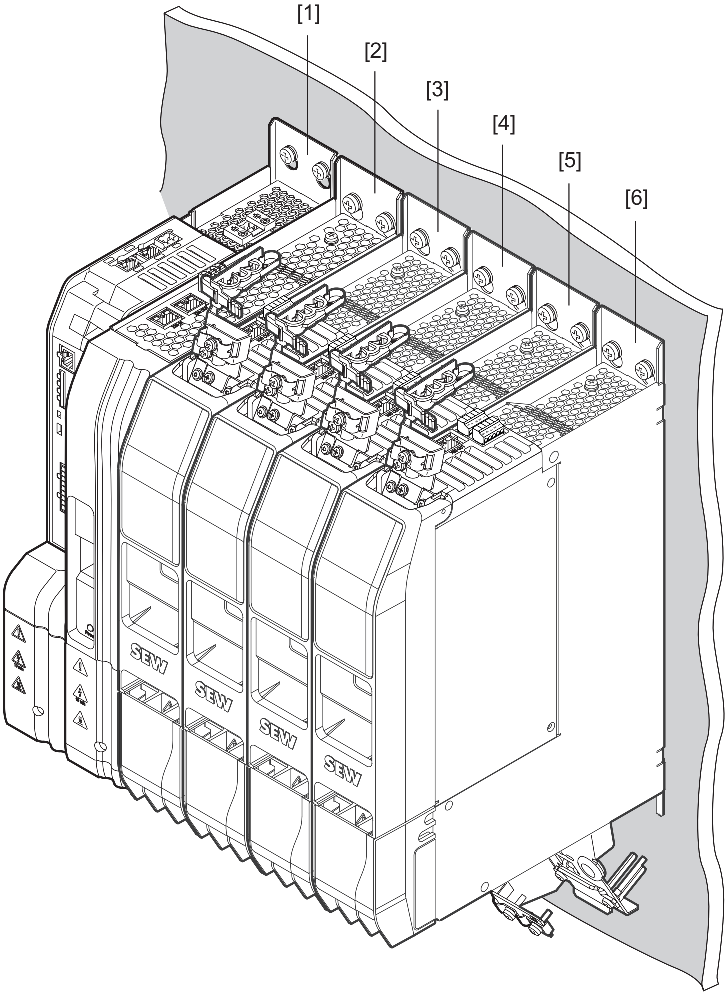
Other modules are used analogously to the instructions described in this chapter.

4.6.1 Arrangement of the axis modules within the axis system

When arranging the axis system, observe that the nominal DC link current of the axis modules must decrease from left to right. The axis module with the highest nominal output current must be on the right side of the power supply module. All remaining axis modules are installed in descending order regarding their nominal DC link current.

The axis modules must always be installed on the right of the power supply module.

The master module must always be installed on the left of the power supply module.



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[1]	Master module	[4]	Example: MDD9.A-0040... double-axis module: I_{NDCL} = 8 A
[2]	Power supply module	[5]	Example: MDA90A-0040... single-axis module: I_{NDCL} = 4 A
[3]	Example: MDA90A-0120... single-axis module: I_{NDCL} = 12 A	[6]	Example: MDA90A-0020... single-axis module: I_{NDCL} = 2 A

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In one axis system, up to 15 axis modules can be used, both as single-axis modules and double-axis modules.

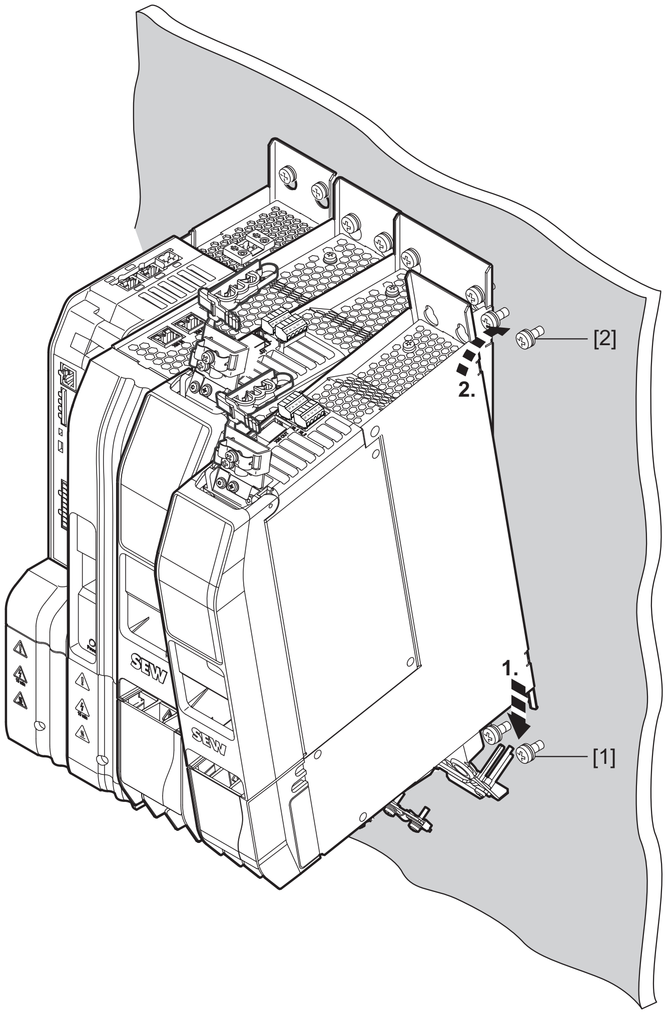
Two-row design

The descending order also applies to the two-row design for the main and the auxiliary row. Up to 15 axis modules can be used together in both rows with the two-row design.

4.6.2 Installing a module

The retaining screws [1] and [2] are screwed into the prepared mounting grid in the control cabinet but not tightened.

1. Place the module with the slotted holes on the unit base plate onto the retaining screws [1] from the top.



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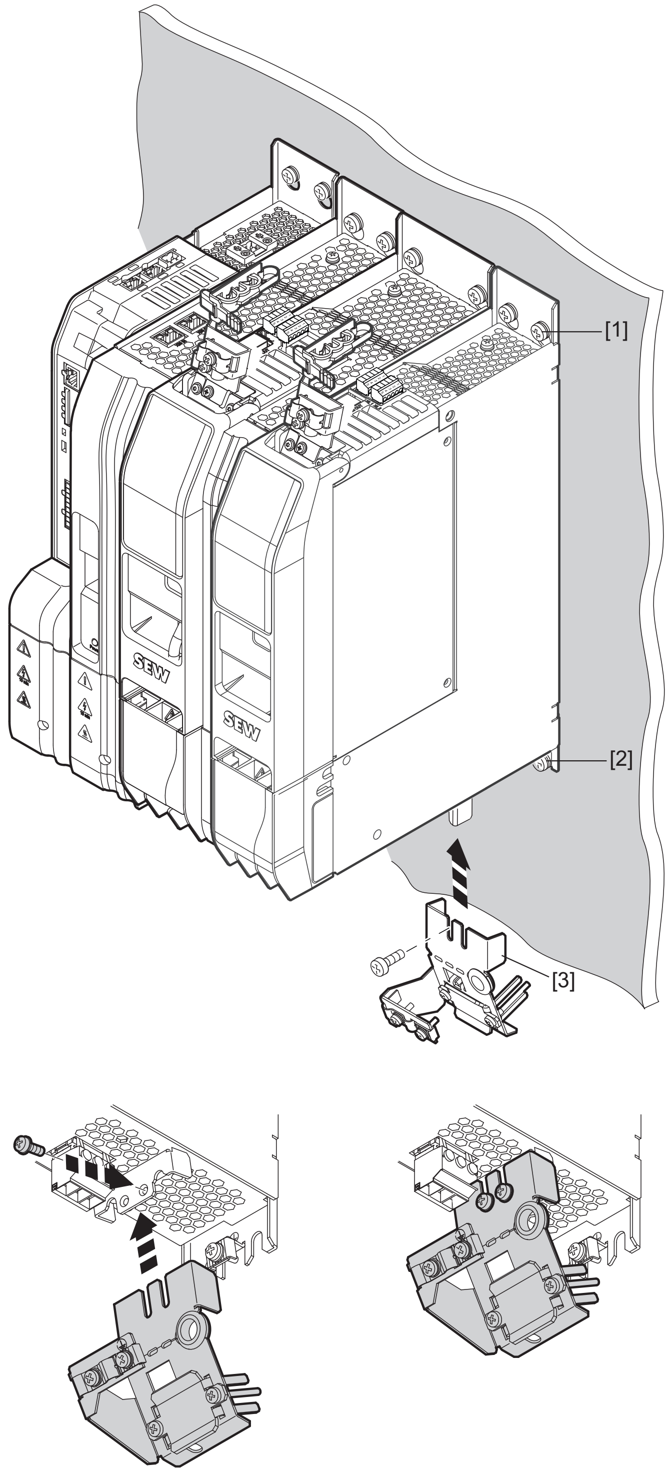
2. Push the module backwards to insert the retaining screws [2] into the upper holes in the unit base plate.
3. Lower the module.
4. Tighten the retaining screws [1] and [2].

4.6.3 Installing shield plates

Bottom shield plate



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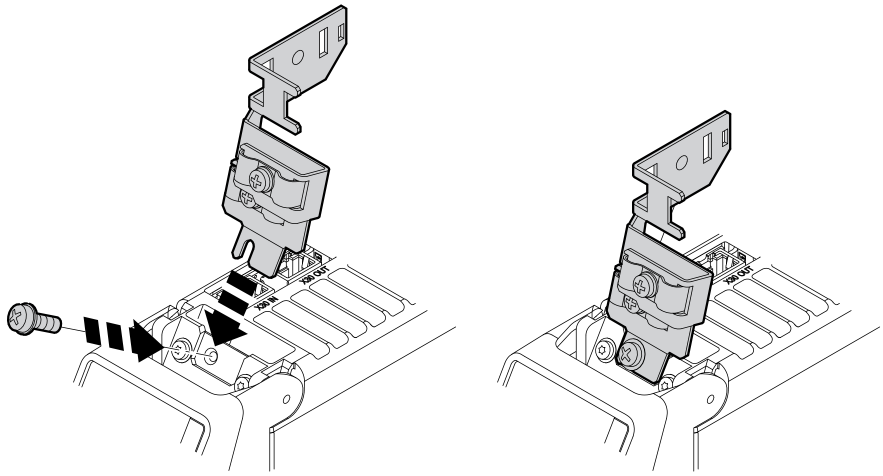
1. Install the shield plate [3] from below.

Top shield plate

1. Install the top shield plate as shown.



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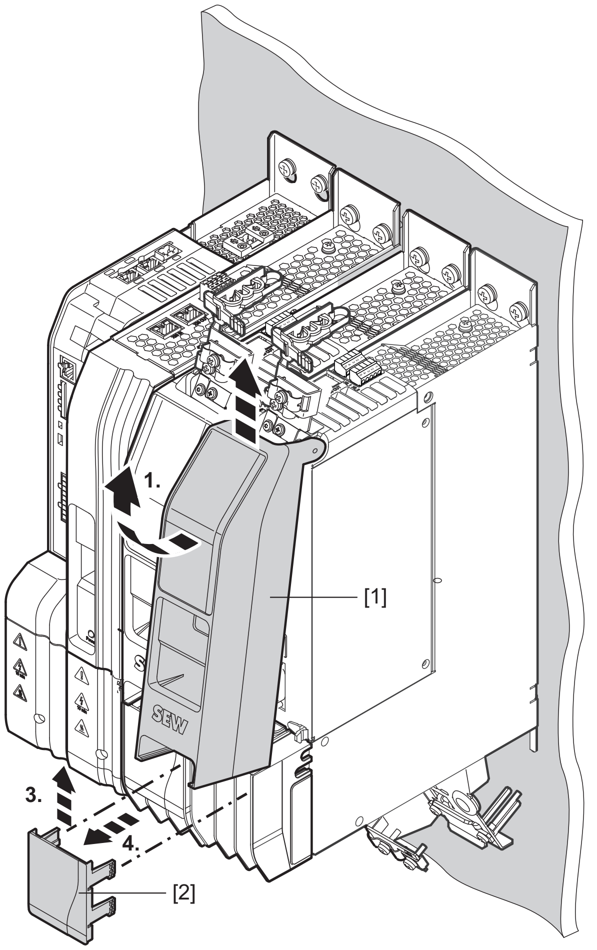
4.6.4 Removing the covers



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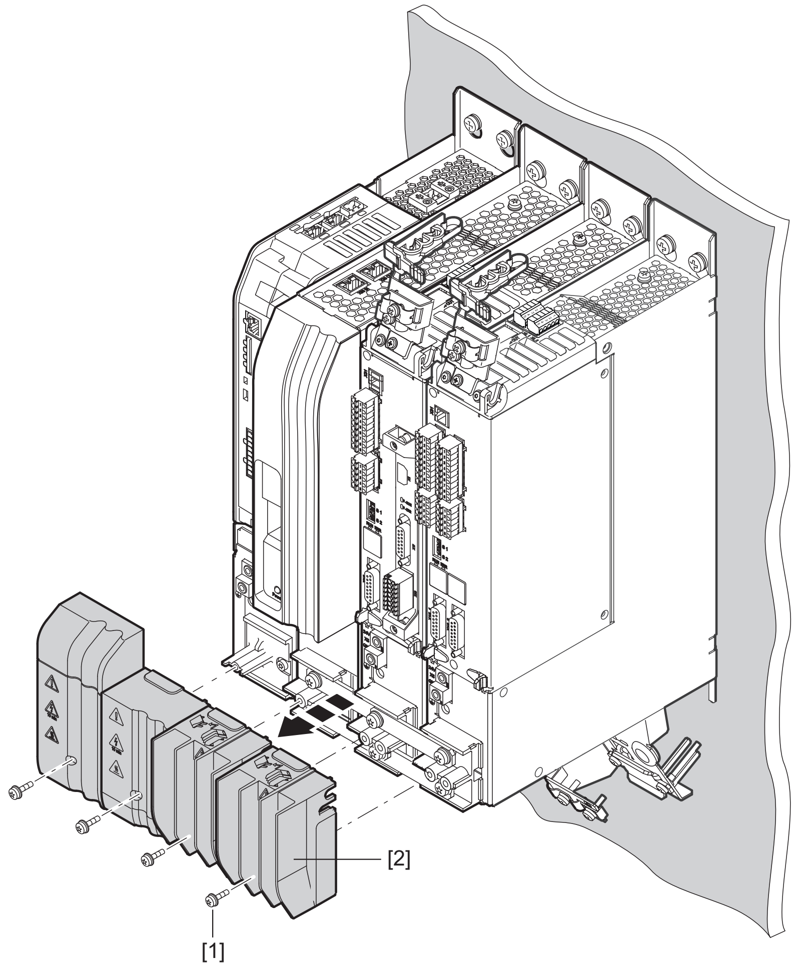
1. Pivot the safety cover [1] forward and lift it to remove it from the application inverter.
2. Move the front cover [2] upwards and remove them by pulling them away from the application inverter.

4.6.5 Removing the touch guards



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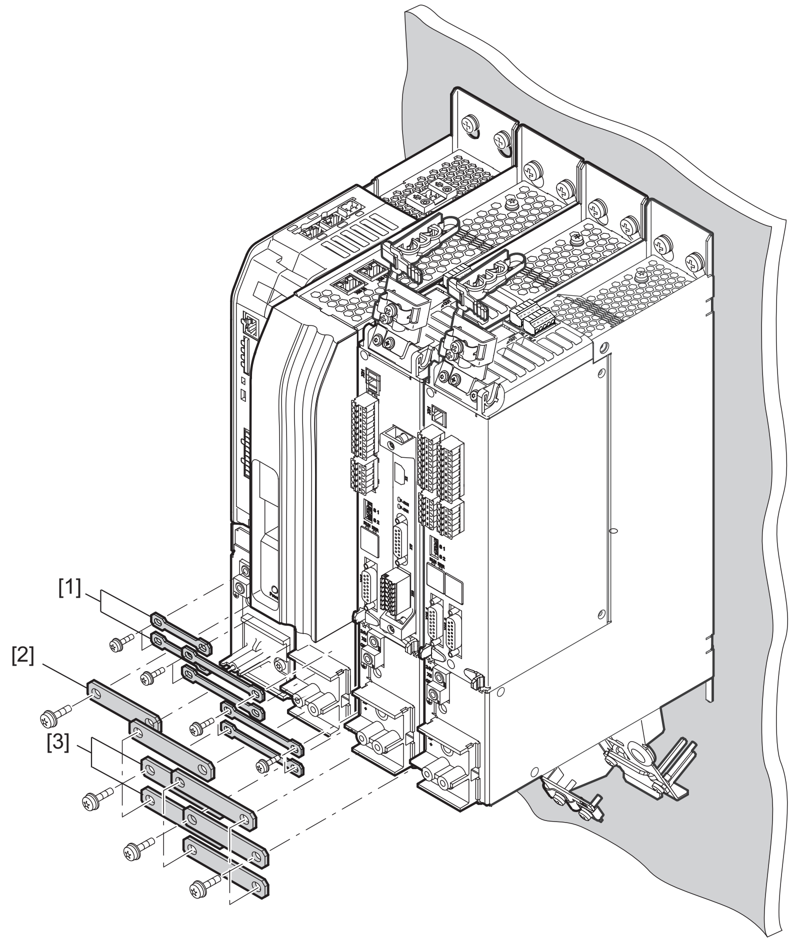
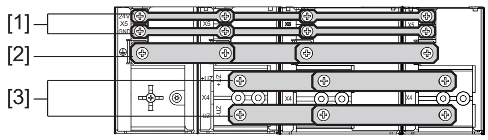
1. Remove the screws [1] of the touch guards of all modules.
2. Remove the touch guards [2] from all modules.

4.6.6 Installing the busbar





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1. Install the busbar [1] for the 24 V supply voltage as shown in the figure. Tighten the screws with the specified tightening torque (→ 🗎 57).
2. Install the busbar [2] for the PE connection as shown in the figure. Tighten the screws with the specified tightening torque (→ 🗎 57).
3. Install the busbar [3] for the DC link connection X4 as shown in the figure. Tighten the screws with the specified tightening torque (→ 🗎 57).

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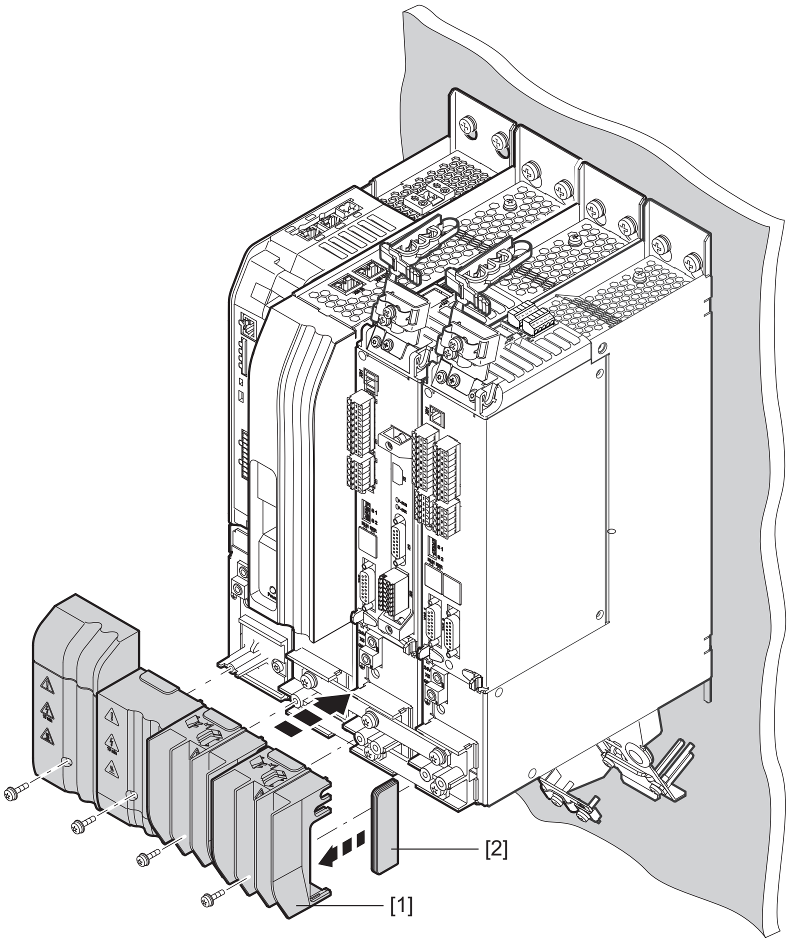
4.6.7 Installing touch guards

All modules of the application inverter are equipped with touch guards [1] and the outer modules of the axis system have closing covers [2], see the following figure. If the axis system contains a master module, the closing cover [2] only needs to be attached at the last module in the axis system.

Axis system with master module



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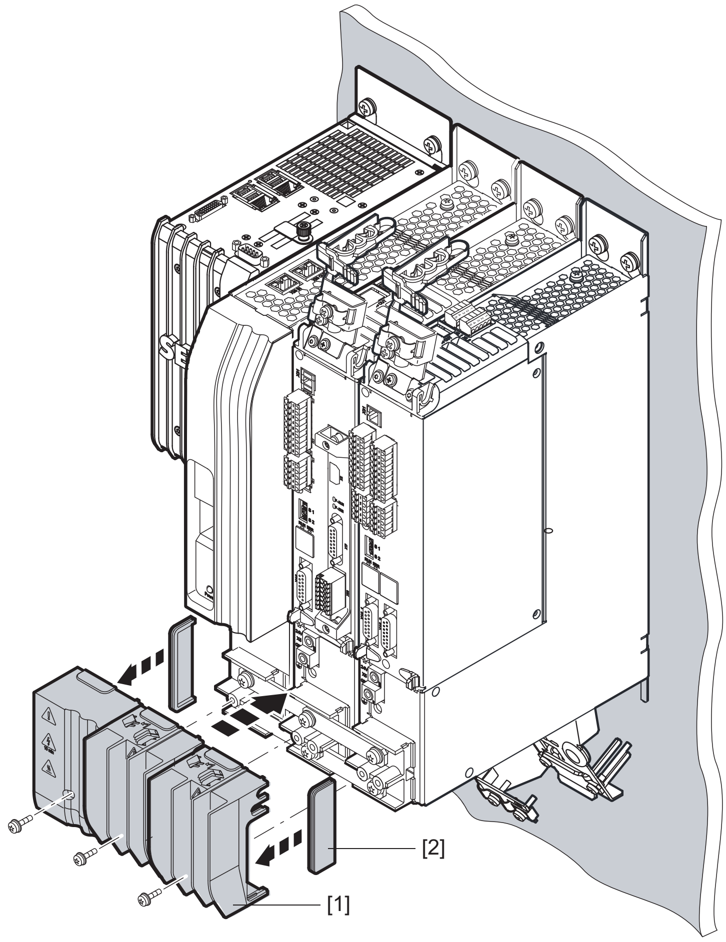
Axis system without master module



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[1] Touch guard

[2] Closing cover

Reinstall all touch guards [1] after installation work.

1. Insert the closing cover [2] into the touch guard [1].
2. Install the touch guard [1] on the respective module. Insert the screws and tighten them securely with the specified tightening torque (→ 🗎 57).

Install one closing cover [2] each at the outer modules of the axis system. The closing covers prevent the DC link from being touched. Two closing covers are included with each power supply module.

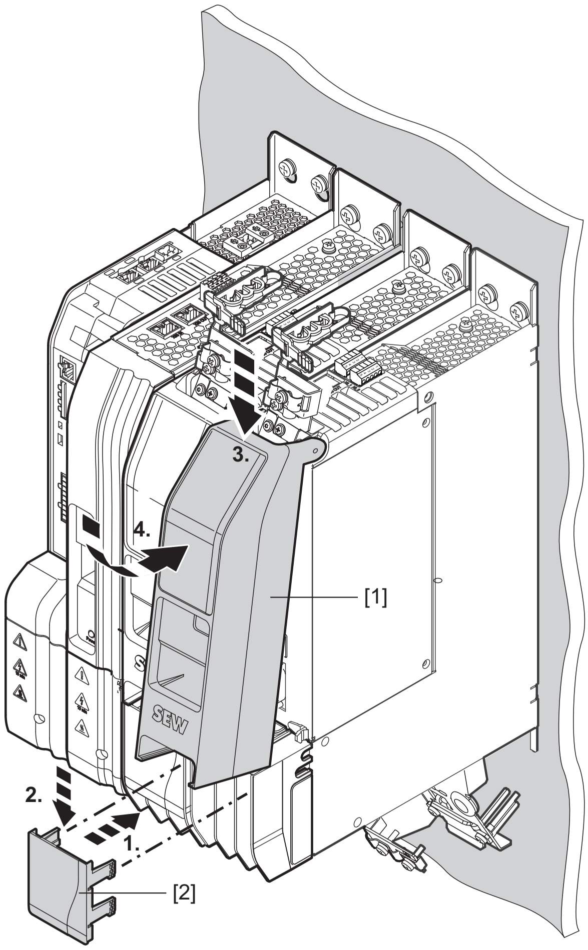
⚠ WARNING

Missing touch guards and closing covers

Severe or fatal injuries from electric shock

- Install all touch guards.
- Install closing covers at the first and last module in the axis system.

4.6.8 Installing front covers and covers



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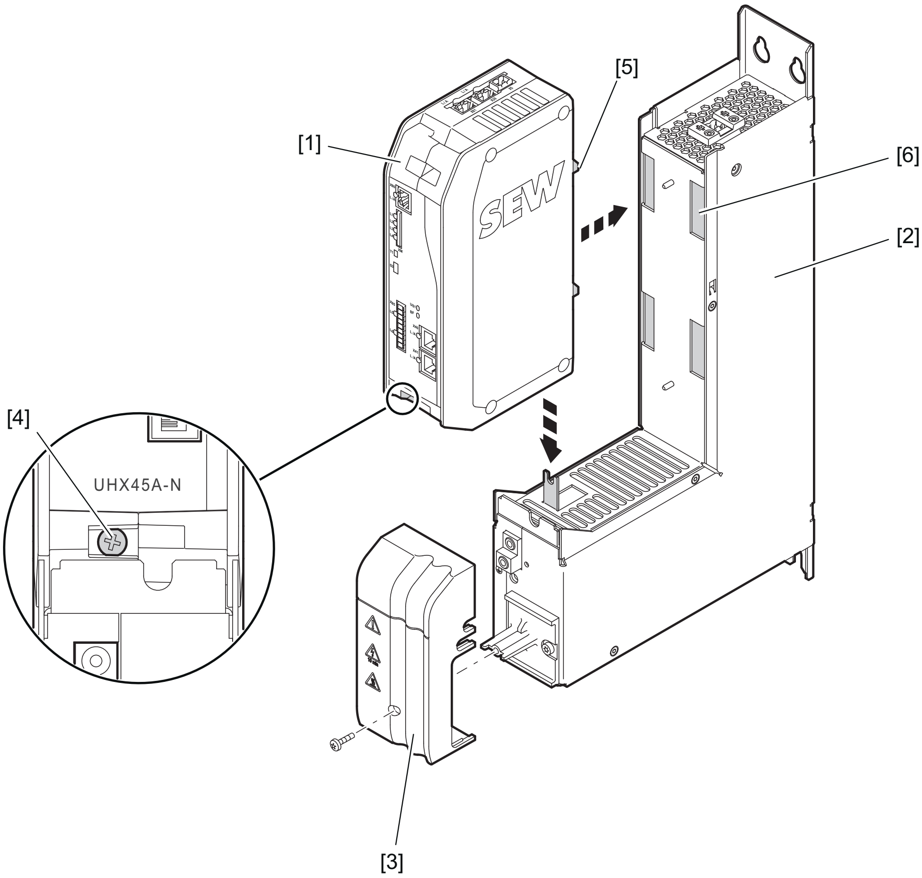
1. Push the front cover [2] forwards and downwards.
2. Place the safety cover [1] into the recess and pivot it into position.

4.6.9 Removing an axis module

To remove an axis module from the axis system proceed in the opposite order compared to installation, see chapter "Control cabinet installation" (→ 🗎 71).

Also observe the safety notes in chapter "Electrical installation" (→ 🗎 82).

4.6.10 Installation/removal of the UHX45A



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[1]	UHX45A	[4]	Screw
[2]	Housing of the master module MDM90A	[5]	4 cams
[3]	Touch guard	[6]	4 recesses

Installation

1. Remove the touch guard [3] at the housing of the master module [2]
2. Install the housing of the UHX45A [1] so that the cams [5] fit into the recesses [6] at the housing of the master module [2].
3. Push the housing of the UHX45A [1] downward until it touches the housing of the master module.
4. Tighten the screw [4]
5. Install the touch guard [3] again

Disassembly

1. Remove the touch guard [3] at the housing of the master module [2]
2. Loosen the screw [4]
3. Pull the housing of the UHX45A [1] upward and remove it toward the front

4.7 Electrical installation

⚠ DANGER

There may be dangerous voltages inside the devices and at the terminal strips after the complete axis system has been disconnected from the power supply.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Observe the labels on the devices and the waiting times until discharge of the energy storage units before you start working on the power connections.
- If you discharge the energy storage units with the discharge unit, observe the information in chapter Discharging the energy storage units using the discharge unit.
- After maintenance work, do not operate the axis system unless you have remounted the safety covers, because the device has only a IP00 degree of protection with the safety cover removed.

⚠ DANGER

A leakage current > 3.5 mA can occur during operation of the MOVIDRIVE® modular application inverter.

Severe or fatal injuries from electric shock.

To avoid shock currents according to EN 61800-5-1, observe the following:

- Supply system cable < 10 mm²:
  - Route a second PE conductor with the cable cross-section of the supply system cable in parallel to the protective earth via separate terminals or use a copper PE conductor with a cable cross-section of 10 mm².
- Supply system cable 10 mm² – 16 mm²:
  - Route a copper PE conductor with the cable cross-section of the supply system cable.
- Supply system cable 16 mm² – 35 mm²:
  - Route a copper protective earth conductor with a cable cross-section of 16 mm².
- Supply system cable > 35 mm²:
  - Route a copper protective earth conductor with half the cross-section of the supply system cable.
- If an earth leakage circuit breaker is used for protection against direct and indirect contact in isolated cases, it must be universal current-sensitive (RCD type B).

NOTICE

Interchanging the poles when connecting a DC source/sink.

The devices are damaged if you interchange poles while connecting an external DC source/sink to a MDP92A and/or MDC90A.

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INFORMATION

Installation with protective separation.

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

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4.7.1 General information

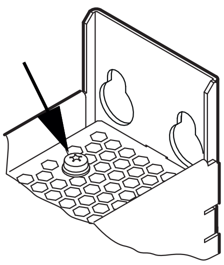
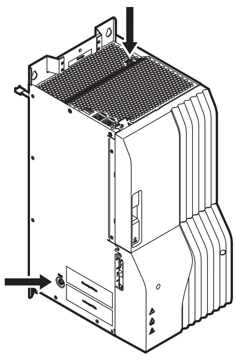
- Take suitable measures to prevent the motor starting up inadvertently, for example by removing the electronics terminal block X20 on the axis module. You must provide additional safety features depending on the application, to prevent possible injuries and damage to machines.
- SEW-EURODRIVE recommends using closed cable lugs for connection to the screws in order to prevent litz strands from escaping.
- SEW-EURODRIVE recommends using 10 mm-long conductor end sleeves when connecting to plug connectors.

4.7.2 Permitted voltage systems

Information on voltage systems	Information on permissibility
TN and TT systems – voltage systems with directly grounded star point.	Use is possible without restrictions.
IT systems – voltage systems with non-grounded star point.	Use is only permitted adhering to specific measures. For measures, refer to chapter "Use in IT systems" (→ 🗎 84).
Voltage systems with grounded outer conductor.	Not permitted.

4.7.3 Use in IT systems

To ensure IT system-capability, the terminal screw(s) shown in the following figure must be removed from all modules in the axis system.

 12924056459	• All axis modules • All double-axis modules • Power supply modules up to MDP90A-0750-..
	• Power supply modules as of MDP90A-1100-..

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INFORMATION

EMC limit values

No EMC limits are specified for interference emission in voltage supply systems without a grounded star point (IT systems). The effectiveness of line filters is severely limited.

4.7.4 Line fuses, fuse types

Line fuses and miniature circuit breakers are used for fusing the supply system cables of the axis block. In case of a fault, these components protect the power supply module against short-circuits. For fusing, use fuses and miniature circuit breakers with the following properties:

Type class	Requirement
Fuses in utilization categories gL, gG	Fusing voltage ≥ nominal line voltage
Miniature circuit breaker with characteristics B, C, D	• Nominal miniature circuit breaker voltage ≥ nominal line voltage • Nominal miniature circuit breaker currents must be at least 10% above the nominal line current of the power supply module

Adhere to the country-specific and system-specific regulations when carrying out the fusing. If required, observe the notes in chapter "Information regarding UL".

4.7.5 Line connection

For the terminal assignment for line connection of the various sizes, refer to the chapter "Terminal assignment".

For operation without line contactor, observe the specifications in the chapter "Protection of braking resistor against thermal overload".

Observe a minimum switch-off time of 10 s for the power supply module/the application inverter. Do not turn power on or off more than once per minute.

NOTICE

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

Adhere to the specified times and intervals.

- Observe the minimum switch-off time of 10 s before switching the power back on.
- Do not turn the power of the supply system on or off more than once per minute.

- The line contactor must always be located upstream of the line filter.
- Use only line contactors of utilization category AC-3 (EN 60947-4-1) or higher.
- Do not use the line contactor for jog mode, but only for switching the power supply module on and off. The FCB 20 "Jog" must be used for jog mode.
- Observe the required dimensioning of the cable cross-section for UL-compliant installing.

4.7.6 Power connections

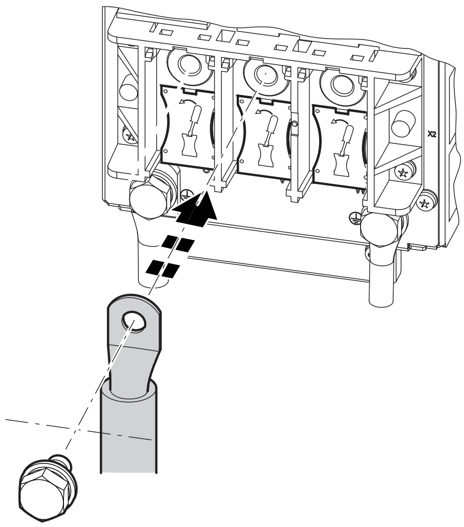
For the terminal assignment for the power connection of the various sizes, refer to the chapter "Terminal assignment" (→ 🗎 148).

To achieve degree of protection IP20 according to EN 60529 with larger modules, the connectors must be secured against touch using a protection cap. The protection caps are included in the accessory bag. The ring lugs must be insulated using a heat shrink tubing.

- Power supply modules MDP90A-0500-.. and larger, line connection X1, braking resistor connection X3
- Axis modules MDA90A-0640-.. and larger: Motor connection X2

The power connection can be designed either with 1 or 2 parallel cables.

Connection with 1 cable



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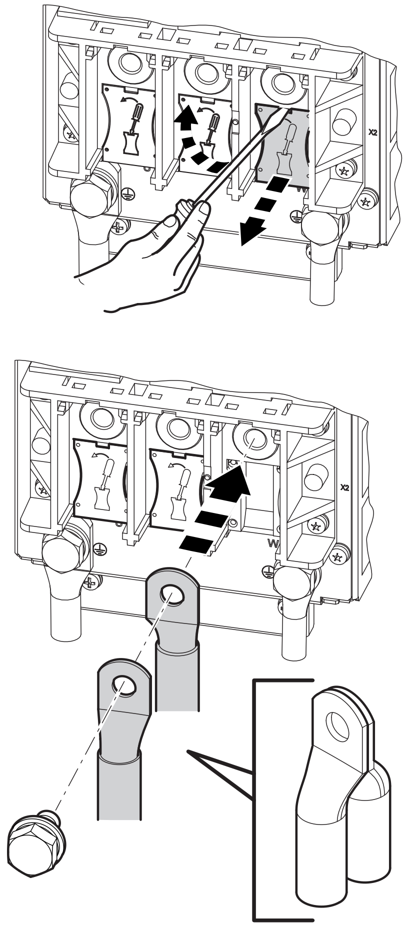
1. Attach the heat shrink tubing at the ring lug.
2. Connect the cable as depicted in the figure.
3. Attach the protection caps, see chapter "Protection caps" (→ 🗎 69).

INFORMATION

If the device is connected using 1 cable, the plastic plate in the connection block must not be removed.

Connection with 2 cables



20119708427

1. Remove the plastic plate in the connection block as depicted in the figure above.
2. Attach a heat shrink tubing at the ring lugs.
3. Connect the 2 cables as depicted in the figure above.
4. Attach the protection caps, see chapter "Protection caps" (→ 🗎 69).

4.7.7 24 V supply voltage

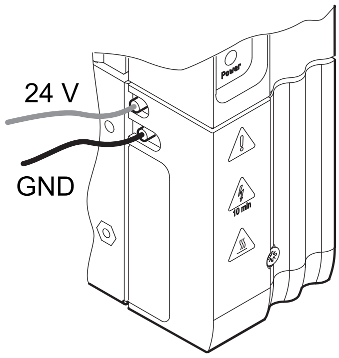
24 V supply voltage without master module

MOVIDRIVE® modular requires an external 24 V supply voltage. Us the following installation material for the connection:

- M4 fork-type or ring lugs with insulating collar and a cable cross-section of maximum 4 mm^2,

  or

- M4 tubular cable lugs with insulating heat shrink tubing and a cable cross-section of maximum 6 mm^2.



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Select the cross-section of the supply cable according to the power demand of the device to be supplied. Note the additionally required power of the directly supplied 24 V brakes for CMP motors with BK or BP brake without brake control.

The maximally permitted length of the 24 V supply cable is 30 m.

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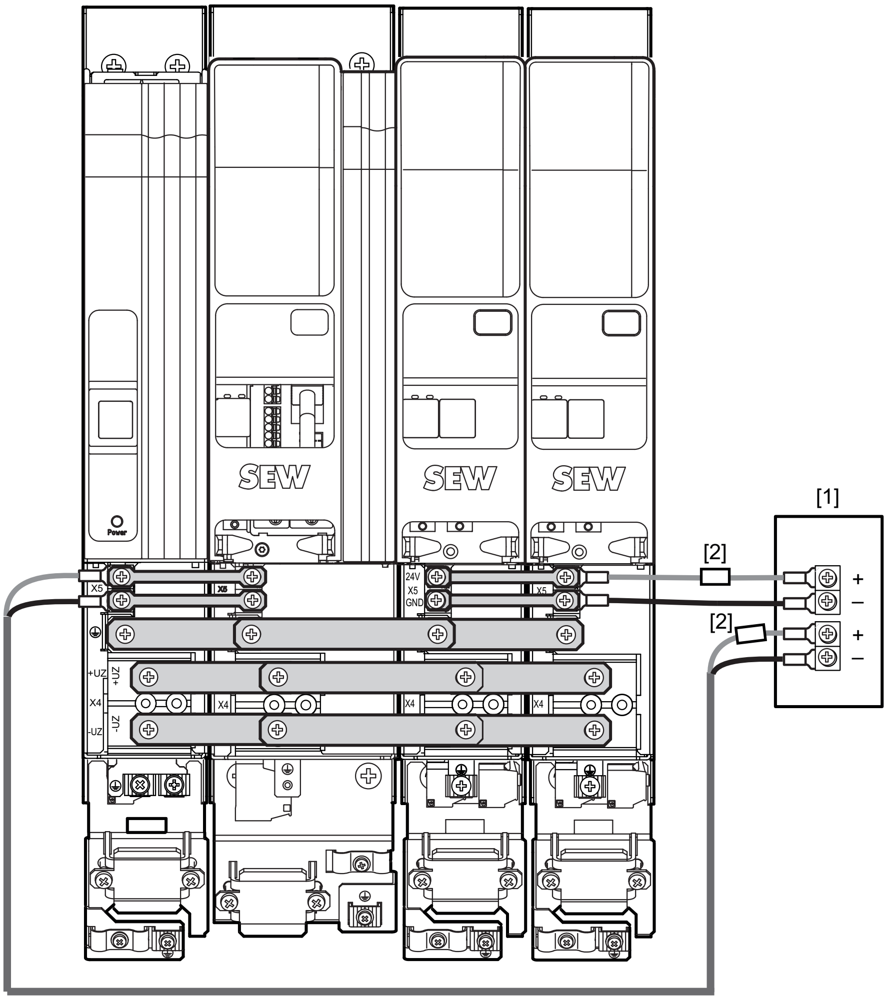
The connection is established either one-sided at the power supply module, or two-sided at the power supply module and the last axis module in the axis system, see the following figure for more details.



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[1] External DC 24 V voltage supply

[2] DC 24 V fuse

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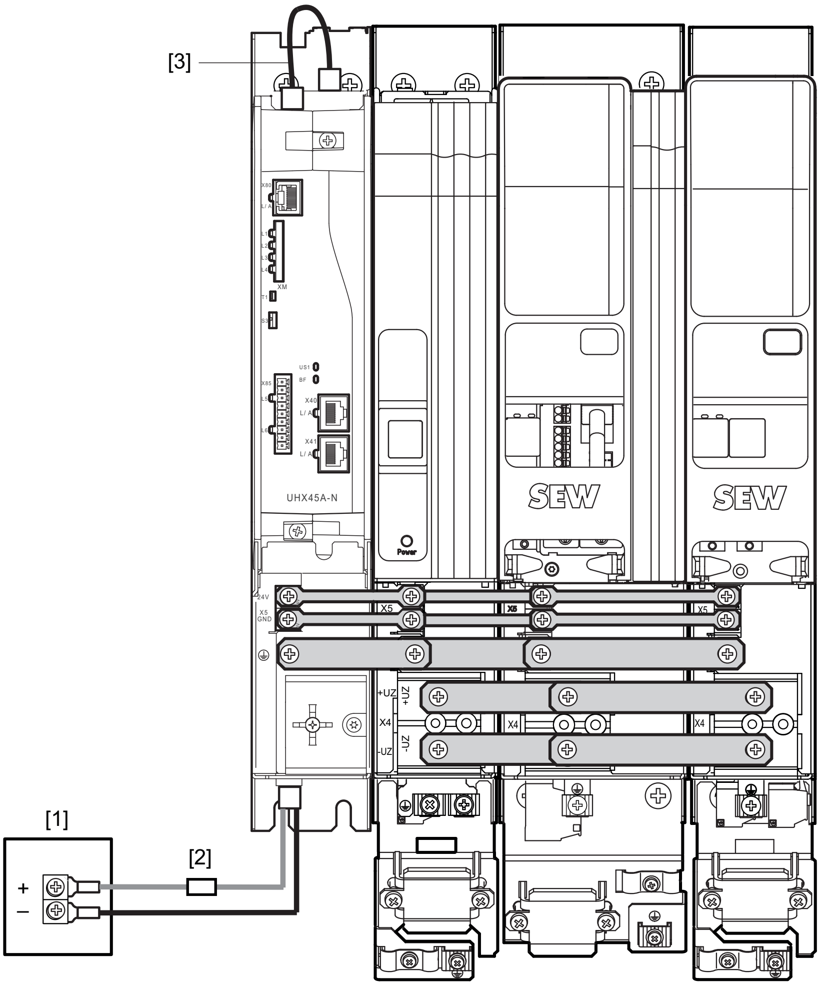
24 V supply voltage with master module UHX45A/MDM90A



9007220204831115

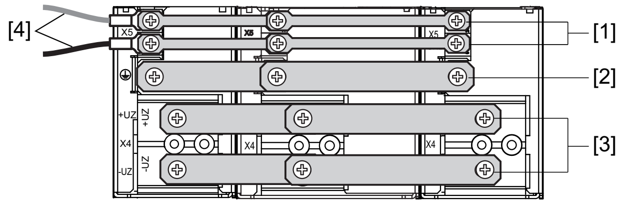
[1] External DC 24 V supply at X5_A

[2] DC 24 V fuse

[3] X5_B → X5: DC 24 V supply voltage UHX45A

Only use the connection cable included in the delivery to connect the 24 V supply of the MOVI-C CONTROLLER® advanced.

4.7.8 Connection of an axis system



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[1] Connection +24 V supply voltage

[2] PE connection

[3] X4: DC link connection

[4] Connection external 24 V supply voltage

For information on how to connect a DC link, refer to chapter "Installing the busbar" (→ 🗎 77).

Particularities of the DC link connection

Use of axis modules ≤ MDA90A-1000-.. at the MDP90A-1100-.. power supply module.

If the axis modules ≤ MDA90A-1000-.. are operated with a PWM frequency of 4 kHz, the following restrictions must not be observed.

INFORMATION

If axis modules ≤ MDA90A-1000-.. are operated with a PWM frequency of 8 or 16 kHz on a MDP90A-1100-.. power supply module, either directly or to the right of an axis module ≥ MDA90A-1400-…, the total of the nominal DC link currents I_{NDCL} of the axis modules ≤ MDA90A-100-… must not exceed 153 A.

Example 1:

MDP90A-1100-..

MDA90A-0640-.. I_{NDCL} = 64 A

MDA90A-0640-.. I_{NDCL} = 64 A

MDA90A-0240-.. → I_{NDCL} = 24 A

Total of I_{NDCL} = 152 A→ Set-up is permitted

Example 2:

MDP90A-1100-..

MDA90A-1400-..

MDA90A-0640-.. I_{NDCL} = 64 A

MDA90A-0640-.. I_{NDCL} = 64 A

MDA90A-0640-.. I_{NDCL} = 64 A

Total of I_{NDCL} = 192 A→ Set-up is not permitted

Adapter connectors of the DC link connection

To be able to establish an axis system in which modules with DC link bars of different widths are used, adapter connectors must be used at the transition from wide to narrow or narrow to wide. These adapter connectors are listed in the following table.

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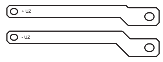
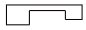
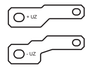
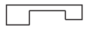
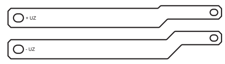
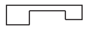
The necessary closing covers are included with the adapter connectors.

From module	To module	Adapter connectors/ closing covers	Part number
MDP90A-0750-..	MDA90A-1400-..		28244052
			18181716
MDP90A-1100-..	• MDA90A-0020-.. – MDA90A-1000-.. • MDD9.A-0020.. – MDD9.A-0080-..		28244079
			18151884
MDA90A-1400-.. – MDA90A-1800-..	• MDA90A-0020-.. – MDA90A-1000-.. • MDD9.A-0020.. – MDD9.A-0080-..		28244060
			18151884
			18183751

The closing cover 18181716 is included with the adapter connectors 28244052.

The closing cover 18151884 is included with the adapter connectors 28244079.

The closing covers 18151884 and 18183751 are included with the adapter connectors 28244060.

Adapter connectors are not included in the scope of delivery and must be ordered.

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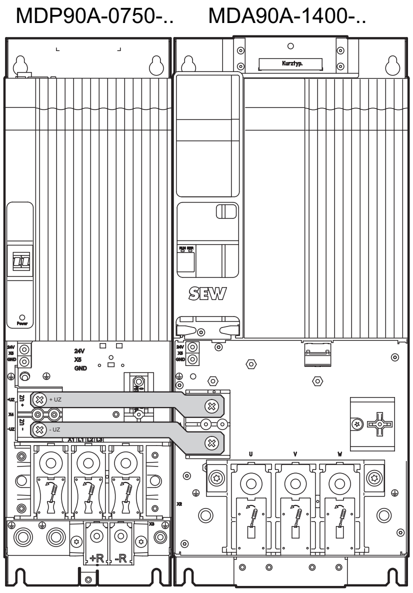
Examples of the DC link busbar with different bar widths

Example 1

Axis system with MDP90A-0750-.. power supply module, MDA90A-1400-.. axis module

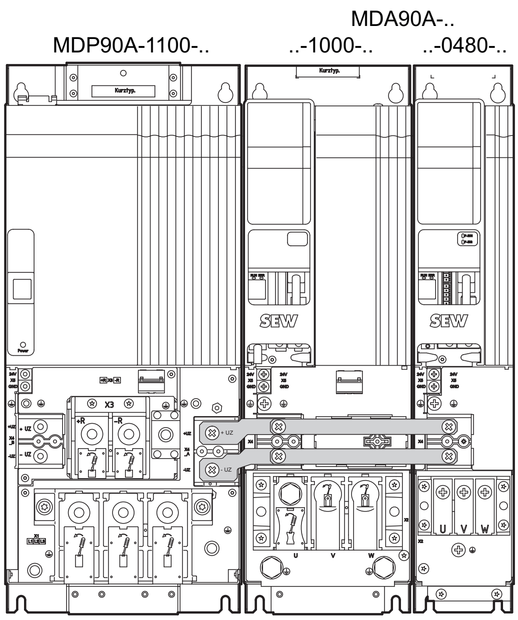


23268391819

Adapter connectors with the part number 28244052 must be ordered for this arrangement.

Example 2

Axis system with MDP90A-1100-.. power supply module, MDA90A-1000-.. axis module, MDA90A-0480-..



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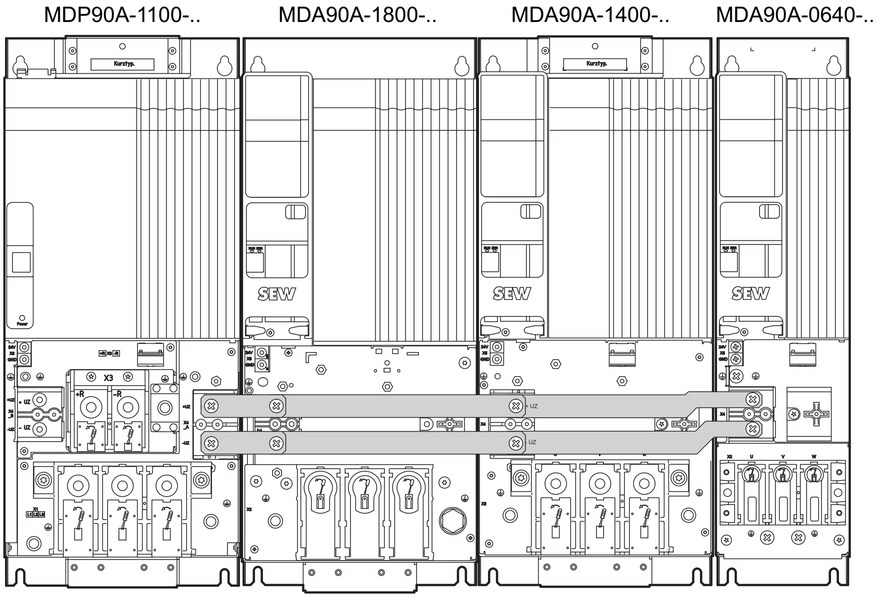
Adapter connectors with the part number 28244079 must be ordered for this arrangement.

Example 3

Axis system with MDP90A-1100-.. power supply module, MDA90A-1800-.. axis module, MDA90A-1400-.., MDA90A-0640-..



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Adapter connectors with the part number 28244060 must be ordered for this arrangement.

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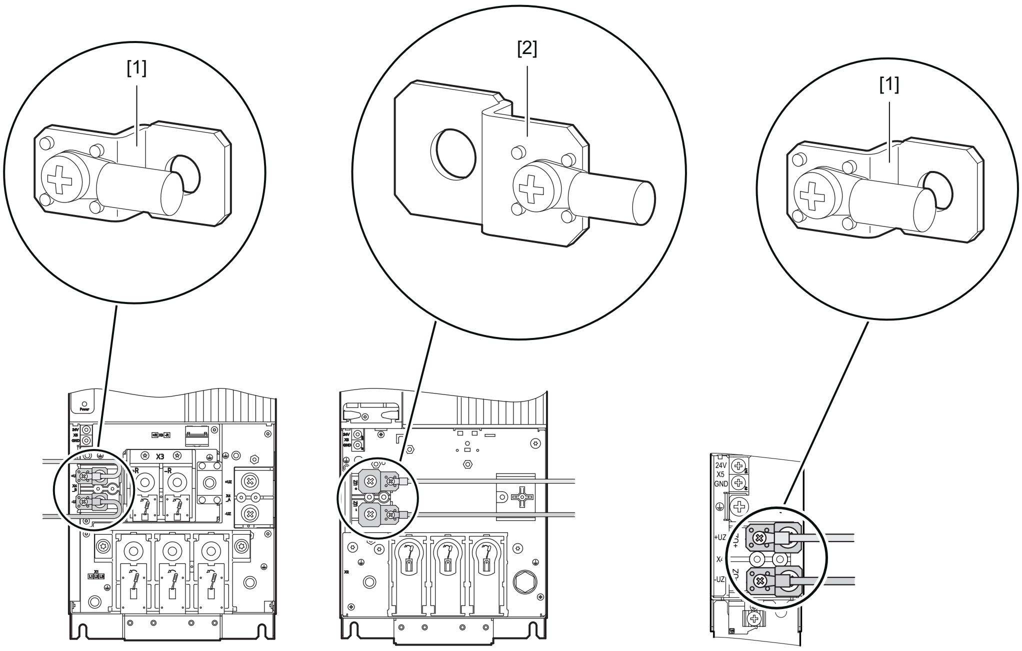
4.7.9 Connecting a safe brake module to the DC link

The safe BST brake module is directly supplied from the DC link. For connecting the safe brake module to the DC link, a set of angled bars is available in 2 sizes.

Axis module	Set of angled bars	Part number
MDP90A-..	Small [1]	28249674
MDA90A-0020 .. 1000..	Small [1]	28249674
MDD9.A-0020 .. 0080..	Small [1]	28249674
MDA90A-1400 .. 1800..	Large [2]	28249682

The angled bars are screwed to the DC link bars in the last axis module on the right side or in the power supply module on the left side. Use a M4 screw to fasten a ring cable lug.



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⚠ DANGER

Dangerous voltages of up to DC 970 V can occur.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- After disconnection from the power supply, wait at least 10 minutes and ensure that there is no voltage present before you start working on the power connections.
- After maintenance work, do not operate the axis system unless you have remounted the safety covers, because the device has only a IP00 degree of protection with the safety cover removed.

- Use suitable cable lugs for M4 screws.
- Connect a maximum number of 16 BST brake modules to a DC link output.
- Only BST brake modules may be connected to the angled bars.

For more information on the safe brake module, refer to the "BST Safety-Related Brake Module" operating instructions.

Two-row design with MDC90A-..

In case of a two-row design with MDC90A-0001-.. or MDC90A-0002-.. capacitor module, the safe brake modules can be connected directly to the capacitor module at terminal X4. In this case, no angled bars are required.

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4.7.10 Two-row design

Design variants in a control cabinet

If, for reasons of space, the modules of an axis system cannot be set up in one row, some of the modules must be installed in a second row. There are 3 design variants for the two-row design, which are described below.

INFORMATION

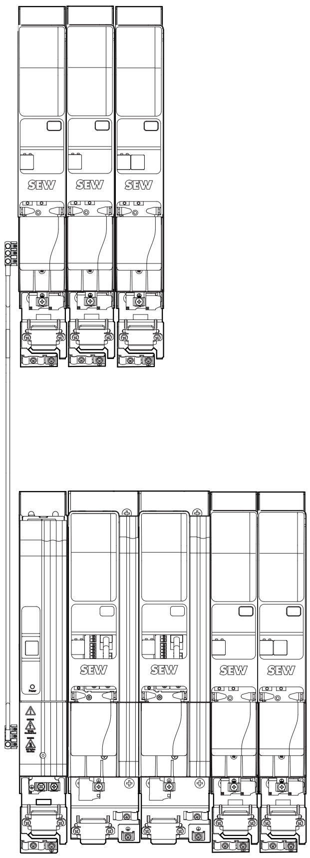
Change of the degree of protection

In variant 1 and 2, the degree of protection is reduced to IP10 when the DCP34A cable set is connected.

In variant 1 and 2 the main row and auxiliary row must be connected as in variant 3 if the IP20 degree of protection is required.

For the two-row design in a control cabinet, cable sets from SEW-EURODRIVE must be used, see chapter "Cable sets and accessories" (→ 🗎 107).

Variant 1



Auxiliary row

- MDA90A-0020 – 0120-.. - MDD9.A-0020 – 0080-..	Maximum 8 modules

Total nominal DC link current in auxiliary row: Max. 46 A

Connection of main row and auxiliary row

- Connection via cable lug
- Cable set DCP34A
- Degree of protection IP10

Main row

- MDP90A-0250 – 1100-..
- MDR91A-0500 – 0750-..
- MDA90A-0020 – 0180-..
- MDD9.A-0020 – 0080-..

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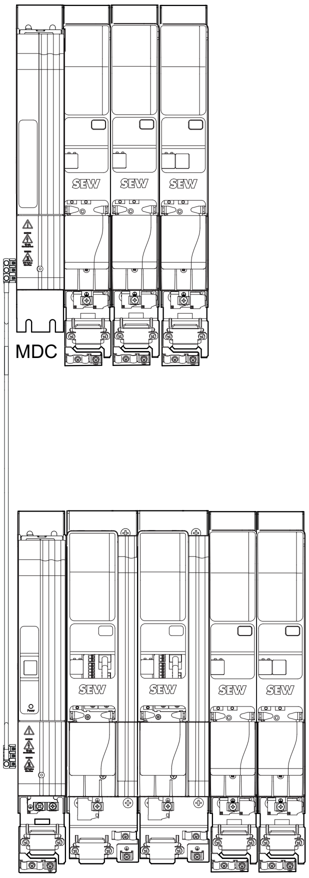
Variant 2



Auxiliary row

MDC90A-0001-50X-X-000	Use is mandatory
- MDA90A-0020 – 0120-.. - MDD9.A-0020 – 0080-..	Maximum 8 modules
- MDA90A-0160 – 0240-..	Maximum 2 modules
- MDA90A-0320-..	Maximum 1 module

Total nominal DC link current in auxiliary row: Max. 46 A

Connection of main row and auxiliary row

- Connection via cable lug
- Cable set DCP34A
- Degree of protection IP10

Main row

- MDP90A-0250 – 1100-..
- MDR91A-0500 – 0750-..
- MDA90A-0020 – 0180-..
- MDD9.A-0020 – 0080-..

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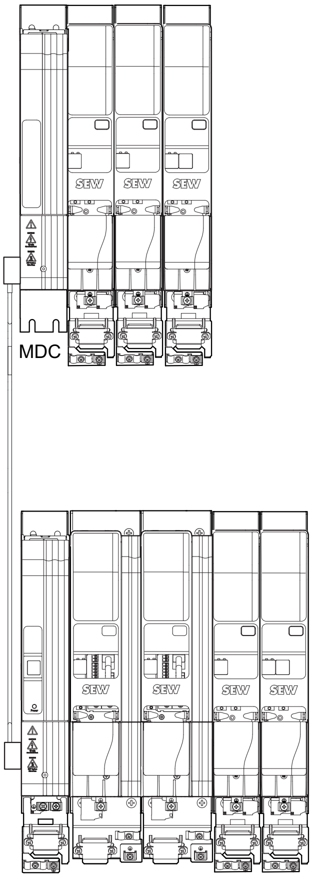
Variant 3



Auxiliary row

MDC90A-0001-50X-X-000	Use is mandatory
- MDA90A-0020 – 0120-.. - MDD9.A-0020 – 0080-..	Maximum 8 modules
- MDA90A-0160 – 0240-..	Maximum 4 modules
- MDA90A-0320 – 0480-..	Maximum 2 modules

Total nominal DC link current in auxiliary row: Max. 109 A

Connection of main row and auxiliary row

- Connection via connection units

- DCP35A cable set

- With MDP90A in main row: MDP connection unit set, 28261666

- With MDR91A in the main row: MDR connection unit set, 28261674

- Degree of protection IP20

Main row

- MDP90A-0250 – 1100-..

- MDR91A-0500 – 0750-..

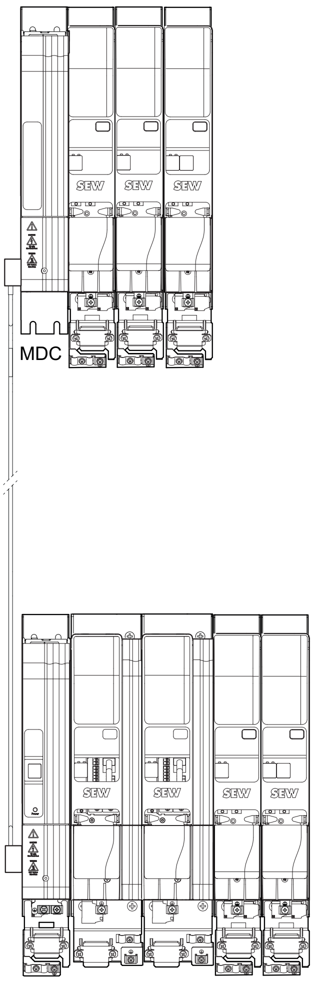
- MDA90A-0020 – 0180-..

- MDD9.A-0020 – 0080-..

Design variant with large distance between main row and auxiliary row

If, for reasons of space, the modules of an axis system cannot be set up in one row, some of the modules must be installed in a second row. This variant is used if there is a large distance of up to 50 m between the main row and the auxiliary row.

Applications in this design must be tested by SEW-EURODRIVE for the individual application. Contact SEW-EURODRIVE.



Auxiliary row

- MDC90A-0002-50X-X-000	Use is mandatory
- MDA90A-0020 – 0120-.. - MDD9.A-0020 – 0080-..	Maximum 8 modules
- MDA90A-0160 – 0240-..	Maximum 4 modules
- MDD9.A-0320 – 0480-..	Maximum 2 modules

Total DC link current in auxiliary row: Max. 109 A

Connection of main row and auxiliary row

- Connection via cable lug or connection unit
- Cable or conductor rail up to 50 m
- Maximum cable cross section with cable lug: 16 mm^2
- Maximum cable cross section to connection unit: 35 mm^2
- Degree of protection: IP10 or IP20

Optional: With MDP.. in the main row: Connection unit MDP, part number: 28261666

Optional: With MDR.. in the main row: Connection unit MDR, part number: 282616746

Main row

- MDP90A-0250 – 1100-..
- MDR91A-0500 – 0750-..
- MDA90A-0020 – 0180-..
- MDD9.A-0020 – 0080-..

The following measures must be checked, depending on the system configuration:

- Use of DC link chokes in the connection from the main row to the auxiliary row.
- Adapted regulator settings in the CFC control mode.

Installation

A MOVIDRIVE® modular axis system is designed so that the axis modules must be mounted in descending order of the nominal DC link current.

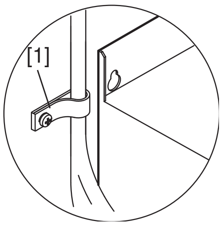
If the width of the axis system is wider than the available control cabinet width, it is possible to install some of the modules in a second row (auxiliary row).

The first row is connected with the second row (DC link connection) using cables. The cable length is predetermined. The distance between the upper edge of the main row and the upper edge of the auxiliary row is 670 mm.

The power supply modules are selected in the same way as with the one-row design depending on the connected axis modules in the main row and auxiliary row.

The following requirements must be met for installation in a control cabinet:

- Ensure a clearance of at least 40 mm left of the axis blocks for routing the DC link connection and the motor cables.
- You must route the motor cables on the left side of the axis blocks.
- You must route the DC link connection on the left side of the axis blocks. The DC link connection must be secured using suitable measures, such as a clamp [1], to prevent mechanical oscillation. Consider any oscillations and vibrations, especially in mobile control cabinets.



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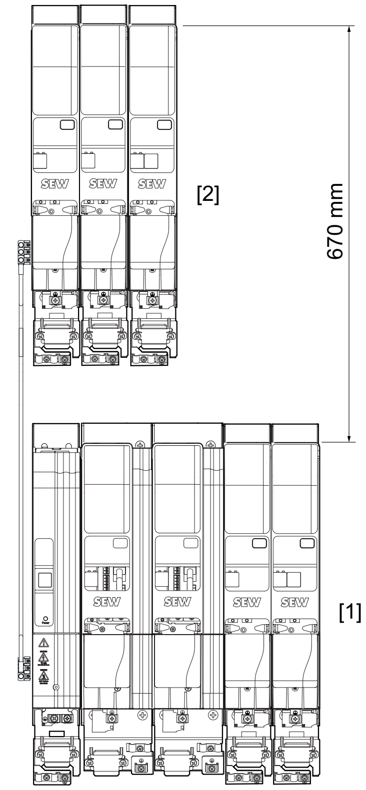
Connection to the DC link connection



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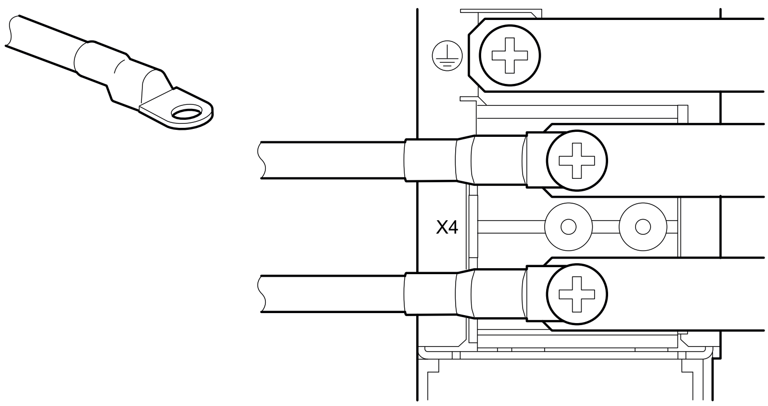
[1] Main row
[2] Auxiliary row

Connection main row and auxiliary row with DPC34A cable set

Use the DCP34A cable set for the connection of the main row and auxiliary row.

- The cables are connected to the DC link with cable lugs.



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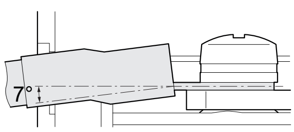
- The cable lugs must be bent down approx. 7°.



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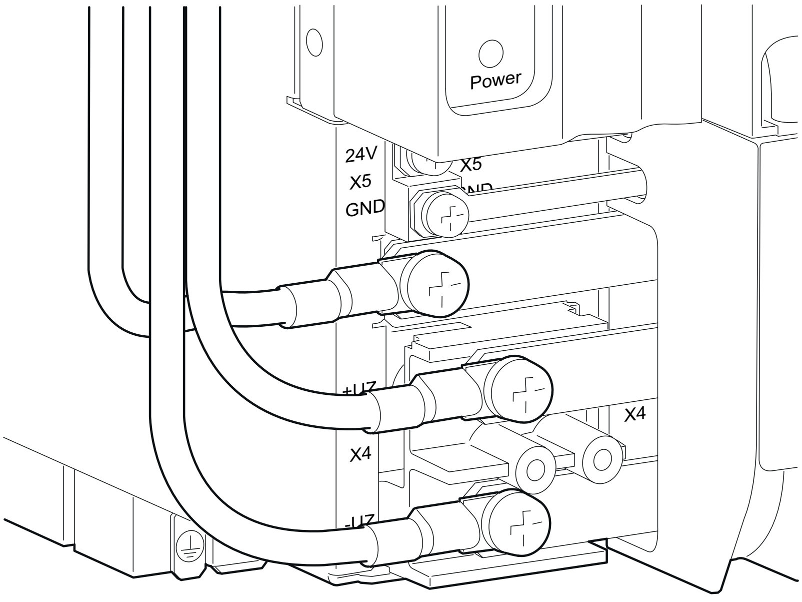

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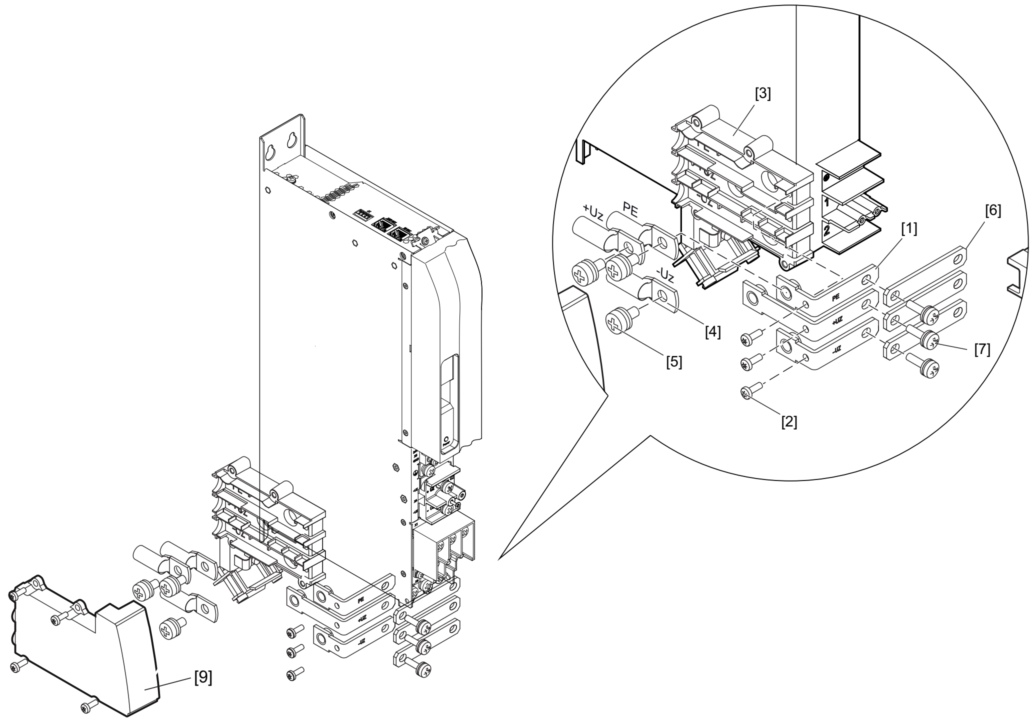
Connection main row and auxiliary row with DCP35A cable set and connection unit



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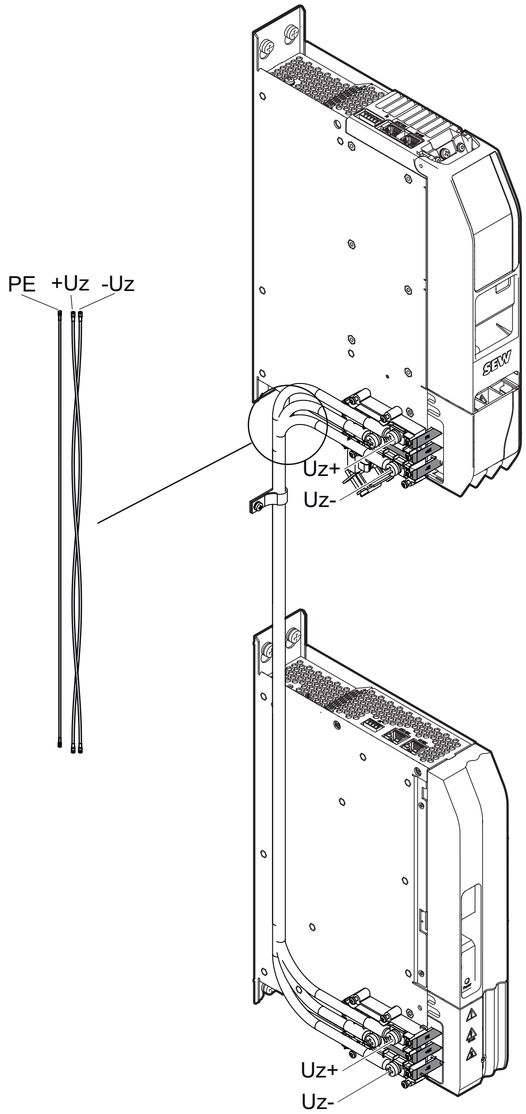
- Use the screws [2] to screw the 3 conductor rails [1] to the insulator [3]. The tightening torque is 2.5 – 3 Nm.

- The DC link connections U_z+ and U_z- must be twisted 3 times, see the following figure.



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- Use the screws [5] to screw the 3 prefabricated DC link connections [4] to the conductor rails [1]. The tightening torque is 3 – 4 Nm.

The steps described above must be performed at both insulators.

Mount the preinstalled insulators to the axis module as follows:

- Push the conductor rails [1] **under** the DC link bars [6] of the module and use the screws [7] to connect them.
- Re-install all covers.

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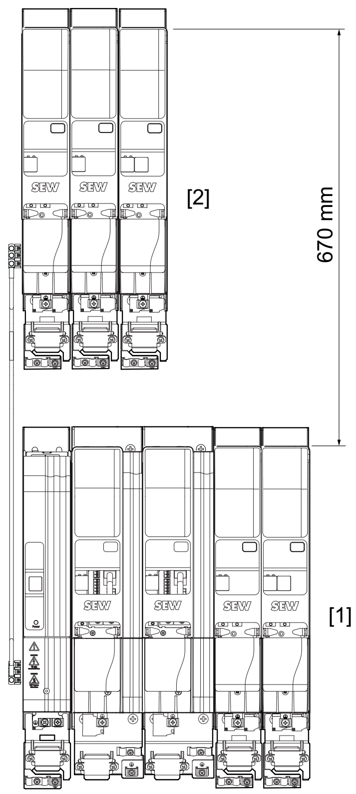
Cable sets and accessories

DCP34A cable set, part number: 28261631	
Cables	1× PVC conductor H07V-K, color: black, identification: Uz-
	1× PVC conductor H07V-K, color: black, identification: Uz+
	1× PVC conductor H07V-K, color: green/yellow, identification: PE
Cross section	16 mm²
Connection	Crimping cable lug M6
Length	Approx. 1150 mm
DCP35A cable set, part number: 28261658	
Cables	1× PVC conductor H07V-K, color: black, identification: Uz-
	1× PVC conductor H07V-K, color: black, identification: Uz+
	1× PVC conductor H07V-K, color: green/yellow, identification: PE
Cross section	35 mm²
Connection	Crimping cable lug M8
Length	Approx. 1000 mm
Connection units for:	
MDP90A-...	28261666
MDR92A-..	28261674

Maximum permitted distance of the module rows



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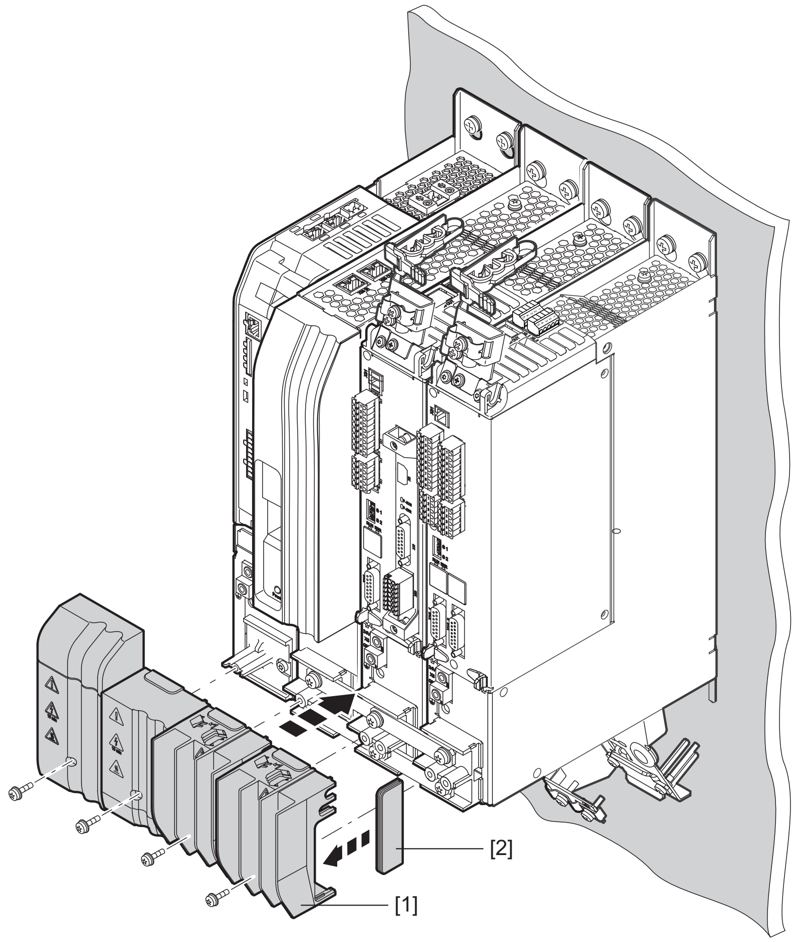
1 Main row
2 Auxiliary row

4.7.11 Installing touch guards and closing covers

All modules of the application inverter are equipped with touch guards [1] and the first and last modules of the axis system have closing covers [2]; see the following figure. If the axis system contains a master module, the closing cover [2] must be attached only to the final module in the axis system.

With master module



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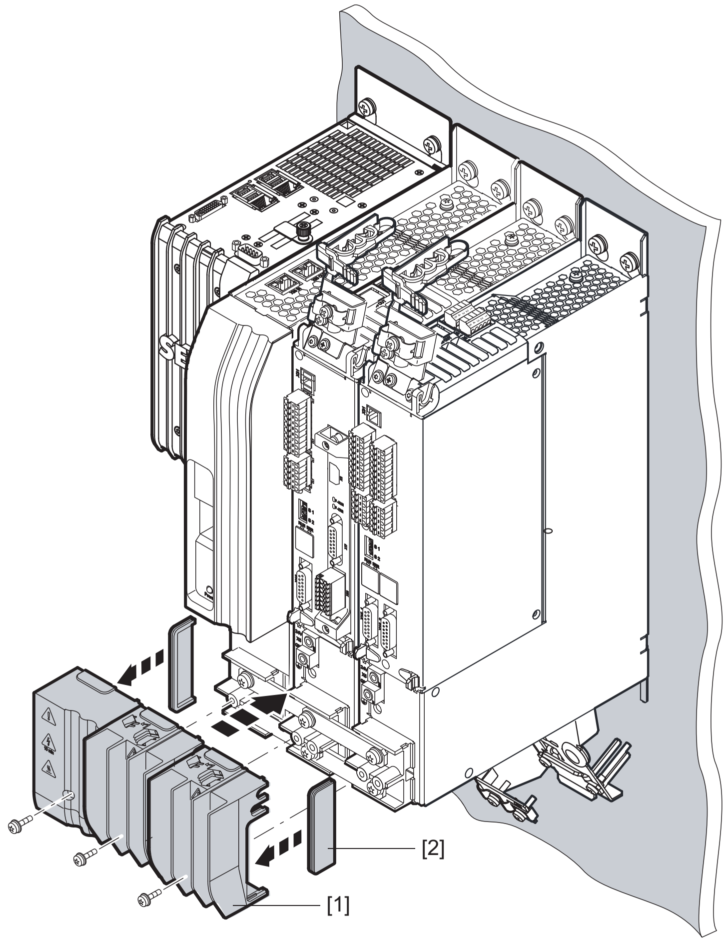
Without master module



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[1] Touch guard

[2] Closing cover

Install all touch guards [1] after installation work.

1. Insert the closing cover [2] into the touch guard [1].
2. Install the touch guard [1] on the respective module. Insert the screws and tighten them securely with the specified tightening torque.

Install one closing cover [2] each on the first and final modules of the axis system. The closing covers prevent any contact with the DC link. Two closing covers are included with each power supply module.

⚠ WARNING

Missing touch guards and closing covers

Severe or fatal injuries from electric shock

- Install all touch guards.
- Install closing covers on the first and final module in the axis system.

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4.7.12 Motor output

NOTICE

Connecting capacitive loads to an axis module.

Destruction of the axis module.

- Only connect ohmic/inductive loads (motors).
- Never connect capacitive loads.

4.7.13 Output brake chopper

NOTICE

Connecting capacitive or inductive loads to the power supply module.

Destruction of the power supply module.

- Only connect ohmic loads (braking resistors).
- Never connect capacitive or inductive loads.

4.7.14 Temperature evaluation of the motor

The temperature evaluation can be connected in 2 ways:

- The encoder cable includes the cables of the temperature evaluation.
- The temperature evaluation is connected via terminal X10.

⚠ WARNING

Dangerous contact voltages at the signal terminals of the application inverter when connecting the wrong temperature sensors.

Severe or fatal injuries from electric shock.

- Connect only temperature sensors with protective separation from the motor winding to the temperature evaluation. Otherwise, the requirements for protective separation are not met. Dangerous contact voltages may occur at the signal terminals of the application inverter via the signal electronics in case of an error.

4.7.15 Brake output

INFORMATION

- If the brake connection and the motor connection are combined in one power cable, the brake cable must be shielded separately. The shielding of the power cable and the brake cable must be connected to the motor and application inverter over a large area.
- SEW-EURODRIVE recommends to also use a shielded brake cable for separate brake cable routing.
- Note the different project planning criteria to determine the length of brake cable and motor cable.

4.7.16 Inputs/outputs

NOTICE

Damage to the digital inputs and digital outputs.

The digital inputs and digital outputs are not electrically isolated. Incorrectly applied voltages can damage the digital inputs and digital outputs.

- Do not apply external voltages to the digital outputs.
- The digital inputs and outputs are dimensioned according to IEC 61131-2.

- The cable length must not exceed 30 m.
- Cables outside the control cabinet must be shielded.

4.7.17 System bus EtherCAT®/SBusPLUS

For connecting the EtherCAT®/SBusPLUS system bus, SEW-EURODRIVE recommends using only prefabricated cables from SEW-EURODRIVE.

NOTICE

Use of wrong cables

Damage to the application inverter

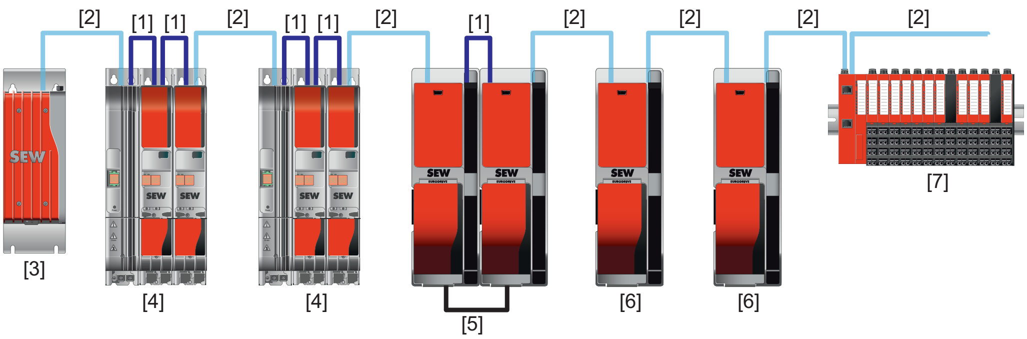
Only 4-pole cables are permitted to be used as system bus cables [2]. If an 8-pole cable is used, malfunctions or failures may occur at the connected devices.

INFORMATION

The mounting plates on which the axis systems are mounted must have a sufficiently large ground connection, e.g., a ground strap.

System bus and module bus cabling

Example of a system bus and module bus cabling



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[1] Module bus cable: EtherCAT®/SBusPLUS and internal signals, 8-pole, color: anthracite

[2] System bus cable: EtherCAT®/SBusPLUS, 4-pole, color: light gray

[3] MOVI-C® CONTROLLER power UHX85A

[4] MOVIDRIVE® modular

[5] MOVIDRIVE® system/technology with DC link connection

[6] MOVIDRIVE® system/technology

[7] Other EtherCAT® stations at the EtherCAT®/SBusPLUS

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Correct cabling

Module bus cable

In the case of MOVIDRIVE® modular, the 8-core module bus cable connects the power supply module to the first axis module and the axis modules to one another; see figure (→ 🗎 112).

In the case of MOVIDRIVE® modular, in addition to the system bus communication, the module bus is routed in the cable for information inside the device. The module bus cable is delivered in the length required as part of the accessories for the axis modules.

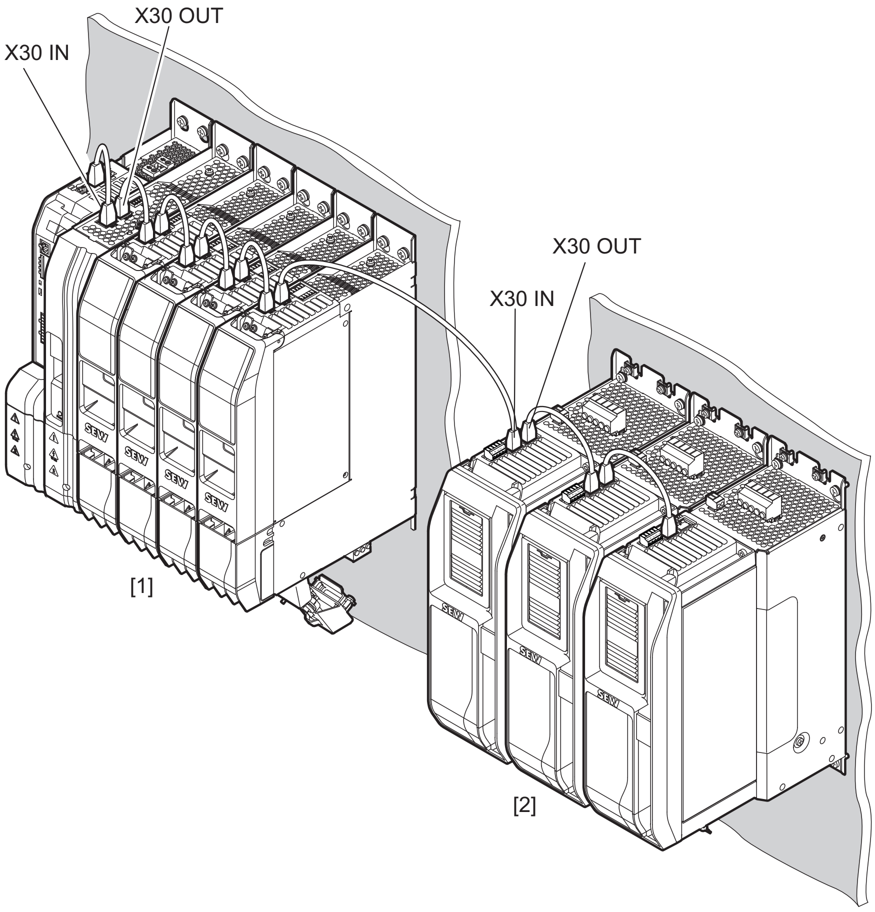
The connectors of the module bus cables are red and black to simplify correct attachment of the cables; see the following figure.

- The black connectors must be plugged into the bus input X30 IN.
- The red connectors must be plugged into the bus output X30 OUT.

System bus cable

The 4-pole system bus cable is used between automation components; see figure (→ 🗎 112). Some of these components are listed here as examples:

- MOVI-C® CONTROLLER
- MOVIDRIVE® modular/system application inverter
- PC with MOVISUITE® engineering software
- MOVI-PLC® I/O system
- Other EtherCAT® stations at the EtherCAT®/SBus^{PLUS}



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[1] MOVIDRIVE® modular   [2] MOVIDRIVE® system

4.7.18 Encoder

The encoder cable may include the cables of the temperature evaluation.

For information on the pin assignment, refer to chapter "Terminal assignment at MDA single-axis module" (→ 🗎 151).

⚠ WARNING

Dangerous contact voltages at the terminals of the application inverter when connecting the wrong temperature sensors.

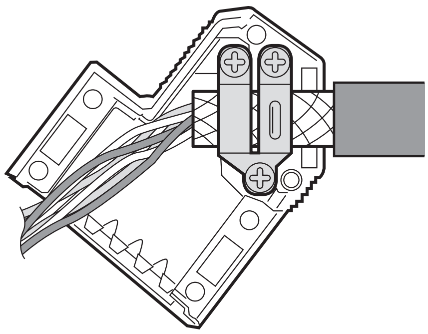
Severe or fatal injuries from electric shock.

- Connect only temperature sensors with protective separation from the motor winding to the temperature evaluation. Otherwise, the requirements for protective separation are not met. Dangerous contact voltages may occur at the terminals of the application inverter via the signal electronics in case of an fault.

Installation notes for encoder connection

Encoder cable

- Use shielded cables with twisted pair cores. Connect the shield over a wide area at both ends:
  – At the encoder in the cable gland or in the encoder plug,
  – At the application inverter in the housing of the D-sub connector.



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- Route the encoder cable separately from the power cables.
- Connect the shield on the inverter end in the housing of the D-sub connector over a large area.

On the encoder/resolver

- To ensure a flawless shield connection, an EMC screw fitting must be used for the cable entry of the signal line.
- For drives with a plug connector, connect the shield on the encoder plug.

Prefabricated cables

SEW-EURODRIVE offers prefabricated cables for connecting encoders. SEW-EURODRIVE recommends to use these prefabricated cables.

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Encoder connection/cable lengths

Connection/encoder	Cable length
HTL encoder ES7C and EG7C	300 m
Standard HTL encoder	200 m
Other encoders	100 m

INFORMATION

The maximum cable length might be reduced depending on the technical data of the respective encoder. Observe the manufacturer specifications.

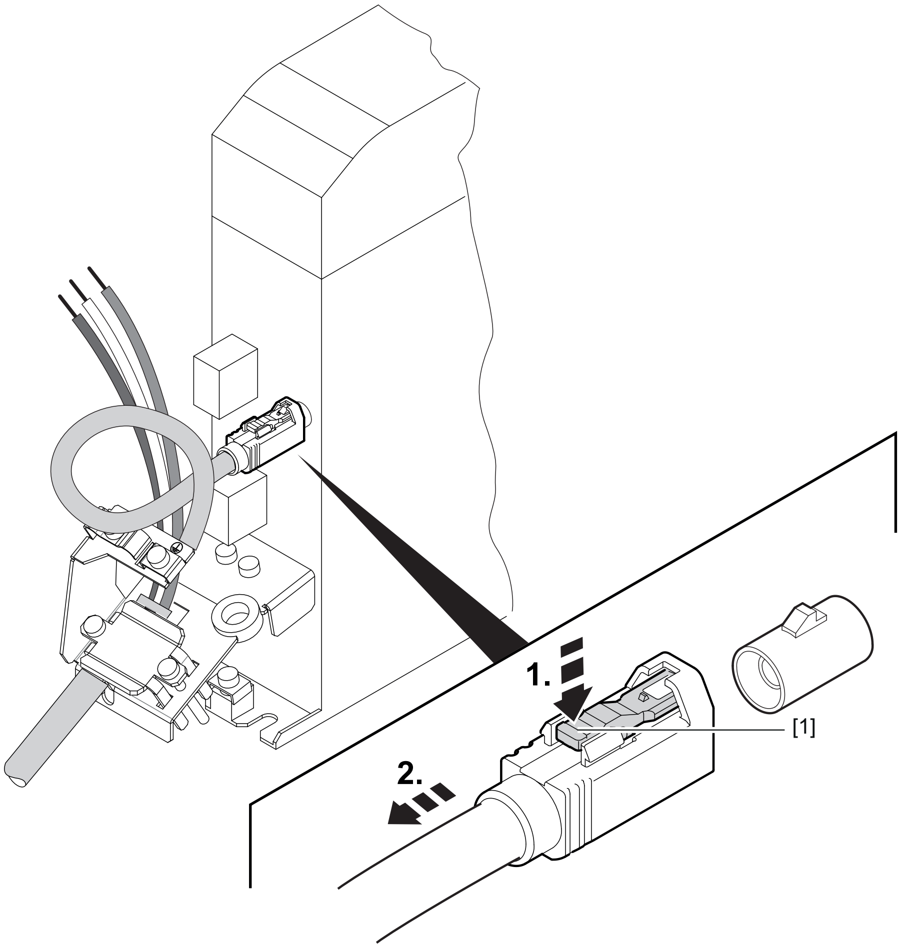
4.7.19 Notes on MOVILINK® DDI

INFORMATION

You must only remove the MOVILINK® DDI connector if the 24 V voltage supply is switched off or if standby operation is active.

Removing the connector

When removing the MOVILINK® DDI connector X16, note that the latch [1] at the connector must be pushed before removing the connector, see figure.



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Maximum line length

The maximum cable length for the coaxial cable is 200 m.

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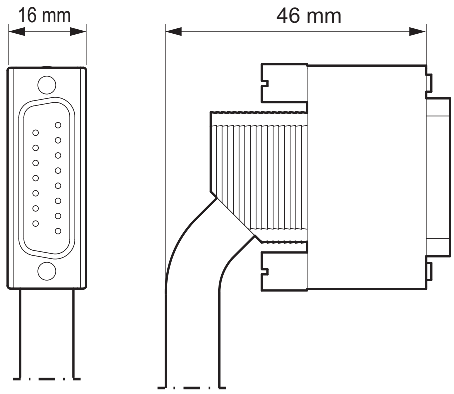
4.7.20 Self-assembled encoder cables

If self-assembled encoder cables are used, make sure to dimension the connector and the route the cable in a way that the safety cover of the application inverter can be closed.

The maximum permitted width of the connector is 16 mm.

The maximum permitted height of the connector up to the highest point of the cable routing is 46 mm.



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Minimum requirements for encoder cables

Make sure that self-assembled cables fulfill the following requirements:

- Cross section of voltage supply cable:
  - At least 0.25 mm^2 for cable lengths up to 50 m.
  - At least 0.5 mm^2 for cable lengths up to 100 m.
- Cross section of the signal wire:
  - At least 0.25 mm^2.
- Capacitance per unit length:
  - Maximum 70 pF/m – core/core.
  - Maximum 120 pF/m – core/shield.
- The cable must be shielded.
- Differential signals must be routed via twisted wires e.g. Data+ and Data-.

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4.8 Installing options and accessories

4.8.1 Installing a card

Observe the safety notes in chapter "Electrical installation" (→ 🗎 82).

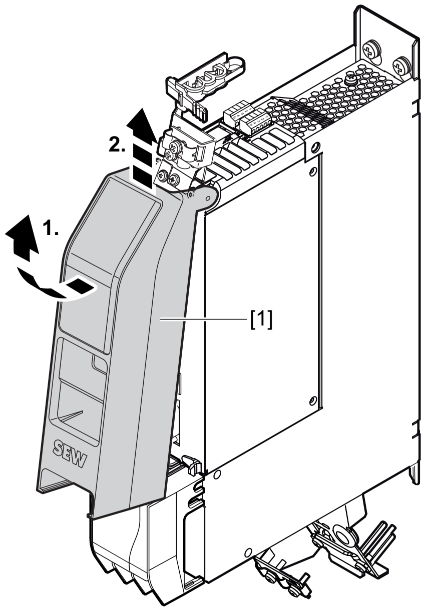
INFORMATION

Requirements for installation.

Cards can only be installed in axis modules suitable for option cards.

For information on which option card can be installed in which slot, refer to chapter "Card slots" (→ 🗎 51).

1. Disconnect the application inverter from the power supply. Disconnect the DC 24 V supply and the line voltage.
2. Ensure electrostatic discharge with suitable measures before starting the work. Suitable measures for equipotential bonding are e.g. the use of a discharge strap or wearing conductive shoes.
3. Remove the safety cover [1] from the front of the application inverter.



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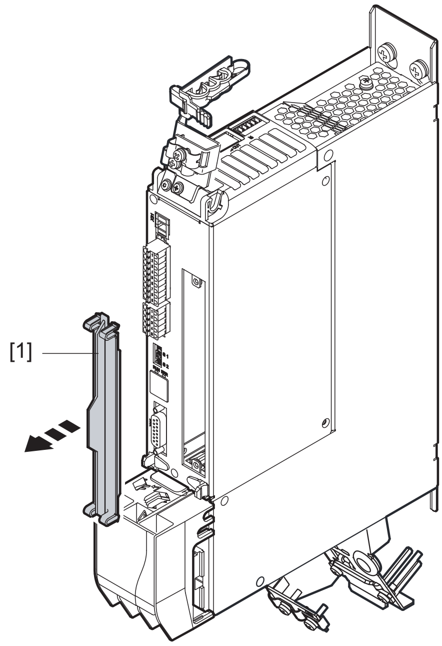
4. Remove the plastic cover [1] at the card slot.



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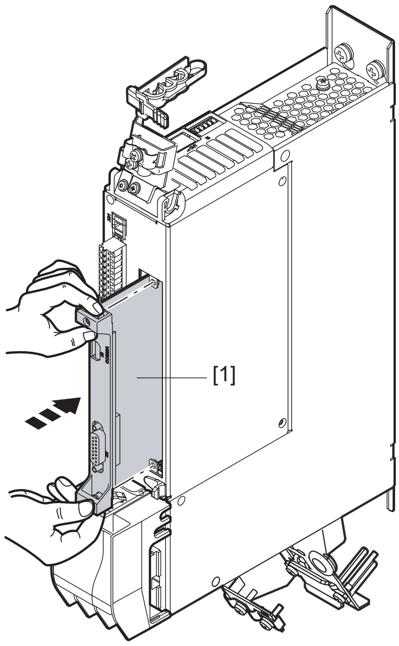
INFORMATION

Handling the card

Hold the card by its edges only.

5. Take the card [1] and insert it in the slot with slight pressure.



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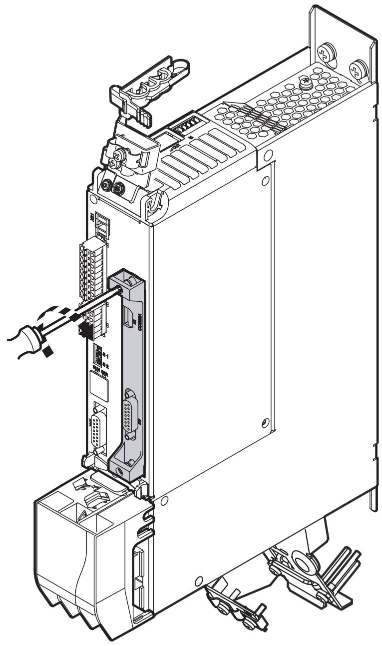
6. Screw in the card with the specified tightening torque (→ 🗎 57).



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7. Install the safety cover at the front of the application inverter.

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4.8.2 CIO21A and CID21A input/output card

INFORMATION

Technical data of the option cards

For technical data and a detailed description of the encoder interface, refer to chapter "Technical data of the option cards".

Voltage supply

The I/O cards are supplied by the basic unit via the 24 V voltage supply.

Short-circuit behavior of digital outputs

The digital outputs are short-circuit-proof.

As soon as the short circuit is remedied, the target output voltage is output, meaning the output does not switch off.

Short circuit behavior of analog outputs

The analog outputs are short-circuit-proof.

In the event of a short circuit, the output current is limited to a maximum value of 30 mA. The short circuit current is not pulsating.

As soon as the short circuit is remedied, the target output voltage is output, meaning the output does not switch off.

Connecting inductive loads at digital outputs

The digital outputs can switch inductive loads up to an energy content of maximum 500 mJ 10 times per seconds at the maximum without any additional measures. For larger energy contents an external protective element (freewheeling diode) is required.

Connecting 2 digital outputs in parallel

Connecting digital outputs in parallel is possible. The possible output current is doubled. Ensure identical parameterization of the digital outputs.

Cable lengths

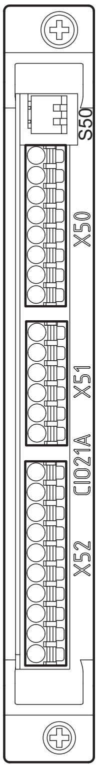
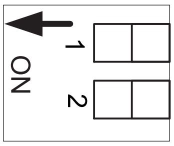
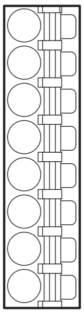
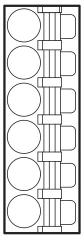
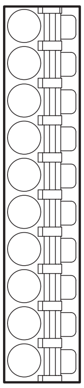
The maximum cable length of connections on the inputs and outputs is 30 m.

INFORMATION

Shielding the cables.

Cables outside the control cabinet must be shielded.

CIO21A terminal assignment

	Terminal		Connection	Short description
				S50/1 on: Current input active for AI2x S50/2 on: Current input active for AI3x S50/1 off[1]: Voltage input active for AI2x S50/2 off[1]: Voltage input active for AI3x
		X50:1	REF1	+10 V reference voltage output
		X50:2	AI21	Analog current and voltage input
		X50:3	AI22	Analog current and voltage input, reference for AI21
		X50:4	GND	Reference potential
		X50:5	AI31	Analog current and voltage input
		X50:6	AI32	Analog current and voltage input, reference for AI31
		X50:7	GND	Reference potential
		X50:8	REF2	-10 V reference voltage output
		X51:1	AOV2	Analog voltage output 1, freely programmable
		X51:2	AOC2	Analog current output 1, freely programmable
		X51:3	GND	Reference potential for the outputs AOV2 and AOC2
		X51:4	AOV3	Analog voltage output 2, freely programmable
		X51:5	AOC3	Analog current output 2, freely programmable
		X51:6	GND	Reference potential for the outputs AOV3 and AOC3
		X52:1	DI10	Digital input 1, freely programmable
		X52:2	DI11	Digital input 2, freely programmable
		X52:3	DI12	Digital input 3, freely programmable
		X52:4	DI13	Digital input 4, freely programmable
		X52:5	GND	Reference potential for the digital inputs DI10 – DI13
		X52:6	DO10	Digital output 1, freely programmable
		X52:7	DO11	Digital output 2, freely programmable
		X52:8	DO12	Digital output 3, freely programmable
		X52:9	DO13	Digital output 4, freely programmable
		X52:10	GND	Reference potential for the digital outputs DO10 – DO13

1) Delivery state

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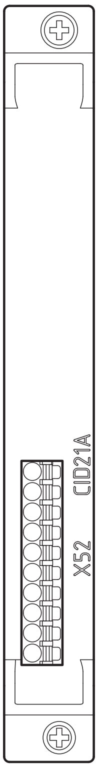
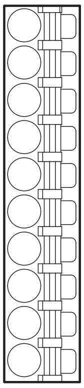
CID21A terminal assignment

	Terminal		Connec-tion	Short description
		X52:1	DI10	Digital input 1, freely programmable
		X52:2	DI11	Digital input 2, freely programmable
		X52:3	DI12	Digital input 3, freely programmable
		X52:4	DI13	Digital input 4, freely programmable
		X52:5	GND	Reference potential for the digital inputs DI10 – DI13
		X52:6	DO10	Digital output 1, freely programmable
		X52:7	DO11	Digital output 2, freely programmable
		X52:8	DO12	Digital output 3, freely programmable
		X52:9	DO13	Digital output 4, freely programmable
		X52:10	GND	Reference potential for the digital outputs DO10 – DO13

4.8.3 CES11A multi-encoder card

INFORMATION

Technical data of the cards

For technical data and a detailed description of the encoder interface, refer to the chapter "Technical data of the cards".

Overview of functions

The CES11A multi-encoder card expands the functionality of the application inverter in a way that an additional encoder can be evaluated. The encoder connected to the CES11A multi-encoder card can be used as motor encoder or external encoder.

Supported encoder types

The following encoder types can be evaluated by the CES11A multi-encoder card:

HTL 12/24 V (differential)
TTL (differential)
RS422
sin/cos 1 V_{SS} (differential)
HIPERFACE® with sin/cos signals 1 V_{SS}
SEW encoder (RS485) with sin/cos signals 1 V_{SS}, e.g. AS7W, AG7W
EnDat 2.1 with sin/cos signals 1 V_{SS}
SSI encoder with/without sin/cos signals 1 V_{SS}
CANopen encoder

Encoder connection/cable lengths

Connection/encoder	Cable length
HTL encoder ES7C and EG7C	300 m
Standard HTL encoder	200 m
Other encoders	100 m

INFORMATION

The maximum cable length might be reduced depending on the technical data of the respective encoder. Observe the manufacturer specifications.

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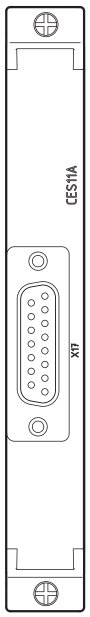
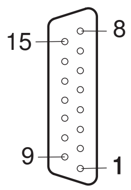
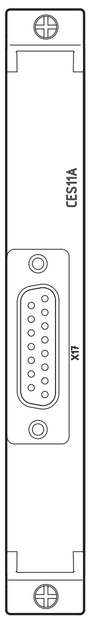
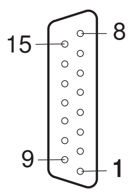
Terminal assignment of TTL, HTL, sin/cos encoder

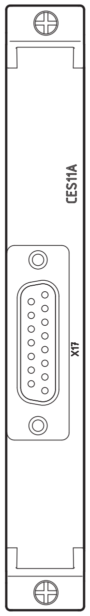
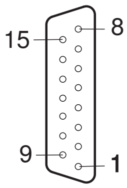
Card	Terminal		Connection	Brief description
		X17:1	A (cos+) (K1)	Signal track A (cos+) (K1)
		X17:2	B (sin+) (K2)	Signal track B (sin+) (K2)
		X17:3	C	Signal track C (K0)
		X17:4	DATA+[1)]	Data cable for electronic nameplate
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	$\overline{A}$ (cos-) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
		X17:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
		X17:11	$\overline{C}$	Negated signal track $\overline{C}$ ($\overline{K0}$)
		X17:12	DATA-[1)]	Data cable for electronic nameplate
		X17:13	U_{S24VG}	Encoder supply 24 V
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	U_{S12VG}	Encoder supply 12 V

1) For encoders from SEW-EURODRIVE with electronic nameplate of type E.7S

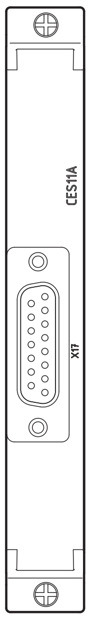
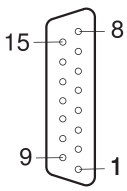
Terminal assignment HIPERFACE® and SEW-EURODRIVE encoder (RS485)

Card	Terminal		Connection	Brief description
		X17:1	A (cos+) (K1)	Signal track A (cos+) (K1)
		X17:2	B (sin+) (K2)	Signal track B (sin+) (K2)
		X17:3	Reserved	–
		X17:4	DATA+	Data line
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	$\overline{A}$ (cos-) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
		X17:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
		X17:11	Reserved	–
		X17:12	DATA-	Data line
		X17:13	U_{S24VG}	Encoder supply 24 V
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	U_{S12VG}	Encoder supply 12 V

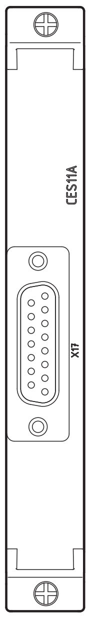
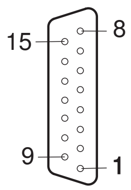
Terminal assignment EnDat encoder

Card	Terminal		Connection	Brief description
		X17:1	A (cos+)	Signal track A (cos+)
		X17:2	B (sin+)	Signal track B (sin+)
		X17:3	PULSE+	Clock signal
		X17:4	DATA+	Data line
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	$\overline{A}$ (cos-)	Negated signal track $\overline{A}$ (cos-)
		X17:10	$\overline{B}$ (sin-)	Negated signal track $\overline{B}$ (sin-)
		X17:11	PULSE-	Clock signal
		X17:12	DATA-	Data line
		X17:13	U_{S24VG}	Encoder supply 24 V
		X17:14	+TEMP_M	–
		X17:15	U_{S12VG}	Encoder supply 12 V

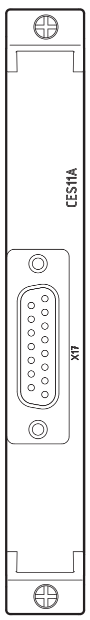
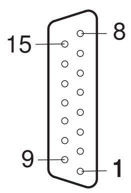
Terminal assignment SSI encoder

Card	Terminal		Connection	Brief description
		X17:1	Reserved	–
		X17:2	Reserved	–
		X17:3	PULSE+	Clock signal
		X17:4	DATA+	Data line RS485
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	Reserved	–
		X17:10	Reserved	–
		X17:11	PULSE-	Clock signal
		X17:12	DATA-	Data line
		X17:13	V_{S24VG}	24 V encoder supply
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	V_{S12VG}	12 V encoder supply

Terminal assignment SSI and sin/cos combination encoders

Card	Terminal		Connection	Brief description
		X17:1	A (cos+)	Signal track A (cos+)
		X17:2	B (sin+)	Signal track B (sin+)
		X17:3	PULSE+	Clock signal
		X17:4	DATA+	Data line
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	$\overline{A}$ (cos-)	Negated signal track $\overline{A}$ (cos-)
		X17:10	$\overline{B}$ (sin-)	Negated signal track $\overline{B}$ (sin-)
		X17:11	PULSE-	Clock signal
		X17:12	DATA-	Data line
		X17:13	U_{S24VG}	Encoder supply 24 V
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	U_{S12VG}	Encoder supply 12 V

Terminal assignment CANopen encoder

Card	Terminal		Connection	Brief description
		X17:1	Reserved	–
		X17:2	Reserved	–
		X17:3	Reserved	–
		X17:4	CAN_H	CAN high data cable
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	Reserved	–
		X17:10	Reserved	–
		X17:11	Reserved	–
		X17:12	CAN_L	CAN low data cable
		X17:13	V_{S24VG}	24 V encoder supply
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	V_{S12VG}	12 V encoder supply

4.8.4 Safety cards CS..A

For detailed information on the safety card CS..A, refer to the manual "MOVISAFE® CS..A safety card".

4.9 Braking resistors

The supply cables to the braking resistors carry a high pulsed DC voltage during nominal operation.

⚠ DANGER

Dangerous pulsed DC voltage of up to 970 V.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the application inverter from the power supply and wait 10 minutes before working on a braking resistor or its supply cables.
- Never operate the application inverter without touch guards and installed closing covers.

Braking resistors become very hot during operation.

⚠ WARNING

The surfaces of the braking resistors will reach temperatures of up to 250 °C when the braking resistors are loaded with the nominal power.

Severe burns.

To prevent burns:

- Do not touch any hot braking resistor.
- Select a suitable installation location for the braking resistors such as the control cabinet roof.

4.9.1 Permitted installation of braking resistors

The surfaces of the resistors become very hot if loaded with nominal power. Make sure that you select an installation site that will accommodate these high temperatures. For this reason, braking resistors are usually mounted on the control cabinet roof.

NOTICE

Braking resistors overheat.

Non-permissible installation might lead to an accumulation of heat in the braking resistor due to reduced convection. A tripping temperature contact or an overheated braking resistor can lead to a system standstill.

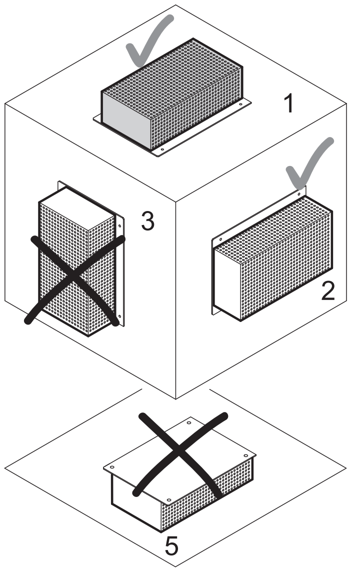
Adhere to the following minimum clearances:

- 200 mm to adjacent components and walls

- 300 mm to above components/ceilings

Observe the following permitted mounting positions when installing the resistors:

- Grid resistor



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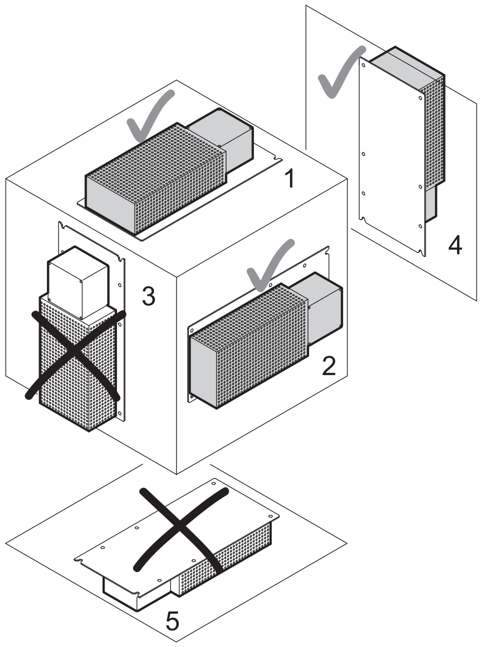
The brake resistor BW003-420-T may be used only in position 1.

- Wire resistor



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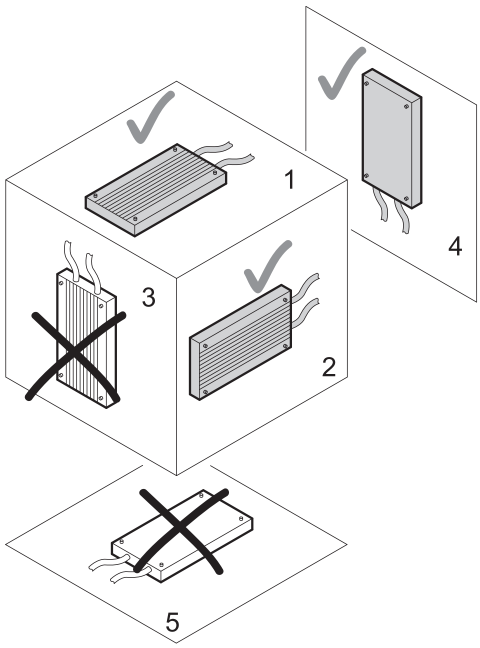
- Flat type resistor



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4.9.2 Thermal protection with flat-type resistors

In the documented assignment of inverter and flat-type resistor, flat-type resistors have a thermal protection (non-replaceable fuse) that interrupts the current circuit in the event of overload.

4.9.3 Protection against thermal overload of the braking resistor

INFORMATION

Guards for power supply modules with a nominal power of 50 kW and 75 kW

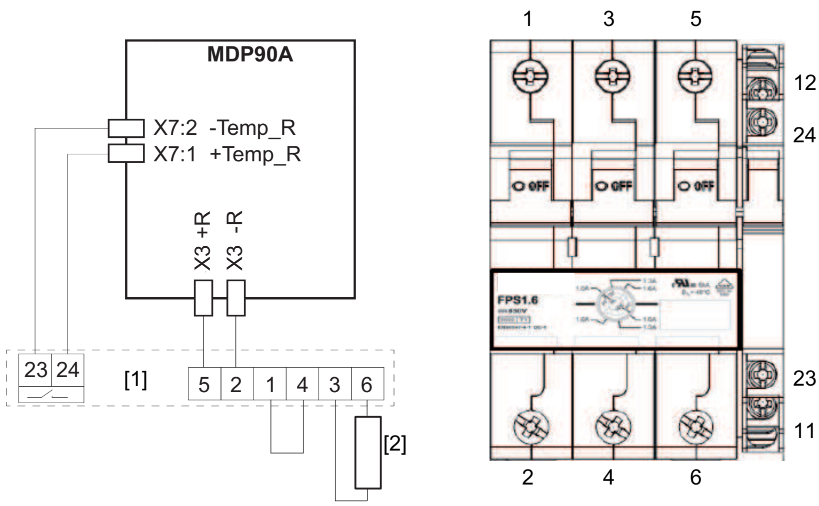
It is not permitted to separate the connection between power supply module and braking resistor. Guards, such as fuses or miniature circuit breakers are not permitted.

External thermal circuit breaker TCB

Power supply module MDP90A 10 kW, 25 kW, 110 kW

If an external TCB thermal circuit breaker is used, the following connection applies.

Connection



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[1] TCB thermal circuit breaker

[2] Braking resistor

INFORMATION

The polarity of the connections 5 (+R) and 2 (-R) must be strictly adhered to during connection of the TCB circuit breaker to the inverter.

- If the thermal circuit breaker trips, the signal contact is set (23-24 connection is opened) and evaluated in the power supply module.
- The connection between power supply module and braking resistor is disconnected.
- This does not require a response by the PLC.
- It is not required to disconnect the supply system connection with an external switching device.
- If the thermal circuit breaker trips, the power supply module switches all axis modules to "Output stage inhibited".

- Set the control knob of the thermal circuit breaker TCB to the tripping current I_F of the connected braking resistor. Set the scaling 40 °C.
- After all cables are connected, the 3 upper screw holes must be covered with 3 touch guard caps. The touch guard caps are included in the delivery.

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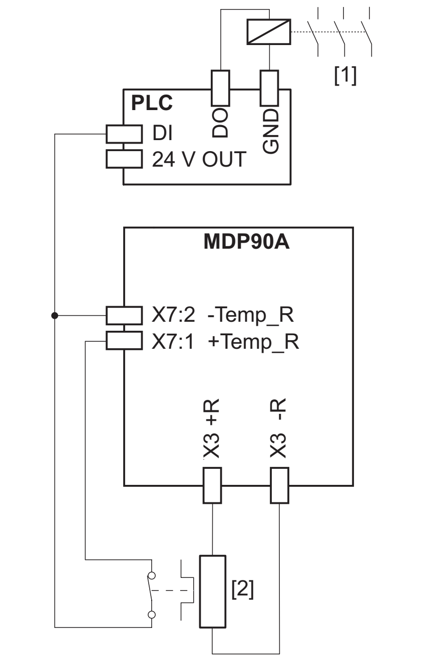
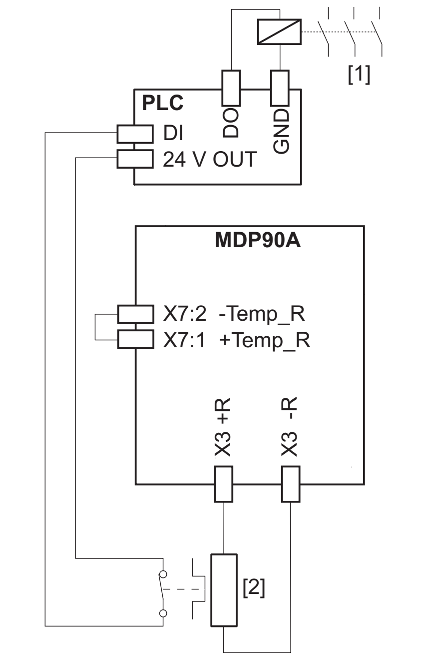
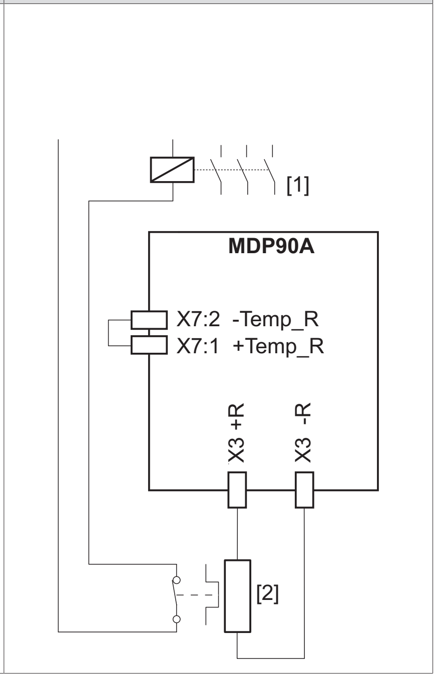
Internal temperature switch -T

MDP90A-0100-.. power supply module

If an BW...-T braking resistor with internal temperature switch is used with a 10 kW power supply module, there are 3 possible connections.

Connection 1	Connection 2	Connection 3
		

[1] Line contactor

[2] Braking resistor

Note that the reference potential GND of the digital input control must be the same as the reference potential of the application inverter when connection 1 is used.

- Connection 1
  - If the thermal circuit breaker trips, the signal in the power supply module and in the PLC is evaluated.
  - If the thermal circuit breaker trips, the PLC must interrupt the power supply.
  - If the thermal circuit breaker trips, the power supply module switches all axis modules to "Output stage inhibited".
- Connection 2
  - If the thermal circuit breaker trips, the signal is evaluated only in the PLC.
  - If the thermal circuit breaker trips, the PLC must interrupt the power supply.
  - If the thermal circuit breaker trips, there is no response in the power supply module and the axis modules.
  - With connection 2, it is possible that the PLC finishes the current travel cycle although the thermal circuit breaker has tripped. Only then is the power supply disconnected. In this case, the residual braking energy $W_{Rest} = P_{BRnom} \times 20$ s must not be exceeded.
- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.
  - This does not require a response by the PLC.

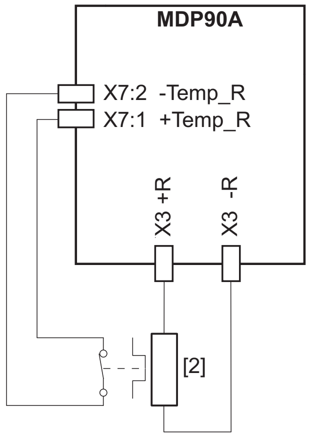
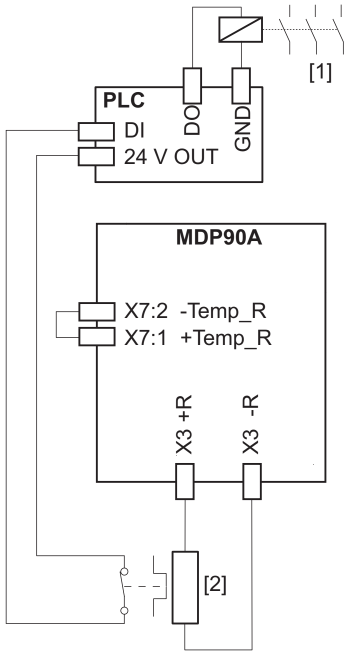
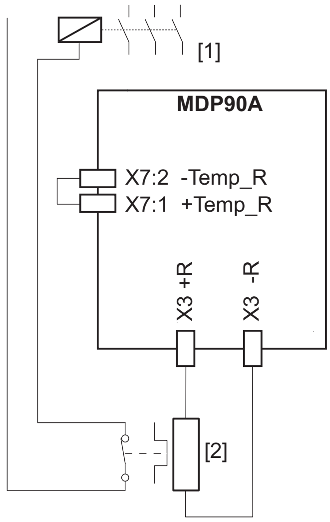
– If the thermal circuit breaker trips, there is no response in the power supply module and the axis modules.

INFORMATION

The braking resistor integrated in the MDP90A-0100-...-C00 power supply module is protected by the thermal protection.

MDP90A-0250, 0500, 0750, 1100 power supply module

If an BW...-T braking resistor with internal temperature switch is used with a 25 – 110 kW power supply module, there are 3 possible connections.

Connection 1	Connection 2	Connection 3
		

[1] Line contactor

[2] Braking resistor

- Connection 1
  - If the thermal circuit breaker trips, the signal in the power supply module is evaluated.
  - This does not require a response by the PLC.
  - It is not required to disconnect the supply system connection with an external switching device.
  - If the thermal circuit breaker trips, the power supply module switches all axis modules to "Output stage inhibited".
- Connection 2
  - If the thermal circuit breaker trips, the signal is evaluated only in the PLC.
  - If the thermal circuit breaker trips, the PLC must interrupt the power supply.
  - If the thermal circuit breaker trips, there is no response in the power supply module and the axis modules.
  - With connection 2, it is possible that the PLC finishes the current travel cycle although the thermal circuit breaker has tripped. Only then is the power supply disconnected. In this case, the residual braking energy $W_{Rest} = P_{BRnom} \times 20$ s must not be exceeded.
- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.
  - This does not require a response by the PLC.

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– If the thermal circuit breaker trips, there is no direct response in the application inverter.

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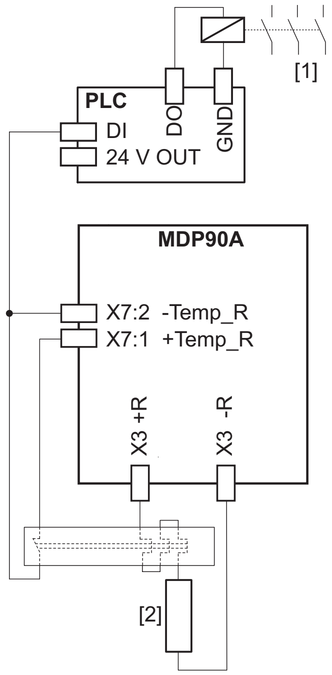
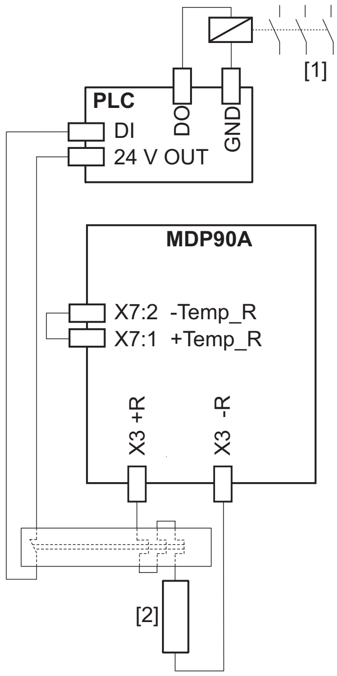
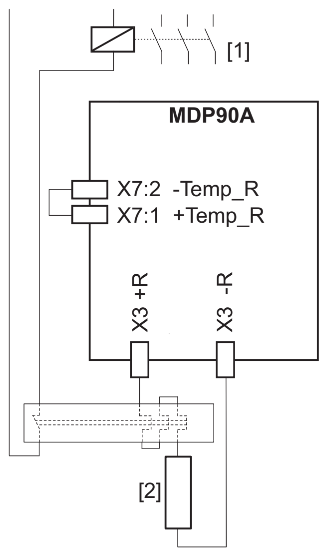
External bimetallic relay

MDP90A-0100-.. power supply module

If an external bimetallic relay is used with a 10 kW power supply module, there are 3 possible connections.

Connection 1	Connection 2	Connection 3
		

[1] Line contactor

[2] Braking resistor

Note that the reference potential GND of the digital input control must be the same as the reference potential of the application inverter when connection 1 is used.

- Connection 1
  - If the thermal circuit breaker trips, the signal in the power supply module and in the PLC is evaluated.
  - If the thermal circuit breaker trips, the PLC must interrupt the power supply.
  - If the thermal circuit breaker trips, the power supply module switches all axis modules to "Output stage inhibited".
- Connection 2
  - If the thermal circuit breaker trips, the signal is evaluated only in the PLC.
  - If the thermal circuit breaker trips, the PLC must interrupt the power supply.
  - If the thermal circuit breaker trips, there is no response in the power supply module and the axis modules.
  - With connection 2, it is possible that the PLC finishes the current travel cycle although the thermal circuit breaker has tripped. Only then is the power supply disconnected. In this case, the residual braking energy $W_{Rest} = P_{BRnom} \times 20$ s must not be exceeded.
- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.

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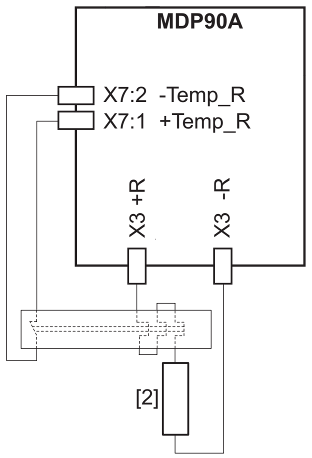
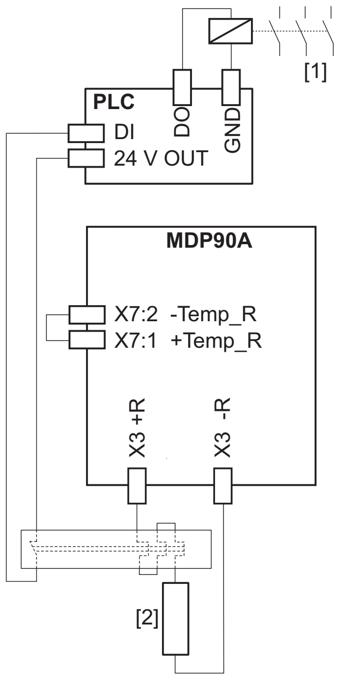
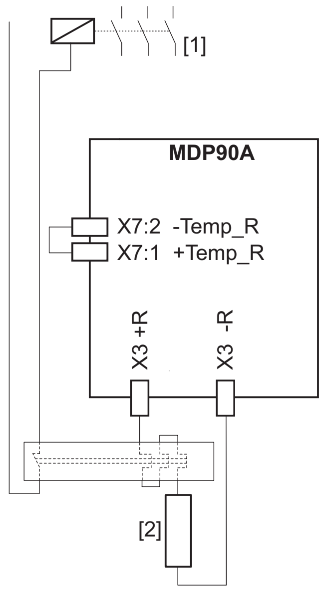
- This does not require a response by the PLC.
- If the thermal circuit breaker trips, there is no response in the power supply module and the axis modules.

MDP90A-0250, 0500, 0750, 1100 power supply module

If an external bimetallic relay is used with a 25 – 110 kW power supply module, there are 3 possible connections.

Connection 1	Connection 2	Connection 3
		

[1] Line contactor

[2] Braking resistor

- Connection 1
  - If the thermal circuit breaker trips, the signal in the power supply module is evaluated.
  - This does not require a response by the PLC.
  - It is not required to disconnect the supply system connection with an external switching device.
  - If the thermal circuit breaker trips, the power supply module switches all axis modules to "Output stage inhibited".
- Connection 2
  - If the thermal circuit breaker trips, the signal is evaluated only in the PLC.
  - If the thermal circuit breaker trips, the PLC must interrupt the power supply.
  - If the thermal circuit breaker trips, there is no response in the power supply module and the axis modules.
  - With connection 2, it is possible that the PLC finishes the current travel cycle although the thermal circuit breaker has tripped. Only then is the power supply disconnected. In this case, the residual braking energy $W_{Rest} = P_{BRnom} \times 20$ s must not be exceeded.
- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.
  - This does not require a response by the PLC.

– If the thermal circuit breaker trips, there is no direct response in the application inverter.

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4.10 Line choke

Install the line choke close to the application inverter but outside the minimum clearance for cooling. The line choke must not be heated by the exhaust air of the application inverter.

- Install the line choke before the line filter.
- The connection cable between line choke and line filter does not have to be shielded.
- Limit the length of the cable between the line choke and the line filter to the absolute minimum needed.

4.11 Line filter

- Install the line filter close to the power supply module/inverter but outside the minimum clearance for cooling. The line filter must not be heated by the exhaust air of the power supply module/inverter.
- Do not wire any other consumers between the line filter and the power supply module/inverter.
- The connection cable between line filter and power supply module/inverter does not have to be shielded.
- Limit the length of the cable between the line filter and the power supply module/inverter to the absolute minimum needed.
- Do not switch between the line filter and power supply module/inverter.

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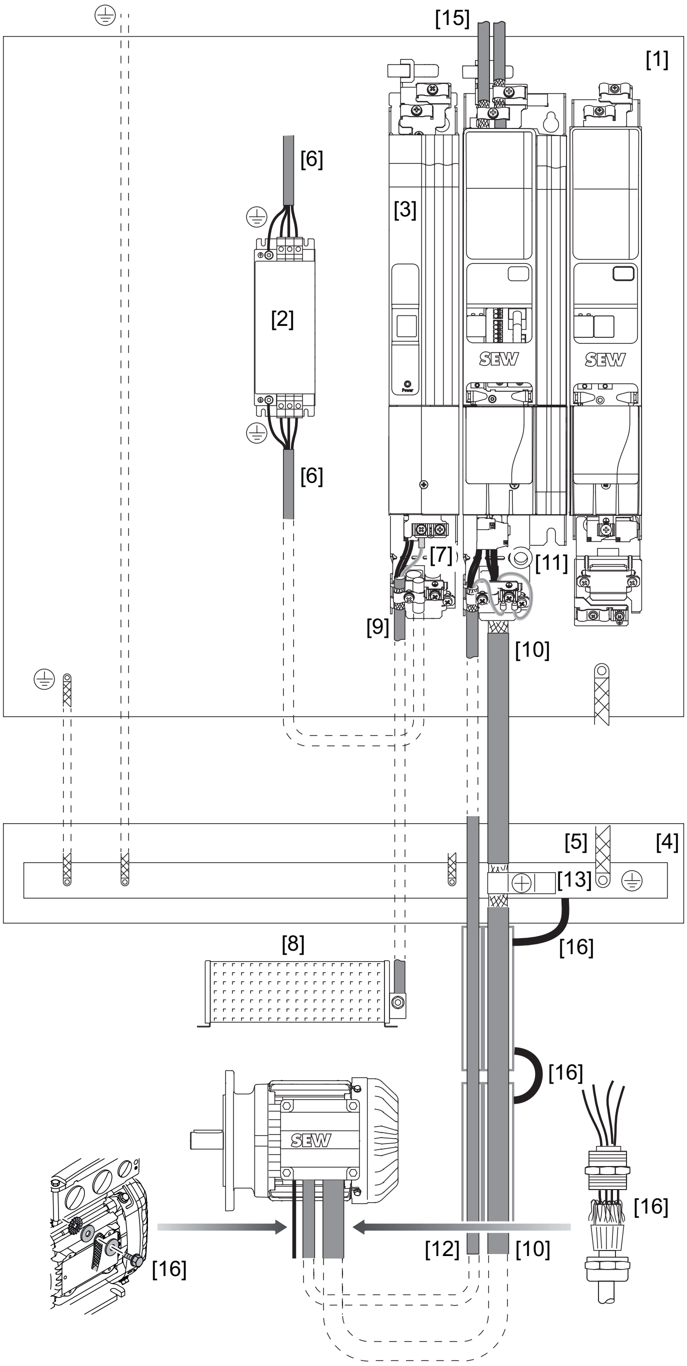
4.12 EMC-compliant installation



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[1] Zinc-coated mounting plate
[2] Line filter
[3] MDP power supply module
[4] PE busbar
[5] HF connection of PE busbar/mounting plate
[6] Supply system cable
[7] Power shield plate at the power supply module
[8] Braking resistor
[9] Braking resistor performance
[10] Motor cable
[11] Power shield plate at the axis module
[12] Brake cable
[13] Grounding clamp
[15] Electronics shield plate
[16] HF connection

The information in this chapter will help you to optimize the system in regard of electromagnetic compatibility, or to eliminate already existing EMC interferences.

The notes in this chapter are not legal regulations; they are merely recommendations for improving the electromagnetic compatibility of your plant.

For further notes on EMC-compliant installation, refer to the publication Drive Engineering – Practical Implementation, edition "EMC in Drive Engineering – Basic Theoretical Principles – EMC-Compliant Installation in Practice".

4.12.1 Control cabinet

Use control cabinets with electrically conductive (galvanized) mounting plates. If several mounting plates are used, connect them in such a way that they are conductive over a large area.

Mount the line filter and inverter on a shared mounting plate if possible. Make sure they are connected over a large area and with good conductivity.

4.12.2 HF equipotential bonding in the system

Make sure that there is a suitable equipotential bonding between the system, the control cabinet, the machine structure, the cable ducts, and the drives.

Connect the individual sections together in an HF-capable manner.

From an electrical safety perspective, the PE busbar is the star point. The PE connection does not replace either the HF grounding or the shielding.

In terms of EMC, it is advantageous if the mounting plate is used as a star point with respect to HF equipotential bonding.

Perform the following measures for a suitable HF equipotential bonding:

- Connect the PE busbar to the mounting plate in an HF-compatible manner.
- Connect the sheet metal cable ducts to the control cabinet in an HF-compatible manner.
- Connect the cable ducts to the mounting plate in the control cabinet using an HF braid.
- Connect the parts of the sheet metal cable ducts together in an HF-compatible manner.
- Connect the sheet metal cable ducts to the gearmotor in an HF-compatible manner.

4.12.3 Cable installation

Route the power cables, such as the motor cable and the brake cable, separately from the supply system cable and the control cables.

Route all cables as closely to the reference potential as possible, e.g. the mounting plate.

Keep all cables as short as possible. Avoid spare loops.

4.12.4 Supply system cable connection

The supply system cable can be connected to the line choke and/or line filter using twisted unshielded single conductors or using unshielded cables.

If necessary, shielded cables may improve EMC.

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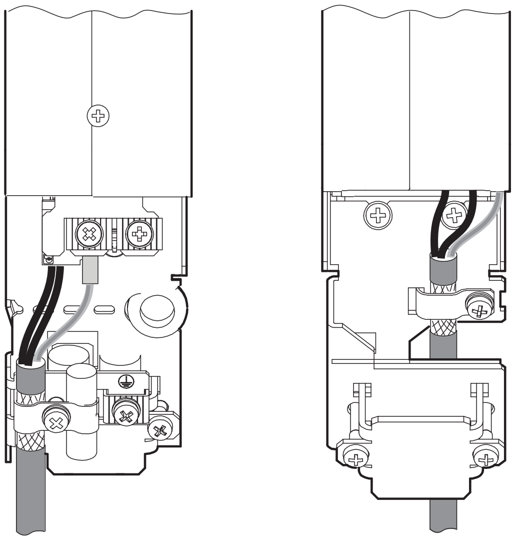
4.12.5 Line filter connection

Limit the length of the connection lead between the line filter and the inverter to the absolute minimum needed.

You must never route filtered and unfiltered cables together. For this reason, route incoming and outgoing line filter cables separately.

4.12.6 Braking resistor connection

For connecting braking resistors, use 2 closely twisted conductors or a shielded power cable. Connect the braided shields of shielded cables over the entire circumference. Use the designated shield plates at the basic device to connect the shield.



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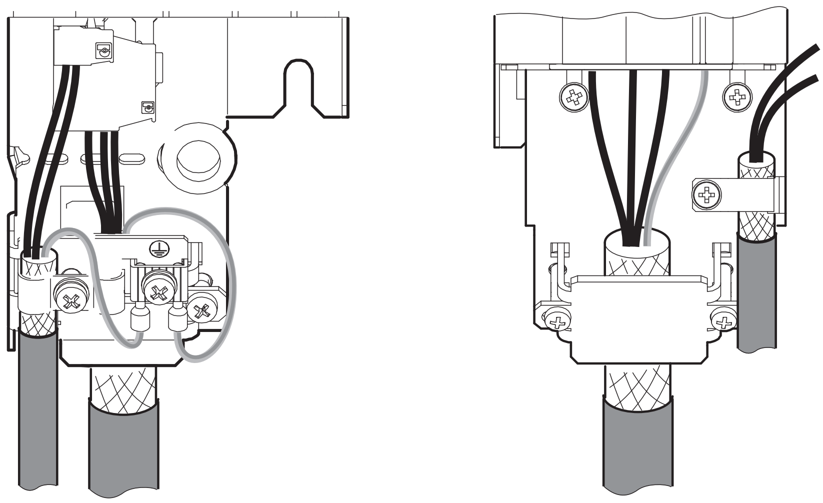
4.12.7 Motor and brake connection

Only use shielded motor cables. Connect the braided shield of the motor cable at both ends over its entire circumference to the power shield plate at the inverter.

Shielded cables must be selected for the brake supply. The shield of the brake cable can be connected to the power shield plate at the inverter.

In case motor cable and brake cable are combined in a shared cable, the cable must have an inner shield separating the brake cable from the motor conductors. The cables also possess an overall shield.



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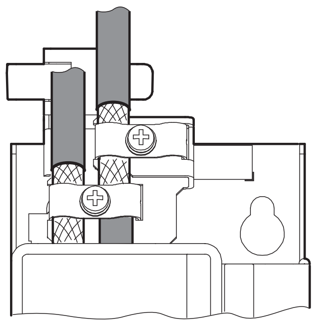
SEW-EURODRIVE recommends to use prefabricated cables.

In case of especially high requirements, an additional connection point for the shield is recommended. To limit the emitted interference the motor shield can additionally be grounded to the control cabinet outlet using commercial installation materials (grounding clamps or EMC screw fittings).

4.12.8 Control cable connection

The digital inputs can be connected using an unshielded single conductor. Shielded cables increase the EMC. Use the designated shield plates to connect the shield.

For routing outside of the control cabinet shielded cables must be used.



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4.12.9 Encoder connection

SEW-EURODRIVE recommends the use of prefabricated encoder cables.

The shield of prefabricated cables from SEW-EURODRIVE is connected via the connector.

4.12.10 Shielding connection

Ensure that there is an HF-compatible shield connection, e.g. by using grounding clamps or EMC cable glands, so that the braided shield has a large connection surface.

4.13 Terminal assignment

INFORMATION

Reference potentials inside the device:

The device internal reference potential is designated as GND in the following table.

All reference potentials GND are internally connected to PE.

INFORMATION

The assignment "reserved" means that no cable must be connected to this connection.

INFORMATION

The technical data for the connection of power electronics and control electronics are listed in chapter Technical Data.

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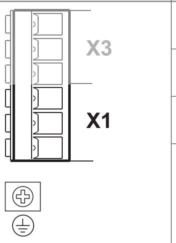
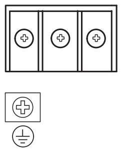
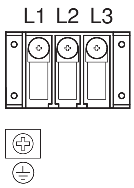
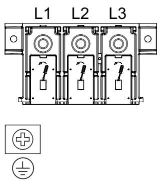
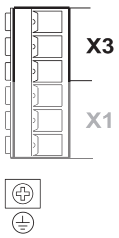
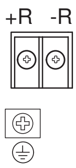
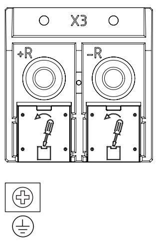
4.13.1 Terminal assignment at MDP power supply module

Representation	Terminal	Connection	Brief description
	X1:L1	L1	Line connection MDP90A-0100-.. (size 1)
	X1:L2	L2	
	X1:L3	L3	
	⏚	PE	PE connection
	X1:L1	L1	Line connection MDP90A-0250-.. (size 2)
	X1:L2	L2	
	X1:L3	L3	
	⏚	PE	PE connection
	X1:1	L1	Line connection MDP90A-0500 – 0750-.. (size 3)
	X1:2	L2	
	X1:3	L3	
	⏚	PE	PE connection
	X1:1	L1	Line connection MDP90A-1100-.. (size 4)
	X1:2	L2	
	X1:3	L3	
	⏚	PE	PE connection
	X3:+R	+R	Braking resistor connection MDP90A-0100-.. (size 1)
	X3:-R	-R	
	X3:R_i	R_i	Reserved with size 1 as no R_i available
			Connection of internal braking resistor to MDP..C00 (R_i)
	⏚	PE	PE connection
	X3:+R	+R	Braking resistor connection MDP90A-0250 – 0750-.. (size 2, 3)
	X3:-R	-R	
	⏚	PE	PE connection
	X3:+R	+R	Braking resistor connection MDP90A-1100-.. (size 4)
	X3:-R	-R	
	⏚	PE	PE connection

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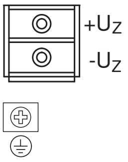
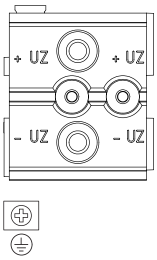
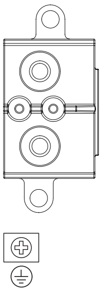
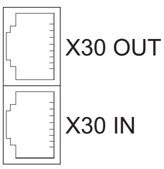
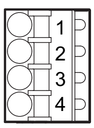
Representation	Terminal	Connection	Brief description
	X4:+U_Z	+U_Z	DC link connection
	X4:-U_Z	-U_Z	
	⏚	PE	PE connection
	X4:+U_Z	+U_Z	DC link connection left side MDP90A-1100-.. (size 4)
	X4:-U_Z	-U_Z	
	⏚	PE	PE connection
	X4:+U_Z	+U_Z	DC link connection right side MDP90A-1100-.. (size 4)
	X4:-U_Z	-U_Z	
	⏚	PE	PE connection
	X5:24 V	24V_in	+24 V supply voltage
	X5:GND	GND	
	X30 OUT		System bus
	X30 IN		
	X7:1	+TEMP_R	DC 24 V auxiliary voltage output
	X7:2	-TEMP_R	Sensor input for temperature monitoring of the braking resistor
	X7:3	Reserved	–
	X7:4	Reserved	–

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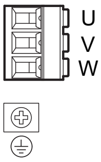
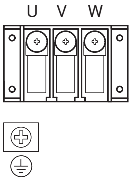
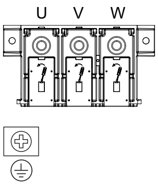
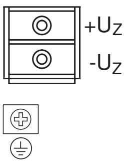
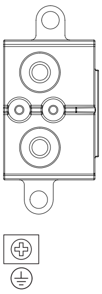
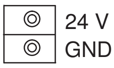
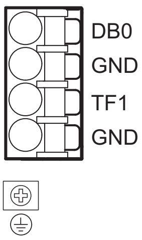
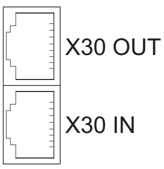
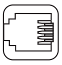
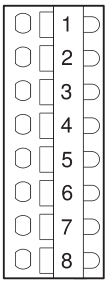
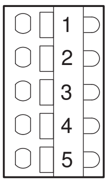
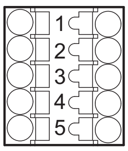
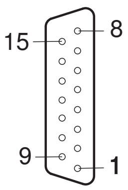
4.13.2 Terminal assignment at MDA single-axis module

Representation	Terminal	Connection	Brief description
	X2:U	U	Motor connection MDA90A-0020 – 0240-.. (Sizes 1, 2)
	X2:V	V	
	X2:W	W	
	⏚	PE	PE connection
	X2:U	U	Motor connection MDA90A-0320 – 1000-.. (sizes 3 – 5)
	X2:V	V	
	X2:W	W	
	⏚	PE	PE connection
	X2:U	U	Motor connection MDA90A-1400 – 1800 (size 6)
	X2:V	V	
	X2:W	W	
	⏚	PE	PE connection
	X4:+U_Z	+U_Z	DC link connection
	X4:-U_Z	-U_Z	
	⏚	PE	PE connection
	X4:+U_Z	+U_Z	DC link connection MDA90A-1400 – 1800-.. (size 6)
	X4:-U_Z	-U_Z	
	⏚	PE	PE connection
	X5:24 V	24V_in	DC 24 V supply voltage
	X5:GND	GND	Reference potential
	X10:DB0	DB00	Brake control
	X10:GND	GND	Reference potential
	X10:TF1	TF1	Sensor input for temperature monitoring of the motor
	X10:GND	GND	Reference potential
	⏚	PE	PE connection
	X30 OUT		System bus
	X30 IN		

Representa-tion	Terminal	Connection	Brief description
	X31		SEW-EURODRIVE Service interface
	X20:1	DI00	Digital input 1, with fixed assignment "Output stage enable"
	X20:2	DI01	Digital input 2, fixed setpoints – positive direction of rotation[1)]
	X20:3	DI02	Digital input 3, fixed setpoints – negative direction of rotation[1)]
	X20:4	DI03	Digital input 4, fixed setpoint – speed, bit 0[1)]
	X20:5	DI04	Digital input 5, fixed setpoint – speed, bit 1[1)]
	X20:6	DI05	Digital input 6, fault reset[1)]
	X20:7	GND	Reference potential
	X20:8	24V_out	DC 24 V voltage output
	X21:1	DO00	Digital output 1, ready for operation[2)]
	X21:2	DO01	Digital output 2, output stage enable[2)]
	X21:3	DO02	Digital output 3, error[2)]
	X21:4	DO00	Digital output 4, STO active[2)]
	X21:5	GND	Digital output 5, reference potential
	X6:1	F_STO_P1	DC +24 V input F_STO_P1
	X6:2	F_STO_M	DC 0 V input F_STO_M
	X6:3	F_STO_P2	DC +24 V input F_STO_P2
	X6:4	GND	Reference potential
	X6:5	24 V STO_OUT	U_{out} = DC 24 V supply of F_STO_P1 and F_STO_P2
	X15:1	S2 (sin+)	Signal track
	X15:2	S1 (cos+)	Signal track
	X15:3	Reserved	–
	X15:4	Reserved	–
	X15:5	R1 (REF+)	Supply voltage resolver
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	Reserved	–
	X15:9	S4 (sin-)	Signal track
	X15:10	S3 (cos-)	Signal track
	X15:11	Reserved	–
	X15:12	Reserved	–
	X15:13	R2 (REF-)	Supply voltage resolver
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	Reserved	–

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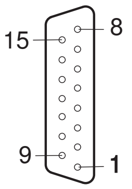
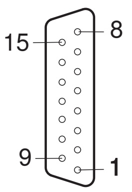
Representa-tion	Terminal	Connection	Brief description
	X15:1	A (cos+) (K1)	Signal track A (cos+) (K1)
	X15:2	B (sin+) (K2)	Signal track B (sin+) (K2)
	X15:3	C (K0)	Signal track C (K0)
	X15:4	DATA+[3)]	Data cable for electronic nameplate
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	GND	Reference potential
	X15:9	$\overline{A}$ (cos -) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
	X15:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
	X15:11	$\overline{C}$ ($\overline{K0}$)	Negated signal track $\overline{C}$ ($\overline{K0}$)
	X15:12	DATA-[2)]	Data cable for electronic nameplate
	X15:13	U_{S24VG}	Encoder supply 24 V
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	Encoder supply 12 V
	X15:1	A (K1)	Signal track A (K1)
	X15:2	B (K2)	Signal track B (K2)
	X15:3	C (K0)	Signal track C (K0)
	X15:4	Reserved	–
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	GND	Reference potential
	X15:9	$\overline{A}$ ($\overline{K1}$)	Negated signal track $\overline{A}$ ($\overline{K1}$)
	X15:10	$\overline{B}$ ($\overline{K2}$)	Negated signal track $\overline{B}$ ($\overline{K2}$)
	X15:11	$\overline{C}$ ($\overline{K0}$)	Negated signal track $\overline{C}$ ($\overline{K0}$)
	X15:12	Reserved	–
	X15:13	U_{S24VG}	Encoder supply 24 V
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	Encoder supply 12 V

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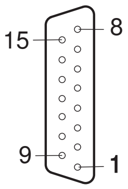
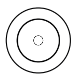
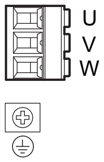
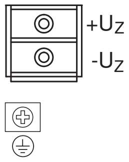
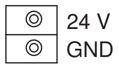
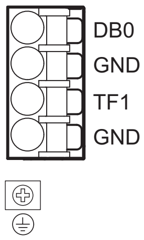
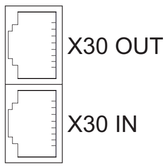
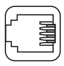
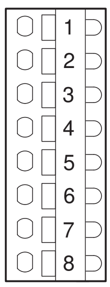
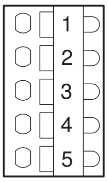
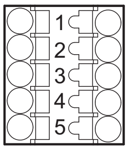
Representation	Terminal	Connection	Brief description
	X15:1	A (cos+) (K1)	Signal track A (cos+) (K1)
	X15:2	B (sin+) (K2)	Signal track B (sin+) (K2)
	X15:3	Reserved	–
	X15:4	DATA+	Data line RS485
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	GND	Reference potential
	X15:9	$\overline{A}$ (cos -) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
	X15:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
	X15:11	Reserved	–
	X15:12	DATA-	Data line
	X15:13	U_{S24VG}	Encoder supply 24 V
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	Encoder supply 12 V
	X16	Coaxial connection	MOVILINK® DDI

1) The assignment of DI01 – DI05 specified here is the factory setting. The inputs are parameterizable.
2) The assignment of DOI00 – DO02 specified here is the factory setting. The outputs are parameterizable.
3) For encoders from SEW-EURODRIVE with electronic nameplate of type E.7S

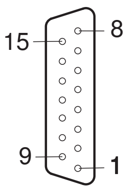
4.13.3 Terminal assignment at MDD double-axis module

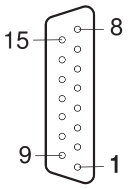
Representa-tion	Terminals		Connection	Brief description
	X2_1:U	X2_2:U	U	Motor connection MDD9.A-0020 – 0080-.. (Sizes 1, 2)
	X2_1:V	X2_2:V	V	
	X2_1:W	X2_2:W	W	
	⏚		PE	PE connection
	X4:$+U_Z$		$+U_Z$	DC link connection
	X4:$-U_Z$		$-U_Z$	
	⏚		PE	PE connection
	X5:24 V		24V_in	DC 24 V supply voltage
	X5:GND		GND	Reference potential
	X10_1:DB0	X10_2:DB0	DB00	Brake control
	X10_1:GND	X10_2:GND	GND	Reference potential
	X10_1:TF1	X10_2:TF1	TF1	Sensor input for temperature monitoring of the motor
	X10_1:GND	X10_2:GND	GND	Reference potential
	⏚		PE	PE connection
	X30 OUT			System bus
	X30 IN			
	X31			SEW-EURODRIVE Service interface
	X20_1:1	X20_2:1	DI00	Digital input 1, with fixed assignment "Output stage enable"
	X20_1:2	X20_2:2	DI01	Digital input 2, fixed setpoints – positive direction of rotation[1)]
	X20_1:3	X20_2:3	DI02	Digital input 3, fixed setpoints – negative direction of rotation[1)]
	X20_1:4	X20_2:4	DI03	Digital input 4, fixed setpoint – speed, bit 0[1)]
	X20_1:5	X20_2:5	DI04	Digital input 5, fixed setpoint – speed, bit 1[1)]
	X20_1:6	X20_2:6	DI05	Digital input 6, fault reset[1)]
	X20_1:7	X20_2:7	GND	Reference potential
	X20_1:8	X20_2:8	24V_out	DC 24 V voltage output

Representation	Terminals		Connection	Brief description
	X21_1:1	X21_2:1	DO00	Digital output 1, ready for operation[2)]
	X21_1:2	X21_2:2	DO01	Digital output 2, output stage enable[2)]
	X21_1:3	X21_2:3	DO02	Digital output 3, error[2)]
	X21_1:4	X21_2:4	DO03	Digital output 4, STO active
	X21_1:5	X21_2:5	GND	Digital output 5, reference potential
	X6_1:1	X6_2:1	F_STO_P1	DC +24 V input F_STO_P1
	X6_1:2	X6_2:2	F_STO_M	DC 0 V input F_STO_M
	X6_1:3	X6_2:3	F_STO_P2	DC +24 V input F_STO_P2
	X6_1:4	X6_2:4	GND	Reference potential
	X6_1:5	X6_2:5	24 V STO_OUT	U_{out} = DC 24 V supply of F_STO_P1 and F_STO_P2

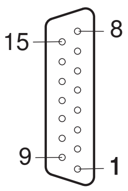
1) The assignment of DI01 – DI05 specified here is the factory setting. The inputs are parameterizable.
2) The assignment of DO00 – DO02 specified here is the factory setting. The outputs are parameterizable.

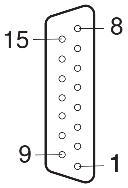
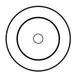
The X15_.. terminals are available for the MDD90A double-axis module.

Representation	Terminals		Connection	Brief description, motor encoder resolver
	X15_1:1	X15_2:1	S2 (sin+)	Signal track
	X15_1:2	X15_2:2	S1 (cos+)	Signal track
	X15_1:3	X15_2:3	Reserved	–
	X15_1:4	X15_2:4	Reserved	–
	X15_1:5	X15_2:5	R1 (REF+)	Supply voltage resolver
	X15_1:6	X15_2:6	-TEMP_M	Motor temperature evaluation
	X15_1:7	X15_2:7	Reserved	–
	X15_1:8	X15_2:8	Reserved	–
	X15_1:9	X15_2:9	S4 (sin-)	Signal track
	X15_1:10	X15_2:10	S3 (cos-)	Signal track
	X15_1:11	X15_2:11	Reserved	–
	X15_1:12	X15_2:12	Reserved	–
	X15_1:13	X15_2:13	R2 (REF-)	Supply voltage resolver
	X15_1:14	X15_2:14	+TEMP_M	Motor temperature evaluation
	X15_1:15	X15_2:15	Reserved	–

Representa-tion	Terminals		Connection	Brief description, motor encoder sin/cos encoder, TTL encoder
	X15_1:1	X15_2:1	A (cos+) (K1)	Signal track A (cos+) (K1)
	X15_1:2	X15_2:2	B (sin+) (K2)	Signal track B (sin+) (K2)
	X15_1:3	X15_2:3	C (K0)	Signal track C (K0)
	X15_1:4	X15_2:4	DATA+[1)]	Data cable for electronic nameplate
	X15_1:5	X15_2:5	Reserved	–
	X15_1:6	X15_2:6	-TEMP_M	Motor temperature evaluation
	X15_1:7	X15_2:7	Reserved	–
	X15_1:8	X15_2:8	GND	Reference potential
	X15_1:9	X15_2:9	$\overline{A}$ (cos -) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
	X15_1:10	X15_2:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
	X15_1:11	X15_2:11	$\overline{C}$ ($\overline{K0}$)	Negated signal track $\overline{C}$ ($\overline{K0}$)
	X15_1:12	X15_2:12	DATA-[1)]	Data cable for electronic nameplate
	X15_1:13	X15_2:13	U_{S24VG}	24 V encoder supply
	X15_1:14	X15_2:14	+TEMP_M	Motor temperature evaluation
	X15_1:15	X15_2:15	U_{S12VG}	Encoder supply 12 V

1) For encoders from SEW-EURODRIVE with electronic nameplate of type E.7S

Representa-tion	Terminals		Connection	Brief description motor encoder HTL en-coder
	X15_1:1	X15_2:1	A (K1)	Signal track A (K1)
	X15_1:2	X15_2:2	B (K2)	Signal track B (K2)
	X15_1:3	X15_2:3	C (K0)	Signal track C (K0)
	X15_1:4	X15_2:4	Reserved	–
	X15_1:5	X15_2:5	Reserved	–
	X15_1:6	X15_2:6	-TEMP_M	Motor temperature evaluation
	X15_1:7	X15_2:7	Reserved	–
	X15_1:8	X15_2:8	GND	Reference potential
	X15_1:9	X15_2:9	$\overline{A}$ ($\overline{K1}$)	Negated signal track $\overline{A}$ ($\overline{K1}$)
	X15_1:10	X15_2:10	$\overline{B}$ ($\overline{K2}$)	Negated signal track $\overline{B}$ ($\overline{K2}$)
	X15_1:11	X15_2:11	$\overline{C}$ ($\overline{K0}$)	Negated signal track $\overline{C}$ ($\overline{K0}$)
	X15_1:12	X15_2:12	Reserved	–
	X15_1:13	X15_2:13	U_{S24VG}	24 V encoder supply
	X15_1:14	X15_2:14	+TEMP_M	Motor temperature evaluation
	X15_1:15	X15_2:15	U_{S12VG}	Encoder supply 12 V

Representa-tion	Terminals		Connection	Brief description motor encoder HIPERFACE® and SEW-EURODRIVE en-coder (RS485)
	X15_1:1	X15_2:1	A (cos+) (K1)	Signal track A (cos+) (K1)
	X15_1:2	X15_2:2	B (sin+) (K2)	Signal track B (sin+) (K2)
	X15_1:3	X15_2:3	Reserved	–
	X15_1:4	X15_2:4	DATA+	Data line RS485
	X15_1:5	X15_2:5	Reserved	–
	X15_1:6	X15_2:6	-TEMP_M	Motor temperature evaluation
	X15_1:7	X15_2:7	Reserved	–
	X15_1:8	X15_2:8	GND	Reference potential
	X15_1:9	X15_2:9	$\overline{A}$ (cos -) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
	X15_1:10	X15_2:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
	X15_1:11	X15_2:11	Reserved	–
	X15_1:12	X15_2:12	DATA-	Data line
	X15_1:13	X15_2:13	U_{S24VG}	24 V encoder supply
	X15_1:14	X15_2:14	+TEMP_M	Motor temperature evaluation
	X15_1:15	X15_2:15	U_{S12VG}	Encoder supply 12 V
	X16_1	X16_2	Coaxial con-nection	MOVILINK® DDI for MDD91A

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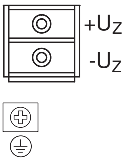
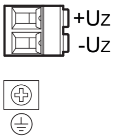
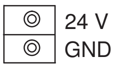
4.13.4 Terminal assignment of MDC90A-0001/0002-.. capacitor module

Representa-tion	Terminal	Connec-tion	Brief description
	X4:+U_Z	+U_Z	DC link connection
	X4:-U_Z	-U_Z	
	⏚	PE	PE connection
	X4_A:+	+U_Z	Connection of safe brake module
	X4_A:-	-U_Z	
	⏚	PE	PE connection
	X5:24 V	24V_in	+24 V supply voltage
	X5:GND	GND	

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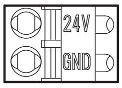
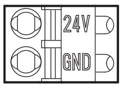
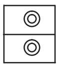
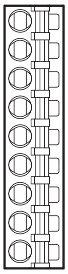
4.13.5 Terminal assignment at master module UHX45A/MDM90A

Representa-tion	Terminal	Connection	Brief description
	X5_A:24V	24V_in	External DC 24 V supply voltage from housing MD-M90A
	X5_A:GND	GND	Reference potential housing MDM90A
	X5_B:24V	24V_out	Output of DC 24 V supply voltage from housing MD-M90A
	X5_B:GND	GND	Reference potential housing MDM90A
 24 V	X5:24 V	24V_in	DC 24 V supply voltage UHX45A
GND	X5:GND	GND	Reference potential UHX45A
	X85:1-3	RS485	RS485 interface (in preparation)
	X85:4-6	CAN1	System bus CAN 1 – non-isolated (in preparation)
	X85:7-9	CAN2	System bus CAN 2 – non-isolated (in preparation)

4.14 Wiring diagrams

4.14.1 General information on the wiring diagrams

- For technical data of the power electronics and the control electronics, refer to chapter "Technical data" (→ 🗎 247).
- For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 148).

4.14.2 Power connection

NOTICE

Incorrectly placed components.

Destruction of the power supply module.

- Do not install any other components between the line filter and the power supply module.

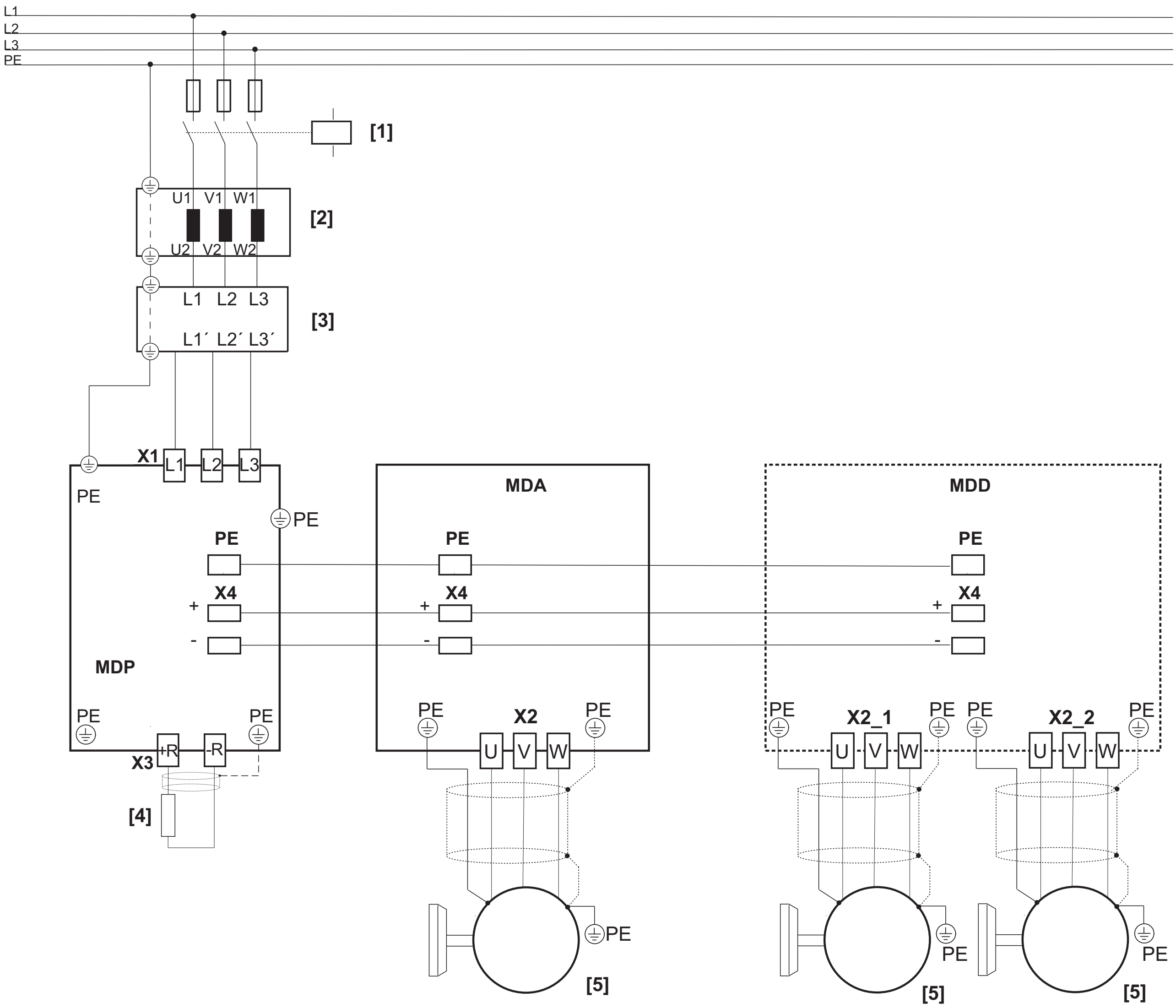
NOTICE

Overtemperature of line filter and line choke.

Destruction of line filter and line choke.

- Make sure line filter and line choke are not heated by warm exhaust air of other devices.

Exemplary wiring of the MDP90A.. power connections with line contactor, line choke, and line filter



36028806497163019

[1]	Line contactor
[2]	Line choke (optional)
[3]	Line filter
[4]	Connection of the braking resistor
[5]	Motor
MDP	Power supply module
MDA	Single-axis module
MDD	Double-axis module

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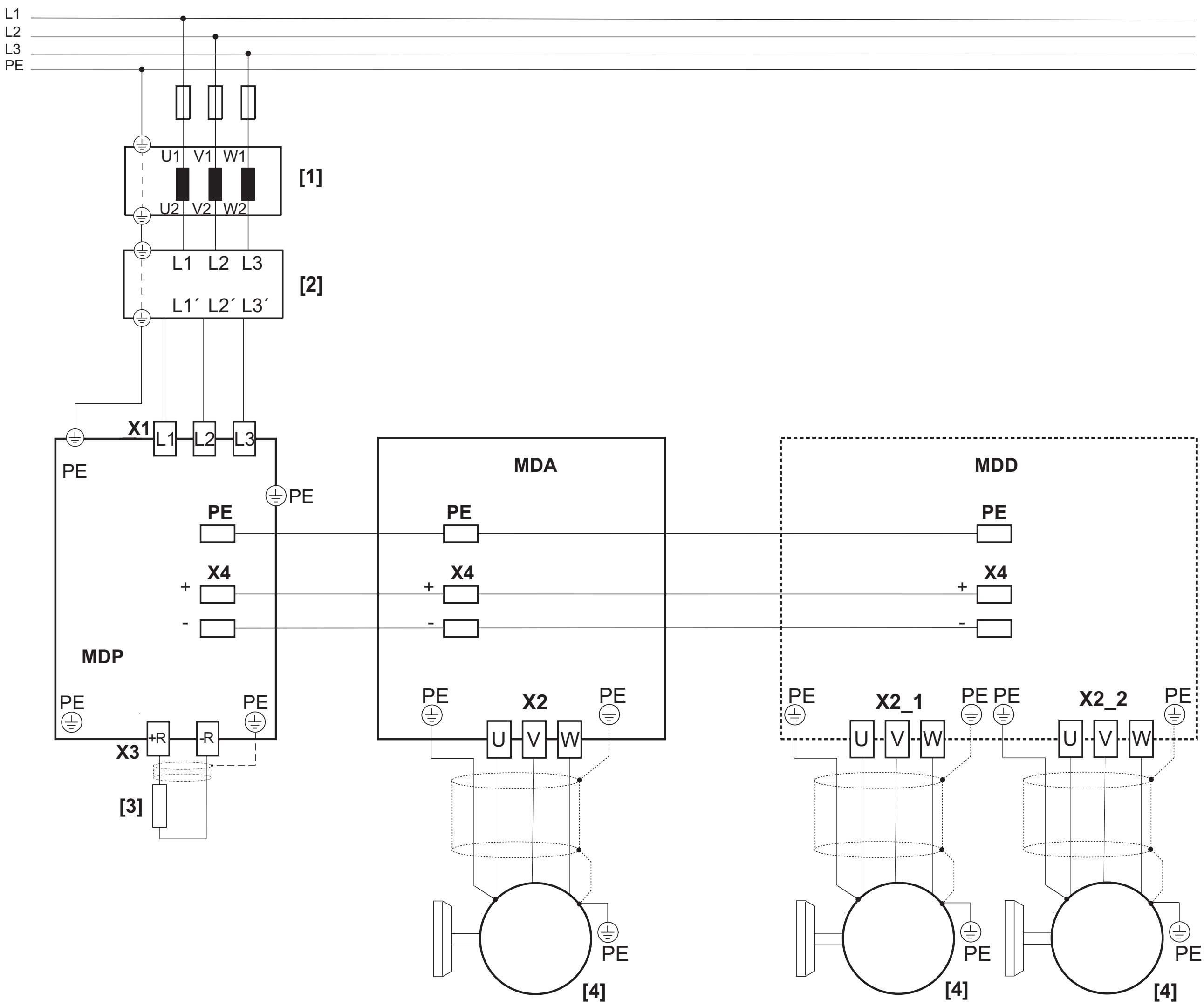
Wiring the MDP90A-0250, 0500, 0750, 1100 power connections without line contactor

Operation without line contactor is only possible for power supply modules of 25 kW of higher.



27021609848822539

[1]	Line choke (optional)
[2]	Line filter
[3]	Connection of the braking resistor
[4]	Motor
MDP	Power supply module
MDA	Single-axis module
MDD	Double-axis module

INFORMATION

In case of a line connection without line contactor, the temperature evaluation of the braking resistor via connection X7 of the power supply module must be ensured. The temperature evaluation is evaluated as error message in each axis.

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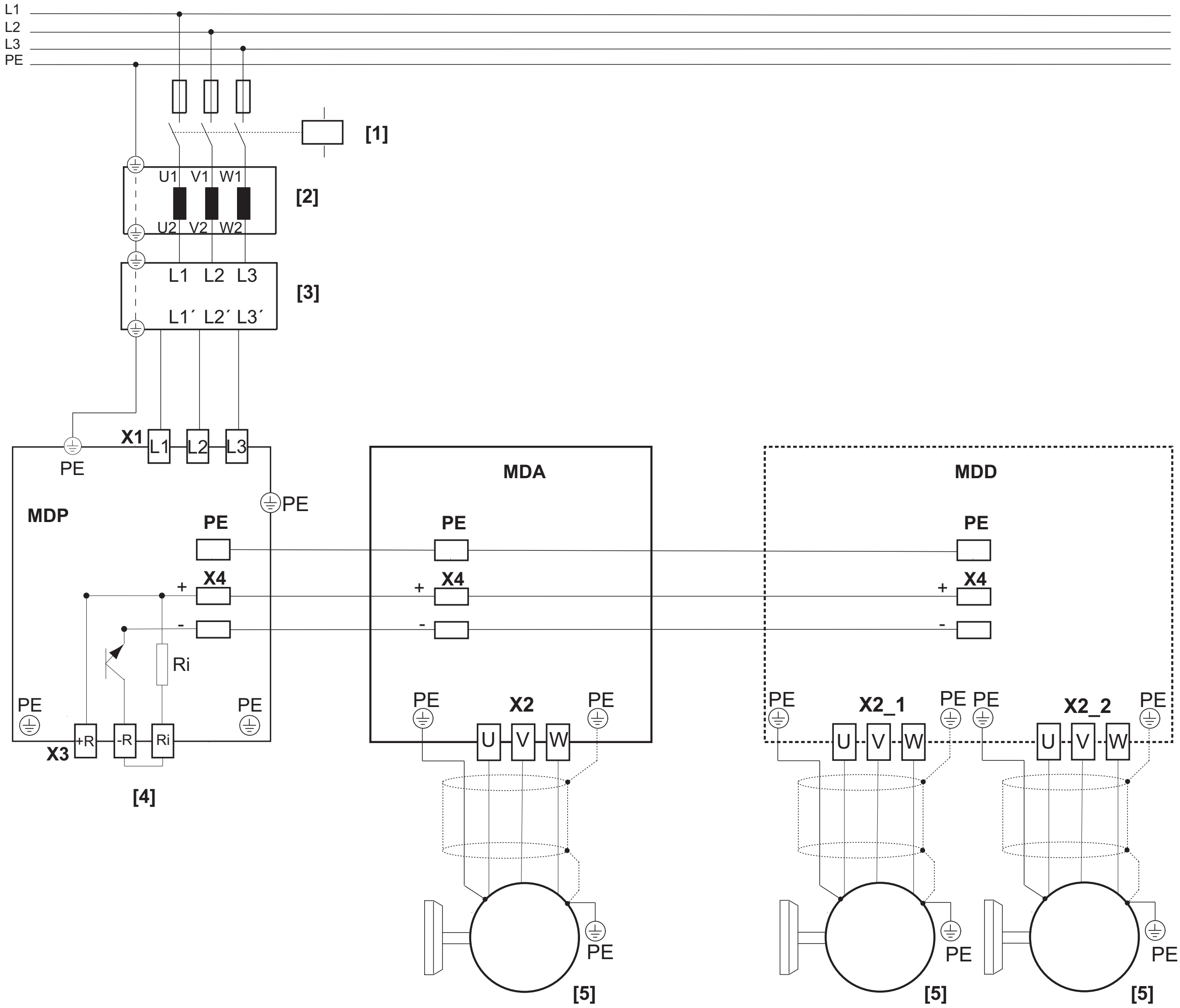
Wiring of the MDP90A-..-C00 power connections using the integrated braking resistor



27021607242286475

[1]	Line contactor
[2]	Line choke (optional)
[3]	Line filter
[4]	Connection of the braking resistor
[5]	Motor
MDP	Power supply module
MDA	Single-axis module
MDD	Double-axis module

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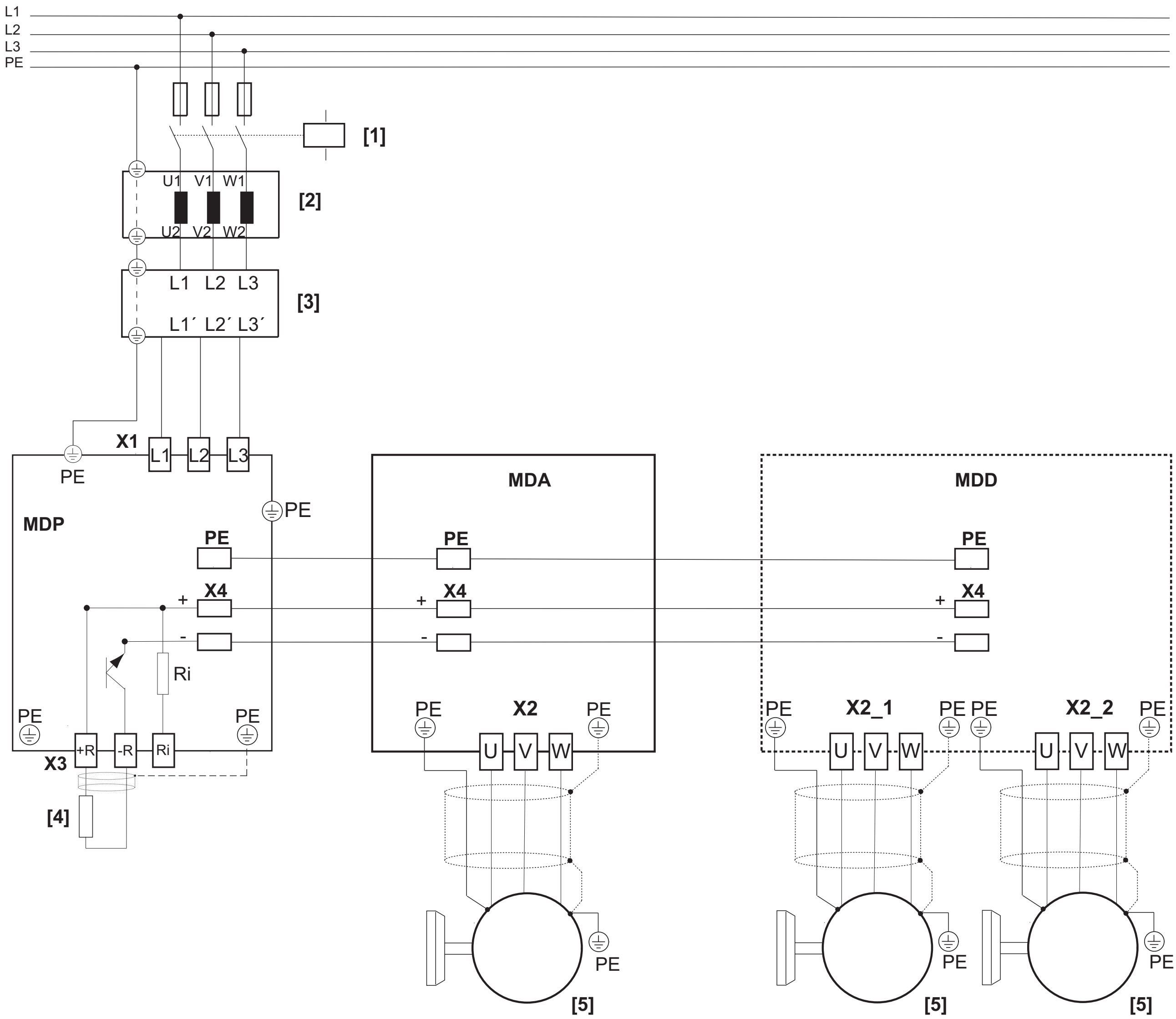
Wiring of the MDP90A-..-C00 power connections using the external braking resistor



36028806505258635

[1]	Line contactor
[2]	Line choke (optional)
[3]	Line filter
[4]	Connection of the braking resistor
[5]	Motor
MDP	Power supply module
MDA	Single-axis module
MDD	Double-axis module

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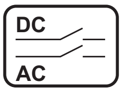
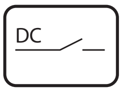
4.14.3 Brake control

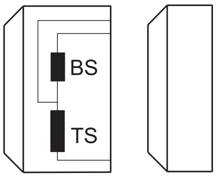
Legend:



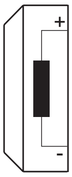
Cut-off in the DC and AC circuits
(rapid brake application)



Cut-off in the DC circuit



Brake
BS = accelerator coil
TS = coil section



DC brake with one brake coil

Auxiliary terminal strip in terminal box

Control cabinet limit

WH	White
RD	Red
BU	Blue

INFORMATION

Type and source of the hazard

The selection of the brake control and the shown connection diagrams only represent one of the many possibilities. Observe the catalogs and operating instructions of the motors for more information and installation notes.

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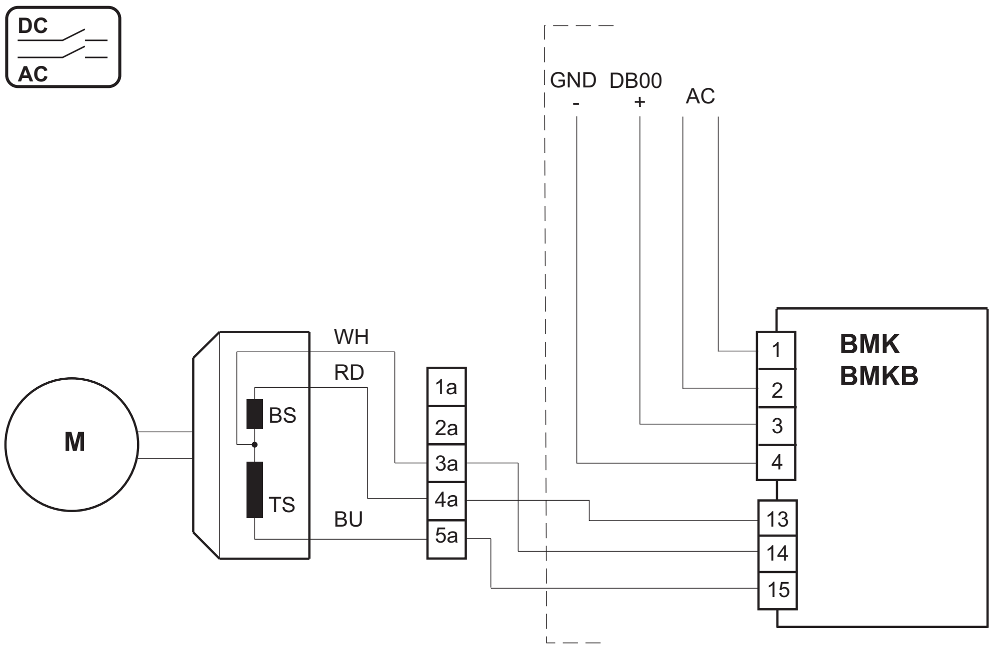
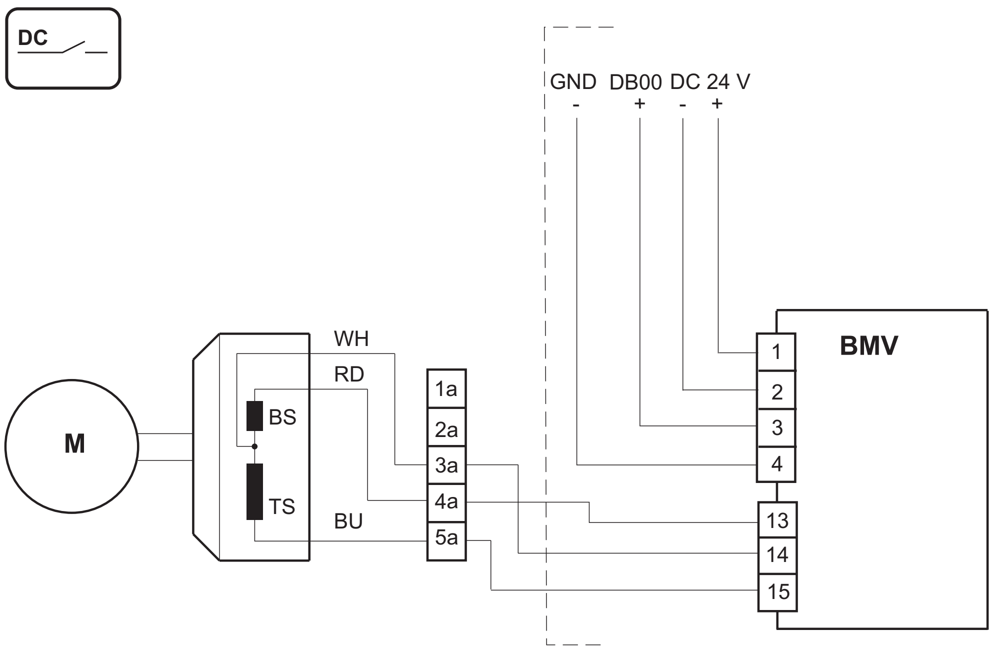
BMK. brake control



14324495755

BMV brake control – 2 coils



14373482507

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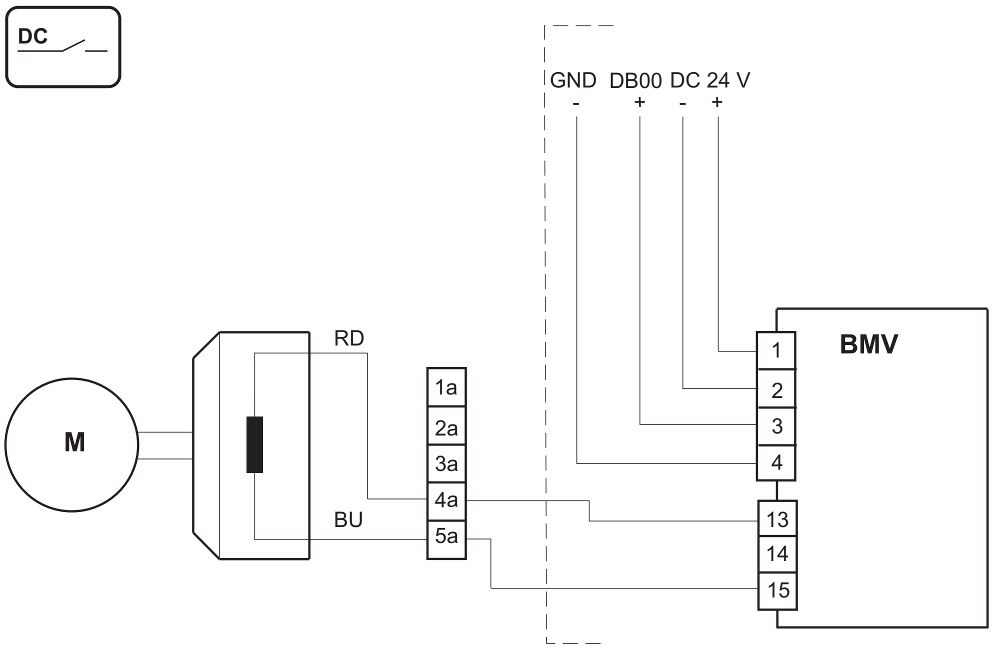
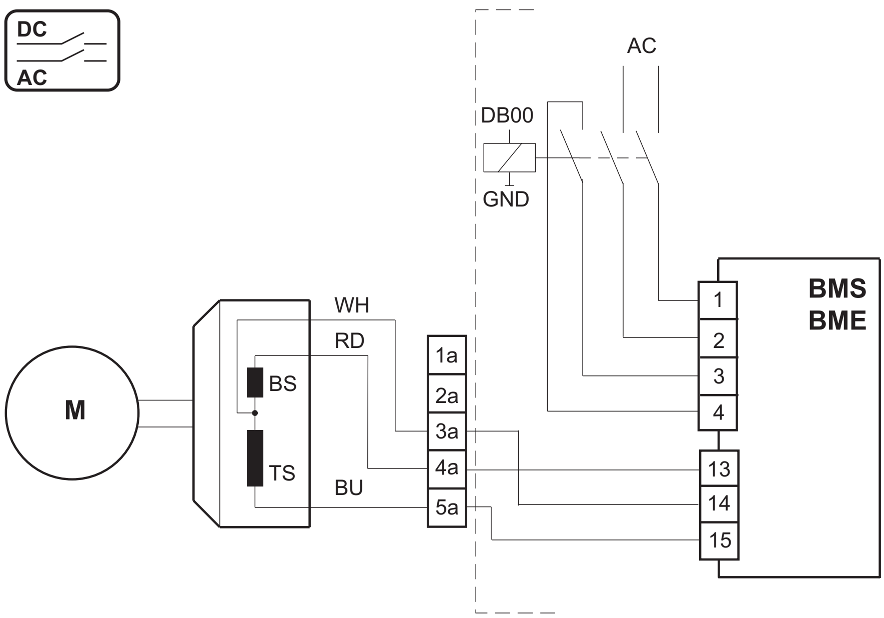
BMV brake control – 1 coil



14373494923

BMS, BME brake control



14324554891

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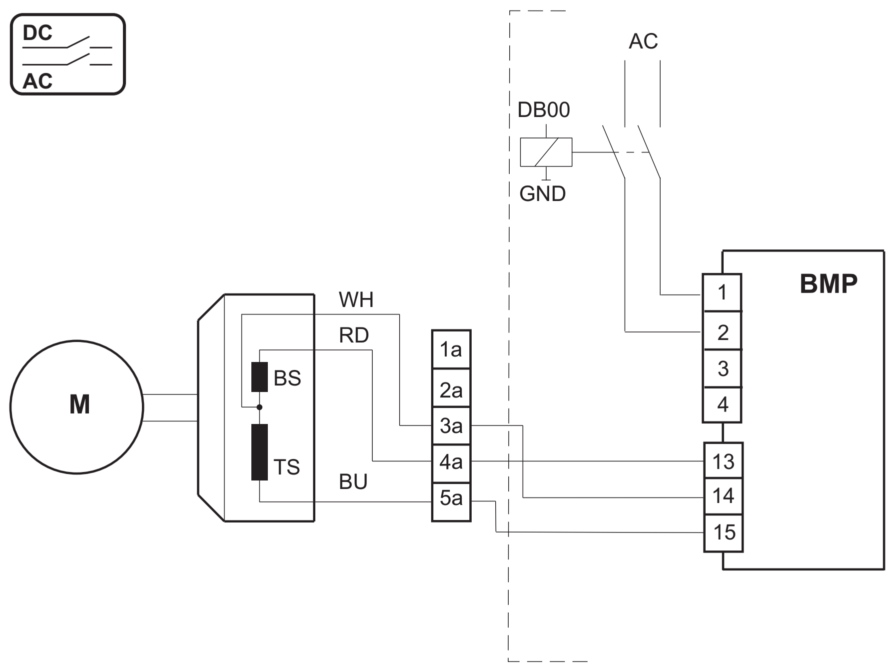
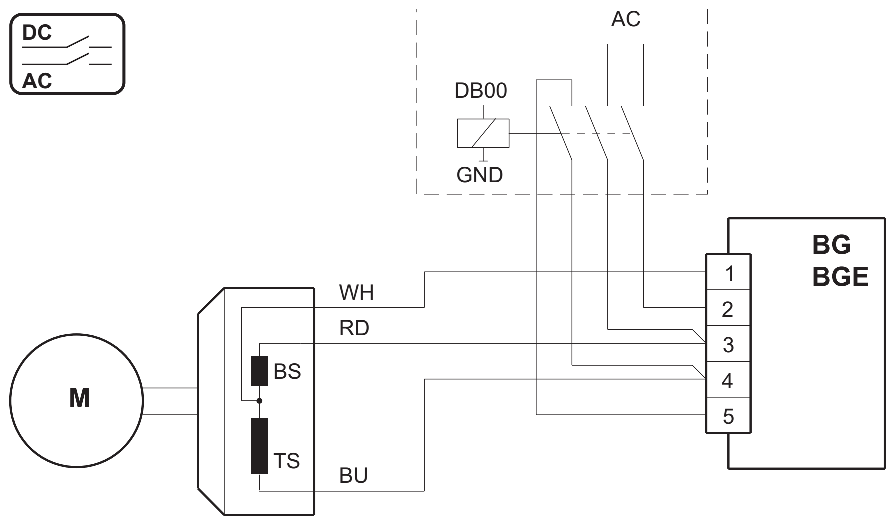
BMP brake control



14324544523

BG, BGE brake control



14324565259

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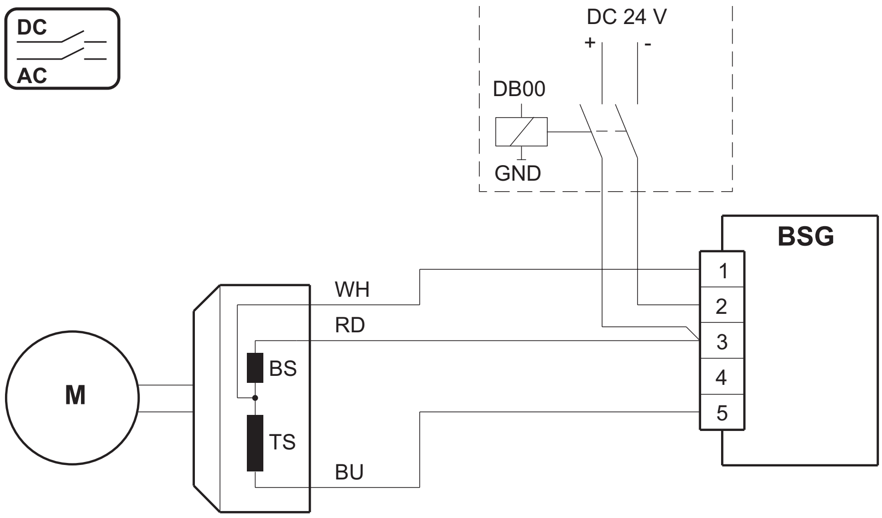
BSG brake control



14324597131

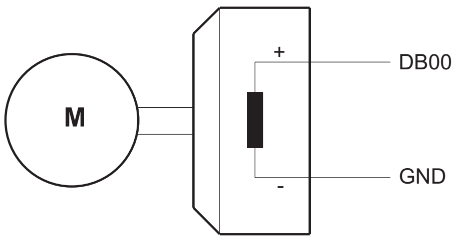
Direct control DC 24 V brake

If the system complies with the following specifications for direct brake control, a BK or BP brake (holding brake) can also be controlled directly via the brake output of an application inverter.

Specifications for direct brake control:

- Only the BK brakes of the CMP40 – 63 motor and the BP brake of the CMP71 motor are permitted.
- Expressly excluded are brakes of the motor types CMP80 and greater, CMPZ motors, and all non-SEW brakes.
- Only prefabricated brakemotor cables from SEW-EURODRIVE must be used.
- The brakemotor cable must be shorter than 25 m.
- The shielding of the brake cable must be connected to the shielding plate.

Observe additional information in the "Synchronous Servomotors" catalog.



14333605771

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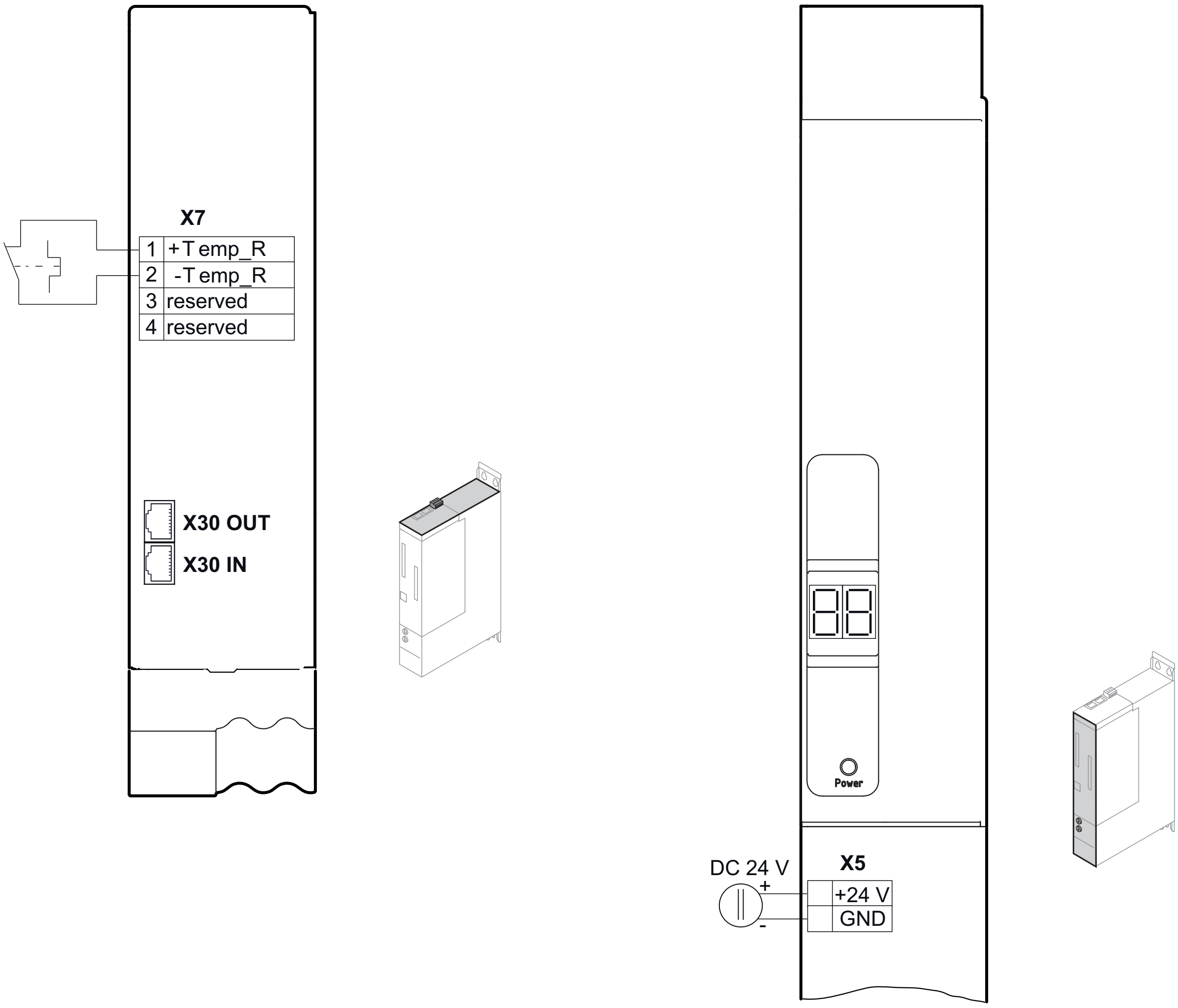
4.14.4 Electronics connection MDP90A.. power supply module

Wiring the control electronics

For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 148).



54043209842314507

X5	Connection +24 V supply voltage
X7	Braking resistor temperature monitoring
X30	System bus

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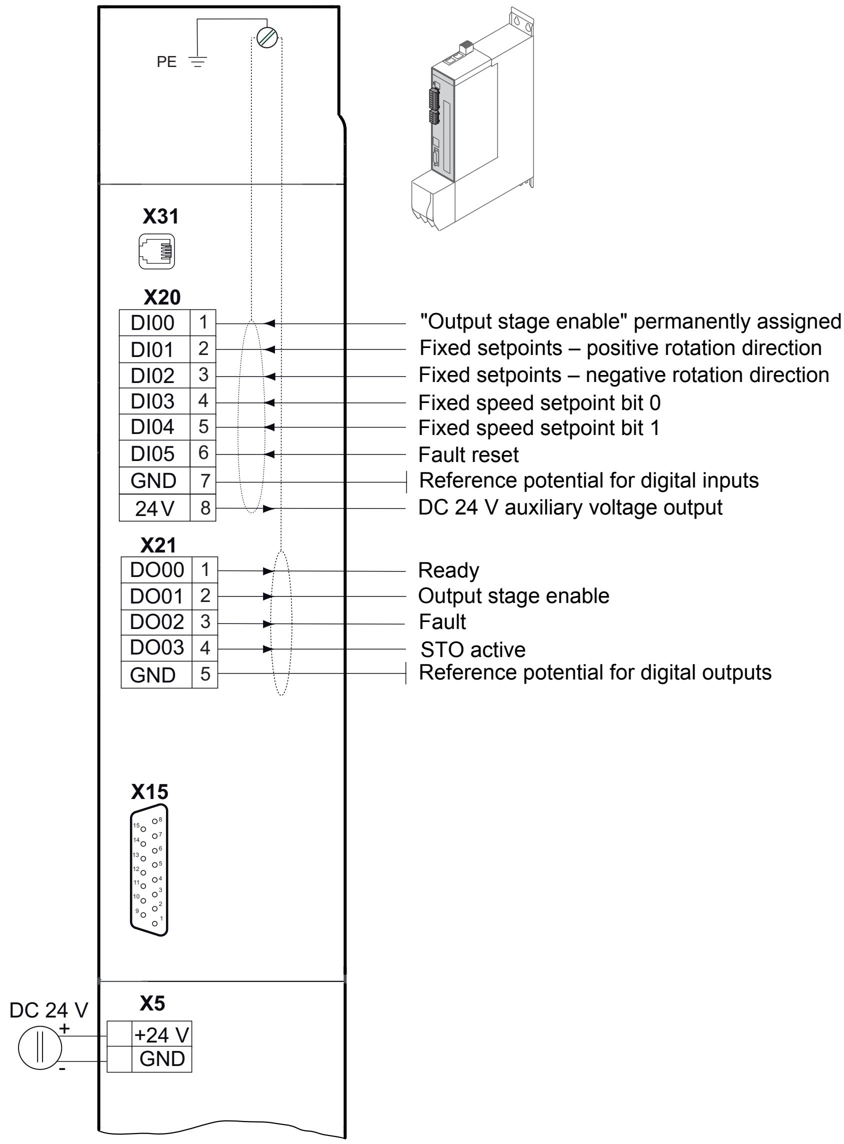
4.14.5 Electronics connection MDA90A.. single-axis module

Wiring the control electronics

For the terminal assignment and connections, refer to the chapter "Terminal assignment" (→ 🗎 148).



9007224862225163

X5	Connection +24 V supply voltage
X20	Digital inputs
X21	Digital outputs
X30	System bus
X31	SEW-EURODRIVE Service interface

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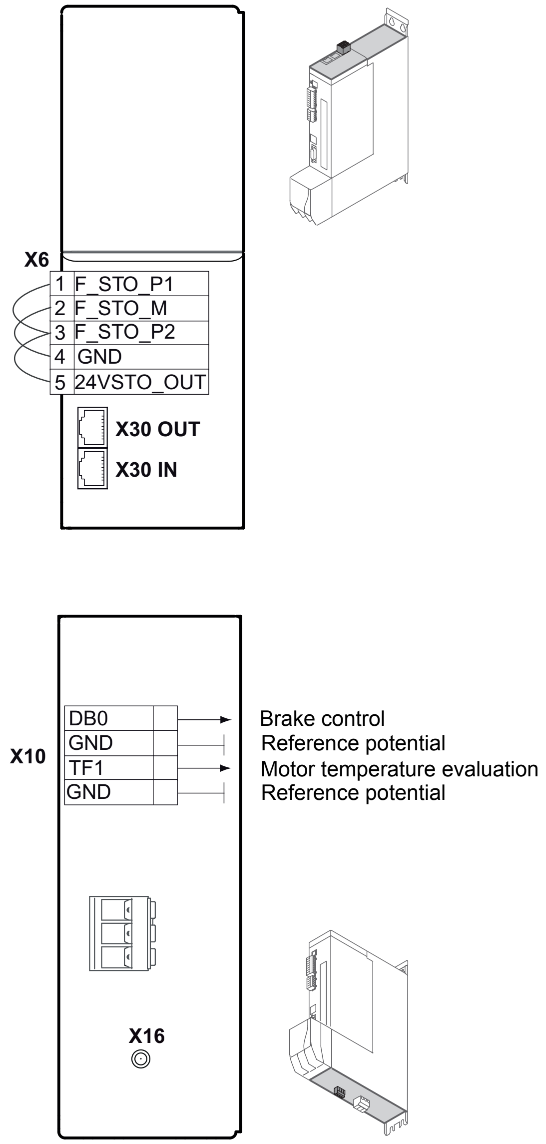


9007224862221067

X6 Connection for Safe Torque Off (STO)
With installed CS.A card, the cable bridges are removed at the factory.
If no CS.A card is installed upon delivery, the cable bridges are installed at the factory

X10 Brake control and motor temperature monitoring

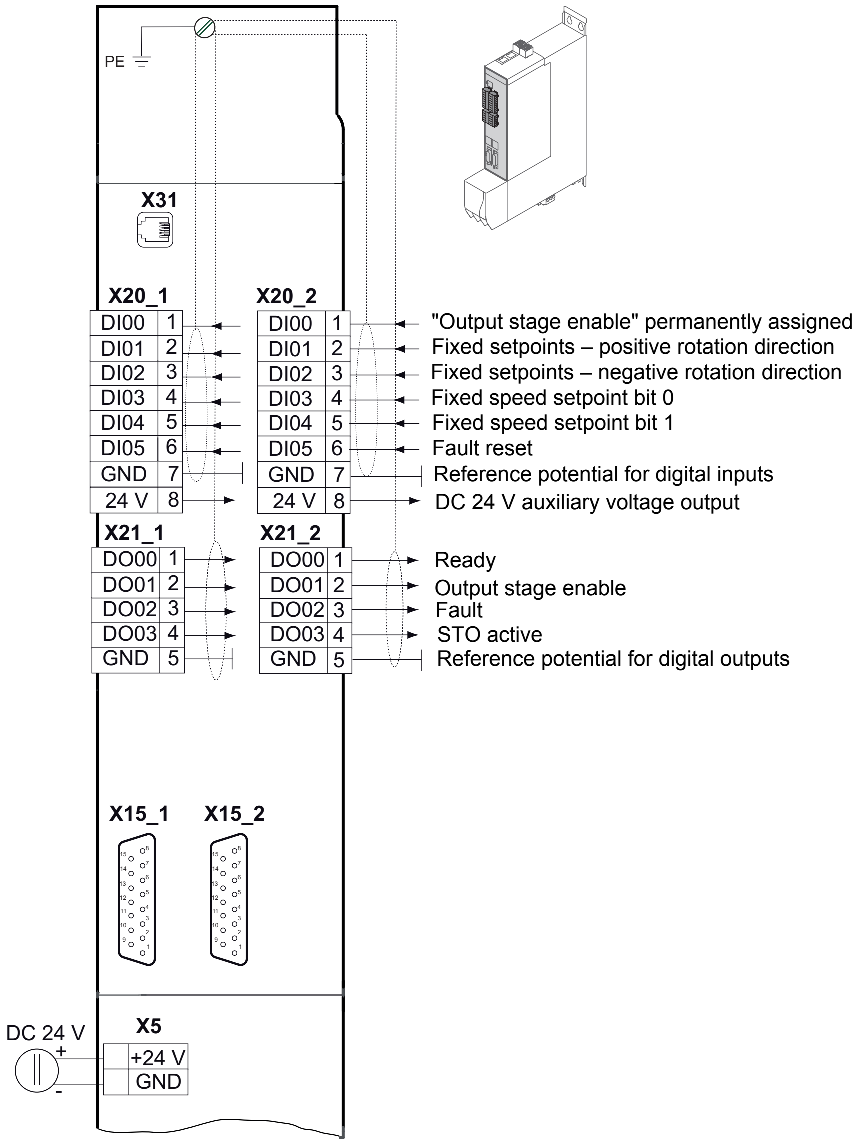
X16 MOVILINK® DDI connection

X30 System bus

4.14.6 MDD9.A.. double-axis module electrical connection

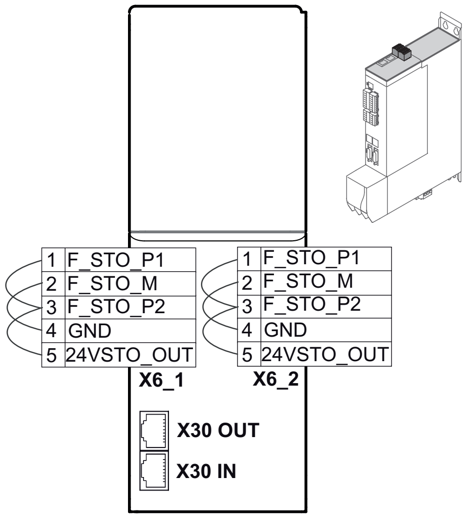
Wiring the control electronics

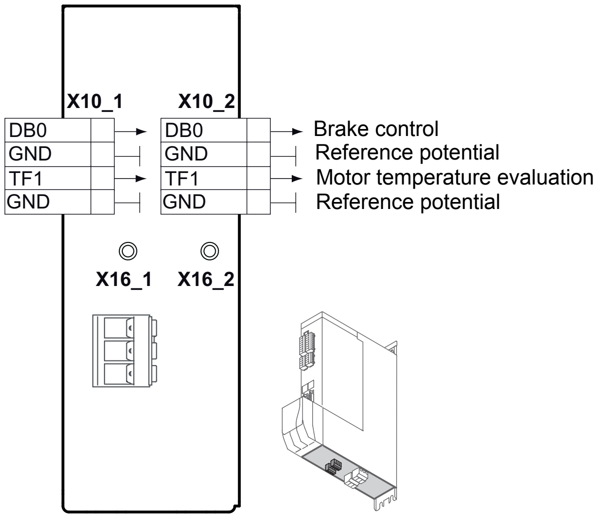
For the terminal assignment and connections, refer to the chapter "Terminal assignment" (→ 🗎 148).



9007224862457611

X5 Connection +24 V supply voltage
X15 Motor encoder connection with MDD90A-..
X20 Digital inputs
X21 Digital outputs
X30 System bus
X31 SEW-EURODRIVE Service interface





25607711883

X6 Connection for Safe Torque Off (STO)
With installed CS.A card, the cable bridges are removed at the factory.
If no CS.A card is installed upon delivery, the cable bridges are installed at the factory.

X10 Brake control and motor temperature monitoring

X16 MOVILINK® DDI connection with MDD91A-..

X30 System bus

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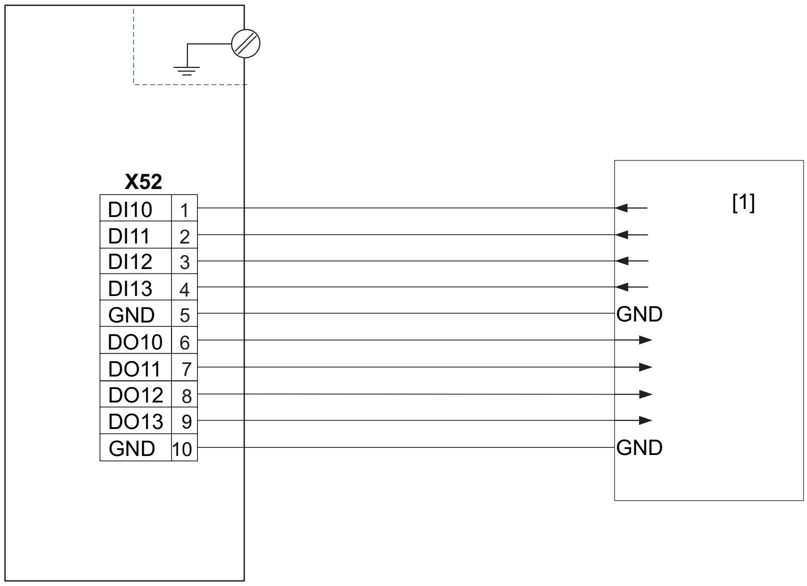
4.14.7 Connection diagram CIO21A and CID21A input/output card

Digital inputs and outputs



18014412829087243

[1] Higher-level controller

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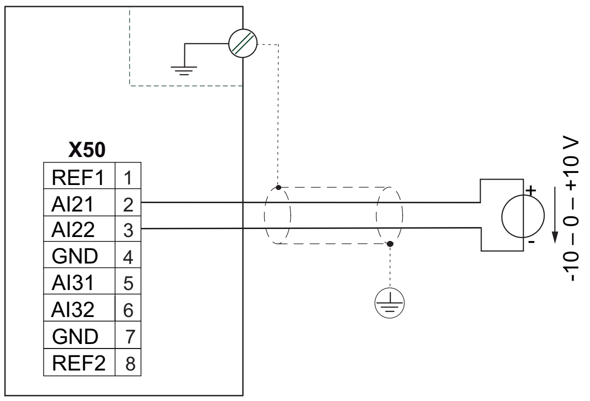
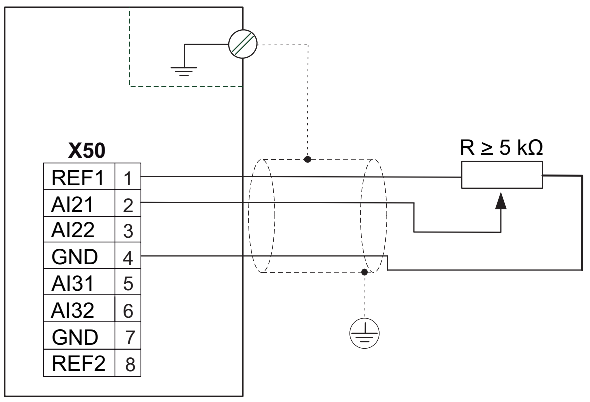
Voltage input



9007213575393675

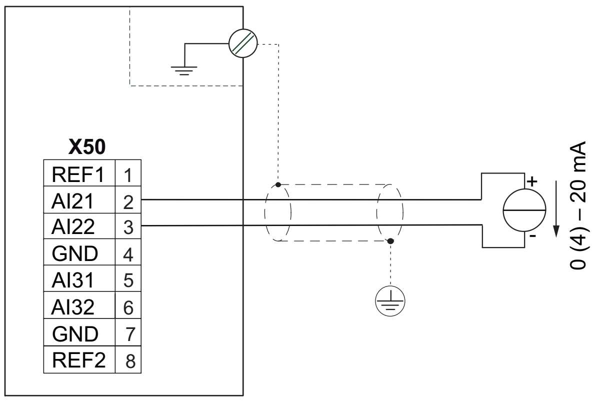
Connection to the terminals AI31 and AI32 is carried out analogously to the connection to the terminals AI21 and AI22 shown in the wiring diagrams.



18014412830137099

Connection to the terminals REF2 and AI31 is carried out analogously to the connection to the terminals REF1 and AI21 shown in the wiring diagrams.

Current input

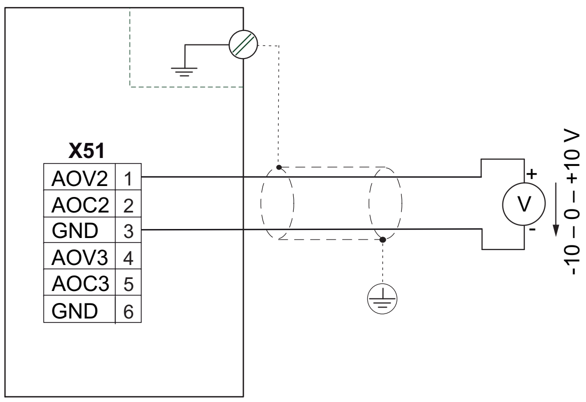


9007213575398539

Connection to the terminals AI31 and AI32 is carried out analogously to the connection to the terminals AI21 and AI22 shown in the wiring diagrams.

Observe the switch position of DIP switch S50 when activating the current input.

Voltage output



18014412830141963

Connection to the terminals AOV3 and GND is carried out analogously to the connection to the terminals AOV2 and GND shown in the wiring diagram.

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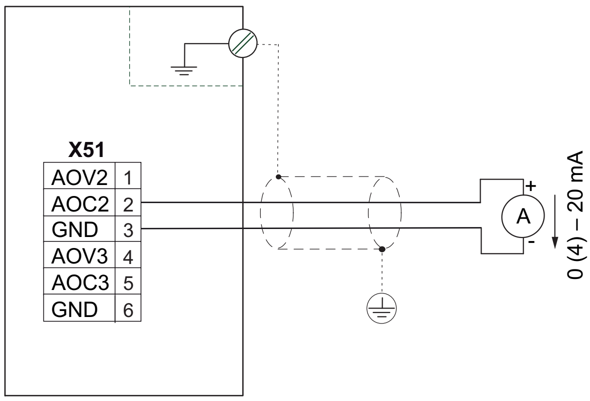
Current output



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Connection to the terminals AOC3 and GND is carried out analogously to the connection to the terminals AOC2 and GND shown in the wiring diagram.

4.15 Information regarding UL

INFORMATION

Due to UL requirements, the following chapter is always printed in English independent of the language of the documentation.

4.15.1 Field Wiring Power Terminals

- Use 75 °C solid or stranded copper wire only sized at 14 AWG minimum. Suitable for 1 wire per terminal.
- For double axis modules use wire size 12 – 14 AWG.
- Tighten terminals to in-lbs (Nm) as follows

	Tightening torque in-lbs (Nm)			
MDP90A-...-	Power supply module			
	Line connection		Braking resistor terminals	
0100 (size 1)	X1	4.4 – 5.3 (0.5 – 0.6)	X3	4.4 – 5.3 (0.5 – 0.6)
0100 (size 1A)	X1	4.4 – 5.3 (0.5 – 0.6)	X3	4.4 – 5.3 (0.5 – 0.6)
0250	X1	26.6 – 35.4 (3.0 – 4.0)	X3	26.6 – 35.4 (3.0 – 4.0)
0500	X1	159.3 – 194.7 (18.0 – 22.0)	X3	26.6 – 35.4 (3.0 – 4.0)
0750	X1	159.3 – 194.7 (18.0 – 22.0)	X3	26.6 – 35.4 (3.0 – 4.0)
1100	X1	159.3 – 194.7 (18.0 – 22.0)	X3	97.4 – 106.2 (11.0 – 12.0)
MDA90A-...-	Single-axis module			
	Motor connection		-	
0020 – 0120	X2	4.4 – 5.3 (0.5 – 0.6)	-	-
0160 – 0240	X2	13.3 – 15.0 (1.5 – 1.7)	-	-
0320 – 0480	X2	26.6 – 35.4 (3.0 – 4.0)	-	-
0640 – 1800	X2	159.3 – 194.7 (18.0 – 22.0)	X3	159.3 – 194.7 (18.0 – 22.0)
MDD90A-...-	Double-axis module			
	Motor connection		-	
0020 – 0040	X2	4.4 – 5.3 (0.5 – 0.6)	-	-
0020 – 0080	X2	13.3 – 15.0 (1.5 – 1.7)	-	-
	All modules (exception below)			
	DC link connection		PE connection	
	X4	26.6 – 35.4 (3.0 – 4.0)		26.6 – 35.4 (3.0 – 4.0)
DC link connection				
MDP90A-1100	X4B	97.4 – 106.2 (11.0 – 12.0)	-	-
MDA90A-1400 – 1800	X4	97.4 – 106.2 (11.0 – 12.0)	-	-

4.15.2 Short Circuit Current Rating

Suitable for use on a circuit capable of delivering not more than

- 5000/10000/65000 rms symmetrical amperes when protected by fuses and circuit breakers as described in the tables below.

Max. voltage is limited to 500 V.

4.15.3 Branch Circuit Protection

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.

Power supply module MDP90A-..	**SCCR: 5 kA/500 V**		**SCCR: 65 kA/500 V**		
	when protected by:				
	Non semiconductor fuses (currents are maximum values)	**Inverse-time circuit breaker (currents are maximum values)**	**Non semiconductor fuses (currents are maximum values)**	**Inverse-time circuit breaker (currents are maximum values)**	**Type E Combination Motor Controller**
0100 (size 1)	20 A/600 V Class: K5	20 A/500 V min.	20 A/600 V Class: CA, CB, CC, CD, CF, G, J, K1, K5, T	20 A/500 V min.	Siemens Sirius 3RV2011-4AA10 (11 – 16 A)
0100 (size 1A)	20 A/600 V Class: K5	20 A/500 V min.	20 A/600 V Class: K5	20 A/500 V min.	Siemens Sirius 3RV2011-4AA10 (11 – 16 A)
0250	50 A/600 V Class: K5	50 A/500 V min.	50 A/600 V Class: K1	50 A/500 V min.	Siemens Sirius 3RV1031-4HA10 (40 – 50 A)
Power supply module MDP90A-..	**SCCR: 10 kA/500 V**		**SCCR: 65 kA/500 V**		
	when protected by:				
	Non semiconductor fuses (currents are maximum values)	**Inverse-time circuit breaker (currents are maximum values)**	**Non semiconductor fuses (currents are maximum values)**	**Inverse-time circuit breaker (currents are maximum values)**	**Type E Combination Motor Controller**
0500 (size 3)	100 A/600 V Class: K1	100 A/500 V min.	100 A/600 V Class: K1	100 A/500 V min.	
0750 (size 3)	150 A/600 V Class: J, T	150 A/500 V min	150 A/600 V Class: J, T	150 A/500 V min.	
1100 (size 4)	200 A/600 V Class: J, T	200 A/500 V min.	200 A/600 V Class: J, T	200 A/500 V min.	

- If you use cable cross sections that are dimensioned for a smaller current than the rated current of the unit, make sure that the fuse is dimensioned for the used cable cross section.
- For information on selecting cable cross sections, refer to the project planning manual.
- Comply with the country-specific installation regulations in addition to the above notes.
- Single- and double-axis modules are intended for installation with the supply modules.
- Accessory Model MDM90A is intended for use with the drive system MOVIDRIVE®.

4.15.4 Motor Overload Protection

The units are provided with load and speed-sensitive overload protection and thermal memory retention upon shutdown or power loss.

The trip current is adjusted to 150 % of the rated motor current.

4.15.5 Ambient Temperature

The units are suitable for an ambient temperature of 45 °C.

INFORMATION

UL certification does not apply to operation in voltage supply systems without earthed star point (IT systems).

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5 Startup

5.1 General

⚠ DANGER

Uncovered power connections.

Severe or fatal injuries from electric shock.

- Install the touch guards at the modules, see chapter "Covers" (→ 🗎 62).
- Install the closing covers according to the regulations, see chapter "Covers" (→ 🗎 62).
- Never start up the application inverter without installed closed touch guards and closing covers.

5.1.1 Lifting applications

⚠ WARNING

Danger of fatal injury if the hoist falls.

Severe or fatal injuries.

- The application inverter is not designed for use as a safety device in lifting applications. Use monitoring systems or mechanical protection devices to ensure safety.

5.1.2 Connecting power

NOTICE

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

Irreparable damage to the application inverter or unforeseeable malfunctions.

The specified times and intervals must be observed.

- After disconnection from the supply system, observe a minimum switch-off time of 10 s.
- Do **not** turn the power of the supply system on or off **more than once per minute**.

5.1.3 Connecting cables

NOTICE

Disconnecting lines under voltage.

Irreparable damage to the application inverter or unforeseeable malfunctions.

- The following plug-in connections must always be disconnected in a de-energized state: Motor, grid, braking resistor, brake, encoder, connection, energy storage unit, connection discharge unit.

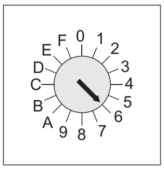
5.2 Assigning the EtherCAT®/SBus^{PLUS} address at the axis module

There are 2 hexadecimal address switches S1 and S2 installed in each axis module to set the EtherCAT®/SBus^{PLUS} address. For information on the installation position of the switches, refer to chapter . Use these address switches to set a decimal address between 1 and 255.

The following table lists example settings for the address switches.

Required address, decimal	**Address, hexadecimal**	**Setting S1 (× 16)**	**Setting S2 (× 1)**
3	03	0	3
18	12	1	2
25	19	1	9
100	64	6	4
110	6E	6	E
255	FF	F	F

S1 address switch



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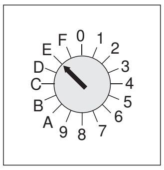
S2 address switch



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The EtherCAT®/SBus^{PLUS} address "110" is set as an example in the illustration above.

The setting at the single-axis module is identical to the setting at the double-axis module.

5.3 Startup requirements

The following requirements apply to startup:

- You have installed the device correctly both mechanically and electrically.
- The device and connected devices have been configured correctly.
- Safety measures prevent accidental startup of the drive.
- Safety measures prevent danger to persons or machines.

Required hardware components:

- PC or laptop with Ethernet interface.
- Commercially available Ethernet cable for connection between PC and MOVI-C® CONTROLLER.
- MOVI-C® CONTROLLER with completed startup

Required software:

- MOVISUITE® standard engineering software from SEW-EURODRIVE.

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5.4 Startup procedure

The application inverters are put into operation using the MOVISUITE® engineering software from SEW-EURODRIVE.

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The startup is functionally divided into segments. The following steps illustrate in exemplary fashion the startup procedure for an application inverter.

Drive train segment

Drive train	Configuring drive trains.

Interfaces segment

Inputs/outputs	• Basic unit • I/O card
Setpoints	• Process data • PO data • Setpoint buffer • Fixed setpoints • Control word 1 – 3
Actual values	• PI data • Status word 1 – 3

Drive functions	• FCB 01 Output stage inhibit • FCB 05 Speed control • FCB 06 Interpolated speed control • FCB 08 Interpolated torque control • FCB 09 Positioning • FCB 10 Interpolated position control • FCB 12 Reference travel • FCB 08 Rotor position identification • FCB 20 Jog mode • FCB 21 Brake test • FCB 26 Stop at user limit
Monitoring functions	• Reference signals 1 • Reference signals 2 • Limit values 1 • Limit values 2 • Control functions 1 • Monitoring functions 2 • Output stage
Advanced functions	• Parameter set • Auto reset • Standby mode • Touchprobe 1 • Touchprobe 2 • Cam switch

Functions segment

Device data	• Device identification • Main component • Subcomponents • Production data
Overview of fault responses	• Axis module • Power supply monitoring • Functions
Setup	• Permissions • Reset device parameters • Select memory source

Information on the application inverter

Default	Basic settings of the installed interfaces • Basic unit • Encoder 1

Optional	Basic settings of the options • Fieldbus • I/O card • Encoder 2 • MOVISAFE® CS..

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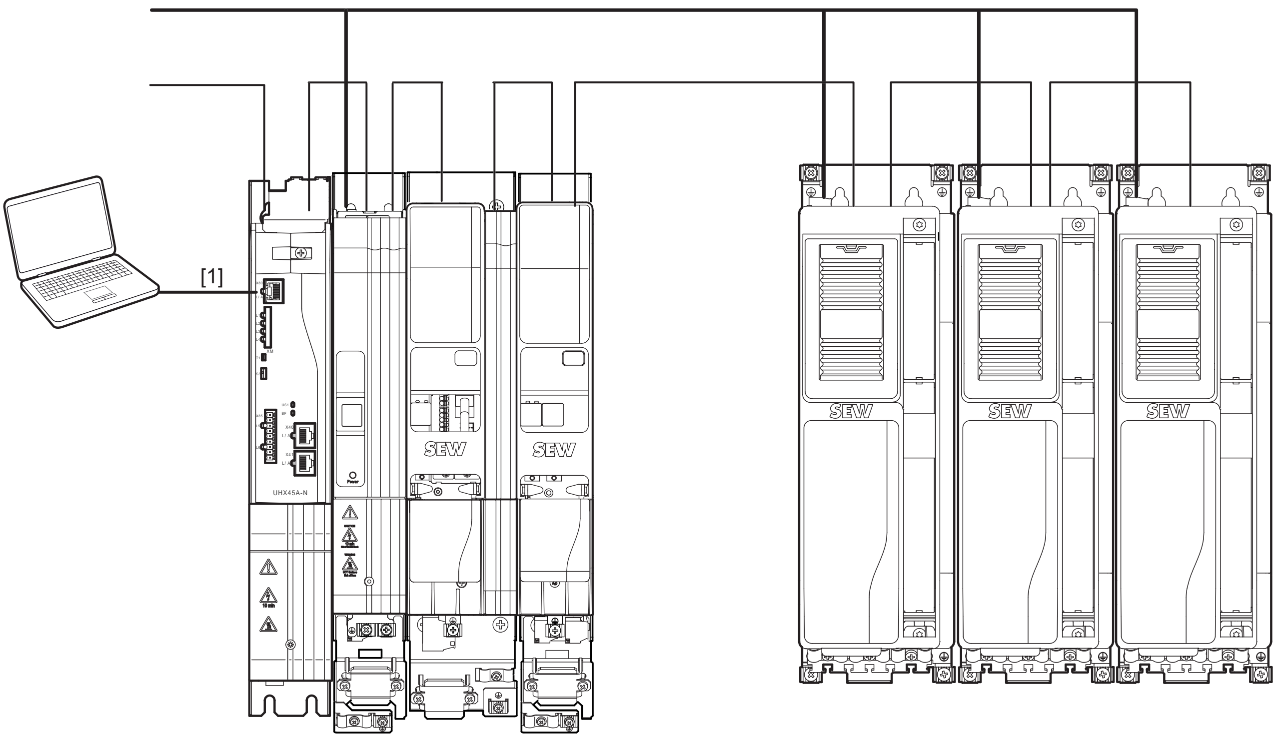
5.4.1 Check list for startup

The following checklist lists the necessary steps for complete startup.

Step	Startup step	Done
1	Motor installation	
2	Install MOVI-C® component	
3	Start MOVISUITE®	
4	Start up the drive train	
5	Parameterize setpoints and FCBs	
6	Configure digital inputs and outputs	
7	Configure PD	
8	Configure software module (MOVIKIT®)	
9	Test drives/application	

5.5 Connection to the engineering software

The following figure shows the connection of the application inverter to the MOVISUITE® engineering software using a PC.



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[1] Ethernet

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6 Operation

6.1 General information

⚠ DANGER

Dangerous voltages present at cables and motor terminals.

Severe or fatal injuries from electric shock.

- Dangerous voltages are present at the output terminals and the cables and motor terminals connected to them when the device is switched on. This also applies even when the device is inhibited and the motor is at standstill.
- Check whether the device is disconnected from the power supply before you start working on the power connections.
- After disconnection from the power supply, wait at least 10 minutes and ensure that there is no voltage present before you start working on the power connections.
- The fact that the operation LEDs are no longer illuminated does not indicate that the application inverter no longer carries any voltage.
- Observe the general safety notes in chapter Safety notes.

⚠ DANGER

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Ensure that the motor cannot start inadvertently, for example, by removing the electronics terminal block X20.
- Additional safety precautions must be taken, depending on the application, to avoid injury to personnel and damage to machinery.

NOTICE

Switching the motor output at the application inverter with enabled output stage.

Damage to the application inverter.

- The motor output of the application inverter may be switched or disconnected only when the output stage is inhibited.

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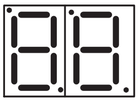
6.2 7-segment display

6.2.1 Operating displays



- The two 7-segment displays indicate the operating state of the power supply modules and axis modules.
- The displays for the axis modules and the power supply modules are therefore described separately.

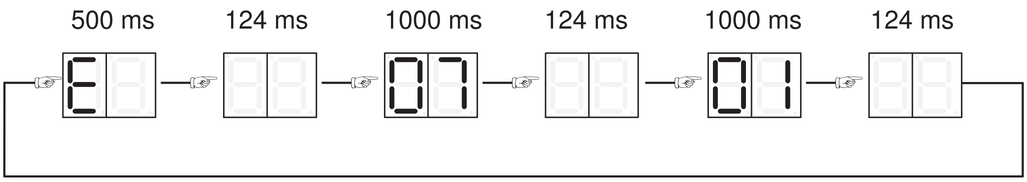
6.2.2 Fault display

The application inverter detects any faults that occur and displays them as fault code. Each fault is clearly defined by its fault code and corresponding attributes, as shown below:

- Fault response
- Final state after executing the fault response
- Type of reset response.

The fault codes are indicated as flashing numeric values in the axis and power supply module.

The fault code is displayed in the following display sequence:



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In the example, a 2-digit fault code with subfault is shown at the axis module, fault 07.01 in this example.

Fault display at the double-axis module

The double-axis module has one two-digit 7-segment display for each of the two integrated axes. They are located horizontally next to each other. The left display applies to axis 1, the right one to axis 2.

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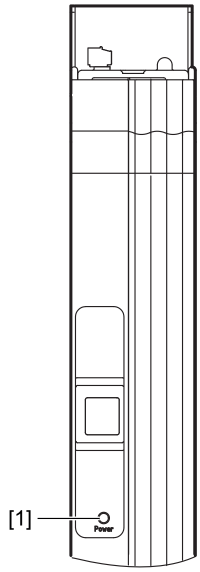
6.3 Operating displays

6.3.1 Operating states of the power supply module – 7-segment display

Display	Description	State	Comment/action
Displays in normal operation			
rd	Ready for operation (ready).	No fault/warning: U_z ≥ 100 V.	Only status display.
Display	**Description**	**State**	**Comment/action**
Displays of different device statuses			
00	DC link voltage is below 100 V.	24 V backup mode	Check the supply system.

6.3.2 Operating displays of the power supply module – LED displays



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- LED display [1] off: DC link voltage V_{DCL} < DC 60 V
- LED display [1] is illuminated: DC link voltage V_{DCL} > DC 60

6.3.3 Operating displays of the axis module – 7-segment display

Display	Description	State	Comment / action
Displays during boot process			
b0 nF nc nH rF -b rb b3 br	Device passes through several states when loading the firmware (boot) in order to become ready for operation.	• Status: Not ready. • Output stage is inhibited. • No communication possible.	• Waiting for boot process to finish. • Device stays in this condition: Device is defective.
Display	**Description**	**State**	**Comment / action**
Displays of different device statuses			
00	DC link voltage is below 100 V.	24 V backup mode	Check the supply system.
.	Energy-saving mode		Energy-saving mode active.
C0 Flashing	Module bus is not ready		Check the module bus connection.

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Display	Description	State	Comment / action
C1 Flashing	Startup state		Startup state is active.
C2 Flashing	STO active		The function Safe Torque Off is active.
C3 Flashing	Synchronization with bus is incorrect. Process data processing not available.		• Check the bus connection. • Check synchronization setting at device and controller. • Check process data settings at device and controller.
C4 Flashing	The encoder evaluation is not ready.		• Encoders are being initialized. • Device stays in this condition: – No encoder selected. – "Source actual speed" or "Actual position" parameter shows an encoder that does not exist.
C5 Flashing	Motor management is not ready.		The motor control system is not ready.
C6 Flashing	Internal device supply incomplete.		• Supply voltage fault of SMPS • 24 V supply not ready.
C7 Flashing	Power section not ready		The power section is not ready.
C8 Flashing	External device not ready.		The message "Not ready" was detected at the digital input.
C9 Flashing	Data flexibilization layer not ready		Flexibility level is not ready yet.
Cd Flashing	Parameter download running.		One parameter set is being downloaded.
Display	**Description**	**State**	**Comment / action**
Displays during initialization processes (parameters will be reset to default values)			
d0 Flashing	Basic initialization.	• Status: Not ready. • Output stage is inhibited. • Communication is possible.	Waiting for initialization to finish.
d1 Flashing	Initialization at delivery state.		
Display	**Description**	**State**	**Comment / action**
Displays in normal operation			
01	Output stage inhibited	• Output stage is inhibited.	The drive is not actuated by the output stage. Brake is applied. The motor coasts without brake. This FCB is permanently selected with terminal DI00. But it can be selected by other sources.

Display	Description	State	Comment / action
02	Stop default	For further information, refer to the FCB description.	Drive function (FCB) "Default stop" active, if not other FCB is selected and the system is "ready".
04	Manual mode		Manual mode active
05	Speed control		Speed control with internal ramp generator.
06	Interpolated speed control		Speed control with setpoints cyclically via bus. The ramp generator is located externally, e.g. in the higher-level controller.
07	Torque control		Torque control
08	Interpolated torque control		Torque control with setpoints cyclically via bus.
09	Position control		Positioning mode with internal ramp generator.
10	Interpolated positioning control		Positioning mode with setpoints cyclically via bus. The ramp generator is located externally, e.g. in the higher-level controller.
12	Reference travel		The drive performs reference travel.
13	Stop at application limits		Deceleration at the application limit. This FCB also becomes active if no other FCB is selected as default FCB.
14	Emergency stop		Deceleration at emergency stop limit.
18	Rotor position identification		Encoder commutation for synchronous motors.
19	Position hold control		Position control on current position.
20	Jog		Jog mode active.
21	Brake test		Brake is tested by applying torque while brake is closed.
25	Motor parameter measurement		Motor parameter measurement active
26	Stop at user limits		Serves to stop at user limits.

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6.4 Faults at the power supply module

6.4.1 Fault 49 Power supply module

Subfault: 49.1 **Description: Unknown supply unit**		
	Response: Remote – critical fault	
	Cause	Measure
	Failed to identify supply unit.	Contact SEW-EURODRIVE Service.
Subfault: 49.2 **Description: EEPROM memory – hardware faulty**		
	Response: Remote – critical fault	
	Cause	Measure
	EEPROM cannot be read; initialization error.	Contact SEW-EURODRIVE Service.
Subfault: 49.3 **Description: Internal voltage supply**		
	Response: Remote – critical fault	
	Cause	Measure
	At least one internal supply voltage is faulty.	Switch the power off and on again. Contact SEW-EURODRIVE Service if the error is still present.
Subfault: 49.4 **Description: DC 24 V supply voltage**		
	Response: Remote – critical fault	
	Cause	Measure
	24 V supply below min. specified 24 V input voltage.	Check the 24 V supply, switch power supply off and on again. Contact SEW-EURODRIVE Service if the error is still present.
Subfault: 49.5 **Description: Fault in hardware component of analog to digital conversion.**		
	Response: Remote – critical fault	
	Cause	Measure
	Measured DC link values outside valid range, or voltage supply of transducers defective.	Contact SEW-EURODRIVE Service.
Subfault: 49.6 **Description: CRC error – power section data**		
	Response: Remote – critical fault	
	Cause	Measure
	Device not calibrated yet.	Contact SEW-EURODRIVE Service.
	Initialization error.	Contact SEW-EURODRIVE Service.
Subfault: 49.7 **Description: EEPROM data error**		
	Response: Remote – critical fault	
	Cause	Measure
	Calibration data not plausible.	Contact SEW-EURODRIVE Service.
Subfault: 49.8 **Description: DC link overvoltage**		
	Response: Remote – critical fault	
	Cause	Measure
	Maximum permitted DC link voltage limit exceeded.	– Check brake chopper function, braking resistor, and regenerative energy. – Check project planning of the axis system.
Subfault: 49.9 **Description: DC link overcurrent**		
	Response: Remote – critical fault	
	Cause	Measure
	DC link current too high in motor or generator mode.	– Motoring operation: load too high / check project planning. – Regenerative operation: Braking resistance too low-impedance or short circuit in braking resistor.

Cause	Measure
Subfault: 49.10 **Description: Brake chopper short circuit**	
Response: Remote – critical fault	
Cause	**Measure**
A failed brake chopper was detected in the device. For devices with half-controlled bridge, the thyristors are inhibited.	– Check brake chopper circuit connections --> Switch the power off and on again. – If the fault is still present, replace the device. Contact SEW-EURODRIVE Service.
Subfault: 49.11 **Description: Collector emitter voltage monitoring**	
Response: Remote – critical fault	
Cause	**Measure**
Voltage supply for brake chopper defective.	Check the connection of the braking resistor.
UCE monitoring of brake chopper trips.	Switch the power off and on again. Contact SEW-EURODRIVE Service if the error is still present.
Short circuit in braking resistor.	Check braking resistor and supply cable.
Too much regenerative power.	Check the project planning for the axis system.
Subfault: 49.12 **Description: Temperature sensor (internal) defective**	
Response: Remote – critical fault	
Cause	**Measure**
Temperature sensor does not respond (e.g. wire break).	Contact SEW-EURODRIVE Service.
Subfault: 49.13 **Description: Overtemperature 105%**	
Response: Remote – critical fault	
Cause	**Measure**
Maximum permitted heat sink temperature exceeded.	Check the project planning and installation of the axis system. Contact SEW-EURODRIVE Service.
Subfault: 49.14 **Description: Temperature evaluation defective**	
Response: Remote – critical fault	
Cause	**Measure**
Failed to transfer temperature signals.	Contact SEW-EURODRIVE Service.
Subfault: 49.15 **Description: Capacity utilization 105%**	
Response: Remote – critical fault	
Cause	**Measure**
Electromechanical utilization of > 105% detected by I2xT model.	– Check the project planning and installation of the axis system. – Contact SEW-EURODRIVE Service.
Subfault: 49.16 **Description: Braking resistor temperature monitoring**	
Response: Remote – critical fault	
Cause	**Measure**
– Monitoring of the external braking resistor has tripped. – The temperature of the externally connected braking resistor is too high.	Check the project planning for the axis system.
Incorrect wiring.	Check the installation of the braking resistor.
Subfault: 49.17 **Description: Internal braking resistor utilization 105%**	
Response: Remote – critical fault	
Cause	**Measure**
Utilization of internal braking resistor reached switch-off threshold of > 105%.	Check the project planning and installation of the axis system.

Subfault: 49.18 **Description: Internal device temperature**		
	Response: Remote – critical fault	
	Cause	Measure
	Impermissible high device temperature.	– Clarify the temperature condition of the axis system. – Check ventilation of the control cabinet. – Check mounting position, fan function. – Check heat sink and fan for dirt and clean them.
Subfault: 49.19 **Description: External fault**		
	Response: Remote – critical fault	
	Cause	Measure
	Another module bus station requested external emergency shutdown.	Eliminate emergency shutdown condition at the module bus station.
Subfault: 49.20 **Description: Utilization 100%**		
	Response: Remote – standard fault	
	Cause	Measure
	Electromechanical utilization of > 100% detected by I2xT model.	– Check the project planning and installation of the axis system. – Contact SEW-EURODRIVE Service.
Subfault: 49.21 **Description: Internal braking resistor utilization 100%**		
	Response: Remote – standard fault	
	Cause	Measure
	Utilization of internal braking resistor reached switch-off threshold of > 100%.	Check the braking resistor installation and the project planning of the axis system. – Contact SEW-EURODRIVE Service.
Subfault: 49.22 **Description: Overtemperature 100%**		
	Response: Remote – standard fault	
	Cause	Measure
	Permitted heat sink temperature exceeded.	– Check mounting position and fan function. – Check heat sink and fan for dirt and clean them. – Check the project planning and installation of the axis system.
Subfault: 49.23 **Description: Module bus timeout**		
	Response: Remote – standard fault	
	Cause	Measure
	Slave does not receive telegrams.	Check the module bus cable.
Subfault: 49.24 **Description: Module bus initialization**		
	Response: Remote – warning	
	Cause	Measure
	Module bus system not yet initialized.	Check the module bus cable.
Subfault: 49.25 **Description: Module bus CRC error**		
	Response: Remote – standard fault	
	Cause	Measure
	CRC error	Check the module bus cable.
Subfault: 49.26 **Description: Module bus station error**		
	Response: Remote – warning	
	Cause	Measure
	More than 15 module bus stations (axes) connected to module bus master.	Connect a maximum of 15 module bus stations.

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Subfault: 49.27 Description: Fan function fault		
	Response: Remote – warning	
	Cause	Measure
	One of the fans not connected or blocked mechanically.	– Check the fan plug connector. – Check the fan for mechanical blockage. – Replace the fan.
Subfault: 49.28 Description: Temperature prewarning		
	Response: Remote – warning	
	Cause	Measure
	Temperature of heat sink reached prewarning threshold.	– Check mounting position and fan function. – Check heat sink and fan for dirt and clean them. – Check the project planning and installation of the axis system.
Subfault: 49.29 Description: Utilization prewarning		
	Response: Remote – warning	
	Cause	Measure
	Electromechanical utilization greater than electromechanical utilization of prewarning threshold detected by I2xT model.	Check the project planning and installation of the axis system.
Subfault: 49.30 Description: Internal braking resistor utilization prewarning		
	Response: Remote – warning	
	Cause	Measure
	Utilization of internal braking resistor reached prewarning threshold.	Check the connection and project planning of the braking resistor.
Subfault: 49.31 Description: Braking resistor connection monitoring		
	Response: Remote – warning	
	Cause	Measure
	Connection monitoring has not detected a connected braking resistor.	Check the connection of the braking resistor.
	Connected braking resistor not within configured range.	Check the connection and project planning of the braking resistor.
	Short circuit in braking resistor.	Check the connection of the braking resistor.
Subfault: 49.32 Description: Thermal overload of additional capacity		
	Response: Remote – warning	
	Cause	Measure
	Additional capacity at full thermal capacity. Braking resistor converters regenerative energy into heat.	Check device utilization and project planning.

6.5 Faults at the single-axis module/double-axis module

6.5.1 Fault 1 Output stage monitoring

Subfault: 1.1 Description: Short circuit in motor output terminals		
	Response: Output stage inhibit	
	Cause	Measure
	Overcurrent in output stage or faulty output stage control detected, and output stage inhibited by hardware.	Possible causes for overcurrent are short circuit at the output, excessive motor current, or a defective power output stage.
Subfault: 1.2 Description: Overcurrent in output stage		
	Response: Output stage inhibit	
	Cause	Measure
	Motor current too high.	Connect a smaller motor.
	Current supply	Check the current supply.
	Current transformer	Check the current transformer.
	Ramp limit deactivated and set ramp time too short.	Increase the ramp time.
	Phase module defective.	Check the phase module.
	DC 24 V supply voltage unstable.	Check the DC 24 V supply voltage.
	Interruption or short circuit on signal lines of phase modules.	Check the signal lines.

6.5.2 Fault 3 Ground fault

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

6.5.3 Fault 4 Brake chopper

Subfault: 4.1 Description: Brake chopper overcurrent		
	Response: Output stage inhibit	
	Cause	Measure
	Excessive regenerative power.	Extend the deceleration ramps.
	Short circuit detected in braking resistor circuit.	Check the supply cable to the braking resistor.
	Braking resistance too high.	Check the technical data of the braking resistor.
Subfault: 4.2 Description: Brake chopper defective		
	Response: Output stage inhibit	
	Cause	Measure
	Output stage of brake chopper defective.	Replace the defective brake chopper.

6.5.4 Fault 6 Line fault

Subfault: 6.1 Description: Line phase failure		
	Response: Line phase failure	
	Cause	Measure
	Missing line phase detected.	Check the supply system cable.
	DC link voltage periodically too low.	Check the configuration of the supply system.
	Inadequate line voltage quality.	Check the supply (fuses, contactor).

6.5.5 Fault 7 DC link

Subfault: 7.1 Description: DC link overvoltage	
Response: Output stage inhibit	
Cause	Measure
Maximum permitted DC link voltage limit exceeded and output stage inhibited by hardware.	– Extend the deceleration ramps. – Check the supply cable to the braking resistor. – Check the technical data of the braking resistor.

6.5.6 Fault 8 Speed monitoring

Subfault: 8.1 Description: Speed monitoring – motor mode	
Response: Output stage inhibit	
Cause	Measure
Speed controller operates at setting limit (mechanical overload or phase failure in supply system or motor).	Increase the delay time set for speed monitoring, or reduce the load.
Encoder not connected correctly.	Check the encoder connection and direction of rotation. If necessary, increase the current limiting or reduce the acceleration values.
Encoder has incorrect direction of rotation.	– Check encoder connection and direction of rotation. If necessary, increase current limiting or reduce acceleration values. – Check motor lead and motor, check line phases.
Subfault: 8.2 Description: Speed monitoring – generator mode	
Response: Output stage inhibit	
Cause	Measure
Speed controller operates at setting limit (mechanical overload or phase failure in supply system or motor).	Increase the delay time set for speed monitoring, or reduce the regenerative load.
Encoder not connected correctly.	Check the encoder connection and direction of rotation. If necessary, increase the current limiting or reduce the deceleration values.
Encoder has incorrect direction of rotation.	– Check the encoder connection and direction of rotation. If necessary, increase the current limiting or reduce the deceleration values. – Check motor cable and motor. Check the line phases.
Subfault: 8.3 Description: Maximum speed at motor shaft	
Response: Output stage inhibit	
Cause	Measure
Actual speed exceeded "Maximum speed at motor shaft" limit value (index 8360.9 / 8361.9). This limit value is set at startup matching the motor and gear unit.	Reduce the maximum speed.

6.5.7 Fault 9 Control mode

Subfault: 9.1 Description: Magnetization of motor not possible	
Response: Output stage inhibit	
Cause	Measure
The user-defined current limit or output stage monitoring have reduced the possible maximum current to such a degree that the required magnetizing current cannot be set.	– Reduce the output stage utilization, e.g. by reducing the PWM frequency or reducing the load. – Increase the user-defined current limit.
Subfault: 9.2 Description: Requested operating mode not possible with active control mode	
Response: Output stage inhibit	
Cause	Measure
The current FCB activated an operating mode. The active control mode does not support this operating mode, for example "position control" or "torque control" with U/f control mode.	Start up control mode that supports the required operating mode. Connect an encoder if necessary. Select an operating mode that is supported by the current control mode.

Subfault: 9.3 Description: Absolute rotor position not available		
	Response: Output stage inhibit	
	Cause	Measure
	The current control mode requires an absolute rotor position. The encoder selected for "Source of actual speed" does not provide an absolute rotor position.	Use an absolute encoder, or identify the rotor position using FCB 18.
Subfault: 9.4 Description: Correct current supply of motor not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Failed to set required current during premagnetization.	Check the cabling, or disable the function "Current monitoring during premagnetization".
Subfault: 9.5 Description: Maximum output frequency exceeded		
	Response: Output stage inhibit	
	Cause	Measure
	Maximum output frequency exceeded.	Reduce the maximum speed.
Subfault: 9.6 Description: Maximum model speed exceeded		
	Response: Output stage inhibit	
	Cause	Measure
	Speed of drive calculated in ELSM® control mode too high for motor control.	If possible, minimize the "Speed/position controller sampling cycle", or reduce the speed.
Subfault: 9.8 Description: Flux model error		
	Response: Output stage inhibit	
	Cause	Measure
	Rotor flux calculated by motor model not plausible, or calculated internal voltage too small.	– Check configuration data. – Check motor data. – Check machine: Idle state or speed too low. – Check the connection cable between inverter and motor. – Contact SEW-EURODRIVE Service.
Subfault: 9.9 Description: Parameter measurement not possible with active motor type		
	Response: Output stage inhibit	
	Cause	Measure
	Parameter measurement is possible only with "asynchronous" and "synchronous" motor types. No magnetic reluctance motors and LSPM motors.	Select the correct motor type.
Subfault: 9.10 Description: Rotor stall monitoring		
	Response: Output stage inhibit	
	Cause	Measure
	The current control cannot hold the load torque. The deviation between stationary setpoint voltage and actual voltage is too large.	Reduce the load torque (hoist) in the controlled system.
Subfault: 9.11 Description: Standstill current function		
	Response: Output stage inhibit	
	Cause	Measure
	With the ELSM method, the standstill current function is possible only in combination with rotor position measurement.	– Enable rotor position measurement. – Check motor data.

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6.5.8 Fault 10 Data Flexibility

Subfault: 10.1
Description: Initialization

Response: Application stop + output stage inhibit

Cause	Measure
Init task error.	The init task has issued a return code ! = 0. Check the program.

Subfault: 10.2
Description: Illegal operation code

Response: Application stop + output stage inhibit

Cause	Measure
Illegal opcode in Data Flexibility program.	Contact SEW-EURODRIVE Service.

Subfault: 10.3
Description: Memory access

Response: Application stop + output stage inhibit

Cause	Measure
Memory area violated while accessing array.	For example, an array access results in writing beyond the permitted memory range. Check the program.

Subfault: 10.4
Description: Stack

Response: Application stop + output stage inhibit

Cause	Measure
Overflow of Data Flexibility stack detected.	Check the program.

Subfault: 10.5
Description: Division by 0

Response: Application stop + output stage inhibit

Cause	Measure
Division by 0.	Check the program.

Subfault: 10.6
Description: Runtime

Response: Application stop + output stage inhibit

Cause	Measure
Runtime error/watchdog	Check the program. The program execution time exceeds the permitted time.
PDI or PDO tasks.	Check the program. The execution time of the PDI or PDO task exceeds the permitted time.

Subfault: 10.7
Description: Calculation result of multiplication/division command too large

Response: Application stop + output stage inhibit

Cause	Measure
Calculation result of multiplication/division command exceeds 32 bits.	Check the program.
Failed to write calculation result of multiplication/division command into result variable.	Check the program.

Subfault: 10.8
Description: Illegal connection

Response: Application stop + output stage inhibit

Cause	Measure
Index used in connect not allowed.	Check the program. The index used either does not exist or is not permitted for access via process data – see parameter list.

Subfault: 10.9
Description: CRC code

Response: Application stop + output stage inhibit

Cause	Measure
Wrong CRC checksum of code.	Load the program again. The program memory is corrupt. Unauthorized write access to the program memory.

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Subfault: 10.10 Description: Setpoint cycle time not supported		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Non-supported setpoint cycle time parameterized.	Set the setpoint cycle time to the default value 1 ms.
Subfault: 10.11 Description: No application program loaded		
	Response: Output stage inhibit	
	Cause	Measure
	No Data Flexibility application program loaded.	Load the program or disable Data Flexibility.
Subfault: 10.99 Description: Unknown error		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Unknown Data Flexibility error.	Contact SEW-EURODRIVE Service.

6.5.9 Fault 11 Temperature monitoring

Subfault: 11.1 Description: Heat sink overtemperature		
	Response: Output stage inhibit	
	Cause	Measure
	Maximum permitted heat sink temperature exceeded. The capacity utilization is possibly too high.	– Reduce the load. – Reduce the rms value of the current. – Reduce the PWM frequency. – Ensure sufficient cooling. – Reduce the ambient temperature.
Subfault: 11.2 Description: Heat sink utilization – prewarning		
	Response: Heat sink utilization – prewarning	
	Cause	Measure
	High thermal load on heat sink of device, and prewarning threshold reached.	– Reduce the load. – Reduce the rms value of the output current. – Reduce the PWM frequency. – Ensure sufficient cooling. – Reduce the ambient temperature.
Subfault: 11.3 Description: Device utilization		
	Response: Output stage inhibit	
	Cause	Measure
	The temperature has reached or exceeded the switch-off threshold. Possible causes: Mean output current too high.	Reduce the load.
	PWM frequency too high.	Reduce the PWM frequency.
	Ambient temperature too high.	Ensure sufficient cooling.
	Unfavorable air convection.	Check air convection.
	Fan defective.	Check the fan and replace if necessary.
Subfault: 11.5 Description: Electromechanical utilization		
	Response: Output stage inhibit	
	Cause	Measure
	Electromechanical components of device overloaded by excessive continuous current.	Reduce the load. If necessary, reduce the rms value of the current.
Subfault: 11.6 Description: Electromechanical utilization – prewarning		
	Response: Electromechanical utilization – prewarning	
	Cause	Measure
	High load on electromechanical components of device due to high continuous current. Prewarning threshold reached.	– Reduce the load. – Reduce the PWM frequency. – Reduce the rms value of the current. – Reduce the ambient temperature.

Subfault: 11.7 Description: Wire break at temperature sensor of heat sink		
	Response: Output stage inhibit	
	Cause	Measure
	Wire break at temperature sensor of heat sink.	Contact SEW-EURODRIVE Service.
Subfault: 11.8 Description: Short circuit at temperature sensor of heat sink		
	Response: Output stage inhibit	
	Cause	Measure
	Short circuit at temperature sensor of heat sink.	Contact SEW-EURODRIVE Service.

6.5.10 Fault 12 Brake

Subfault: 12.1 Description: Brake output		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	No brake connected.	Check the connection of the brake.
	Brake cable disconnected in switched-on state.	Check the connection of the brake.
	Overload due to overcurrent > 2 A	Check the sequential profile of brake control.
	Overload due to excessive connection (> 0.5 Hz)	Check the sequential profile of brake control.
	Monitoring works only with parameter setting "Brake installed" and "Brake applied".	Make sure that the connected brake is permitted.
Subfault: 12.2 Description: DC 24 V brake voltage		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	DC 24 V supply voltage not within permitted tolerance of ± 10%.	Check the DC 24 V supply voltage.
	Monitoring is only active with parameter settings “Brake installed” and “Brake applied”.	Check the parameter setting.

6.5.11 Error 13 encoder 1 fault

Subfault: 13.1 Description: Position comparison check		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Faulty comparison between raw position and track counter of absolute encoders.	– Check the track signal wiring. – Check interference sources (e.g. from the area of EMC). – Replace encoder. – Replace the card. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.2 Description: Unknown encoder type		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder type not known and not supported by device.	– Check the encoder type. – Contact SEW-EURODRIVE Service. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

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Subfault: 13.3 Description: Invalid data	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Invalid encoder nameplate data (measuring steps/pulses per revolution/multi-turn).	– Check the startup parameters. – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.4 Description: Track measurement error	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Error during track measurement.	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from EMC). – Check the encoder. Replace if necessary. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.5 Description: Internal warning	
Response: Encoder – warning	
Cause	Measure
Encoder signaled warning.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Clean the sensor.
Subfault: 13.6 Description: Signal level too low	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Vector below permitted limit during signal level monitoring.	– Check the wiring. – Check interference sources (e.g. from the area of EMC). – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.7 Description: Signal level too high	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Vector exceeds permitted limit during signal level monitoring.	Check the gear ratio of the resolver in use. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.8 Description: Signal level monitoring	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Vector exceeds permitted limit during signal level monitoring.	Check the resolver mounting position. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.9 Description: Quadrant check	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Error checking quadrants (sine encoder).	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from the area of EMC). – Check the encoder. Replace if necessary. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.10 Description: Position tolerance range monitoring		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Position outside tolerance range.	– Check the startup parameters. – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.11 Description: Data timeout		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder process data timeout.	– Check interference sources (e.g. from the area of EMC). – Check the startup parameters. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.12 Description: Emergency		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder signaled emergency.	– Check interference sources (e.g. from the area of EMC). – Check the startup parameters. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.13 Description: Error during initialization		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Communication error during initialization.	– Check parameterization. – Check baud rate. – Ensure that the CANopen interface on the encoder (Node ID) is correctly adjusted. – Check the wiring. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.14 Description: Communication		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Faulty communication with encoder.	– Check the voltage supply. – Check interference sources (e.g. from the area of EMC). – Check the wiring. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.15 **Description: System error**		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	System error while evaluating encoder.	– Ensure that the multi-turn encoder is within the configured path range. – Check the limits. – Check for correct settings of encoder numerator/denominator factors. – Check interference sources (e.g. from the area of EMC). – Check the startup parameters. – Switch the device off and on again. – If the fault occurs repeatedly, contact SEW-EURODRIVE Service. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.16 **Description: Permanent high level in data line – critical**		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.17 **Description: Permanent high level in data line**		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.18 **Description: Permanent low level in data line – critical**		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Permanent low level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.19 **Description: Permanent low level in data line**		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Permanent low level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.20 **Description: SSI error bit – critical**		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error bit set in SSI protocol.	– Check the startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.

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Subfault: 13.21 Description: SSI error bit		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Error bit set in SSI protocol.	– Check the startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.
Subfault: 13.22 Description: Internal fault – critical		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.23 Description: Internal fault		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.24 Description: Travel range exceeded		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Current position mode (index 8381.10) does not allow for larger travel range.	Check travel range. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.25 Description: Error during encoder startup		
	Response: Output stage inhibit	
	Cause	Measure
	Fatal error during encoder startup.	Switch the device off and on again. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.26 Description: Digital motor integration fault – critical		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder of "Digital motor integration" signaled a component fault.	– Check interference sources. – Replace encoder.
Subfault: 13.27 Description: Digital motor integration fault		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Encoder of "Digital motor integration" signaled a component fault.	– Check interference sources – Replace encoder.

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

6.5.12 Fault 14 Encoder 2

Subfault: 14.1 **Description: Position comparison check**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Faulty comparison between raw position and track counter of absolute encoders.	– Check the track signal wiring. – Check interference sources (e.g. from the area of EMC). – Replace encoder. – Replace the card. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.2 **Description: Unknown encoder type**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder type not known and not supported by device.	– Check the encoder type. – Contact SEW-EURODRIVE Service. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.3 **Description: Invalid data**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Invalid encoder nameplate data (measuring steps/pulses per revolution/multi-turn).	– Check the startup parameters. – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.4 **Description: Track measurement error**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error during track measurement.	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from the area of EMC). – Check the encoder. Replace if necessary. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.5 **Description: Internal warning**		
	Response: Encoder – warning	
	Cause	Measure
	Encoder signaled warning.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Clean the sensor.

Subfault: 14.6 Description: Signal level too low		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Vector below permitted limit during signal level monitoring.	– Check the wiring. – Check interference sources (e.g. from the area of EMC). – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.7 Description: Signal level too high		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Vector exceeds permitted limit during signal level monitoring.	Check the gear ratio of the resolver in use. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.8 Description: Signal level monitoring		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Vector below permitted limit during signal level monitoring.	Check the resolver mounting position. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.9 Description: Quadrant check		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error checking quadrants (sine encoder).	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from the area of EMC). – Check the encoder. Replace if necessary. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.10 Description: Position tolerance range monitoring		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Position outside tolerance range.	– Check the startup parameters. – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.11 Description: Data timeout		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder process data timeout.	– Check interference sources (e.g. from the area of EMC). – Check the startup parameters. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 14.12 **Description: Emergency**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder signaled emergency.	– Check interference sources (e.g. from the area of EMC). – Check the startup parameters. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.13 **Description: Error during initialization**		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Communication error during initialization.	– Check parameterization. – Check baud rate. – Ensure that the CANopen interface on the encoder (Node ID) is correctly adjusted. – Check the wiring. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.14 **Description: Communication**		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Faulty communication with encoder.	– Check the voltage supply. – Check interference sources (e.g. from the area of EMC). – Check the wiring. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.15 **Description: System error**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	System error while evaluating encoder.	– Make sure that the multi-turn encoder is within the configured track area. – Check the limits. – Check for correct settings of encoder numerator/denominator factors. – Check interference sources (e.g. from the area of EMC). – Check the startup parameters. – Switch the device off and on again. – If the fault occurs repeatedly, contact SEW-EURODRIVE Service. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.16 **Description: Permanent high level in data line – critical**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.17 **Description: Permanent high level in data line**		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 14.18		
Description: Permanent low level in data line – critical		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Permanent low level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.19 **Description: Permanent low level in data line**		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Permanent low level of data signal.	– Check the wiring. – Check the encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.20 **Description: SSI error bit – critical**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error bit set in SSI protocol.	– Check the startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.
Subfault: 14.21 **Description: SSI error bit**		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Error bit set in SSI protocol.	– Check the startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.
Subfault: 14.22 **Description: Internal fault – critical**		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.23 **Description: Internal fault**		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 14.24 Description: Travel range exceeded	
Response: Encoder 2 – latest fault	
Cause	Measure
Current position mode (index 8381.10) does not allow for larger travel range.	Check travel range. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 14.25 Description: Error during encoder startup	
Response: Output stage inhibit	
Cause	Measure
Fatal error during encoder startup.	Switch the device off and on again. Note: In "Emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

6.5.13 Fault 16 Startup

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

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

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

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

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

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

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

Subfault: 16.9 **Description: Temperature sensor motor 2**		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty startup of temperature sensor of motor 2.	Perform startup again.
Subfault: 16.10 **Description: Actual position source not assigned**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Active control mode requires an encoder for position mode.	– Assign actual position source in encoder assignment of the active drive train (Index 8565.3 or 8566.3). – If no encoder is installed, activate the FCBs only using "torque control" or "speed control" operating mode.
Subfault: 16.11 **Description: Motor data calculation error**		
	Response: Output stage inhibit	
	Cause	Measure
	Motor startup not possible because of inconsistent motor data or wrong device configuration data.	Check the motor data for plausibility, or contact SEW-EURODRIVE Service.
Subfault: 16.12 **Description: Motor data write sequence**		
	Response: Output stage inhibit	
	Cause	Measure
	Subindex 1 not written to zero before writing electrical startup parameters (index 8357, 8360, 8394, 8420 or 8358, 8361, 8395, 8421).	Reset the fault. Set parameters 8360/1 or 8361/1 to "0" before writing additional parameters.
Subfault: 16.20 **Description: Nominal speed too high or nominal frequency too low**		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Nominal speed too high or nominal frequency too low. The resulting number of pole pairs is 0.	Enter plausible motor data (nominal speed and nominal frequency).
Subfault: 16.21 **Description: Nominal slip negative**		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data, the calculated nominal slip is negative: Nominal frequency too low, or nominal speed too high, or number of pole pairs too high.	Enter plausible motor data (nominal frequency, nominal speed, number of pole pairs).
Subfault: 16.22 **Description: Specify the number of pole pairs**		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: It is not possible to calculate the number of pole pairs accurately from nominal frequency and nominal speed.	Enter the number of pole pairs.
Subfault: 16.23 **Description: Plausibility check failed**		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: The estimated nominal power does not match the entered nominal power.	Check entered nameplate data for plausibility.
Subfault: 16.24 **Description: Speed controller sampling cycle not possible with current PWM frequency or current control mode**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	At a PWM frequency of "2.5 kHz", only the speed controller sampling cycle of 2 ms is permitted. For the ELSM® control mode, the only permitted speed controller sampling cycles are 1 ms and 2 ms.	Increase PWM frequency or increase sampling cycle of speed controller to 2 ms. Set the sampling cycle to 1 ms or 2 ms for ELSM® control mode.

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Subfault: 16.25 **Description: User-defined current limit too low for standstill current**		
	Response: Output stage inhibit	
	Cause	Measure
	User-defined current limit value too small for minimum standstill current.	Increase the user-defined current limit, or disable the standstill current function.
Subfault: 16.26 **Description: Nominal values incomplete or implausible**		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Nominal voltage, nominal current, nominal speed or nominal torque are not entered or are not plausible.	Enter or check nominal voltage, nominal current, nominal speed, and nominal torque.
Subfault: 16.27 **Description: Maximum current or maximum torque not plausible**		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Maximum current or maximum torque not entered, or maximum current and maximum torque not plausible.	Check the maximum current and maximum torque.
Subfault: 16.30 **Description: Faulty EtherCAT® EEPROM configuration state**		
	Response: Warning	
	Cause	Measure
	Faulty EtherCAT®/SBus^{PLUS} EEPROM configuration status. EEPROM not loaded; binary file not loaded.	Contact SEW-EURODRIVE Service.
	Faulty EEPROM loading procedure.	Contact SEW-EURODRIVE Service.
	Faulty EEPROM checksum.	Contact SEW-EURODRIVE Service.

6.5.14 Fault 17 Internal processor fault

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

6.5.15 Fault 18 Software error

Subfault: 18.1 **Description: Motor management**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Error detected at motor management interface.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.
Subfault: 18.3 **Description: Task system warning**		
	Response: Warning	
	Cause	Measure
	Error while processing internal task system. This may be a timeout for cyclical tasks, for example.	– Acknowledge the warning. – Contact SEW-EURODRIVE Service if the warning occurs regularly.
Subfault: 18.4 **Description: Task system**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	A fault was detected during the processing of the internal task system. This may be a timeout for cyclical tasks, for example.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.

Subfault: 18.7 Description: Fatal error	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
Fatal software error.	– Switch the device off and on again. – If the fault occurs repeatedly, replace the device and send it together with the fault number to SEW-EURODRIVE. For further support, contact SEW-EURODRIVE Service.
Subfault: 18.8 Description: Invalid fault code	
Response: Output stage inhibit	
Cause	Measure
Invalid fault code requested.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.
Subfault: 18.9 Description: Internal software error	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
The software reports an unexpected event.	– Switch the device off and on again. – If the fault occurs repeatedly, replace the device and send it together with the fault number to SEW-EURODRIVE. For further support, contact SEW-EURODRIVE Service.
Subfault: 18.10 Description: Watchdog	
Response: Output stage inhibit	
Cause	Measure
Software no longer operates within intended cycle time.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.
Subfault: 18.12 Description: Configuration data	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
Configuration data not plausible or cannot be interpreted by active firmware version.	Update the firmware or load valid configuration data.
Subfault: 18.13 Description: Calibration data	
Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
Cause	Measure
Calibration data not plausible.	Load valid calibration data.

6.5.16 Fault 19 Process data

Subfault: 19.1 Description: Torque setpoint violation	
Response: Application stop + output stage inhibit	
Cause	Measure
Implausible values specified as torque setpoints.	Adjust torque setpoints.
Subfault: 19.2 Description: Position setpoint violation	
Response: Application stop + output stage inhibit	
Cause	Measure
Position setpoint outside software limit switches.	Check the position setpoint.
Position setpoint outside modulo range.	Check position setpoint.
Position in user unit generates number overflow in the system unit.	Check the position in user unit.

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Subfault: 19.3 **Description: Speed setpoint violation**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Specified rotational speed setpoints not plausible.	Adjust rotational speed setpoints.
Subfault: 19.4 **Description: Acceleration setpoint violation**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The specified acceleration setpoints are not plausible. Only a value range of >= 0 is permitted.	Adjust acceleration setpoints.
Subfault: 19.5 **Description: Drive function does not exist**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Non-existing drive function (FCB) selected via process data.	Specify an existing FCB number for FCB activation via process data.
Subfault: 19.6 **Description: Mass moment of inertia setpoint violation**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Implausible values specified as mass moment of inertia setpoints. Only a value range of >= 0 is permitted.	Adjust the setpoints for the mass moment of inertia.
Subfault: 19.7 **Description: Referencing missing**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Activated function permitted only with referenced encoder.	Reference the encoder first, then activate the function.
Subfault: 19.8 **Description: Drive train changeover not allowed**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Drive train changeover requested while output stage is enabled.	Inhibit the output stage before changing to another drive train.
Subfault: 19.9 **Description: Jerk setpoint violation**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Jerk values not plausible.	Adjust jerk setpoints.

6.5.17 Fault 20 Device monitoring

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

Subfault: 20.2 Description: Supply voltage overload		
	Response: Output stage inhibit	
	Cause	Measure
	For MOVIDRIVE® system, the current load of the current paths of the DC 24 V standby supply voltage inside the device is too high. The device signal output of the device was de-energized because of the fault message.	Identify the consumer that is overloading the internal supply voltage: 1) Remove all external consumers: – At the digital outputs of the basic device. – At options that may be present. – At all encoder connections. – At other consumers at the DC 24 V output voltage terminals. 2) Acknowledge the fault. 3) Reconnect the consumers with the device, one after the other, until the fault message appears once again. 4) To eliminate the fault, connect a consumer with a lower current consumption or eliminate the short circuit.
Subfault: 20.7 Description: Internal hardware fault		
	Response: Output stage inhibit	
	Cause	Measure
	Fault in the device hardware.	– Acknowledge the fault. – If the fault occurs repeatedly, replace the device. For further support, contact SEW-EURODRIVE Service.
Subfault: 20.8 Description: Fan warning		
	Response: Warning with self-reset	
	Cause	Measure
	Fan function impaired.	Check the fan for proper functioning.
Subfault: 20.9 Description: Fan fault		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Fan defective.	Contact SEW-EURODRIVE Service.
Subfault: 20.10 Description: Fan supply voltage fault		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Supply voltage of fan missing.	Check the connection or establish a connection.
Subfault: 20.11 Description: STO – switching delay		
	Response: Output stage inhibit	
	Cause	Measure
	Switching delay between STO signals F-STO_P1 and F-STO_P2.	– Check the STO wiring. – Check the STO wiring before acknowledging the fault, and make sure that both STO signals are switched to low level.

6.5.18 Fault 21 Digital motor integration 1

Subfault: 21.1 Description: Communication error		
	Response: Output stage inhibit	
	Cause	Measure
	Communication error detected on the interface of the "digital motor integration".	Check the cabling.
Subfault: 21.2 Description: Slave required		
	Response: Output stage inhibit	
	Cause	Measure
	Device started up with a drive with "digital motor integration" but no drive with "Digital motor integration" is connected.	Connect a drive with "digital motor integration" matching startup, or perform a new startup.

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Subfault: 21.3 Description: Incompatible driving motor		
	Response: Output stage inhibit	
	Cause	Measure
	Connected drive not compatible with started-up drive.	Connect a drive that matches startup, or perform a new startup.
Subfault: 21.4 Description: Invalid label		
	Response: Output stage inhibit	
	Cause	Measure
	The connected drive contains invalid data.	Replace the drive.
Subfault: 21.5 Description: Incompatible slave		
	Response: Output stage inhibit	
	Cause	Measure
	The connected slave of "digital motor integration" cannot be used with this inverter firmware.	Update inverter or slave.
Subfault: 21.6 Description: Overload/short circuit on the interface		
	Response: Output stage inhibit	
	Cause	Measure
	Short circuit in the cabling of components of "Digital motor integration"	Check the cabling of the component of "digital motor integration".
	Voltage of "Digital motor integration" component too low.	Check the voltage supply of the component.

6.5.19 Fault 22 Digital motor integration 2

Subfault: 22.1 Description: Communication error		
	Response: Output stage inhibit	
	Cause	Measure
	Communication error detected on the interface of the "digital motor integration".	Check the cabling.
Subfault: 22.2 Description: Slave required		
	Response: Output stage inhibit	
	Cause	Measure
	Device started up with a drive with "digital motor integration" but no drive with "Digital motor integration" is connected.	Connect a drive with "digital motor integration" matching startup, or perform a new startup.
Subfault: 22.3 Description: Incompatible driving motor		
	Response: Output stage inhibit	
	Cause	Measure
	Connected drive not compatible with started-up drive.	Connect a drive that matches startup, or perform a new startup.
Subfault: 22.4 Description: Invalid label		
	Response: Output stage inhibit	
	Cause	Measure
	The connected drive contains invalid data.	Replace the drive.
Subfault: 22.5 Description: Incompatible slave		
	Response: Output stage inhibit	
	Cause	Measure
	The connected slave of "digital motor integration" cannot be used with this inverter firmware.	Update inverter or slave.

Subfault: 22.6 Description: Overload/short circuit on the interface		
	Response: Output stage inhibit	
	Cause	Measure
	Short circuit in the cabling of components of "Digital motor integration"	Check the cabling of the "Digital motor integration" component.
	Voltage of "Digital motor integration" component too low.	Check the voltage supply of the component.

6.5.20 Fault 23 Power section

Subfault: 23.1 Description: Warning		
	Response: Warning with self-reset	
	Cause	Measure
	Power section fault with fault response of the type "Warning".	See also "Power section subcomponent" fault status.
Subfault: 23.2 Description: Fault		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Power section fault with fault response of the type "Standard".	See also "Power section subcomponent" fault status.
Subfault: 23.3 Description: Critical fault		
	Response: Output stage inhibit	
	Cause	Measure
	Power section fault with fault response of the type "Critical fault".	See also "Power section subcomponent" fault status.
Subfault: 23.4 Description: Hardware fault		
	Response: Output stage inhibit	
	Cause	Measure
	A fault occurred in a hardware component of the power section, e.g.: Overcurrent hardware comparator.	– Check the current supply. – Increase the ramp time. – Check for correct motor size (the motor current is too high). – Contact SEW-EURODRIVE Service.
	Switched-mode power supply fault, hardware fault.	– Check the current supply. – Check the DC 24 V supply voltage.
	Fault at the gate driver of an IGBT.	Defect in the power output stage. Contact SEW-EURODRIVE Service.
	Invalid process data configuration. Status of control section and power section are not compatible.	Contact SEW-EURODRIVE Service.
Subfault: 23.5 Description: Invalid process data configuration		
	Response: Output stage inhibit	
	Cause	Measure
	Invalid process data configuration.	Contact SEW-EURODRIVE Service.
Subfault: 23.6 Description: Process data timeout		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Power section communication interface detected process data timeout.	If the fault occurs repeatedly, contact SEW-EURODRIVE Service.
Subfault: 23.7 Description: Parameter communication timeout		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Power section communication interface detected timeout in parameter communication.	If the fault occurs repeatedly, contact SEW-EURODRIVE Service.

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Subfault: 23.8 Description: Parameter communication error		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Power section communication interface detected error in parameter communication.	If the fault occurs repeatedly, contact SEW-EURODRIVE Service.
Subfault: 23.9 Description: Firmware of power section corrupt		
	Response: Output stage inhibit	
	Cause	Measure
	Failed to update firmware on power section.	Update the firmware again.

6.5.21 Error 24 Cam switch

Subfault: 24.1 Description: Cam window limits interchanged		
	Response: Warning	
	Cause	Measure
	Left cam window limit larger than right limit.	Check cam window limits and adjust.
Subfault: 24.2 Description: Cam window limit not within modulo range		
	Response: Warning	
	Cause	Measure
	Cam window limits outside modulo range.	Check cam window limits and adjust.
Subfault: 24.3 Description: Cam windows of a track overlap		
	Response: Warning	
	Cause	Measure
	Cam window limits of a track overlap.	Adjust the cam window limits in such a way that they are flush.
Subfault: 24.4 Description: Modulo limits swapped		
	Response: Warning	
	Cause	Measure
	The left limit of the modulo range is larger than the right limit.	Check the limits of the modulo range and adjust accordingly.

6.5.22 Fault 25 Parameter memory monitoring

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

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Subfault: 25.6 Description: Incompatible device configuration	
Response: Output stage inhibit	
Cause	Measure
The data set in the device was copied from another device, which differs from the current device in the device family, power, or voltage.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
Replaceable memory module used by another device. Power rating, device family, or voltage differs from the current device.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
The power section was replaced and differs in its power rating or voltage from the original power section.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
Subfault: 25.7 Description: NV memory initialization – error	
Response: Output stage inhibit	
Cause	Measure
Error initializing non-volatile memory system.	– Reset the device. – If this error occurs repeatedly, replace the device. Contact SEW-EURODRIVE Service.
Subfault: 25.10 Description: Power section configuration data – version conflict	
Response: Output stage inhibit	
Cause	Measure
Wrong version of configuration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.12 Description: Power section configuration data – CRC error	
Response: Output stage inhibit	
Cause	Measure
Faulty configuration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.13 Description: Control electronics configuration data – CRC error	
Response: Output stage inhibit	
Cause	Measure
Faulty configuration data of control electronics.	Contact SEW-EURODRIVE Service.
Subfault: 25.14 Description: Calibration data of power section – version conflict	
Response: Output stage inhibit	
Cause	Measure
Wrong version of calibration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.15 Description: Calibration data of control electronics – version conflict	
Response: Output stage inhibit	
Cause	Measure
Wrong version of calibration data of control electronics.	Contact SEW-EURODRIVE Service.
Subfault: 25.16 Description: Power section calibration data – CRC error	
Response: Output stage inhibit	
Cause	Measure
Faulty calibration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.17 Description: Control electronics calibration data – CRC error	
Response: Output stage inhibit	
Cause	Measure
Faulty calibration data of control electronics.	Contact SEW-EURODRIVE Service.

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Subfault: 25.18 **Description: Power section QA data – CRC error**		
	Response: Warning	
	Cause	Measure
	Faulty quality assurance data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.19 **Description: Control electronics QA data – CRC error**		
	Response: Warning	
	Cause	Measure
	Faulty quality assurance data of control electronics.	Contact SEW-EURODRIVE Service.
Subfault: 25.20 **Description: Initialization error – basic device memory**		
	Response: Output stage inhibit	
	Cause	Measure
	Initialization error of the basic device memory.	Contact SEW-EURODRIVE Service.
Subfault: 25.21 **Description: Runtime error – basic device memory**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Runtime error in memory of basic device.	Contact SEW-EURODRIVE Service.
Subfault: 25.30 **Description: Initialization error – replaceable memory module**		
	Response: Output stage inhibit	
	Cause	Measure
	The formatting of the replaceable memory module does not match.	Restore delivery state. NOTICE: All the data on the replaceable memory module will be reset to default.
	Initialization error of replaceable memory module after delivery state.	Contact SEW-EURODRIVE Service.
Subfault: 25.31 **Description: Runtime error – replaceable memory module**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Runtime error of replaceable memory module.	Contact SEW-EURODRIVE Service.
Subfault: 25.50 **Description: Runtime error – replaceable safety memory module**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Runtime error of the replaceable safety memory module.	Contact SEW-EURODRIVE Service.
Subfault: 25.51 **Description: Initialization error – replaceable safety memory module**		
	Response: Warning	
	Cause	Measure
	Initialization error of the replaceable safety memory module.	Contact SEW-EURODRIVE Service.
Subfault: 25.61 **Description: Failure – restore point**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Failed to create restore point.	Delete restore point.
Subfault: 25.70 **Description: Incompatible card configuration**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The current configuration of the cards does not match the state of the stored startup. For example, a card was removed that was still present during startup.	– Restore the original configuration of the cards. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".

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6.5.23 Fault 26 External fault

Subfault: 26.1 **Description: Terminal**		
	Response: External fault	
	Cause	Measure
	Fault message about external fault source.	Programmable via 8622.5 (default: application stop (with output stage inhibit)).
Subfault: 26.2 **Description: Emergency shutdown**		
	Response: Output stage inhibit	
	Cause	Measure
	Another module bus station requested external emergency shutdown.	Check other module bus stations for faults.
Subfault: 26.3 **Description: Power section emergency shutdown**		
	Response: Output stage inhibit	
	Cause	Measure
	Power section requested external emergency shutdown because it detected critical fault.	Contact SEW-EURODRIVE Service.
Subfault: 26.4 **Description: External braking resistor fault**		
	Response: Response to external braking resistor fault	
	Cause	Measure
	External braking resistor's temperature switch connected to terminal tripped.	– Check the resistor mounting position. – Clean the resistor. – Check the configuration of the resistor. – Install a larger resistor. – Check the trip switch settings. – Optimize the travel cycle so that less regenerative operation energy arises.

6.5.24 Fault 28 FCB drive functions

Subfault: 28.1 **Description: FCB 11/12 – Timeout while searching zero pulse**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Failed to find zero pulse of encoder's C track within specified search time during reference travel.	Check the encoder wiring.
Subfault: 28.2 **Description: FCB 11/12 – Hardware limit switch upstream of reference cam**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The hardware limit switch was reached during reference travel. The reference cam was not detected.	Make sure that the reference cam is not installed downstream of the hardware limit switch.
Subfault: 28.3 **Description: FCB 11/12 – Hardware limit switch and reference cam not flush**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Hardware limit switch and reference cam not mounted flush.	Make sure that the reference cam and the hardware limit switch are mounted flush.
Subfault: 28.4 **Description: FCB 11/12 – Reference offset error**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Error when determining reference offset.	– Make sure that the reference offset is not set to a larger value than the "Modulo maximum" limit value. When using a single-turn absolute encoder, make sure that the reference offset is not set to a larger value than one encoder revolution.

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Subfault: 28.5 Description: FCB 11/12 – Referencing not possible		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	In the active drive train, the "Actual position source" parameter is set to "No encoder".	Assign "Actual position source", or do not perform any referencing.
Subfault: 28.6 Description: FCB 11/12 – Limit switch/reference cam not flush/overlapping with fixed stop		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Hardware limit switch or reference cam that has not been selected was approached during reference travel to fixed stop.	Check whether the parameters set for reference travel are correct.
	During reference travel to fixed stop with selected hardware limit switch or reference cam, the fixed stop was reached without approaching the hardware limit switch or reference cam.	Check whether the parameters set for reference travel are correct.
Subfault: 28.7 Description: FCB 21 – Test torque greater than maximum torque at motor shaft		
	Response: Output stage inhibit	
	Cause	Measure
	The required test torque for the brake test is higher than the maximum torque. It cannot be generated by the motor/inverter combination.	Reduce the test torque.
Subfault: 28.8 Description: FCB 21 – Test torque not reached		
	Response: Output stage inhibit	
	Cause	Measure
	Test torque required for brake test exceeds valid limit values.	– Reduce the test torque. – Check limit values.
Subfault: 28.9 Description: FCB 18 – Rotor position identification not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Rotor position identification started with incremental encoder but aborted prematurely.	– Restart the rotor position identification. – Check whether the encoder is connected correctly. – Check whether the encoder is defective.
	Result of rotor position identification cannot be stored in encoder.	Select "Inverter" as storage location.
	Combination of "Automatic" mode and "Encoder" storage location not permitted.	Set the operating mode to "Manual" or the storage location to "Inverter".
Subfault: 28.10 Description: FCB 25 – Unbalanced motor phases		
	Response: Output stage inhibit	
	Cause	Measure
	Significantly different values determined in the three phases while measuring stator resistances.	– Check whether the motor is connected correctly. – Check all contact points on the motor and inverter. – Check the motor and motor cable for damage.
Subfault: 28.11 Description: FCB 25 – At least one phase with high resistance		
	Response: Output stage inhibit	
	Cause	Measure
	At least one motor phase could not be measured during motor parameter measurement.	– Check whether the motor is connected correctly. – Check all contact points on the motor and inverter. – Check the motor and motor cable for damage.
Subfault: 28.12 Description: FCB 25 – Timeout during stator resistance measurement		
	Response: Output stage inhibit	
	Cause	Measure
	Motor parameter measurement activated while motor is turning.	– Stop motor. – Start motor parameter measurement when the motor is at standstill.

Subfault: 28.13 Description: FCB 25 – Characteristic curve identification not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Motor parameter measurement does not allow for unique identification of the characteristic curve.	Contact SEW-EURODRIVE Service.
Subfault: 28.14 Description: Modulo min. and max. swapped		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	In the active data set, the value for "Modulo minimum" is greater than the value for "Modulo maximum"; see Monitoring functions\Limit values 1 or Monitoring functions\Limit values 2.	Swap the values for modulo minimum and modulo maximum.
Subfault: 28.15 Description: FCB 25 – Timeout		
	Response: Output stage inhibit	
	Cause	Measure
	Measuring rotor resistance, LSigma, or stator inductance not completed.	Contact SEW-EURODRIVE Service.

6.5.25 Fault 29 HW limit switches

Subfault: 29.1 Description: Positive limit switch approached		
	Response: HW limit switch – current drive train	
	Cause	Measure
	Positive hardware limit switch approached.	– Check hardware limit switch wiring. – Check target position. – Move clear of the hardware limit switch at negative speed.
Subfault: 29.2 Description: Negative limit switch approached		
	Response: HW limit switch – current drive train	
	Cause	Measure
	Negative hardware limit switch approached.	– Check hardware limit switch wiring. – Check target position. – Move clear of the hardware limit switch at positive speed.
Subfault: 29.3 Description: Limit switch missing		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Both positive and negative hardware limit switches approached at the same time.	– Check hardware limit switch wiring. – Check the parameter setting of digital inputs. – Check the parameter setting of process output data.
Subfault: 29.4 Description: Limit switches swapped		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Positive hardware limit switch approached at negative speed, or negative hardware limit switch approached at positive speed.	Check whether hardware limit switch connections are swapped.

6.5.26 Fault 30 Software limit switches

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

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Subfault: 30.2
Description: Negative limit switch approached

Response: SW limit switches – current drive train

Cause	Measure
Negative software limit switch approached.	– Check software limit switch position. – Check target position. – Move clear of software limit switch at positive speed.

Subfault: 30.3
Description: Limit switches swapped

Response: Emergency stop + output stage inhibit

Cause	Measure
Position value of negative software limit switch greater than position value of positive software limit switch.	Check software limit switch positions.

6.5.27 Fault 31 Thermal motor protection

Subfault: 31.1
Description: Temperature sensor wire break – motor 1

Response: Application stop + output stage inhibit

Cause	Measure
Connection to temperature sensor of motor 1 interrupted.	Check the temperature sensor wiring.

Subfault: 31.2
Description: Temperature sensor short circuit – motor 1

Response: Application stop + output stage inhibit

Cause	Measure
Short circuit in connection with temperature sensor of motor 1.	Check the temperature sensor wiring.

Subfault: 31.3
Description: Temperature sensor overtemperature – motor 1

Response: Output stage inhibit

Cause	Measure
Temperature sensor of motor 1 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).

Subfault: 31.4
Description: Temperature model overtemperature – motor 1

Response: Output stage inhibit

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

Subfault: 31.5
Description: Temperature sensor prewarning – motor 1

Response: Thermal motor protection 1 – prewarning threshold

Cause	Measure
Temperature signaled by temperature sensor of motor 1 exceeds prewarning threshold.	Check for motor overload.

Subfault: 31.6
Description: Temperature model prewarning – motor 1

Response: Thermal motor protection 1 – prewarning threshold

Cause	Measure
Temperature signaled by temperature model of motor 1 exceeds prewarning threshold.	Check for motor overload.

Subfault: 31.7
Description: UL temperature monitoring

Response: Output stage inhibit

Cause	Measure
Temperature model of active motor signals overtemperature.	Check for motor overload.

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Subfault: 31.8 **Description: Communication timeout temperature sensor – motor 1**		
	Response: Output stage inhibit	
	Cause	Measure
	Communication with temperature sensor is disrupted, e.g. via MOVILINK® DDI.	Check the cabling.
Subfault: 31.9 **Description: Temperature too low – temperature sensor – motor 1**		
	Response: Warning with self-reset	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 1 below -50 °C.	– Check if a KTY temperature sensor is installed in the motor but the parameterization has been carried out for a Pt1000 temperature sensor. – Heat the motor.
Subfault: 31.11 **Description: Temperature sensor wire break – motor 2**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Connection to temperature sensor of motor 2 interrupted.	Check the temperature sensor wiring.
Subfault: 31.12 **Description: Temperature sensor short circuit – motor 2**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Short circuit in connection with temperature sensor of motor 2.	Check the temperature sensor wiring.
Subfault: 31.13 **Description: Temperature sensor overtemperature – motor 2**		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature sensor of motor 2 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).
Subfault: 31.14 **Description: Temperature model overtemperature – motor 2**		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of motor 2 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).
Subfault: 31.15 **Description: Temperature sensor prewarning – motor 2**		
	Response: Thermal motor protection 2 – prewarning threshold	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 2 exceeds prewarning threshold.	Check for motor overload.
Subfault: 31.16 **Description: Temperature model prewarning – motor 2**		
	Response: Thermal motor protection 2 – prewarning threshold	
	Cause	Measure
	Temperature signaled by temperature model of motor 2 exceeds prewarning threshold.	Check for motor overload.
Subfault: 31.19 **Description: Temperature too low – temperature sensor – motor 2**		
	Response: Warning with self-reset	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 2 below -50 °C.	– Check if a KTY temperature sensor is installed in the motor but the parameterization has been carried out for a Pt1000 temperature sensor. – Heat the motor.

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6.5.28 Fault 32 Communication

Subfault: 32.2
Description: EtherCAT®/SBus^PLUS process data timeout

Response: Fieldbus – timeout response

Cause	Measure
Process data timeout during EtherCAT®/SBus^PLUS communication.	– Check the wiring of the system bus and module bus. – Check that the EtherCAT®/SBus^PLUS configuration is set correctly in the MOVI-C® CONTROLLER. – Check the EtherCAT®/SBus^PLUS timeout configuration in the device.

Subfault: 32.3
Description: Faulty synchronization signal

Response: External synchronization

Cause	Measure
Faulty synchronization signal period.	Check for correct setting of the EtherCAT®/SBus^PLUS configuration in the MOVI-C® CONTROLLER.

Subfault: 32.4
Description: No synchronization signal

Response: External synchronization

Cause	Measure
No synchronization signal present.	Check for correct setting of the EtherCAT®/SBus^PLUS configuration in the MOVI-C® CONTROLLER.

Subfault: 32.5
Description: Synchronization timeout

Response: External synchronization

Cause	Measure
Timeout while synchronizing to synchronization signal.	Check for correct setting of the EtherCAT®/SBus^PLUS configuration in the MOVI-C® CONTROLLER.

Subfault: 32.6
Description: Copy parameter set

Response: Output stage inhibit

Cause	Measure
Error while downloading parameter set to device.	– Check the wiring of the system bus and module bus. – Restart download.

Subfault: 32.7
Description: Application heartbeat timeout

Response: Application heartbeat – timeout response

Cause	Measure
Communication interrupted between IEC program in MOVI-C® CONTROLLER and device.	– Check the status of the IEC program. – Restart the IEC program.

Subfault: 32.8
Description: User-timeout timeout

Response: User timeout timeout response

Cause	Measure
The timeout time of the user timeout function elapsed	Write the parameter for triggering the user timeout function cyclically before the timeout time elapses.

Subfault: 32.12
Description: Manual mode timeout

Response: Manual mode – timeout response

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

6.5.29 Fault 33 System initialization

Subfault: 33.1 **Description: Motor current measurement**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Motor current measurement detected an error.	Contact SEW-EURODRIVE Service.
Subfault: 33.2 **Description: Firmware CRC check**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Error checking firmware.	Contact SEW-EURODRIVE Service.
Subfault: 33.6 **Description: FPGA configuration**		
	Response: Output stage inhibit	
	Cause	Measure
	Error checking FPGA configuration.	Contact SEW-EURODRIVE Service.
Subfault: 33.7 **Description: Function block compatibility error**		
	Response: Output stage inhibit	
	Cause	Measure
	Error checking compatibility of function block.	Contact SEW-EURODRIVE Service.
Subfault: 33.8 **Description: SW function block configuration**		
	Response: Output stage inhibit	
	Cause	Measure
	Error detected while checking configuration of software function block.	Contact SEW-EURODRIVE Service.
Subfault: 33.10 **Description: Run-up timeout**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Timeout during system run-up.	Contact SEW-EURODRIVE Service.
Subfault: 33.11 **Description: Hardware compatibility error**		
	Response: Output stage inhibit	
	Cause	Measure
	Firmware does not match device.	Contact SEW-EURODRIVE Service.
Subfault: 33.12 **Description: Memory module plugged in**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	A plugged-in memory module was detected during device start. The setting for the device parameter source is set to "Internal memory".	– Switch off the device. Remove the memory module and restart the device. – Change the parameter "Non-volatile memory source" to "Arbitrary" or "Replaceable memory module". Switch the device off and on again.
Subfault: 33.13 **Description: Memory module removed**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	The device was started without a memory module. The setting for the device parameter source is set to "Replaceable memory module".	Switch off the device. Insert the memory module and restart the device.
	Replaceable memory module removed during ongoing operation.	Change the parameter "Non-volatile memory source" to "Internal memory". Switch the device off and on again.

Subfault: 33.14 Description: EtherCAT® slave controller cannot be accessed		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	EtherCAT® slave controller cannot be accessed.	Contact SEW-EURODRIVE Service.
Subfault: 33.15 Description: Firmware configuration		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	The Device Update Manager detected a modified version of the application firmware.	Acknowledge the fault. Doing so will update the configuration data of the Device Update Manager.
	The error occurs repeatedly several times. The Device Update Manager is outdated and cannot save the configuration.	Update the Device Update Manager.

6.5.30 Fault 34 Process data configuration

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

6.5.31 Fault 35 Function activation

Subfault: 35.1 Description: Activation key – application level invalid		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The activation key was entered incorrectly.	Enter the activation key again.
	The activation key was not created for this device.	Check the activation key.
	When using a double axis, the activation key for the wrong instance was entered in the device.	Enter the activation key for the allocated instance.
	An activation key for a technology level was entered in the parameter "Application level – Activation key".	Enter the activation key in the correct parameter.
Subfault: 35.2 Description: Application level too low		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The activated software module requires a higher application level.	Enter an activation key for the required application level. You can find the required level in the parameter 8438.3 "Application level – Required level".
Subfault: 35.3 Description: Technology level too low		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	An activated technology function requires a higher technology level.	Enter an activation key for the required technology level. You can find the required level in the parameter 8438.13 "Technology level – Required level".

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

6.5.32 Fault 42 Lag error

Subfault: 42.1 Description: Positioning lag error		
	Response: Positioning lag error	
	Cause	Measure
	A lag error occurred during positioning. Incorrect encoder connection.	Check the connection of the encoder.
	Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
	Wiring faulty.	Check the wiring of encoder, motor, and line phases.
	Acceleration ramps too short.	Extend the acceleration ramps.
	P component of the position controller too small.	Set P component of the position controller to a larger value.
	Speed controller parameters set incorrectly.	Check controller parameters.
	Value of lag error tolerance too small.	Increase the lag error tolerance.
	Mechanical components cannot move freely or are blocked.	Make sure mechanical parts can move freely, and check whether they are blocked.
Subfault: 42.2 Description: Jog mode lag error		
	Response: Output stage inhibit	
	Cause	Measure
	A lag error occurred in jog mode (FCB 20). Incorrect encoder connection.	Check the connection of the encoder.
	Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
	Wiring faulty.	Check the wiring of encoder, motor, and line phases.
	Acceleration ramps too short.	Extend the acceleration ramps.
	P component of the position controller too small.	Set P component of the position controller to a larger value.
	Speed controller parameters set incorrectly.	Check controller parameters.
	Value of lag error tolerance too small.	Increase the lag error tolerance.
	Mechanical components cannot move freely or are blocked.	Make sure mechanical parts can move freely, and check whether they are blocked.
Subfault: 42.3 Description: Standard lag error		
	Response: Output stage inhibit	
	Cause	Measure
	A lag error has occurred outside a positioning process. Incorrect encoder connection.	Check the connection of the encoder.
	Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
	Wiring faulty.	Check the wiring of encoder, motor, and line phases.
	Acceleration ramps too short.	Extend the acceleration ramps.
	P component of the position controller too small.	Set P component of the position controller to a larger value.
	Speed controller parameters set incorrectly.	Check controller parameters.
	Value of lag error tolerance too small.	Increase the lag error tolerance.

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6.5.33 Fault 46 Safety card

Subfault: 46.1
Description: No response

Response: Output stage inhibit

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

Subfault: 46.2
Description: Invalid variant

Response: Output stage inhibit

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

Subfault: 46.3
Description: Internal communication timeout

Response: Output stage inhibit

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

Subfault: 46.50
Description: Warning

Response: Warning with self-reset

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

Subfault: 46.51
Description: Fault

Response: Emergency stop + output stage inhibit with self-reset

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

Subfault: 46.52
Description: Critical fault

Response: Output stage inhibit with self-reset

Cause	Measure
Safety card signals subcomponent fault of the type "Critical fault".	– For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3). – If the jumper plug is plugged at terminal "X6", remove the jumper plug.

6.5.34 Fault 47 Supply unit

Subfault: 47.1
Description: Supply unit – warning

Response: Warning with self-reset

Cause	Measure
The supply unit signals a fault with response type "warning". The fault is only displayed.	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).

Subfault: 47.2 Description: Supply unit – standard fault		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The supply unit signals a fault with response type "standard". The fault response is determined by the driver implemented on the axis. The axis performs the fault response.	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).
Subfault: 47.3 Description: Supply unit – critical fault		
	Response: Output stage inhibit	
	Cause	Measure
	The supply unit signals a fault with response type "critical error". The fault response is determined by the driver implemented on the axis. The axis performs the fault response.	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).

6.5.35 Fault 48 Module bus

Subfault: 48.1 Description: Incompatible		
	Response: Output stage inhibit	
	Cause	Measure
	Module bus slave and module bus master not compatible.	Update the firmware of the module bus at the supply unit or the axis modules to a compatible version.
Subfault: 48.2 Description: Timeout		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Timeout detected via module bus.	Check cable connections and voltage supply of module bus stations.

6.5.36 Fault 50 I/O card

Subfault: 50.1 Description: Boot synchronization timeout		
	Response: Output stage inhibit	
	Cause	Measure
	Card plugged in device but cannot be accessed.	– Check device assignment of basic device and option. – Check card slot and installation and correct if necessary. – Restart device.
Subfault: 50.2 Description: CRC error of FPGA driver		
	Response: Output stage inhibit	
	Cause	Measure
	Communication between FPGA and option card does not work, or is interrupted.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.
Subfault: 50.3 Description: CRC error of option card		
	Response: Output stage inhibit	
	Cause	Measure
	Option card signals CRC error on SPI bus.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.
Subfault: 50.4 Description: Option card timeout error		
	Response: Output stage inhibit	
	Cause	Measure
	Option card signals timeout error on SPI bus.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

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Subfault: 50.5 Description: Option card watchdog error	
Response: Output stage inhibit	
Cause	Measure
Microcontroller of option card signals a watchdog error.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.
Subfault: 50.6 Description: Ready signal timeout	
Response: Output stage inhibit	
Cause	Measure
Card booted but cyclical communication not possible.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.
Subfault: 50.7 Description: Frame error of option card	
Response: Output stage inhibit	
Cause	Measure
Faulty communication between option card and basic device.	–

6.5.37 Fault 51 Analog processing

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

6.5.38 Fault 52 Explosion protection function category 2

Subfault: 52.1 Description: Startup error	
Response: Output stage inhibit	
Cause	Measure
No valid startup available.	Perform startup.
Subfault: 52.2 Description: Impermissible system function	
Response: Output stage inhibit	
Cause	Measure
Impermissible system function activated.	Disable impermissible functions when Ex protection function is active, such as "Activate standstill current" = "On" in the active control mode.
Subfault: 52.3 Description: Inverter too large	
Response: Output stage inhibit	
Cause	Measure
Ratio of inverter current to nominal motor current too large.	Check the assignment of motor and inverter, and check the dimensioning of the system.
Subfault: 52.4 Description: Parameterization of current limit characteristic	
Response: Output stage inhibit	
Cause	Measure
Error while setting parameters for current limit characteristic.	– Parameterize the current limit characteristic. – Perform startup again.

Subfault: 52.5 Description: Time duration exceeded f < 5 Hz		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Duration of 60 s for f < 5 Hz exceeded.	Check the dimensioning of the system: If speed control = FCB05, increase the speed. If speed = 0, inhibit output stage / with stop FCBs, activate the brake function if a brake is installed.

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6.6 Fault at the master module UHX45A/MDM90A

Description: The master module is not connected to voltage, all LEDs are extinguished.		
	Response:	
	Cause	Measure
	The fuse of the master module has tripped.	The UHX45 module must be replaced. Contact SEW-EURODRIVE Service.

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6.7 Module bus faults

The module bus master sends all occurring fault messages to the connected module bus stations (slaves) using the module bus. The faults are divided into 3 categories (warning, standard fault, critical fault). There are two fault transmission modes (normal, warning) available, see chapter "Module bus – fault transmission".

With system conditions that may damage or destroy the axis system, it is important that the output stages of the drives can be inhibited quickly. For this purpose, the module bus offers emergency shutdown, see chapter "Module bus – fault transmission".

If necessary, the module bus communication in the device can be partially deactivated. This means the module bus data in the device is not evaluated, the module bus communication however proceeds if module bus stations are connected to each other. For safety reasons, the device responds to the emergency shutdown.

6.7.1 Grid condition

Regardless of the set fault responses of the different line faults, the module bus master sends information on the grid condition to other module bus stations (slaves) using the module bus.

The grid condition is only relevant when connecting the module bus slaves. There must be a transition from <Grid OFF> to <Grid OK>. Only then, the slaves are ready to be connected. If there is a line fault or a transition away from <Grid OK> during operation, the slaves do not respond to this information. They respond according to the settings of their own monitoring function.

The power supply module must be able to supply the application using the storage units or another DC source (also external source) if the AC grid has partly or completely failed or if it is not even connected. In this case, the module bus master must not prevent the module bus stations (slaves) from connecting. For this purpose, the parameter "8627.3 sending grid condition" is available. Here, it is possible to set that the grid condition is not transfered, which means the slaves will connect independently of the grid condition.

6.7.2 DC link condition

The DC link condition is determined in the same manner as the grid condition.

6.7.3 Line phase failure

Regardless of the set fault response, the module bus master transmits a line phase failure to other module bus stations (slaves) using the module bus.

This status leads to a fault response in the module bus slave. However, this response can be set in the module bus slave. The response to a line phase failure can also be set at the module bus master, see chapter "Fault responses".

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6.8 Responses to fault acknowledgement

6.8.1 Fault acknowledgement at the power supply module

Faults that are detected and displayed at the power supply module are acknowledged by switching off the fault source. The fault messages of the power supply module are transferred to the axis modules.

6.8.2 Fault acknowledgement at the axis modules

During fault acknowledgement, the final fault status determines which reset type will be executed, see following table.

Software reset

Response	Effect
System restart with start of the CPU	Behavior equal to device start
	Reference is lost
	Fieldbus interface is restarted
	EtherCAT®/SBus^{PLUS} is restarted
	The active "fault message" is reset (digital output = 1, system status = 0).

Software restart

A software restart is **no** real reset of the micro controller.

Response	Effect
Software restart	The firmware will be restarted, without the boot loader becoming active (no display "b0"!).
	Reference positions of incremental encoder systems will be lost.
	Any existing fieldbus interfaces are not affected.
	The interface between options and firmware system is initialized again. A new boot synchronization to the fieldbus or control option takes place.
	The active "fault message" is reset (digital output = 1, system status = 0).

The ready signal is set again depending on the system state after the reset by the system state control.

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Warm start

A warm start only resets the fault code.

Response	Effect
Warm start	The firmware system is not rebooted.
	All reference positions will be maintained.
	Communication is not interrupted.
	The active "fault message" is reset (digital output = 1, system status = 0).

Fieldbus timeout

After manual reset of a fault, the fault message is deleted. The system changes to the state "Waiting for data".

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6.9 Fault responses

6.9.1 Default – fault response

Fault response	Description
No response	The inverter ignores the event.
Warning with self-reset	The inverter sends a warning message with self-reset. The fault is automatically reset after the cause of fault is eliminated.
Warning	The inverter issues a warning message.
Application stop (with output stage inhibit)	The inverter stops with the deceleration set for the application limit. Parameter set 1 Index 8375.0-13 Parameter set 2 Index 8375.8-13 For n=0: Brake "applied" and output stage "off".
Application stop (with output stage inhibit) with self reset	
Emergency stop (with output stage inhibit)	The inverter stops with the set emergency stop deceleration. Parameter set 1 Index 8375.0-20 Parameter set 2 Index 8375.8-20
Emergency stop (with output stage inhibit) with self-reset	
Inhibit output stage with self reset	The output stage is deactivated and the brake is applied.
Inhibit output stage	

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

6.9.2 Parameterizable faults

Parameterizable faults	Description	Index no.	Possible fault response
Manual mode – timeout response	This parameter is used to set the response to a bus timeout during manual mode.	8504.3	• Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Heat sink overtemperature – prewarning	Here, you can set the device response when the prewarning threshold for heat sink utilization is exceeded (index 8336.1).	8622.2	• No response • Warning
Positioning lag fault	This parameter is used to set the device response to a lag error (lag error window exceeded, index 8509.4).	8622.3	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Line phase failure	This parameter is used to set the device response to a line phase failure (values below threshold defined by the user, index 8351.5).	8622.4	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
External fault	This parameter is used to set the device response to an external fault (e.g. triggered by terminal or control word).	8622.5	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage

Parameterizable faults	Description	Index no.	Possible fault response
Fieldbus – timeout	This parameter is used to set the device response to an EtherCAT®/SBus^{PLUS} timeout (timeout time, index 8455.3).	8622.6	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage • Warning with self reset • Application stop (with output stage inhibit) with self reset • Emergency stop (with output stage inhibit) with self reset • Inhibit output stage with self reset
External synchronization	This parameter is used to set the device response to loss of external synchronization.	8622.7	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage • Warning with self reset • Application stop (with output stage inhibit) with self reset • Emergency stop (with output stage inhibit) with self reset • Inhibit output stage with self reset
Motor temperature prewarning – current parameter set	Motor temperature active parameter set – prewarning.	8622.8	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Electromechanical utilization – prewarning	This parameter is used to set the device response to an exceeded prewarning threshold for electromechanical utilization (index 8336.2).	8622.10	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
HW limit switches – current parameter set		8622.11	• No response • Emergency stop (with output stage inhibit) • Emergency stop (with output stage inhibit) with self reset
SW limit switches – current parameter set		8622.12	• No response • Emergency stop (with output stage inhibit) • Emergency stop (with output stage inhibit) with self reset
Encoder – warning	This parameter is used to set the device response to an encoder warning.	8622.13	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Encoder – fault	This parameter is used to set the device response to an encoder fault.	8622.14	• Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Additional encoder	This parameter is used to set the device response to a fault of an encoder that is not used for control (speed or positioning control).	8622.15	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Encoder 1 – latest fault		8622.16	• No response
Encoder 2 – latest fault		8622.17	• No response

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Parameterizable faults	Description	Index no.	Possible fault response
Encoder 1 – latest critical fault		8622.18	• No response • Inhibit output stage
Encoder 2 – latest critical fault		8622.19	• No response • Inhibit output stage
Response to external braking resistor fault	External braking resistor fault	8622.20	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Application heartbeat timeout	This parameter is used to set the device response to a timeout of the application heartbeat.	8622.21	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage

7 Service

7.1 Electronics Service by SEW-EURODRIVE

If you are unable to rectify a fault, contact SEW-EURODRIVE Service. For the addresses, refer to www.sew-eurodrive.com.

When contacting SEW-EURODRIVE Service, always specify the following information so that our service personnel can assist you more effectively:

- Information on the device type on the nameplate (e.g. type designation, serial number, part number, product key, purchase order number)
- Brief description of the application
- Fault message on the status display
- Nature of the fault
- Accompanying circumstances
- Any unusual events preceding the problem

7.2 Extended storage

The following table shows the time intervals and maintenance works that are relevant for extended storage of the application inverter modules.

Modules	Time interval	Maintenance
MDP90A...-C00/0[1]	Every 2 years	Line connections: Connect the device to the line voltage for 5 minutes.
MDP90A.... for extended storage above 40 °C		

1) Power supply module with integrated braking resistor and capacitor

For all modules other than the ones listed, no maintenance is required.

⚠ DANGER

Uncovered power connections.

Severe or fatal injuries from electric shock.

- Install the touch guards at the modules, see chapter "Touch guards" (→ 🗎 64).
- Install the closing covers according to the regulations, see chapter "Touch guards" (→ 🗎 64).
- Never start up the application inverter without installed closed touch guards and closing covers.

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7.2.1 Procedure in case maintenance has been neglected

If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the line voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview. After you have completed the regeneration process, the device can be used immediately or stored again.

The following graduations are recommended:

AC 400/500 V devices:

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

7.3 Shutdown

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

⚠ WARNING

Electric shock due to incompletely discharged capacitors.

Severe or fatal injuries.

- Observe a minimum switch-off time of 10 minutes after disconnecting the power supply.

7.3.1 Using energy storage units

Voltage from charged capacitors can still be present at the live components or power connections after disconnection from the supply voltage. Observe the following information to avoid electric shock and risk of injury:

⚠ WARNING

The energy storage units are still charged after the device has been switched off.

Severe or fatal injuries from electric shock.

The energy storage units must be discharged before you perform any work on the device. Only electrically skilled persons may discharge the energy storage units and install the fused connectors for discharging. For further information, refer to the documentation "MOVI-DPS® Discharge Unit".

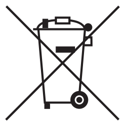
- Prior to any electric work, the energy storage units must be discharged using the discharge units from SEW-EURODRIVE or discharge resistors.
- Observe the hazard symbols on the product.
- Disconnect the device from the power supply.
- Connect the energy storage unit to the discharge unit according to the listed connection variants.
- Install fused connectors for discharging on both MDC90A discharge connections.

7.4 Waste disposal

Observe the applicable national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force, such as:

- Electronics scrap (printed circuit boards)
- Plastic
- Sheet metal
- Copper
- Aluminum



This product falls within the scope of the European WEEE Directive 2012/19/EU on waste electrical and electronic equipment.

Under no circumstances may electrical and electronic equipment be placed in regular household waste. The product must be disposed of properly in accordance with the currently applicable statutory regulations of the respective EU Member State, Norway, Liechtenstein, and Iceland.

The aim of this is to ease the burden on natural resources and to protect the environment and human health from hazardous substances by bringing them to recycling.

8 Technical data

8.1 Markings

8.1.1 Basic device

The MOVIDRIVE® modular application inverter complies with the following regulations and guidelines:

Mark	Definition
	The CE mark states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • EMC Directive 2014/30/EU • Machinery Directive 2006/42/EC • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	Waste disposal of this product must be in compliance with the WEEE directive 2012/19/EU.
	The EAC mark states compliance with the requirements of the technical regulations of the Customs Union of Russia, Kazakhstan, and Belarus.
	The RCM mark states compliance with the technical regulations of the Australian Communications and Media Authority ACMA.
	The China RoHS mark states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment and their packaging.
	The UL and cUL mark states the UL approval.[1)] cUL is equivalent to CSA approval.
	The NM mark states the compliance with the following Moroccan guidelines: • Low Voltage Directive N° 2573-14 (July 16, 2015) • EMC Directive N° 2574-14 (July 16, 2015)

1) UL and cUL mark for the two-row design is in preparation.

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8.1.2 Accessories

Braking resistors BR..

Mark	Definition
	The CE mark states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	Waste disposal of this product must be in compliance with the WEEE directive 2012/19/EU.
	The China RoHS mark states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment and their packaging.
	The cUR mark states the UL approval for this component.

TCB thermal circuit breaker

Mark	Definition
	The CE mark states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	The China RoHS mark states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
	The cUR mark states the UL approval for this component.

NF.. line filter

Mark	Definition
CE	The CE mark states the compliance with the following European guidelines: • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	Waste disposal of this product must be in compliance with the WEEE directive 2012/19/EU.
	The China RoHS mark states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment and their packaging.
	The cUR mark states the UL approval for this component.

ND.. line choke

Mark	Definition
CE	The CE mark states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	Waste disposal of this product must be in compliance with the WEEE directive 2012/19/EU.
	The China RoHS mark states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment and their packaging.
	The cUR mark states the UL approval for this component.

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8.2 General technical data

The following tables lists the technical data for all MOVIDRIVE® modular application inverters independent of

- Type
- Design
- Size
- Power rating

Interference immunity	Meets EN 61800-3; 2. Environment
Interference emission	Limit value category C2 to EN 61800-3
Ambient temperature ϑ_{amb}	0 °C to +45 °C without derating
Type of cooling	Increased air cooling due to an installed, temperature-controlled fan.
Climatic requirements	• Extended storage (weatherproof): EN 60721-3-1 class 1K2 Temperature -25 °C to +70 °C (deviating from norm) Non-condensing; no moisture condensation • Transport (weatherproof): EN 60721-3-2 class 2K3 temperature -25 °C to +70 °C Non-condensing; no moisture condensation • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3K3 temperature 0 °C to +45 °C (deviating from norm) Non-condensing; no moisture condensation
Chemically active substances	• Extended storage (weatherproof): EN 60721-3-1 class 2C2, no corrosive gases, no salt mist (deviating from norm) • Transport (weatherproof): EN 60721-3-2 class 2C2, no corrosive gases, no salt mist, no sea water (deviating from norm) • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3C2, no corrosive gases, no salt mist
Mechanically active substances	• Extended storage (weatherproof): EN 60721-3-1 class 1S1, no conductive dust • Transport (weatherproof): EN 60721-3-2 class 2S1 • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3S1, no conductive dust
Degree of protection according to EN 60529	IP20
Pollution class	2 in accordance with IEC 60664-1
Overvoltage category	III in accordance with IEC 60664-1
Installation altitude	Up to h ≤ 1000 m without restrictions. The following restrictions apply to altitudes > 1000 m: • From 1000 m to maximum 3800 m: I_N reduction by 1% per 100 m • From 2000 m to maximum 3800 m: To maintain protective separation and the air gaps and creepage distances according to EN 61800-5-1, an overvoltage protection device must be connected upstream to reduce the overvoltages from category III to category II.

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8.3 Technical data of MDP power supply modules

8.3.1 Performance data

MOVIDRIVE® modular	Unit	MDP90A-...-503-4-...					
Type		**0100**	**0100**	**0250**	**0500**	**0750**	**1100**
Size		1	1A	2	3		4
Nominal power P_N	kW	10		25	50	75	110
Input							
Nominal line voltage (to EN 50160) AC U_{line}	V	3 × 380 – 500 V					
Nominal line current AC I_{line}	A	16		40	80	120	175
Line frequency f_{line}	Hz	50 – 60 Hz ± 10%					
Controlled rectifier		no		yes			
X1 connection		Plug connector – 1 core: 0.25 – 4 mm^2 – 2 cores: 0.25 – 2.5 mm^2 (twin AEH)[1)]		M6 screw × 16 max. 16 mm^2	Screw M10 × 18 max. 70 mm^2		Screw M10 × 25 max. 120 mm^2
PE connection				M6 × 16	M10 × 18		M10 × 25
Output (DC link)							
Nominal DC link voltage U_{NDCL}	V	DC 560					
Nominal DC link current DC I_{NDCL}	A	21		51	102	153	224
Max. DC link current DC $I_{DCL\ max}$	A	52		127	255	382	560
Additional capacitance	µF	–	1000	–	–	–	–
Overload capacity		250% × P_N: 1 s for cycle duration 10 s					
Connection for UZ-/UZ+		CU busbars					
		M6 screw × 16					Right: Screw M8 × 20 Left: M6 screw × 16
PE connection		M6 screw × 16					
Brake chopper and braking resistor							
Minimum braking resistance value R_{BRmin}	Ω	26		12	4.7	3.6	2.3
Maximum brake chopper power	kW	250% × P_N					
Mean dischargeable power in regenerative operation	kW	25% × P_N					
P_{eff} of the integrated braking resistance	kW	-	0.2	-	-	-	-
P_{max} of the integrated braking resistance	kW	-	25	-	-	-	-
X3 connection		Plug connector – 1 core: 0.25 – 4 mm^2 – 2 cores: 0.25 – 2.5 mm^2 (twin AEH)[1)]		M6 screw × 16 max. 10 mm^2	M6 screw × 16 max. 35 mm^2		Screw M10 × 25 max. 70 mm^2
		M6 × 16					M10 × 25
General							
Nominal power loss 24 V	W	15			20		30
Power section nominal power loss	W	40		90	190	290	420
Permitted number of times power may be switched on/off per minute		< 1					
Minimum switch-off time for power off	s	10					
Mass	kg	4	7.9	5.2	13	13	21
Dimensions							
Width	mm	60	120	60	150		210
Height	mm	324		424			
Depth	mm	250					

1) AEH: Conductor end sleeve

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8.3.2 Electronics data – signal terminals

MDP.. power supply module	Terminal	General electronics data
DC 24 V voltage supply in accordance with IEC 61131[1)]	X5	DC 24 V -10%, +20% For directly supplied DC 24 V brakes, observe the restricted tolerance range of -0% to +10%
Contacts	X5	CU busbars
Evaluation of temperature sensor at braking resistor	X7.1	DC 24 V auxiliary voltage output to supply X7:2
	X7.2	Sensor input for temperature monitoring of the braking resistor. • Signal contact closed: No overtemperature. • Signal contact open: Overtemperature. Connect isolated signal contacts only.
	X7.3/4	Reserved
Connection		Plug connectors – 1 core: 0.25 – 0.5 mm^2

1) Note the restricted tolerance range

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8.4 Technical data of MDA and MDD axis modules

8.4.1 MDA performance data

MOVIDRIVE® modular	Unit	MDA90A-...-503-X-...												
Type		**0020**	**0040**	**0080**	**0120**	**0160**	**0240**	**0320**	**0480**	**0640**[1]	**0640**[2]	**1000**	**1400**	**1800**
Size		1				2		3		4	5		6	
Nominal output current I_N PWM = 4 kHz	A	2	4	8	12	16	24	32	48	64	64	100	140	180
Input														
Nominal DC link voltage U_{NDCL}		DC 560 V												
Nominal DC link current I_{NDCL}[3]	A	2	4	8	12	16	24	32	48	64	64	100	140	180
Connection for UZ-/UZ+		CU busbars												
		Screw M6 × 16											Screw M8 × 20	
PE connection		Screw M6 × 16												
Motor output														
Output voltage V_{out}	V	0 – max. V_{line}												
Motor power ASM P_{Mot}	kW	0.6	1.5	4	5.5	7.5	11	15	22	30	30	45	75	90
Nominal output current I_N PWM = 4 kHz	A	2	4	8	12	16	24	32	48	64	64	100	140	180
Max. output current at f = 0 Hz	A	125% × I_N: 1 s at PWM = 4 kHz												
Overload capacity		250%: 1 s at PWM = 4 kHz												
Apparent output power S_N[4]	kVA	1.4	2.8	5.5	8.5	11	17	22	33	44	44	69	97	125
PWM frequency f_{PWM}	kHz	4, 8, 16 (adjustable)											4, 8 (ad-justable)	
Max. output frequency f_{max}	Hz	V/f: 599 VFC^PLUS: 250 CFC: 500 ELSM®: 500												
X2 connection		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[5]				Plug con-nector - 1 core: 0.5 – 16 mm² - 2 cores: 0.25 – 6 mm² (Twin-AEH)[5]		M6 bolt Max. 16 mm²		M10 screw Max. 70 mm² or 2 × 25 mm²			M10 screw Max. 120 mm²	
PE connection								Screw M6 × 16		Screw M6 × 18			Screw M10 × 25	
Brake output														
Nominal brake voltage V_{BR} (DB00)		DC 24 V, the tolerance depends on the DC 24 V supply												
X10 connection		Plug connector - 1 core: 0.25 – 2.5 mm² - 2 cores: 0.5 – 1 mm² (Twin-AEH)[5]												
General														
Nominal power loss 24 V	W	20				22	25	30		75	75		115	
Nominal power loss power section	W	15	35	65	90	110	185	240	360	430	430	670	980	1250
Mass	kg	4			4.1	5.3		7.1		14	14		18	
Dimensions														
Width	mm	60				90				120	150		210	
Height	mm	328						428						

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MOVIDRIVE® modular	Unit	MDA90A-...-503-X-...												
Type		0020	0040	0080	0120	0160	0240	0320	0480	0640[1)]	0640[2)]	1000	1400	1800
Depth	mm	265												

1) For installation in new systems, the MDA90A-0640-.. axis module in size 4 must be used

2) The MDA90A-0640-.. axis module in size 5 is only used as a spare part for the MDA90A-0640-.. axis module in size 5

3) The nominal DC link current is defined for cosφ = 0.82

4) In relation to PWM = 4 kHz

5) AEH: Conductor end sleeve

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8.4.2 MDD performance data

MOVIDRIVE® modular	Unit	MDD9.A-...-503-X-...[1].		MDD9.A-...-503-X-... with card slot[1]		
Type		**0020**	**0040**	**0020**	**0040**	**0080**
Size		1		2		
Nominal output current I_N PWM = 4 kHz	A	2 × 2	2 × 4	2 × 2	2 × 4	2 × 8
Input						
Nominal DC link voltage U_{NDCL}		DC 560 V				
Nominal DC link current I_{NDCL}[2]	A	4	8	4	8	16
Connection for UZ-/UZ+		CU busbars				
		M6 screw × 16				
PE connection		M6 screw × 16				
Motor output						
Output voltage U_{out}	V	0 – max. V_{line}				
Motor power ASM P_{Mot}	kW	2 × 0.55	2 × 1.5	2 × 0.55	2 × 1.5	2 × 4
Nominal output current I_N PWM = 4 kHz	A	2 × 2	2 × 4	2 × 2	2 × 4	2 × 8
Max. output current at f = 0 Hz	A	125% × I_N: 1 s at PWM = 4 kHz				
Overload capacity		250%: 1 s at PWM = 4 kHz				
Apparent output power S_N[3]	kVA	2 × 1.4	2 × 2.8	2 × 1.4	2 × 2.8	2 × 5.5
PWM frequency f_{PWM}	kHz	4, 8 (adjustable)				
Max. output frequency f_{max}		U/f: 599 Hz VFC^{PLUS}: 250 Hz CFC: 500 Hz ELSM®: 500 Hz				
X2 connection		Plug connectors – 1 core: 0.25 – 4 mm^2 – 2 cores: 0.25 – 2.5 mm^2 (Twin-AEH)[4]				
PE connection						
Brake output						
Nominal brake voltage V_{BR} (DB00)		DC 24 V, the tolerance depends on the DC 24 V supply				
X10 connection		Plug connectors – 1 core: 0.25 – 2.5 mm^2 – 2 cores: 0.5 – 1 mm^2 (Twin-AEH)[3]				
General						
Nominal power loss 24 V	W	20				25
Power section nominal power loss	W	2 × 15	2 × 35	2 × 15	2 × 35	2 × 65
Mass	kg	4		4.85		
Dimensions						
Width	mm	60		90		
Height	mm	328				
Depth	mm	265				

1) MDD90A-..: With encoder input X15, without MOVILINK® DDI X16. MDD91A-..: With MOVILINK® DDI X16, with encoder input X15
2) The nominal DC link current is defined for cosφ = 0.82
3) In relation to PWM = 4 kHz
4) AEH: Conductor end sleeve

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8.4.3 Electronics data – Signal terminals

	Terminal designation		Specifications
	Single-axis module	Double-axis module	
General			
Design			In accordance with IEC 61131-2
Supply voltage			
Connection	X5		External power supply 24 V in accordance with IEC 61131[1)]
Connection	X5		CU busbars
Digital inputs			
Cycle time I/O			1 ms
Number			6
Response time			100 µs plus cycle time
Assignment	X20: 1 – 6	X20_1: 1 – 6 X20_2: 1 – 6	DI00: "Output stage enable" permanently assigned. DI01 – DI05: For the selection option, see the parameter menu. All 6 inputs are suitable for Touchprobe function. Latency period < 100 µs, max. 2 simultaneously. DI04, DI05: Connection HTL low-resolution encoder (only MDA).
	X20: 7	X20_1: 7 X20_2: 7	GND
	X20: 8	X20_1: 8 X20_2: 8	+24 V supply voltage Maximum output current = 50 mA
Connection			Plug connector – 1 core: 0.25 – 2.5 mm^2 – 2 cores: 0.5 – 1.5 mm^2 (twin AEH)[2)] Shield terminals for control cables available.
Digital outputs			
Cycle time I/O			1 ms
Number			• MDA: 1 × 4 • MDD: 2 × 4
Response time			175 µs plus cycle time
Output current			I_{max} = 50 mA
Short-circuit protection			Yes
Assignment	X21: 1 – 4	X21_1: 1 – 4 X21_2: 1 – 4	DO00 – DO03: For the selection option, see the parameter menu.
	X21: 5	X21_1: 5 X21_2: 5	GND
Connection			Plug connector – 1 core: 0.25 – 2.5 mm^2 – 2 cores: 0.5 – 1.5 mm^2 (twin AEH)[1)] Shield terminals for control cables available.
Brake control/temperature sensor motor			
Assignment	X10:DB0	X10_1:DB0 X10_2:DB0	DB00: Direct control is possible with selected brakes from SEW-EURODRIVE. See chapter "Project Planning" for more information.
	X10:GND	X10_1:GND X10_2:GND	GND
	X10:TF1	X10_1:TF1 X10_2:TF1	Sensor input for temperature monitoring of the motor
	X10:GND	X10_1:GND X10_2:GND	GND
Connection			Plug connector – One core: 0.25 – 2.5 mm^2 – Two cores: 0.5 – 1 mm^2 (twin AEH)[1)] Shield terminals for control cables available.
Encoder supply			
	X15:13	X15:13_1 X15:13_2	X15:13 DC 24 V, I_{max} = 500 mA

	Terminal designation		Specifications
	Single-axis module	Double-axis module	
	X15:15	X15:15_1 X15:15_2	X15:15 DC 12 V, I_{max} = 500 mA

1) For directly supplied DC 24 V brakes, observe the restricted tolerance range of -0% to +10%

2) AEH: Conductor end sleeve

MOVILINK® DDI connection		
MDA90A-..	X16	DC 24 V, I_{max} = 500 mA
MDD91A-..	X16_1 X16_2	

NOTICE

Connection of inductive loads to digital outputs

Destruction of digital outputs.

If you connect inductive loads to digital outputs, you must install an external protective element (freewheeling diode).

8.4.4 Electronics data – Drive safety functions

The table below shows the technical data of the application inverter relating to the integrated safety technology.

The safety-related digital inputs comply with type 3 in accordance with IEC 61131-2.

Reference potential for the F_STO_P1 and F_STO_P2 is STO_M (contact at terminal X6:2).

	Terminal designation	General electronics data		
Safety contact STO	X6			
Electrical data of inputs F_STO_P1, F_STO_P2		**Minimum**	**Typical**	**Maximum**
Input voltage range	X6:1 and X6:3	DC -3 V	DC 24 V	DC 30 V
Input capacitance		–	1 nF	10 nF
Power consumption at DC 24 V		–	200 mW	300 mW
Input voltage for ON status (STO)		DC 11 V	–	DC 30 V
Input voltage for OFF status (STO)		DC -3 V	–	DC 5 V
Permitted leakage current of the external safety controller		–	–	1 mA
Technical data				
Time from disconnecting the safety voltage until deactivation of the rotating field		–	1.5 ms	10 ms 2 ms[1)]
Time from connecting the safety voltage until activation of the rotating field		–	–	110 ms
Connection		Plug connectors – 1 core: 0.25 – 1.5 mm^2 – 2 cores: 0.25 – 0.5 mm^2 (twin AEH)[2)]		

1) Only when the STO is used and controlled via a MOVISAFE® CS.A card

2) AEH: Conductor end sleeve

8.4.5 Different functionality of the axis modules MDA/MDD

Functionality	MDA90A-.. single-axis module	MDD9.A-.. double-axis module
Cam switch	Yes	–
Number of drive trains per output stage	2	1
Encoder option	Yes	–
I/O option	Yes	–
PWM frequency constant	4 kHz/8 kHz/16 kHz	4 kHz/8 kHz
Process data processing basic cycle	500 µs/1 ms/1ms PLC	1 ms
Simple encoder evaluation via digital inputs (DI04/DI05)	Yes	–
Sampling cycle n/X control	0.25 ms/0.5 ms/1 ms/2 ms	0.5 ms/1 ms/2 ms

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8.5 Technical data of the MDC90A-0001/0002-.. capacitor modules

8.5.1 Performance data

Capacitor module	**MDC90A-0001-50X-X-000**	**MDC90A-0002-50X-X-000**
DC link connection		
Nominal DC link voltage U_{line} (according to EN 50160)	DC 560 V	
Nominal capacitance	70 µF	130 µF
Connection for UZ-/UZ+	M6 screw × 16, max. 35 mm^2	
PE connection	M6 screw × 16	
Connection of safe brake module X2	Plug connectors – 1 core: 0.25 – 4 mm^2 – 2 cores: 0.25 – 2.5 mm^2 (Twin-AEH)	
General		
Mass	3.8 kg	4.5 kg
Dimensions		
Width	60 mm	
Height	328 mm	
Depth	265 mm	

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8.6 Technical data of the master module UHX45A/MDM90A

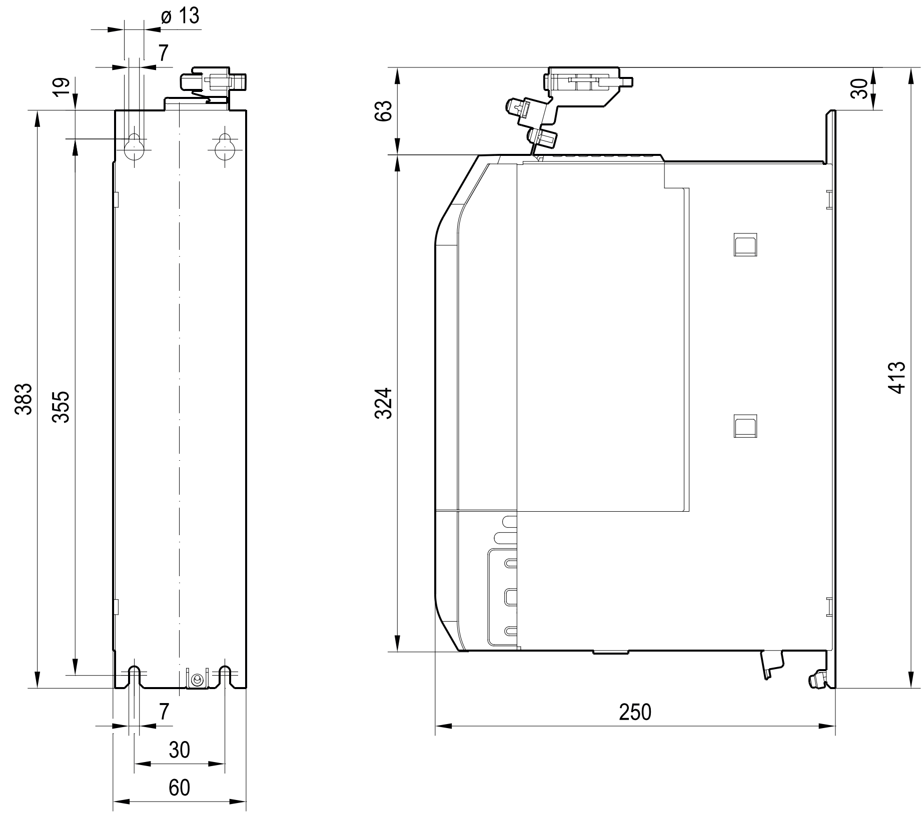
MOVIDRIVE® modular	Terminal	UHX45A/MDM90A
Input		
DC 24 V supply[1)]	X5_A	40 A
Connection contacts	X5_A	2-pin plug connector • 1 core: 0.5 – 10 mm^2 • 2 cores: 0.5 – 6 mm^2
Output		
DC 24 V voltage output UHX45A[2)]	X5_B	Maximum 4 A
Fuse for voltage output UHX45A	X5_B	5 × 20, 4 A, 125 V, miniature fuse, slow-blow Part number: 18190464
DC 24 V connection		Maximum 40 A
General		
Power loss UHX45A		12 W
Mass		1.85 kg
Dimensions		
Width		60
Height		383
Depth		250

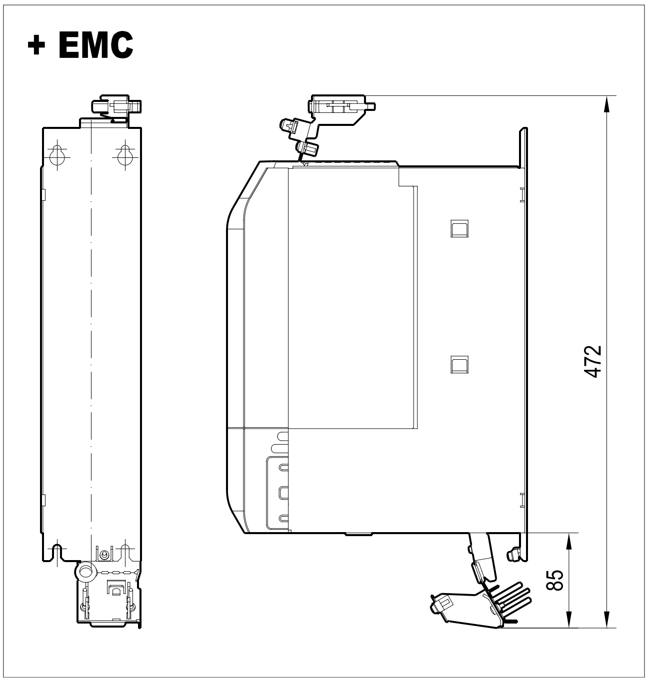
1) The master module can be used to supply the DC 24 V supply voltage for the entire axis system
2) Auxiliary output X5_B for supply of MOVI-C® CONTROLLER advanced UHX45A

8.7 Dimension sheets of the modules

8.7.1 Dimension sheets of the power supply modules

MDP90A-0100-.. (size 1)





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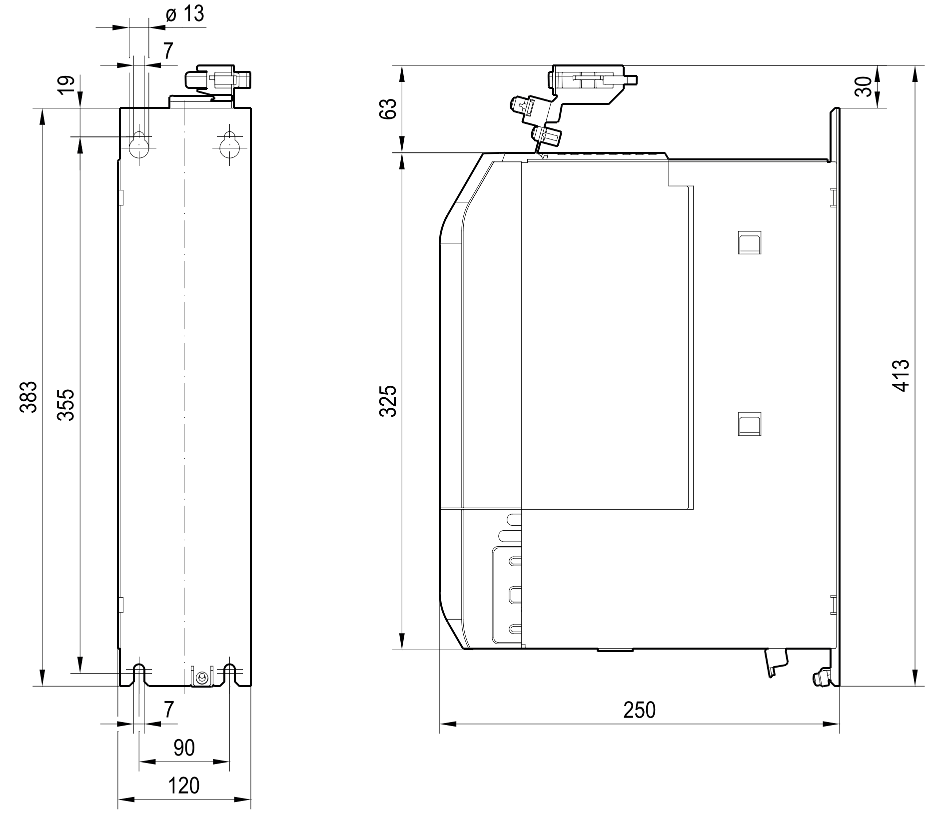
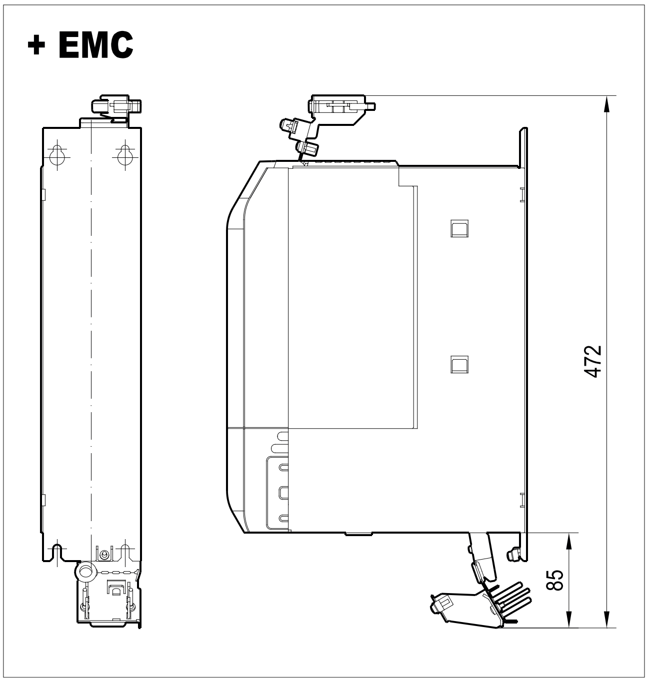
MDP90A-0100-..-C00 (size 1A)





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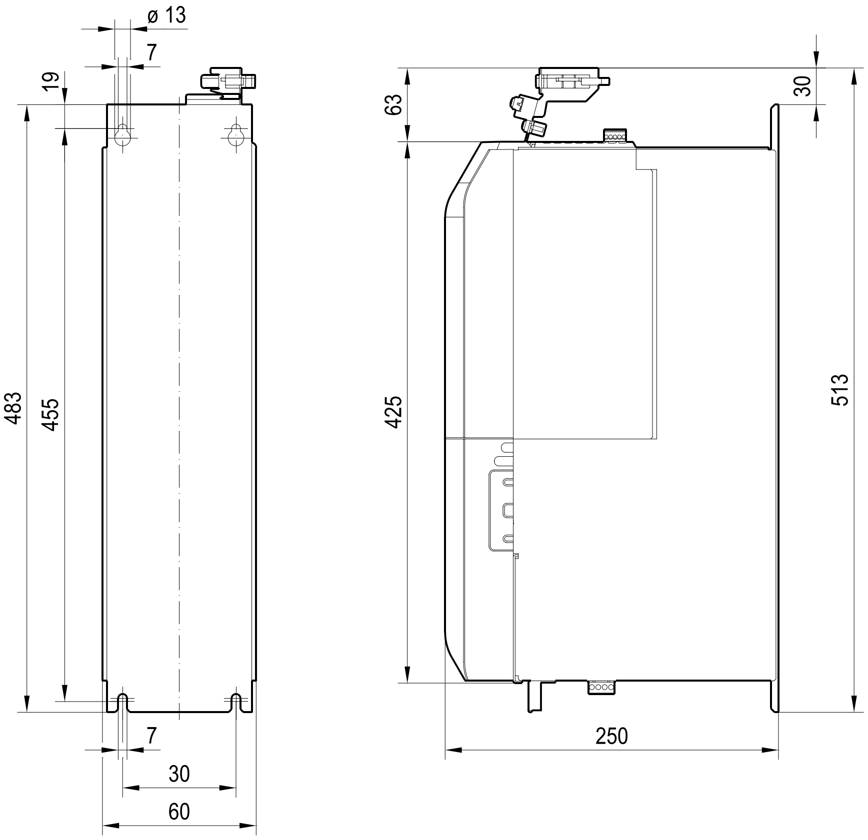
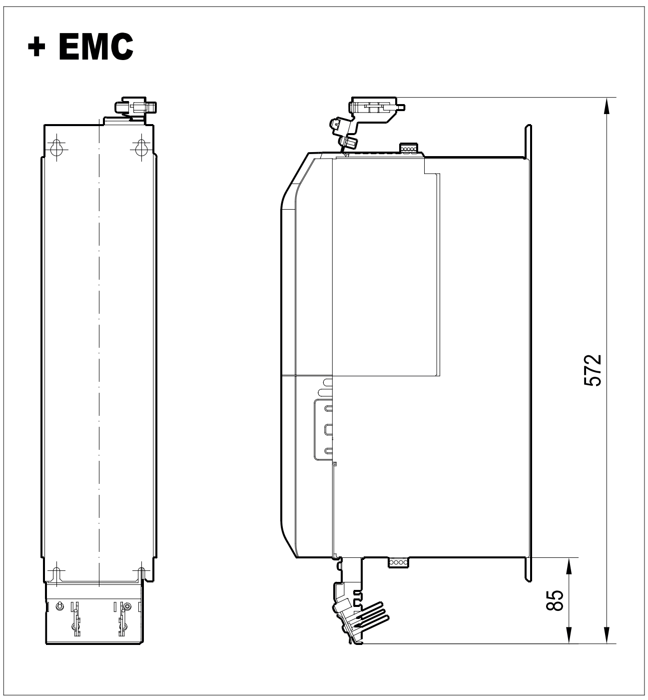
MDP90A-0250-.. (size 2)





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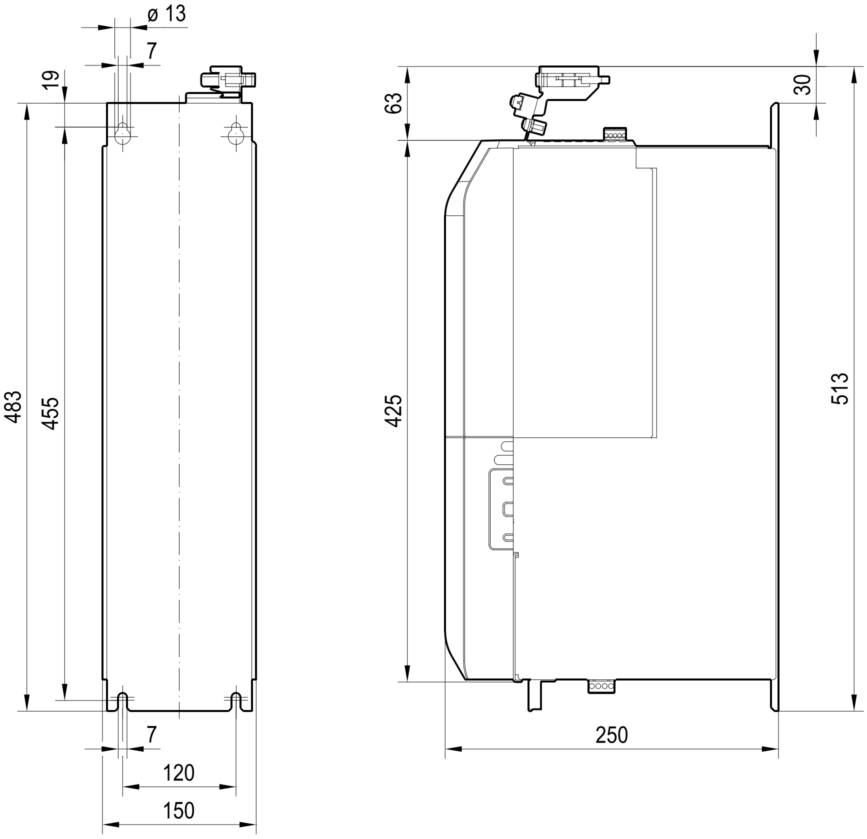
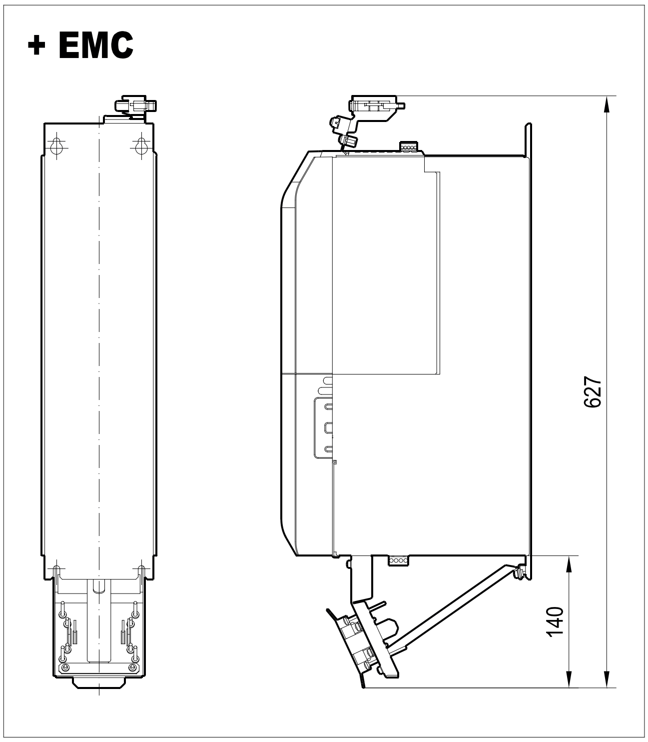
MDP90A-0500 – 0750-.. (size 3)





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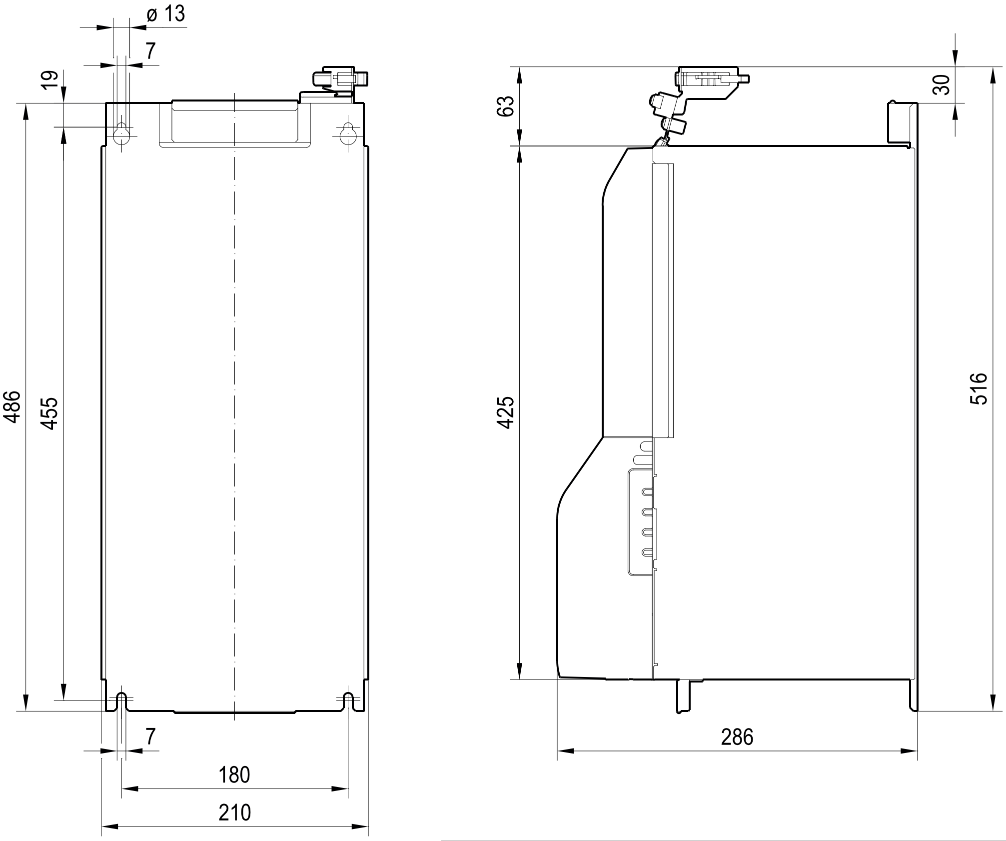
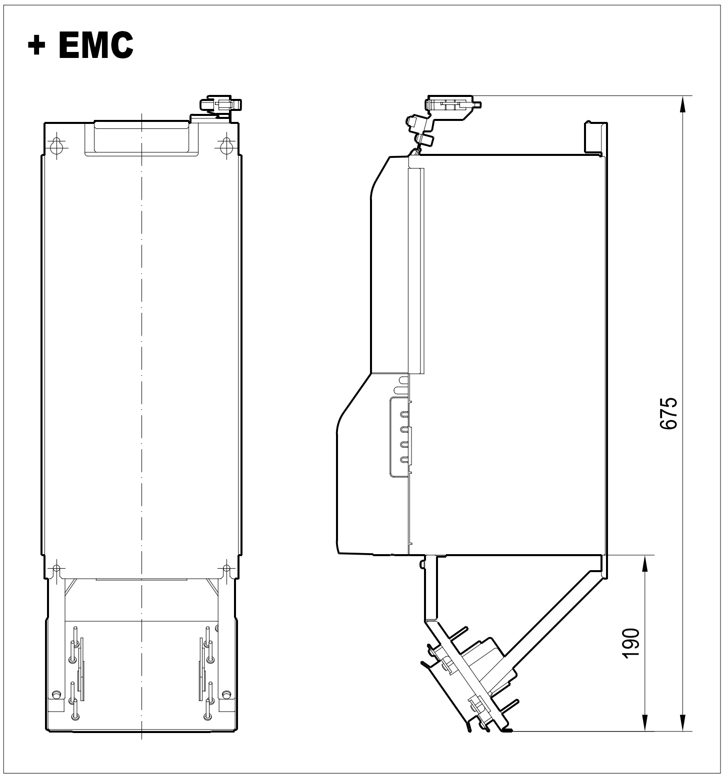
MDP90A-1100-.. (size 4)





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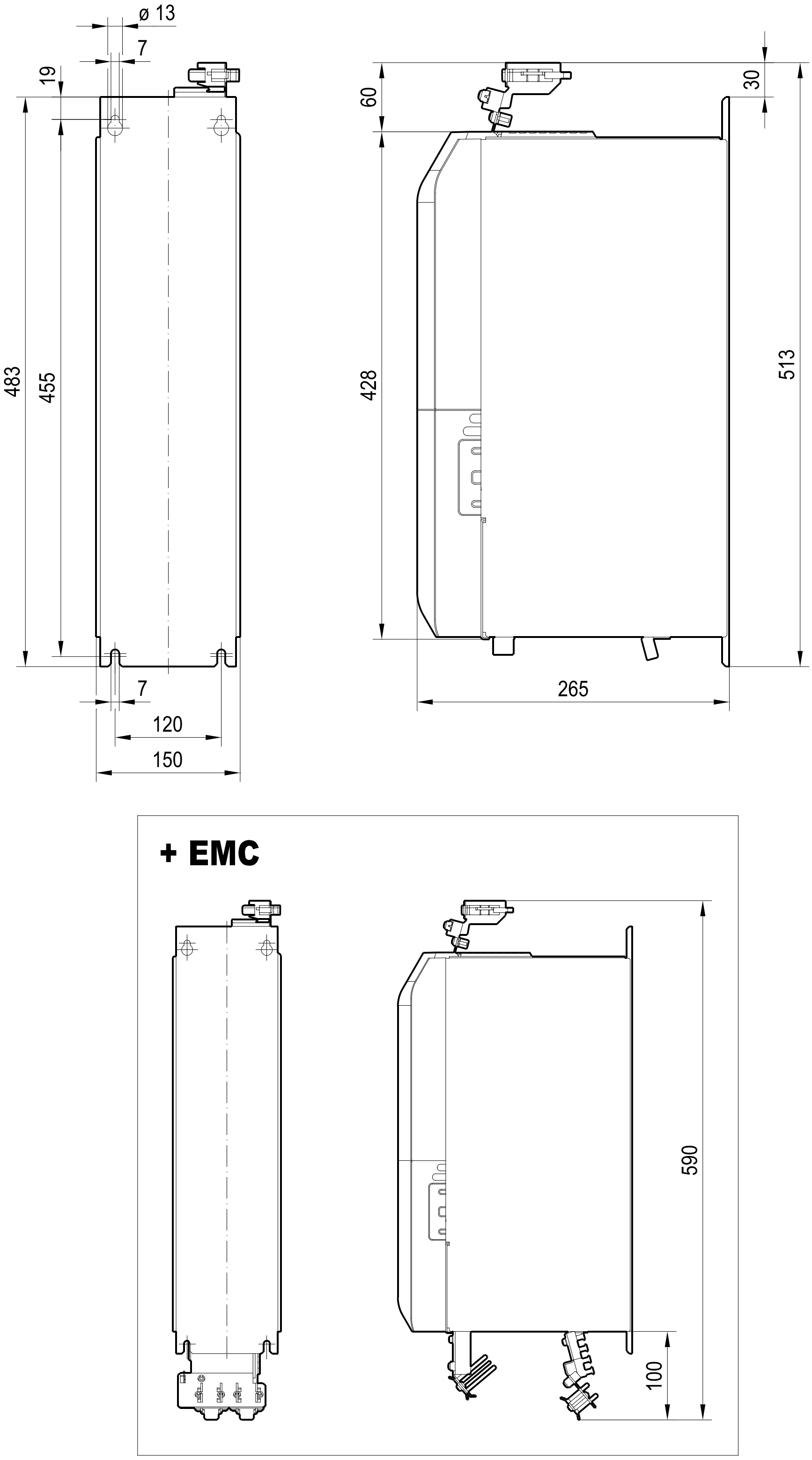
MDP92A-..



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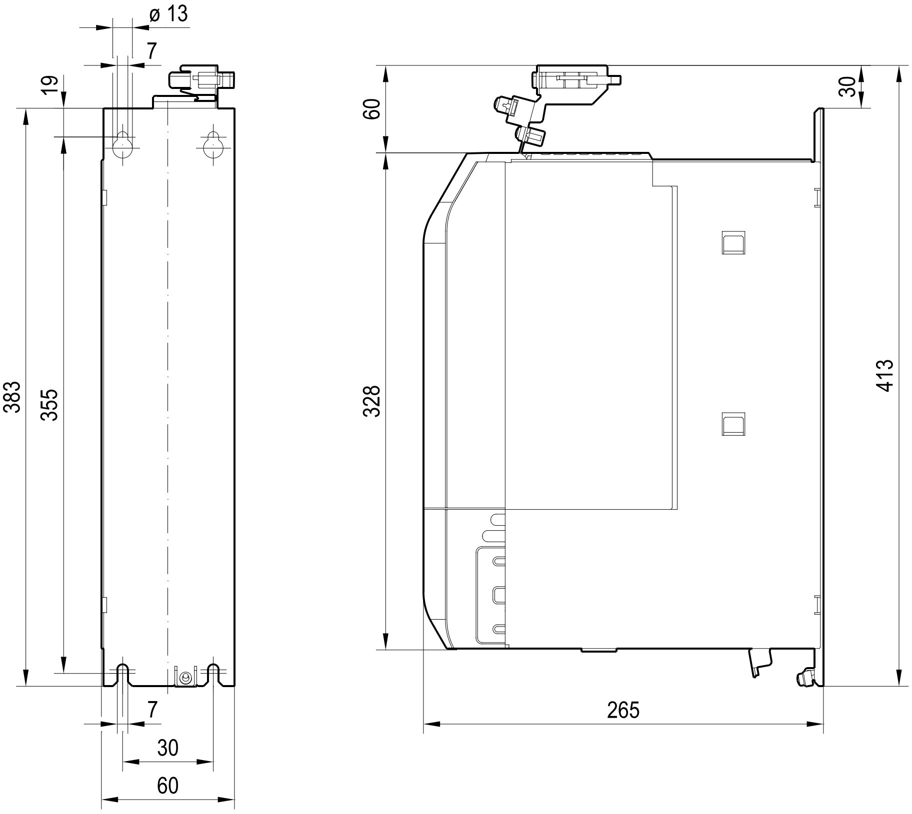
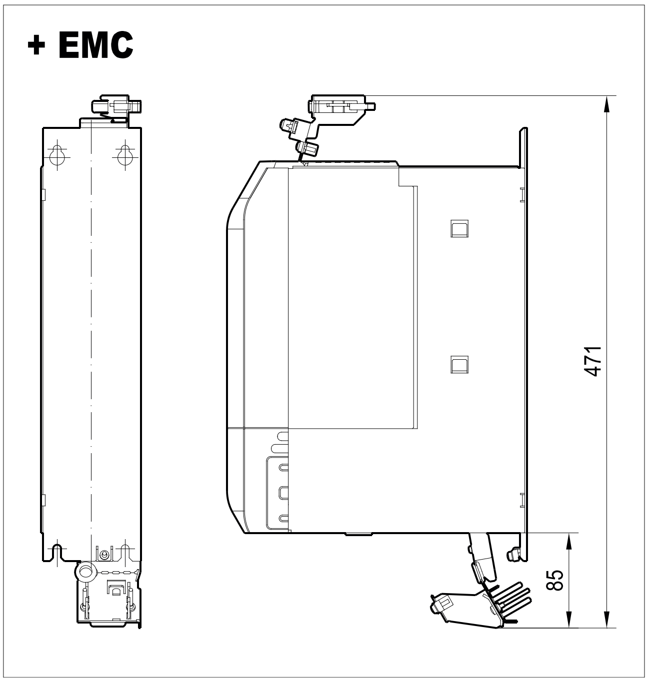
8.7.2 Dimension sheets of the axis modules

MDA90A-0020 – 0120-.. (size 1)





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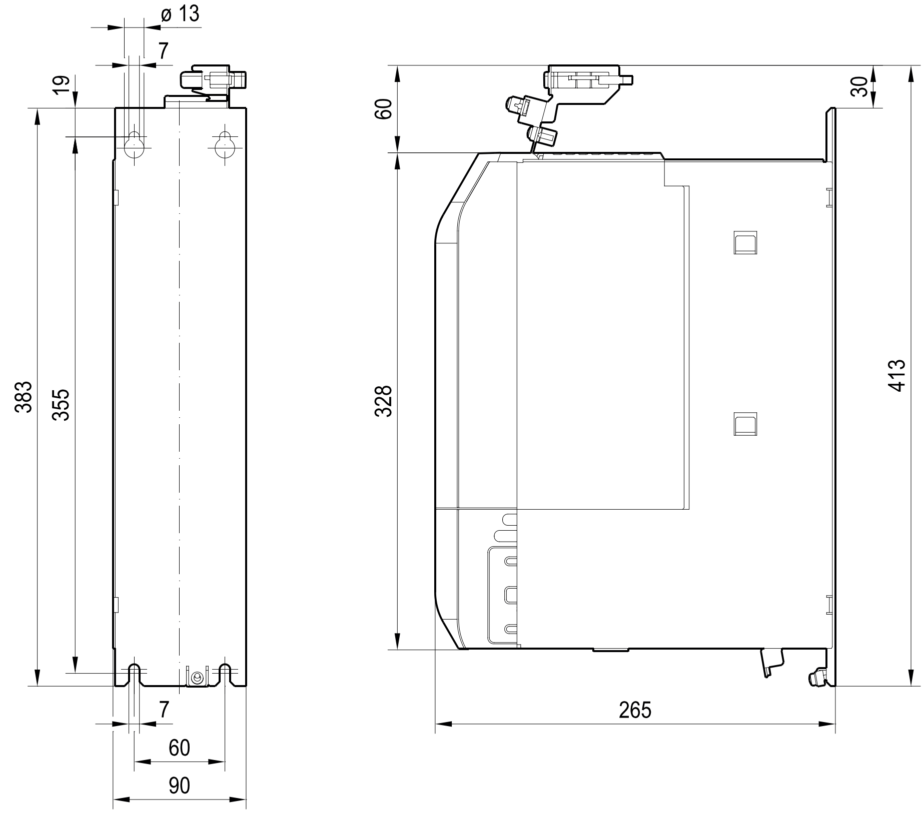
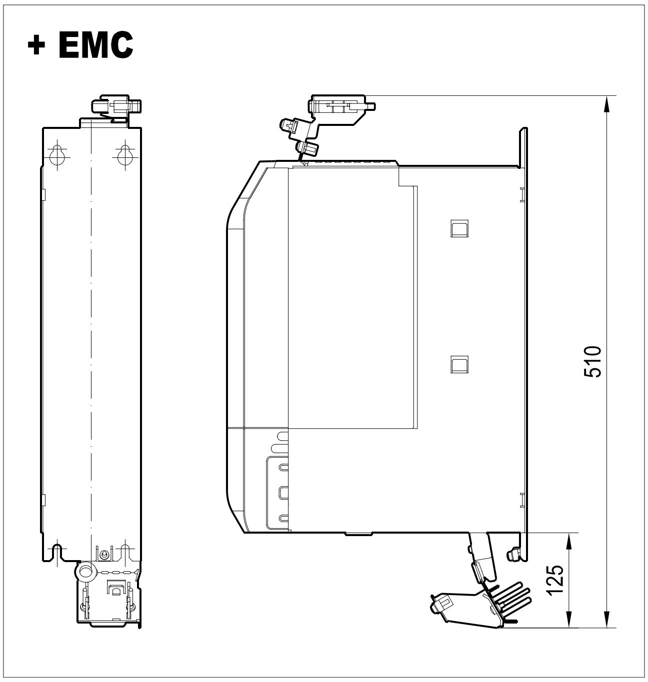
MDA90A-0160 – 0240-.. (BG 2)





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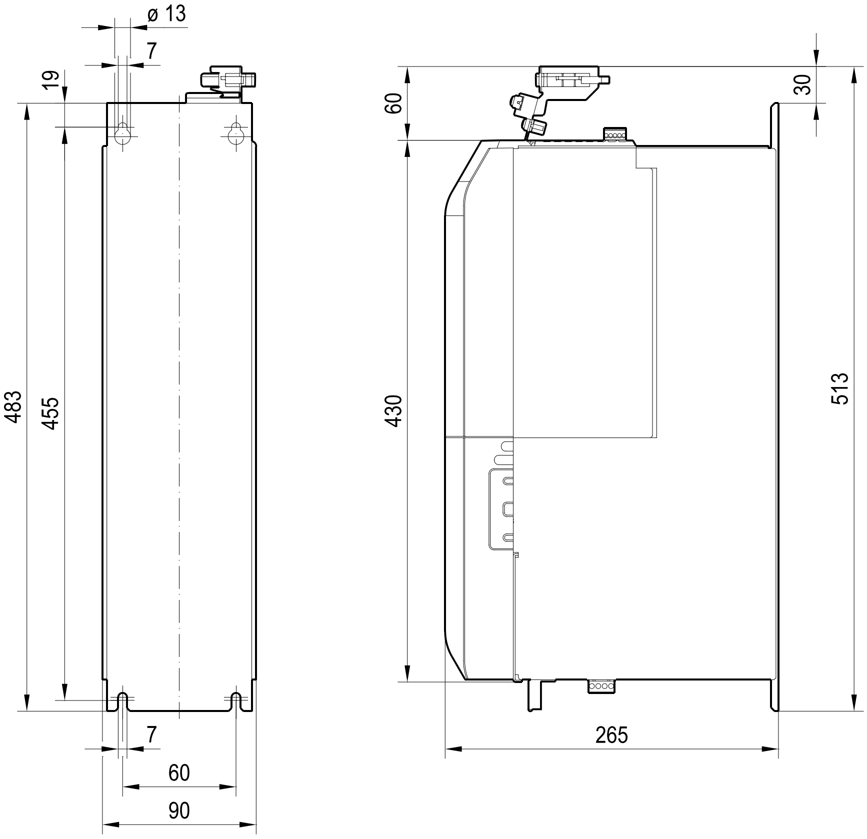
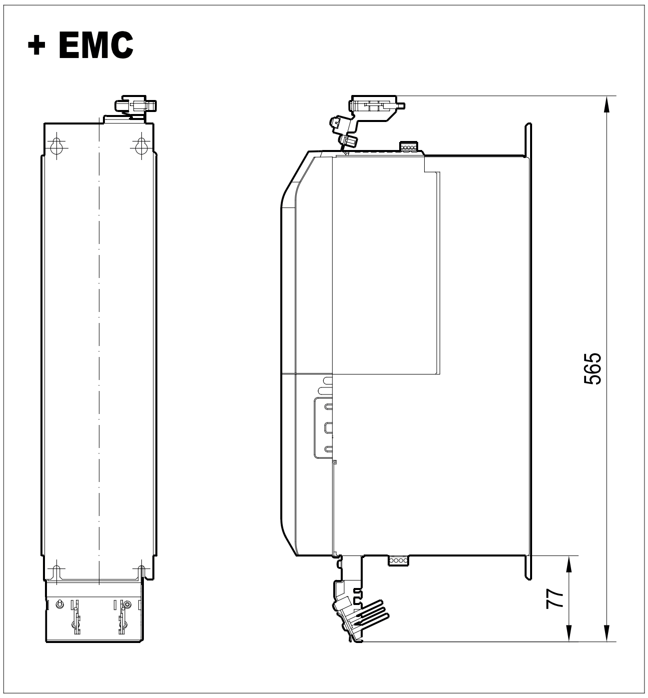
MDA90A- 0320 – 0480-.. (BG 3)





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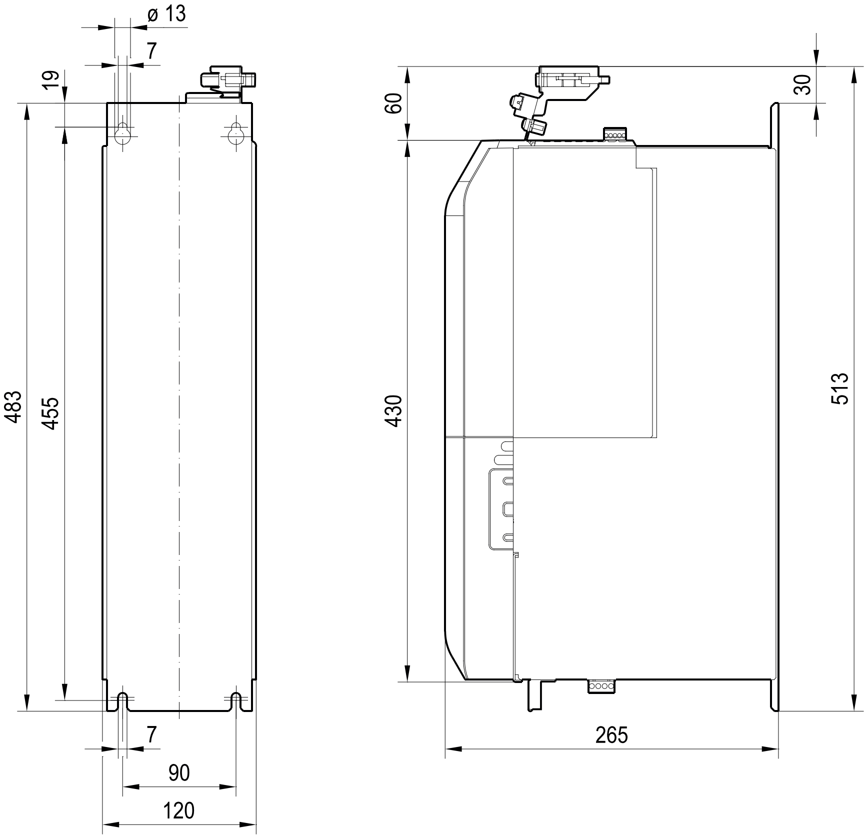
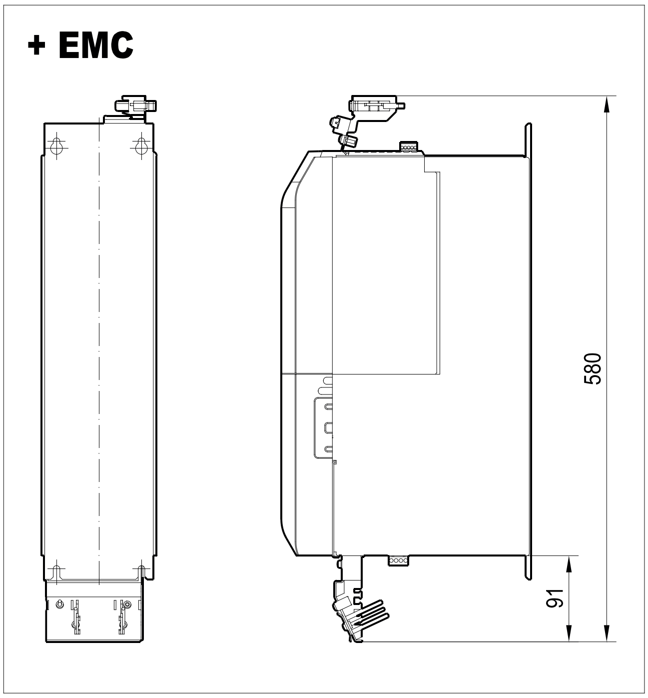
MDA90A-0640-.. (size 4)





9007223429893643

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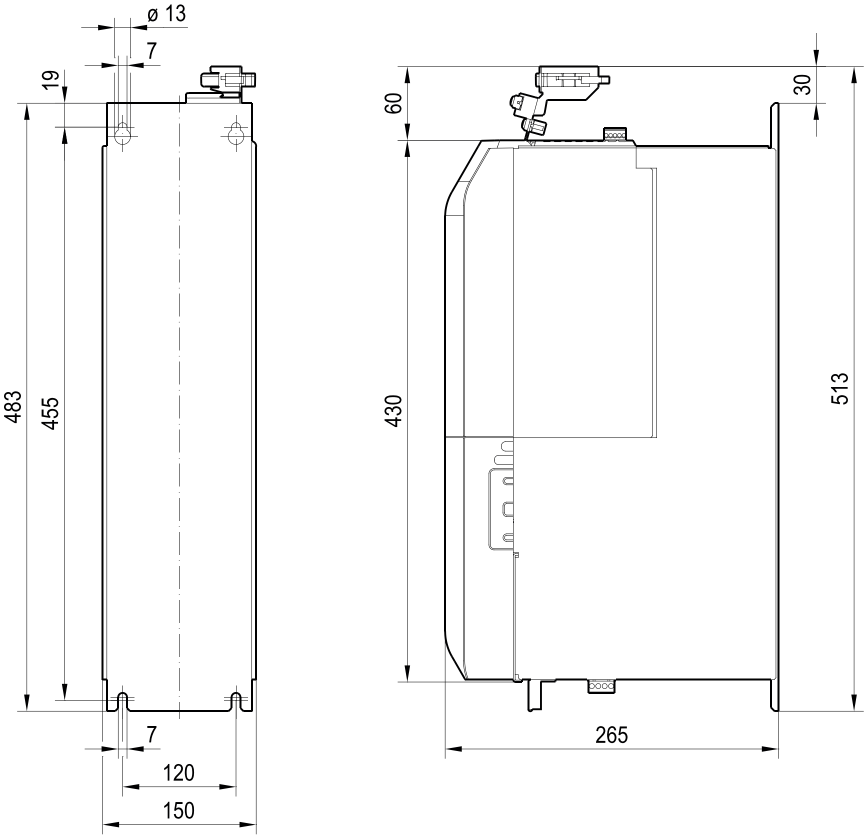
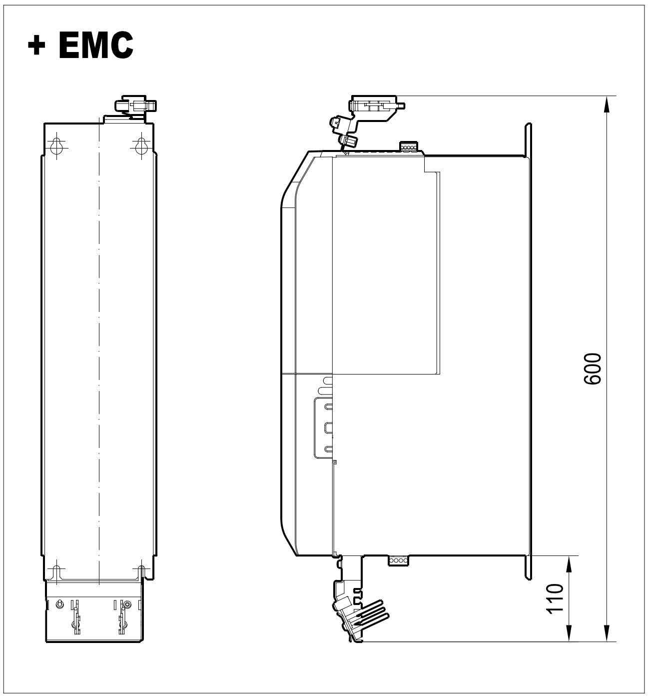
MDA90A-0640 – 1000.. (size 5)





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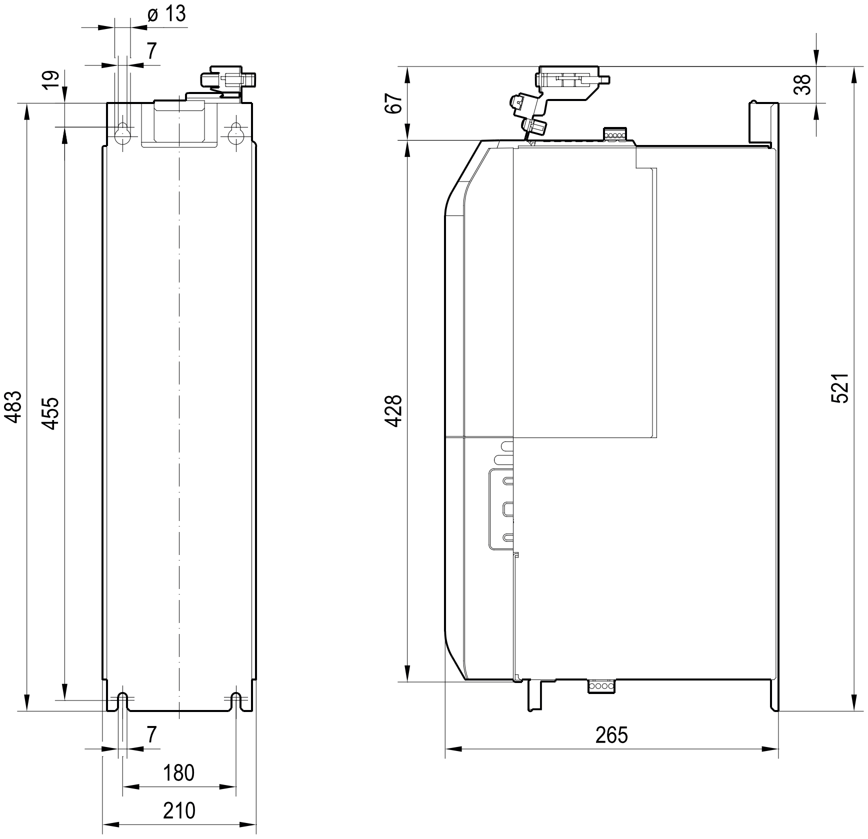
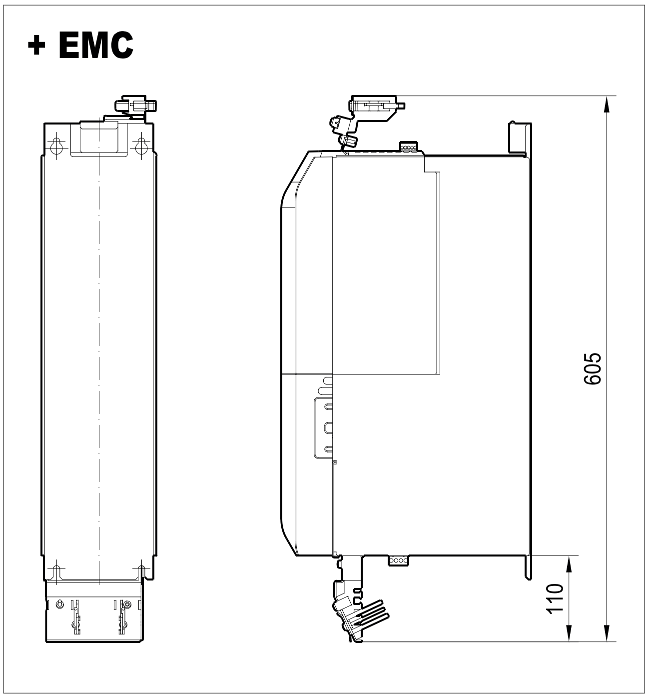
MDA90A-1400 – 1800-.. (size 6)





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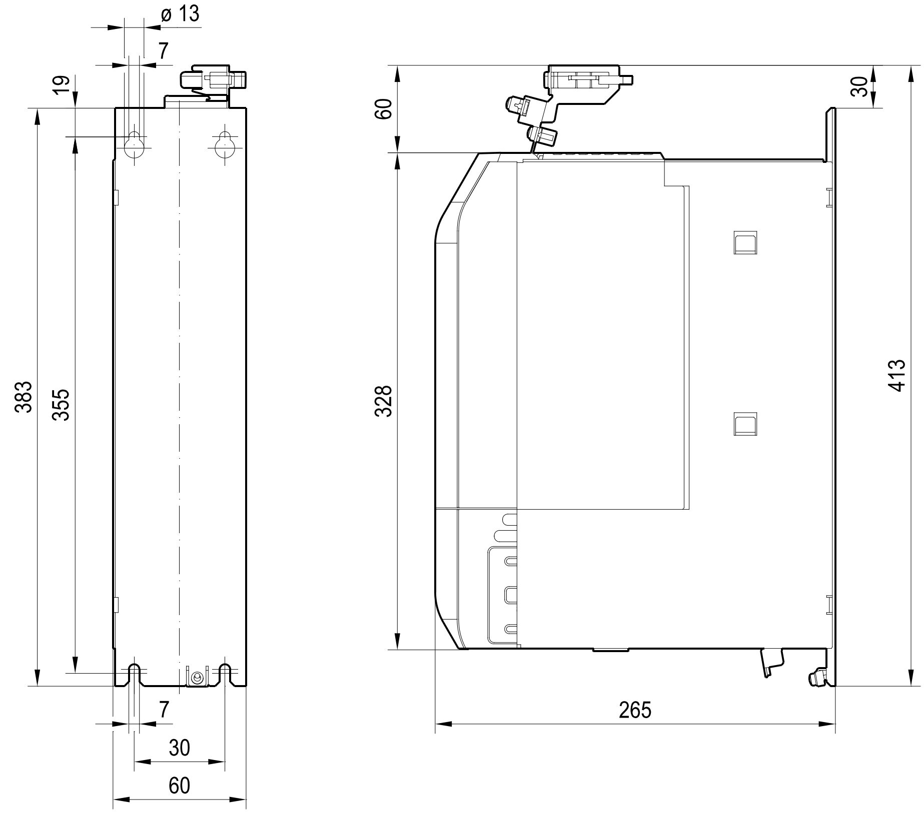
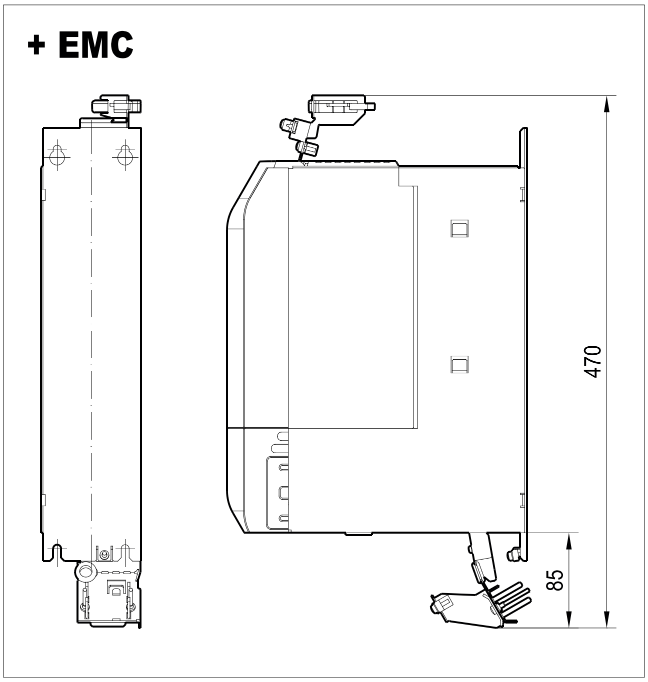
MDD9.A-0020 – 0040-.. (size 1)





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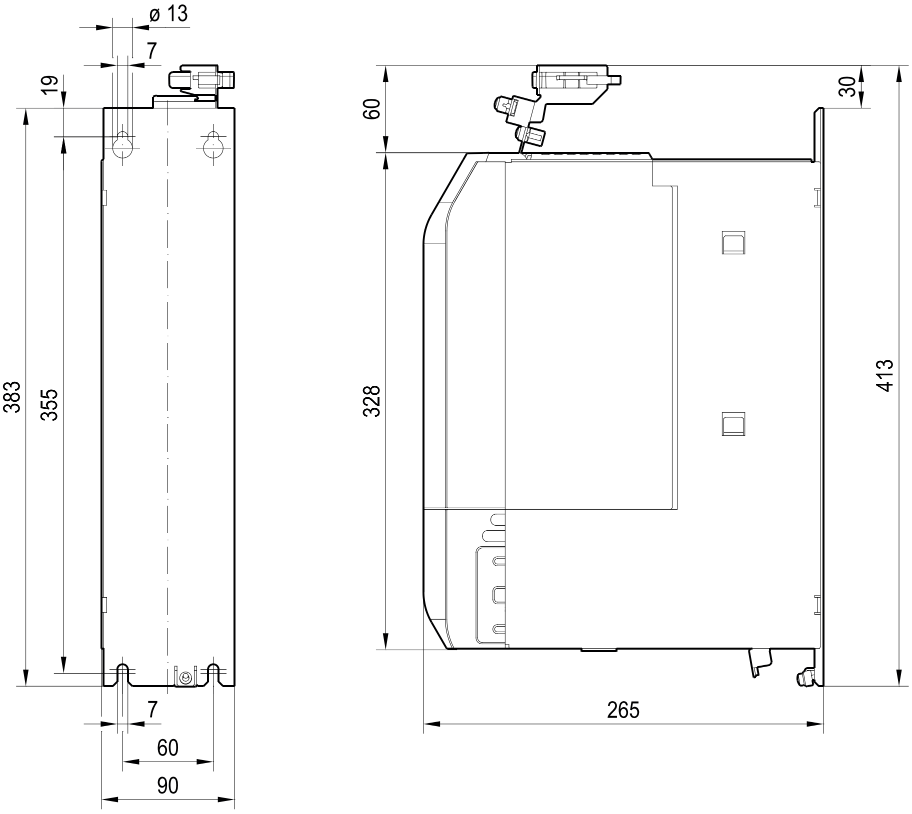
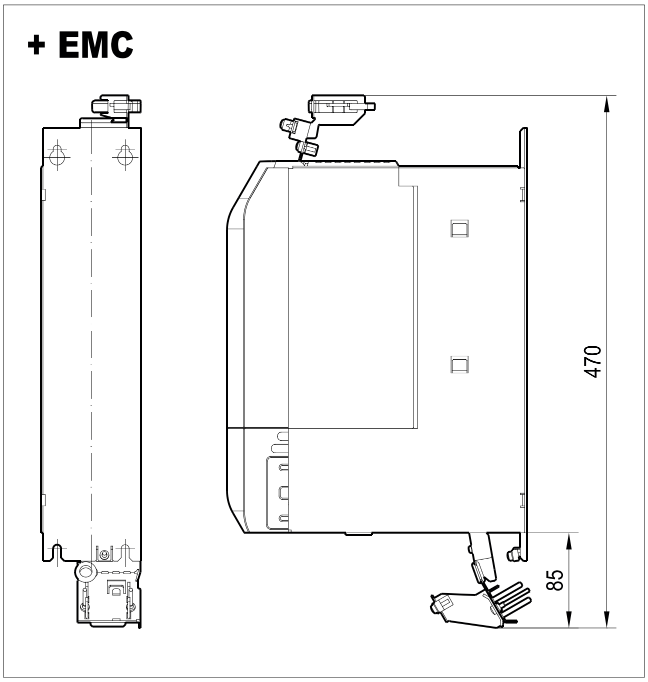
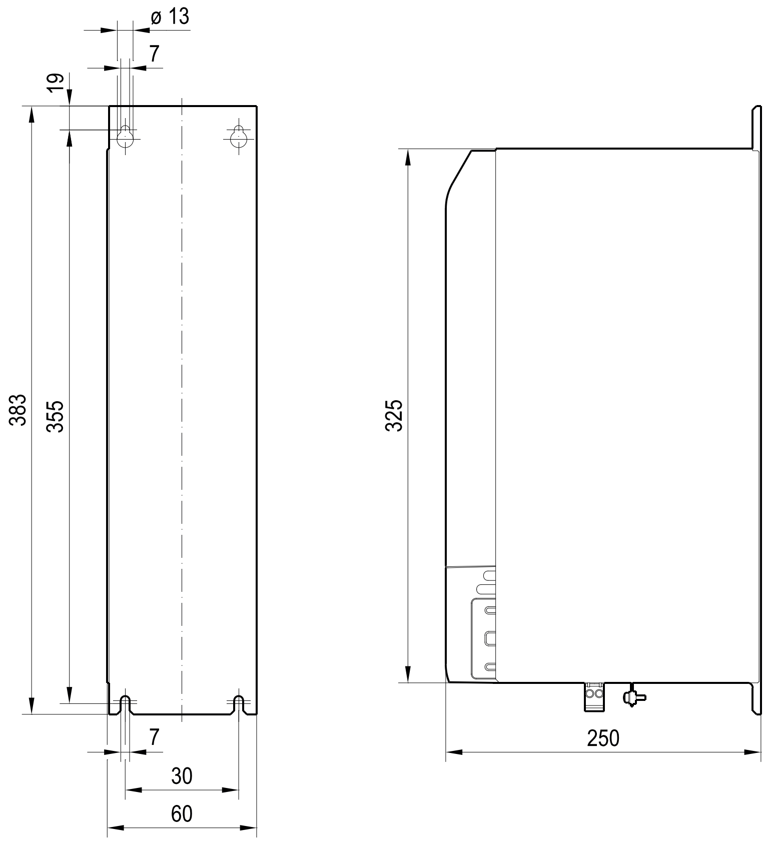
MDD9.A-0020 – 0080-.. (BG 2)





18014414468027275

8.7.3 Dimension sheet of the capacitor modules



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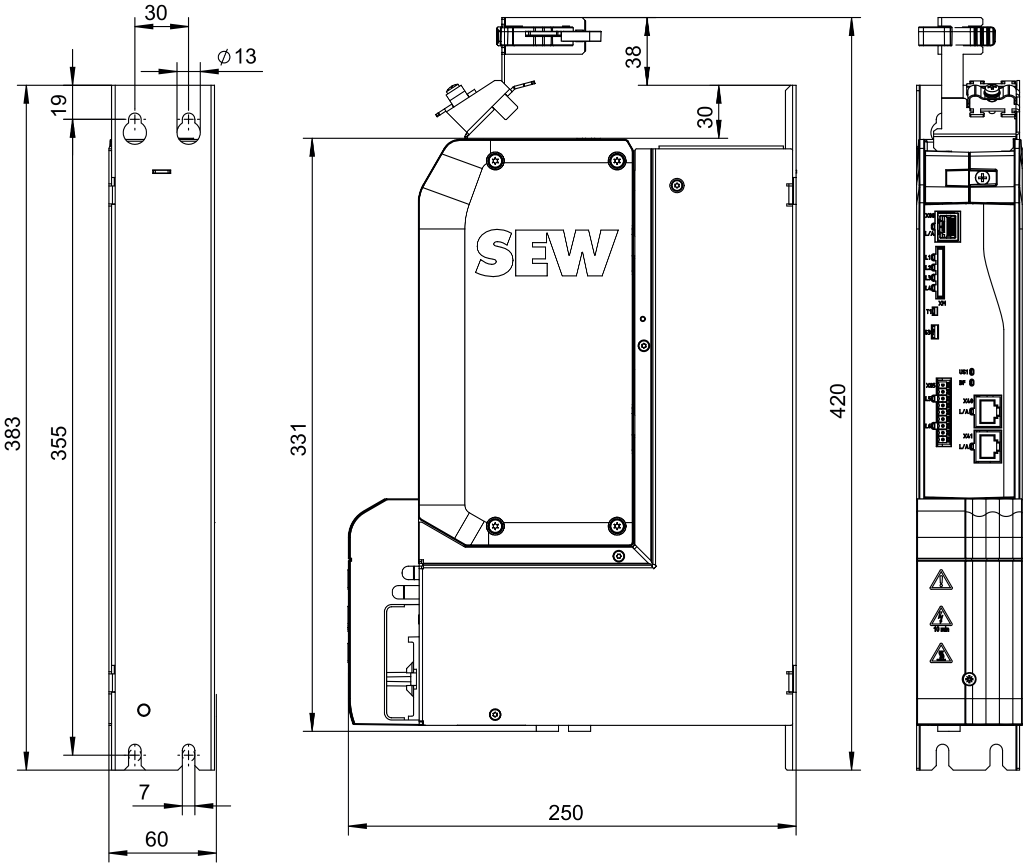
8.7.4 Dimension sheet of the master module



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8.8 Technical data of the cards

8.8.1 CIO21A and CID21A input/output cards

The CIO21A input/output card provides digital/analog inputs and outputs; the CID21A cards provide digital inputs and outputs.

	Terminal designation/ specification		Specifications
	CIO21A	CID21A	
Part number	28229495	28229487	
General			
Design			In accordance with IEC 61131-2 (type 3 for digital inputs)
Cycle time			1 ms
Power consumption	1.2 W	0.4 W	Base load (exclusively total power at outputs)
Connection contacts			Plug connector – 1 core: 0.25 – 0.5 mm^2 Shield terminals for control lines available
Digital inputs			
Number			4
Response time			160 µs plus cycle time
Assignment	X52: 1 – 4		DI10 – DI13: For the selection option, see parameter menu
	X52: 5		GND
Digital outputs			
Number			4
Response time			175 µs plus cycle time
Output current			I ≤ 50 mA
Capacitive load			≤ 300 nF
Inductive load			Not permitted
Protection device			Short-circuit proof, protected against external voltage DC 0 – 30 V
Assignment	X52: 6 – 9		DO10 – DO13: For the selection option, see parameter menu
	X52: 10		GND
Analog inputs			
Number			2
Type			Differential Switchable to current input
Range of values			0 to +10 V, -10 V to +10 V 0(4) – 20 mA
Assignment	X50:2 X50:3		Analog input AI21 Reference of analog input AI21
	X50:4 X50:7		GND
	X50:5 X50:6		Analog input AI31 Reference of analog input AI31
Voltage input			
Resolution			0 to +10 V (11 bit), -10 V to +10 V (12 bit)
Tolerance			± 0.5%
Overvoltage immunity			DC -20 V to DC +20 V
Input resistance			≥ 10 kΩ
Current input			
Resolution			0(4) – 20 mA (11 bit)
Tolerance			± 2%
Load impedance			(Internal) 250 Ω
Overvoltage immunity			DC -10 V to DC +10 V
Analog outputs			
Number			2
Short-circuit protection			Yes

	Terminal designation/ specification		Specifications
	CIO21A	CID21A	
Assignment	X51:1 X51:4		Analog voltage output AOV2/AOV3
	X51:2 X51:5		Analog current output AOC2/AOC3
	X51: 3, 6		GND
Voltage output			
Tolerance			± 5%
Capacitive load			≤ 300 nF
Inductive load			≤ 500 µH
Load resistance			≥ 1 kΩ
Resolution			12 bit
Reset state			0 V
Output value			-10 V to +10 V ≤ 10 mA
Current output			
Tolerance			± 3 %
Capacitive load			≤ 300 nF
Inductive load			None
Load resistance			≤ 500 Ω
Resolution			11 bit
Reset state			0 mA
Measuring range			0(4) – 20 mA
Reference voltage output			
Short-circuit protection			Yes
Output voltage			DC -10 V, DC +10 V
Tolerance			± 0.5 %
Noise			≤ 10 mA
Output current			≤ 3 mA
Capacitive load			≤ 300 nF
Inductive load			≤ 500 µH
Assignment	X50: 1		REF1 (DC +10 V)
	X50: 8		REF2 (DC -10 V)

NOTICE

Connection of inductive loads to digital outputs

Destruction of digital outputs.

If inductive loads are connected to digital outputs, you must install an external protective element (freewheeling diode).

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8.8.2 CES11A multi-encoder card

Voltage supply

The multi-encoder card is supplied by the basic device.

Technical data of encoder supply

	Terminal designation	Specifications
Part number		28229479
Power consumption		
Nominal power loss 24 V		0.8 W
Maximum power consumption 24 V (card including encoder supply)		12.8 W
Encoder supply		
12 V	X17:15	DC 12 V ± 10%
24 V	X17:13	DC 24 V -10%, +20% in accordance with EN 61131[1)]
Nominal output current 12 V or 24 V		500 mA
Peak current I_{max} for 150 µs		1000 mA
Capacitive load		< 220 µF
Inductive load		< 500 µH
Short-circuit protection of 12 V supply		Yes, but a permanent short circuit is not permitted.
Short-circuit protection of 24 V supply		Yes, but a permanent short circuit is not permitted.
Evaluable temperature sensor		TF / TH / KTY84-130 / Pt1000

1) Note the restricted tolerance range

Encoder connection

Encoder connection	Specification
Connection on encoder card end	15-pin socket
Maximum encoder cable length	- HTL encoder ES7C and EG7C: 300 m - Standard HTL encoder: 200 m - Other encoders: 100 m

8.8.3 Safety cards CS..A

General technical data

	Value
Ambient temperature for storage of the safety card	≥ -25 °C – ≤ 85 °C
Ambient temperature of MOVIDRIVE® system/ technology, all sizes (For derating, see the "MOVIDRIVE® system" and "MOVIDRIVE® technology" operating instructions)	• 0 °C – 40 °C without derating • 40 °C – 55 °C with derating
Ambient temperature of MOVIDRIVE® modular, all sizes	0 °C – 45 °C without derating
Installation altitude	Maximum 3800 m above sea level

Safe digital inputs

F-DI00 – F-DI03	Value/description
Properties	DC 24 V input pursuant to EN 61131-2, type 3
Signal level	• Logic "0" = LOW input: ≤ 5 V or ≤ 1.5 mA • Logic "1" = HIGH input: ≥ 11 V and ≥ 2 mA
Reference ground	GND
Power demand (typical)	0.21 W at DC 24 V
Input current	≤ 15 mA
Input resistance	≤ 4 kΩ at DC 24 V
Input filter time, parameterizable	4 ms – 250 ms
Permitted cable length	30 m
Error response time with single-pole connection	No greater than the response time without error.
Edge steepness of input signal	> 120 V/s
Input capacitance	< 500 pF

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Sensor supply

F-SS0, F-SS1	Value/description
Properties	• DC 24 V output pursuant to EN 61131-2 • Short circuit and overload protection • No galvanic isolation
Rated current	150 mA
Inrush current (≤ 10 ms)	300 mA
Short-circuit protection	1.2 A
Internal voltage drop	< DC 1.3 V
Pulsed voltage supply (if activated)	• 2 ms open (LOW) • Period duration, pulsed voltage supply: 8 ms
Permitted cable length	30 m (per sensor)
Leakage current (F-SSx blocked)	< 0.1 mA

Safe digital outputs

F-DO00_P/M, F-DO01_P/M	Value/description
Features	• DC 24 V output in accordance with EN 61131-2 • Short circuit and overload protection
Rated current	150 mA
Inrush current (≤ 10 ms)	300 mA
Leakage current (F-DOx blocked)	< 0.1 mA
Maximum switching frequency	• 10 Hz during operation < 1 minute • 0.5 Hz during operation > 1 minute
Overload protection	210 mA
Minimum current for wire break monitoring	15 mA
Permitted cable length	30 m
Load capacitance (max. test pulse duration)	≤ 300 nF
Load capacitance (1 ms test pulse duration)	50 nF
Capacitance to GND/PE (sourcing output only)	≤ 10 nF
Load capacitance with diode de-coupling	≤ 12 µF
Load inductance	≤ 100 µH
Load inductance with freewheeling diode	≤ 40 H
Minimum load resistance	> 130 Ω

8.9 Technical data of encoder interfaces

8.9.1 Basic device

	Terminal designation	Specification
Encoder interface	X15:1 – 15	Supported encoders
		Resolver
		SIN/COS
		TTL/HTL
		HIPERFACE®
		Encoders with RS422 signals
Connecting contacts		15-pin socket
Encoder supply		
Nominal output voltage U_{S24VG} according to IEC 61131		DC 24 V
Nominal output voltage U_{S12VG} according to IEC 61131		DC 12 V
I_{max}		500 mA
I_{peak} for 150 µs		1000 mA
Short-circuit protection of 12 V supply		Yes, but a permanent short circuit is not permitted.
Short-circuit protection of 24 V supply		Yes, but a permanent short circuit is not permitted.

8.9.2 CES11A multi-encoder card

	Terminal designation	Specification
encoder interface	X17:1 – 15	Supported encoders
		SIN/COS
		TTL/HTL
		HIPERFACE®
		EnDat2.1 with sin/cos signals
		SSI
		CANopen
		Encoders with RS422 signals
Connecting contacts		15-pin socket
Encoder supply		
Nominal output voltage U_{S24VG} according to IEC 61131		DC 24 V
Nominal output voltage U_{S12VG} according to IEC 61131		DC 12 V
I_{max}		500 mA
I_{peak} for 150 µs		1000 mA

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8.10 Technical data of braking resistors, filters and chokes

8.10.1 Braking resistors type BW.../BW...-T

General

The BW... / BW...-T braking resistors are adapted to the technical characteristics of the application inverter.

There are braking resistors with different continuous and peak braking power available.

The braking resistors can be protected against overload and overtemperature by the customer by using a thermal overload relay. The tripping current is set to the value I_F, see the following tables (→ 🗎 284).

The braking resistors of the series BW...-T are equipped with an integrated temperature switch that monitors the temperature. If the nominal operating temperature is exceeded, the temperature switch triggers a signal contact. The temperature switch does not switch off the braking resistor. This is why the temperature switch must be evaluated to avoid thermal overload of the braking resistor.

Another possibility to protect the braking resistor is the TCB thermal circuit breaker. The TCB thermal circuit breaker protects the braking resistor against continuous overload and power peaks over short periods.

INFORMATION

Use of protection devices

Only use the protection devices listed in the following section:

- TCB thermal circuit breaker
- Internal temperature switch -T
- External bimetallic relay

→ See also chapter "Protection against thermal overload of the braking resistor" (→ 🗎 132).

UL and cUL approval

The listed braking resistors have cRUus approvals independent of the application inverter.

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Technical data and assignment to an inverter

Technical data

Braking resistor	Unit	BW047-002[1)]	BR047-010-T	BR027-016-T	BW027-024-T
Part number		08281661	17983207	17983215	17983231
Nominal power P_N	kW	0.2	1	1.6	2.4
Resistance value R_{BW}	Ω	47 ±10%	47 ±10%	27 ± 10%	
Tripping current I_{trip}	A	1.6	4.6	7.7	9.4
Design		Flat-type resistor	Wire resistor		
Power connections		–	0.75 – 10 mm^2		
Tightening torque	Nm	–	1.5 – 1.8		
PE connection		–	M6 stud		
Tightening torque PE	Nm	–	1.8		
Degree of protection		IP65	IP20		
Ambient temperature ϑ_{amb}		-20 °C to +40 °C			
Mass	kg	0.6	4	5.8	8

1) In the documented assignment of inverter and flat-type resistor, flat-type resistors have a thermal protection (non-replaceable fuse) that interrupts the current circuit in the event of overload.

Assignment

Braking resistor		BW047-002	BR047-010-T	BR027-016-T	BW027-024-T
Assignment to MDP90A-..		0100 – 1100			
Assignment to MDR91A-..		0500/0750			
Assignment to MDP92A-..		0250			

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Technical data

Braking resistor	Unit	BW012-016	BW012-024	BW012-050-T
Part number		18213243	17983894	18201407
Nominal power P_N	kW	1.6	2.4	5
Resistance value R_{BW}	Ω	12 ± 10%		
Tripping current I_{trip}	A	11.5	14.1	20.4
Design		Wire resistor		Grid resistor
Power connections		0.75 – 10 mm²		M8 stud
Tightening torque	Nm	1.5 – 1.8		6
PE connection		M6 stud		M6 stud
Tightening torque PE	Nm	1.8		3
Degree of protection		IP20		
Ambient temperature ϑ_{amb}		-20 °C to +40 °C		
Mass	kg	5.8	8	12

Assignment

Braking resistor		BW012-016	BW012-024	BW012-050-T
Assignment to MDP90A-..		0250 – 1100		
Assignment to MDR91A-..		0500/0750		
Assignment to MDP92A-..		0250		

Technical data

Braking resistor	Unit	BR106-T	BR206-T	BR005-070	BR004-050-01	BR002-070	BR003-420-T
Part number		18200834	18204120	17983282	18200133	17983304	13302345
Nominal power P_N	kW	13.5	18	7	5	7	42
Resistance value R_{BW}	Ω	6 ± 10%		4.7 ± 10%	3.6 ± 10%	2.3 ± 10%	2.5 ± 10%
Tripping current I_{trip}	A	47.4	54.7	38.6	37.3	55.2	135.1
Design		Grid resistor					
Power connections		M8 stud				M8 stud	M12 stud
Tightening torque	Nm	6				6	15.5
PE connection		M6 stud				M6 stud	M10 stud
Tightening torque PE	Nm	3				3	10
Degree of protection		IP20					
Ambient temperature ϑ_{amb}		-20 °C to +40 °C					
Mass	kg	30	40	13	12	33	93

Assignment

Braking resistor		BR106-T	BR206-T	BR005-070	BR004-050-01	BR003-420-T	BR002-070
Assignment to MDP90A-..		0500 – 1100			0750 – 1100	1100	
Assignment to MDR91A-..		0500/0750			0750	–	–

Technical data BW..-T signal contact

Specifications for BW..-T signal contact	Design
Connection contacts	0.75 – 2.5 mm^2
Tightening torque	0.6 Nm
Switching capacity	DC 2 A / DC 24 V (DC11) AC 2 A / AC 230 V (AC11)
Switch contact (NC contact)	According to EN 61800-5-1

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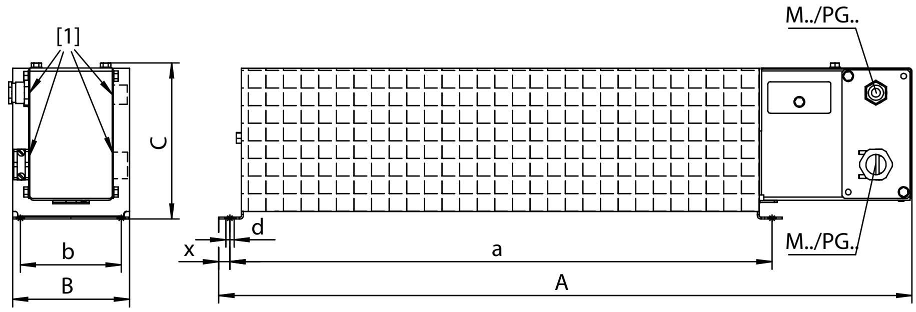
Dimension sheets and dimensions

Wire resistor



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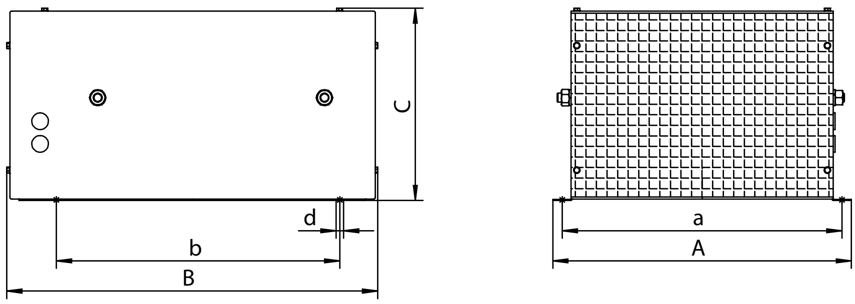
[1] Cable entry is possible from both sides.

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BR047-010-T	749	92	125	630	80	6.5	8	M25+M12
BR027-016-T	649	185	125	530	150	6.5	8	M25+M12
BW027-024-T	649	275	125	530	240	6.5	8	M25+M12
BW012-016	649	185	120	530	150	6.5	8	M25
BW012-024	649	275	125	530	240	6.5	9	M25

Grid resistor mounting position 1



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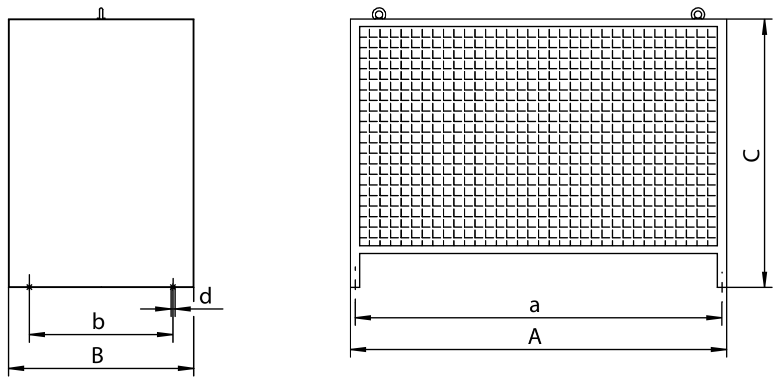
Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW012-050-T	395	490	260	370	380	10.5	–	–
BR106-T	795	490	270	770	380	10.5	–	–
BR206-T	995	490	270	970	380	10.5	–	–
BR005-070	395	490	260	370	380	10.5	–	–
BR004-050-01	395	490	260	370	380	10.5	–	–
BR002-070	395	490	260	370	380	10.5	–	–

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW012-050-T	395	490	260	370	380	10.5	-	-
BR106-T	795	490	270	770	380	10.5	–	–
BR206-T	995	490	270	970	380	10.5	–	–
BR005-070	395	490	260	370	380	10.5	–	–
BR004-050-01	395	490	260	370	380	10.5	–	–
BR002-070	395	490	260	370	380	10.5	–	–

Grid resistor mounting position 2



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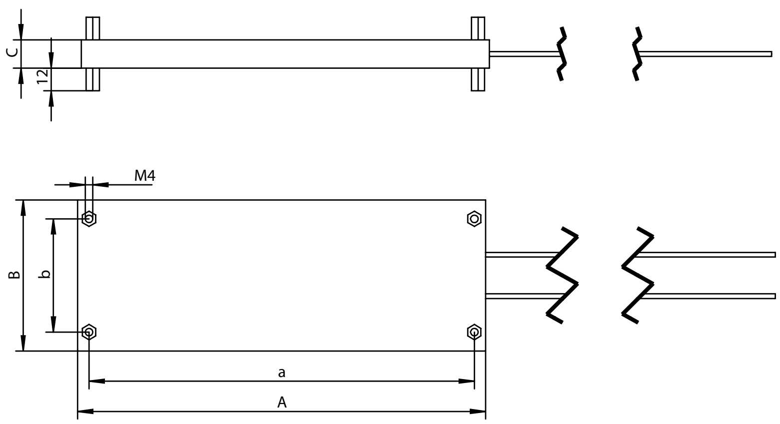
Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW003-420-T	995	490	710	970	380	10.5	-	-

Flat type resistor



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Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW047-002	110	80	15	98	60	-	-	-

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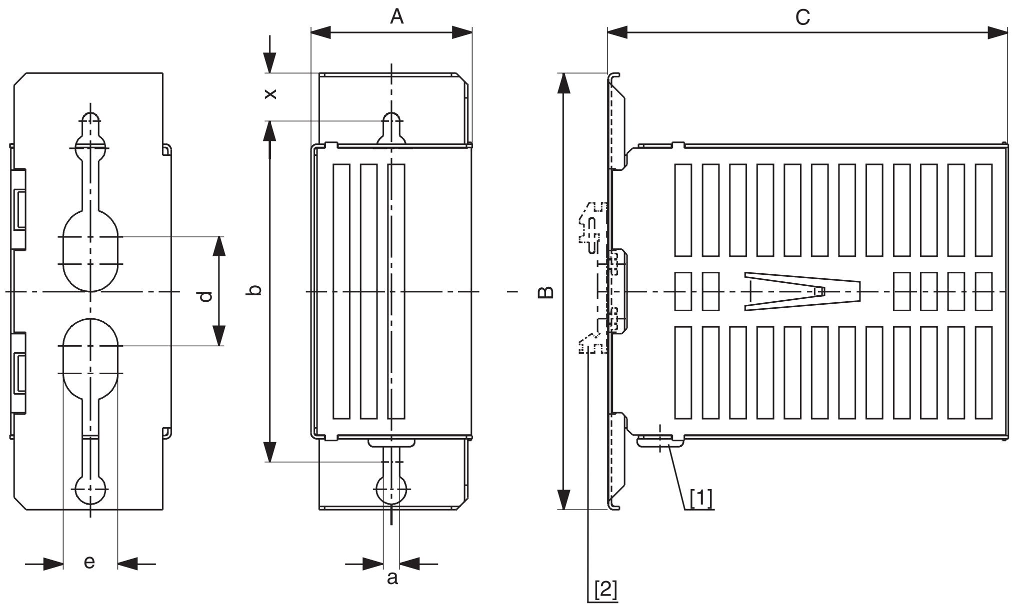
Touch guard BS..

Description

A BS.. touch guard is available for braking resistors in flat design.

Touch guard	BS005
Part number	0813152X
for braking resistor	BW047-002

Dimension sheet BS..



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[1] Grommet

[2] Support rail mounting

Type	Main dimensions in mm			Mounting dimensions mm					Mass kg
	A	B	C	b	d	e	a	x	
BS-005	60	160	252	125	4	20	6	17.5	0.5

Mounting rail installation

A mounting rail attachment HS001 is available from SEW-EURODRIVE, part number 8221944, for mounting the touch guard on a mounting rail.

8.10.2 TCB thermal circuit breaker option

General

The TCB thermal circuit breaker protects the braking resistor from constant overload and protects in case of a short circuit in the cable or the braking resistor.

The setting range of the thermal circuit breaker has to be selected in such a way that it corresponds to the tripping current I_F of the braking resistor.

The switch reacts to the following events:

- Thermal overload via current monitoring device.
- Short circuit.

In the event of a fault, the thermal circuit breaker switches off the braking resistor. The present fault is signaled via isolated NO and NC contacts.

After fault elimination, the thermal circuit breaker can be reconnected like a normal miniature circuit breaker.

The thermal circuit breaker is installed on DIN rails (TS35).

UL and cUL approval

The listed thermal circuit breakers have a cRUus approval independent of the inverter.

Technical data

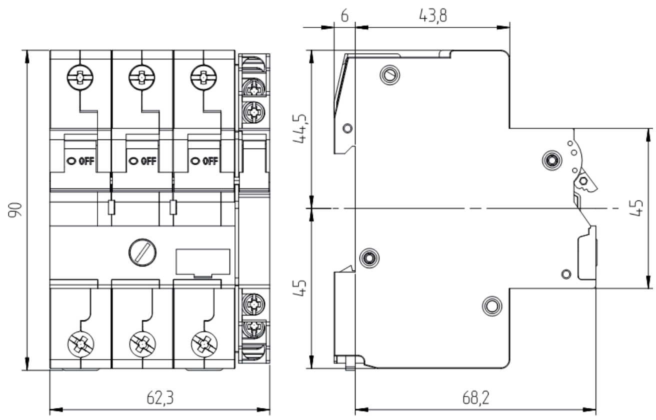
Circuit breaker type	Unit	TCB0040	TCB0063	TCB0100
Part number		19170424	19170432	19170440
Setting range	A	2.5 – 4	4 – 6.3	6.3 – 10
Connection cross section main contact	mm^2	1.5 – 16		
Tightening torque	Nm	2.5		
Signal contact connection cross section	mm^2	0.5 – 1.5		
Tightening torque	Nm	0.8		
Mechanical service life		20000 switching cycles		

Circuit breaker type	Unit	TCB0160	TCB0200	TCB0250	TCB0320	TCB0400
Part number		19170459	19148658	19170467	19170475	19170483
Setting range	A	10 – 16	16 – 20	20 – 25	25 – 32	32 – 40
Connection cross section main contact	mm^2	2.5 – 16	4 – 16		6 – 16	10 – 16
Tightening torque	Nm	2.5				
Signal contact connection cross section	mm^2	0.5 – 1.5				
Tightening torque	Nm	0.8				
Mechanical service life		20000 switching cycles				

Technical data of signal contact

Specifications of the signal contacts	Design
Connecting contacts	0.5 – 1.5 mm^2
Tightening torque	0.8 Nm
Switching capacity	DC 5 A / DC 24 V AC 10 A / AC 230 V

Dimension sheet



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8.10.3 Line filter

Line filters are used to suppress interference emission on the line side of inverters.

UL and cUL approval

The listed line filters have an cRUus approval independent of the inverter.

Technical data

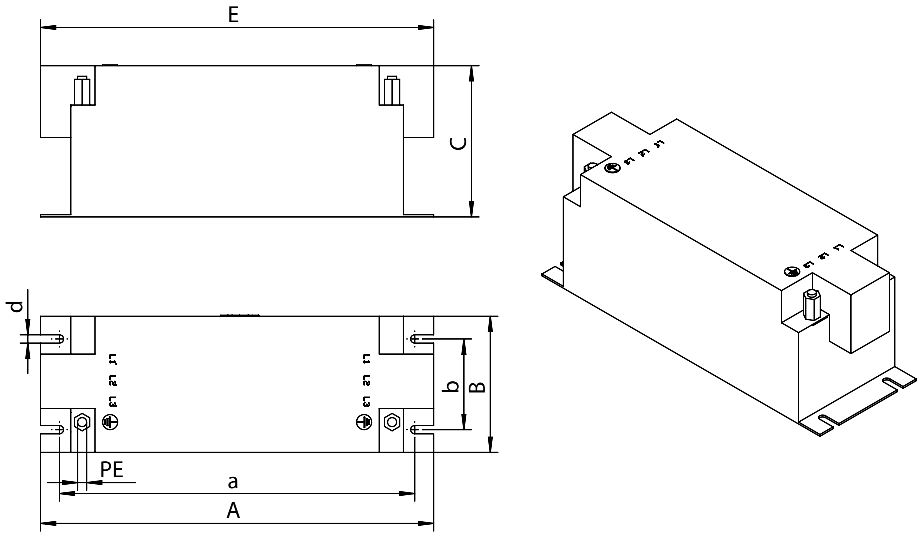
Line filter	NF0420-513	NF0420-523
Part number	17983789	17983797
Nominal line voltage U_N	Maximum 3 × AC 500 V, 50/60 Hz	
Nominal current I_N	42 A	
Nominal power loss	30 W	37 W
Ambient temperature ϑ_{amb}	0 °C to 45 °C	
Connection contacts L1/L2/L3 – L1'/L2'/L3'	2.5 – 16 mm^2	
Tightening torque L1/L2/L3 - L1'/L2'/L3'	2 – 4 Nm	2 - 2.3 Nm
PE connection contact	M6	
Tightening torque PE	6 Nm	
Degree of protection	IP20 according to EN 60529	
Weight	3 kg	4.5 kg

Line filter	NF0910-523	NF1800-523
Part number	17987504	17987865
Nominal line voltage U_N	Maximum 3 × AC 500 V, 50/60 Hz	
Nominal current I_N	91 A	180 A
Nominal power loss	51.5 W	89 W
Ambient temperature ϑ_{amb}	0 °C to 45 °C	
Connection contacts L1/L2/L3 – L1'/L2'/L3'	25 – 50 mm^2	16 – 120 mm^2
Tightening torque L1/L2/L3 - L1'/L2'/L3'	6 - 8 Nm	12 - 20 Nm
PE connection contact	M8	M10
Tightening torque PE	12 Nm	23 Nm
Degree of protection	IP20 according to EN 60529	
Weight	5 kg	9 kg

Assignment to an inverter

Line filter	NF0420-513	NF0420-523
Assignment to MDP90A-..	0100, 0250	
Assignment to MDP90A-..	0500	0750, 1100
Assignment to MDR91A-..	0500	0750

Dimension sheets and dimensions



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Line filter	Main dimensions in mm				Mounting dimensions in mm			
	A	B	C	E	a	b	d	PI
NF0420-513	250	88	97	255	235	60	5.5	M6
NF0420-523	330	83	187	340	314	55	6.5	M6
NF0910-523	270	100	152	320	255	65	6.5	M8
NF1800-523	380	132	185	465	365	102	6.5	M10

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8.10.4 Line choke

Using line chokes is optional:

- To support overvoltage protection.
- To smoothen the line current, to reduce harmonics.
- For protection in the event of distorted line voltage.
- For limiting the inrush current.

UL and cUL approval

The listed line chokes have cRUus approvals independent of the inverter.

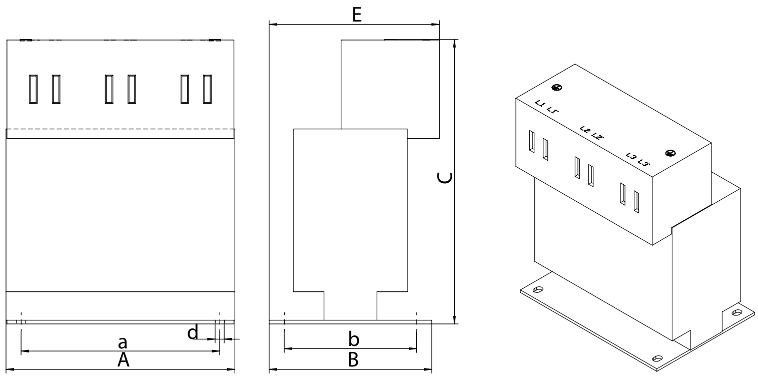
Technical data

Line choke	ND0300-503	ND0420-503	ND0910-503	ND1800-503
Part number	17983800	17983819	17987520	17987539
Nominal line voltage V_N	Maximum 3 × AC 230 V - 500 V, 50/60 Hz			
Nominal current I_N	30 A	42 A	91 A	180 A
Nominal inductance	0.1 mH	0.045 mH	0.035 mH	0.018 mH
Nominal power loss	11 W	13 W	53 W	116 W
Ambient temperature ϑ_{amb}	-10 °C to 45 °C			
Terminal contacts L1/L2/L3 - L1'/L2'/L3'	0.2 – 10 mm^2	2.5 – 16 mm^2	25 – 50 mm^2	16 - 120 mm^2
Tightening torque L1/L2/L3 - L1'/L2'/L3'	1.2 – 2 Nm	2.5 Nm	3 - 6 Nm	12 - 20 Nm
PE terminal contact	M5		M8	M10
Tightening torque PE	3 Nm		12	20
Degree of protection	IPXXB according to EN 60529			IPXXA according to EN 60529
Weight	1.95 kg	1.82 kg	4.4 kg	10 kg

Assignment to an inverter

Line choke	ND0300-503	ND0420-503	ND0910-503	ND1800-503
Assignment to MDP90A-	0100	0250	0500	0750, 1100

Dimension sheets and dimensions



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Line choke	Main dimensions in mm				Mounting dimensions in mm			
	A	B	C	E	a	b	d	PE
ND0300-503	121	86	145	86	105	70	4.8	M5
ND0420-503	121	86	150	90	105	70	4.8	M5

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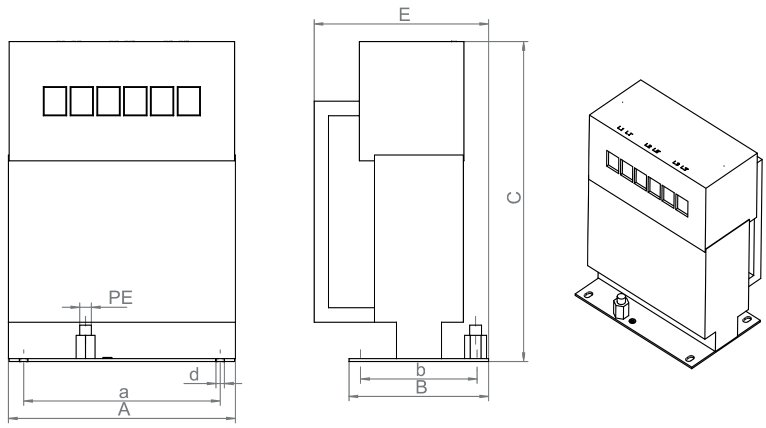

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Line choke	Main dimensions in mm				Mounting dimensions in mm			
	A	B	C	E	a	b	d	PE
ND0910-503	156	96	220	120	135	80	5.8	M8
ND1800-503	187	121	260	153	166	93	6.2	M10

9 Functional safety

9.1 General information

9.1.1 Underlying standards

The safety assessment of the device is based on the following standards and safety classes:

Underlying standards	
Safety class/ underlying standard	• Performance level (PL) in accordance with ISO 13849-1:2015 • Safety Integrity Level (SIL) in accordance with IEC 61800-5-2:2016 • Safety Integrity Level Claim Limit (SILCL) in accordance with IEC 62061 2015

9.2 Integrated safety technology

The described safety technology of the device has been developed and tested in accordance with the following safety requirements:

- SIL 3 in accordance with IEC 61800-5-2:2016, IEC 61508:2010.
- PL e in accordance with ISO 13849-1:2015.

This was certified by TÜV Rheinland. Copies of the TÜV certificate and the corresponding report are available from SEW-EURODRIVE on request.

9.2.1 Safe condition

For safety-related operation of the device, Safe Torque Off is defined as safe state (see STO drive safety function). The safety concept is based on this definition.

9.2.2 Safety concept

The device is supposed to be able to perform the drive safety function "Safe Torque Off" in accordance with IEC 61800-5-2:

- Device is characterized by the optional connection of an external safety controller/ safety relay. This external safety controller/safety relay disconnects the safety-related STO input via a 2-pole 24 V switching signal (sourcing/sinking) when a connected command device (e.g. emergency stop button with latching function) is activated. This activates the STO function of the device. As an alternative to an external safety controller/safety relay, the STO function can also be implemented with the optional MOVISAFE® CS..A safety card.
- An internal, dual-channel structure with diagnostics prevents the generation of pulse trains at the power output stage (IGBT).
- Instead of a galvanic isolation of the drive from the supply system by means of contactors or switches, the disconnection of the STO input described here safely prevents the activation of the power semiconductors in the output stage. The rotary-field generation for the respective motor is deactivated even though the line voltage is still present.

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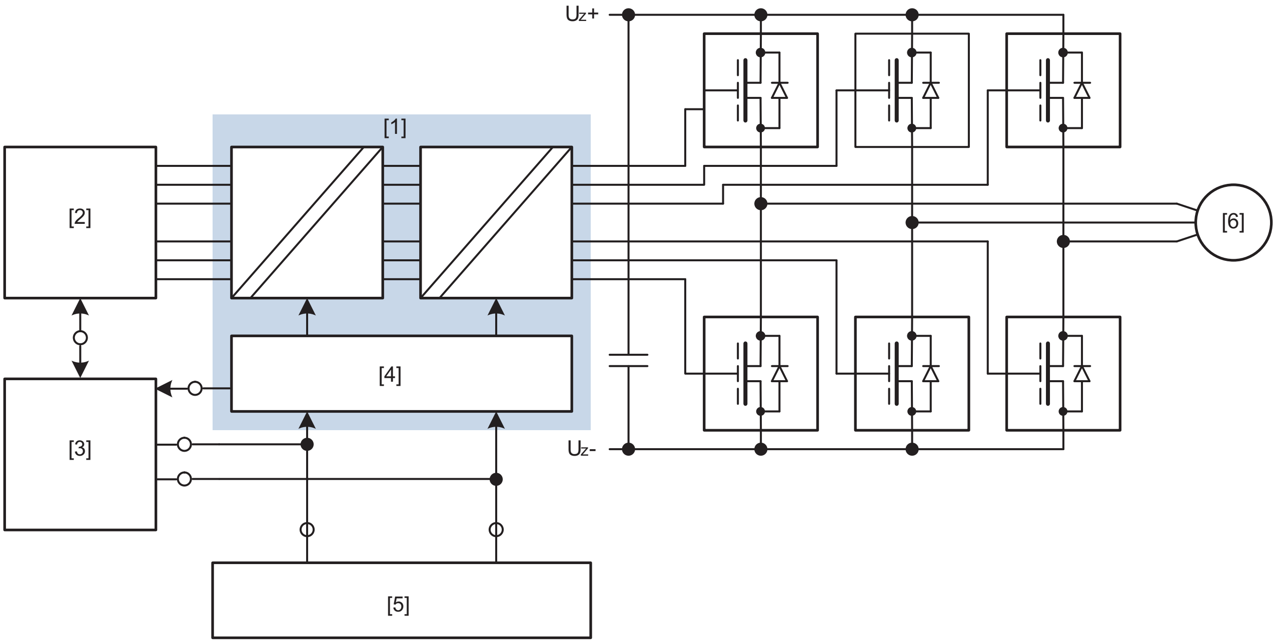
- When the STO drive safety function is activated, the generated PWM signals from the device are interrupted by the STO circuit and not transmitted to the IGBTs.
- If the internal diagnostics of the STO circuit detects a discrepancy between the two channels, the PWM signals are locked, i.e. the STO is activated. This locking requires a reset by switching the DC 24 V supply voltage of the device or the DC 24 V switching signal at the STO inputs F_STO_P1 and F_STO_P2 off and on.

9.2.3 Schematic representation of the safety concept



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[1] STO function
[2] Drive controller
[3] Internal safety card/safety option (optional)
[4] Diagnostics and inhibiting unit
[5] External safety device (optional)
[6] Motor

9.2.4 Drive safety functions

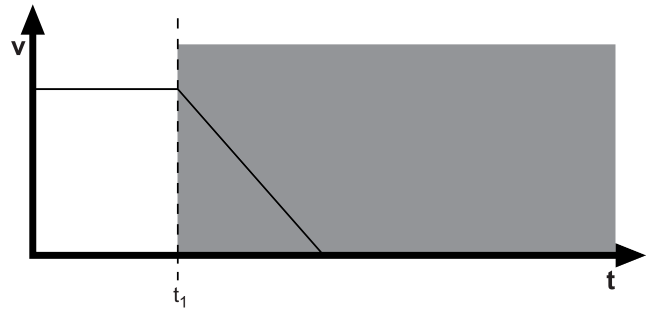
The following drive-related safety functions can be used:

- **STO** (Safe Torque Off in accordance with IEC 61800-5-2) by disconnecting the STO input.

  If the STO function is activated, the frequency inverter no longer supplies power to the motor for generating torque. This drive safety function corresponds to a non-controlled stop according to EN 60204-1, stop category 0.

  The STO input must be disabled by a suitable external safety controller/safety relay.

  The following figure shows the STO function:



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v	Speed
t	Time
t_1	Point of time when STO is triggered
	Disconnection range

- **SS1(c) (SS1-t)** (safe stop 1, function variant c in accordance with IEC 61800-5-2) by means of suitable external control (e.g. safety relay with delayed disconnection).

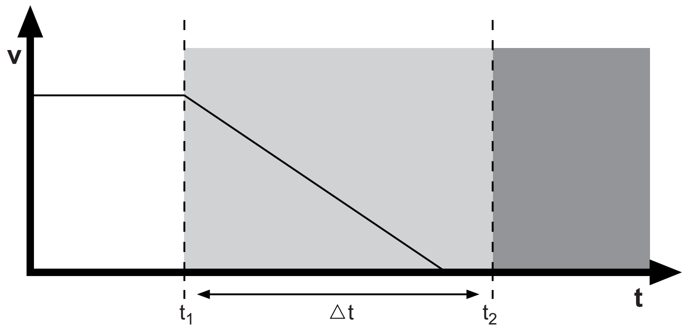
  The following sequence is mandatory:

  – Decelerate the drive using an appropriate brake ramp specified via setpoints.

  – Disconnect the STO input (= triggering the STO function) after a specified safety-related time delay.

  This drive safety function corresponds to a controlled stop in accordance with EN 60204-1, stop category 1.

  The following figure illustrates the SS1(c) (SS1-t) function:



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v	Speed
t	Time
t_1	Point of time when brake ramp is initiated
t_2	Point of time when STO is triggered
Δt	Delay time until STO is triggered
	Safe time delay range
	Disconnection range

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9.2.5 Restrictions

- Note that if the drive does not have a mechanical brake or if the brake is defective, the drive may coast to a halt (depending on the friction and mass moment of inertia of the system). In the event of regenerative loads or with axes that are loaded with gravitational forces or driven externally, the drive can even accelerate. This must be taken into account in a risk assessment of the system/machine. Additional safety measures might have to be implemented (e.g. safety brake system).

  In the case of application-related drive safety functions that require bringing the hazardous motion safely to a standstill, an additional safety brake system may be necessary on an application-specific basis.
- When using the function SS1(c) (SS1-t) as described in the chapter "Drive safety functions", the brake ramp of the drive is not monitored with respect to safety. In the event of a fault, deceleration may fail during the delay time or, in the worst-case scenario, there might be an acceleration. In this case, the STO function (see the chapter "Safety functions") is only activated after the set time delay elapsed. The resulting danger must be taken into account in the risk assessment of the system/machine. Additional safety measures might have to be implemented.
- The STO function cannot prevent a possible jerk or DC braking.

⚠ WARNING

The safety concept is suitable only for performing mechanical work on driven system/machine components.

When the STO signal is disconnected, the voltage is still present at the DC link of the device.

- Before working on the electric part of the drive system, disconnect it from the supply voltage using an appropriate external disconnecting device and secure it against unintentional reconnection.

⚠ WARNING

Electric shock due to incompletely discharged capacitors.

Severe or fatal injuries.

- Observe a minimum switch-off time of 10 minutes after disconnecting the power supply.

INFORMATION

In the event of a safety-related disconnection of the DC 24 V supply voltage at the STO connection, the brake controller is switched off. The brake control in the device is not safety-related.

9.3 Safety conditions

The requirement for safe operation is that the drive safety functions of the application inverter are properly integrated into an application-specific, higher-level drive safety function. A system/machine-specific risk assessment must be carried out without fail by the system/machine manufacturer and taken into account for the use of the drive system with the device.

The system/machine manufacturer and the user are responsible for the compliance of the system/machine with the applicable safety regulations.

The following requirements are mandatory when installing and operating the device in safety-related applications:

- Use of the approved devices
- Installation requirements
- Requirements for external safety controllers and safety relays
- Startup requirements
- Operational requirements

9.3.1 Approved devices

The following device versions of MOVIDRIVE® modular are permitted for safety-related applications:

Device	Size
MOVIDRIVE® modular (single-axis and double-axis modules)	All sizes

9.3.2 Requirements for the installation

- The components must be protected against conductive dirt, e.g. by installing them in a control cabinet with degree of protection IP54 in accordance with IEC 60529.

  Assuming that the presence of conductive dirt can be excluded at the installation site, a control cabinet with a correspondingly lower degree of protection is also permitted if in accordance with the applicable standards (e.g. EN 60204-1).
- The wiring technology used must comply with the standard EN 60204-1.
- The STO control cables must be routed according to EMC guidelines and as follows:
  - Inside an electrical installation space: Single conductors can be routed.
  - Outside a closed installation space: Shielded cables must be routed permanently (fixed) and protected against external damage, or equivalent measures must be taken.
  - Adhere to the regulations in force for the application.
  - The sinking and sourcing cables from the external safety controller/safety relay to the device must be routed right next to each other with a cable length of ≤ 100 m.
  - The sinking and sourcing cables from the external safety device to the device must have the same cable length. A difference in length ≤ 3% of the two cables is permitted.
  - You must use suitable measures to ensure that STO control cables are routed separately from the power lines of the drive. This does not apply to cables approved by SEW-EURODRIVE specifically for this application case.
- The STO function does not detect short circuits or interference voltage in the supply line, so you must ensure the following:
  - No parasitic voltages can occur in the STO control cables
  - The external safety controller can detect a cross fault from an external potential to the STO control lines
- Observe without fail the values specified for safety components when designing the safety circuits.

- The STO signal (F_STO_P1, F_STO_P2, and F_STO_M) must not be used for feedback.
- For safety controller/safety relays, you must only use grounded voltage sources with protective electrical separation (PELV) in accordance with EN 61131-2 and EN 60204-1.
- If several voltage sources are used, each voltage source must be connected to a PE system.
- When planning the installation, observe the technical data of the devices.
- Do not use the port X6:5 (24 V_Out) of the device for safety-related applications. The voltage is only permitted to supply the port for the safe disconnection X6 when a jumper plug is plugged.
- For safety-related applications with the device, the jumper plug at the STO input X6 must be removed.

9.3.3 Requirements for external safety controllers

A safety relay can be used as an alternative to a safety controller. The following requirements apply analogously.

- The safety controller and all other safety-related subsystems must be approved for at least that safety class which is required in the overall system for the respective, application-related drive safety function.

  The following table shows an example of the required safety class of the safety controller:

Application	Safety controller requirements
Performance level d in accordance with ISO 13849-1, SIL 2 in accordance with EN 62061	Performance level d in accordance with ISO 13849-1 SIL 2 in accordance with IEC 61508
Performance level e in accordance with ISO 13849-1, SIL 3 in accordance with EN 62061	Performance level e in accordance with ISO 13849-1, SIL 3 in accordance with EN 61508

- The wiring of the safety controller must be suitable for the required safety class (see manufacturer documentation). The STO input of the device can be switched with 2 poles (sourcing or sourcing/sinking) or with 1 pole (sourcing).
- The values specified for the safety controller must be strictly adhered to when designing the circuit.
- No electro-sensitive protective equipment (such as a light grid or scanner) in accordance with EN 61496-1 or emergency stop buttons may be connected directly to the STO input. The connection must be made via a safety controller or a safety relay.
- To ensure protection against an unintended startup in accordance with EN ISO 14118, the safe control system must be designed and connected in such a way that resetting the command device alone does not lead to a restart. This means that a restart may be carried out only after a manual reset of the safety circuit.
- If no fault exclusion is used for the STO wiring in accordance with ISO 13849-2 or IEC 61800-5-2, the external safety device must detect the following faults in the STO wiring within 20 s depending on the connection type:
  - 2-pole sourcing output:

    Short circuit of 24 V at F_STO_P1 or F_STO_P2 (Stuck-at 1)

  Crossfault between F_STO_P1 and F_STO_P2

  – 2-pole sourcing/sinking:

    Short circuit of 24 V at F_STO_P1 (Stuck-at 1)

    Short circuit of 0 V at F_STO_M (Stuck-at 0)

  – 1-pole sourcing output:

    In the case of a single-pole connection, a fault exclusion is necessary for the wiring between the safety relay and the STO input.

2-pole sourcing output:

- Test pulses can be present when the device is switched on or off:
  - The test pulses on both sourcing channels must be switched with a time delay. However, additional test pulses may occur simultaneously.
  - The test pulses in both sourcing channels must not exceed 1 ms.
  - The next test pulse in one sourcing channel must occur only after a 2 ms time period.
  - A maximum package of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
  - The test pulses must be monitored in the safety device. If a fault is detected, the safety device must initiate a suitable fault response.

2-pole sourcing/sinking:

- Test pulses can be present when the device is switched on or off:
  - The test pulses in the sourcing and sinking channel must not exceed 1 ms.
  - The next test pulse in the sourcing or sinking channel must only occur after a 2 ms time period at the earliest.
  - A maximum package of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
  - The test pulses must be monitored in the safety device. If a fault is detected, the safety device must initiate a suitable fault response.

1-pole sourcing output:

- In switched-off state, no switch-on test pulses must occur in the sourcing cable.
- In switched-on state:
  - The switch-off test pulse in the sourcing channel must not exceed 1 ms.
  - The next switch-off test pulse may only occur after a time period of 2 ms at the earliest.
  - A maximum package of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
  - The test pulses must be monitored in the safety device. If a fault is detected, the safety device must initiate a suitable fault response.

9.3.4 Requirements for startup

- To validate the implemented drive safety functions, they must be checked and documented after successful startup (functional test).

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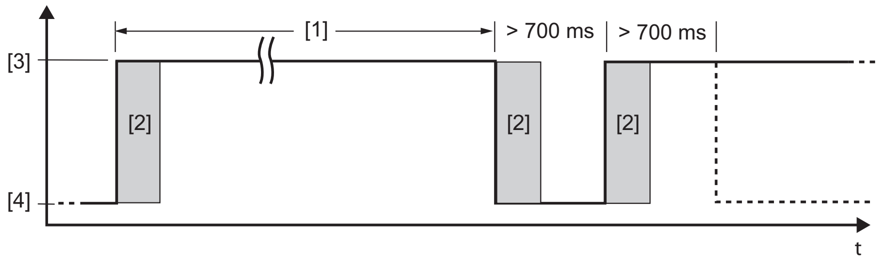
- Observe the restrictions for drive safety functions in the chapter "Restrictions". Non-safety-related parts and components that affect the result of the functional test (e.g. motor brake) must be deactivated, if necessary.
- For using the device in safety-relevant applications, it is essential that you perform and document startup checks for the disconnecting device and the correct electrical connection.

9.3.5 Requirements for operation

- Operation is permitted only within the limits specified in the corresponding documentation. This principle applies to the external safety controller as well as to the device and any approved options.
- The built-in diagnostic function is limited in the case of a permanently enabled or permanently disabled STO input. Advanced diagnostic functions are performed only upon a level change of the STO signal. This is why the STO input of the device must be requested with connected line voltage at least once every 12 months for PL d in accordance with ISO 13849-1 and SIL 2 IEC 61800-5-2 and at least once every 3 months for PL e in accordance with ISO 13849-1 and SIL 3 IEC 61800-5-2 to achieve complete test coverage. Adhere to the following test procedure.



15205932683

[1] Maximum 12 months with PL d/SIL 2
Maximum 3 months with PL e/SIL 3
[2] Internal diagnostics
[3] High: No STO
[4] Low: STO active

- To achieve complete test coverage after a device reset (e.g. after connecting the line voltage), the state transition (STO active → not active) can be started only > 700 ms later. The device signals "ready for operation" or "STO – Safe Torque Off" if it is not in fault state.
- A detected hardware fault in the internal switch-off channels for STO will lead to a locking fault state in the device. If the fault is reset (e.g. by switching the line voltage on/off or by a low level at the STO input for at least 30 ms), a complete test with internal diagnostics according to the abovementioned test procedure must be performed. If the fault occurs again, replace the device or contact SEW-EURODRIVE Service.

9.4 Connection designs

9.4.1 General information

Generally, all the connection designs listed in this documentation are permitted for safety-relevant applications, insofar as the safety conditions arising from this documentation are satisfied. This means that you must ensure without fail that the DC 24 V safety inputs are activated by a safety controller or an external safety relay, so that an independent restart is not possible.

All the safety conditions stipulated in the chapters "Integrated safety technology", "Safety conditions", and "Connection variants" must be satisfied on a primary basis for the basic selection, installation, and application of the safety components, such as safety relay, emergency stop switch, and the approved connection variants.

The wiring diagrams are block diagrams whose only purpose is to show the drive safety function(s) with the relevant components. For reasons of clarity, circuit-related measures that usually always have to be implemented are not shown in the diagram. These measures are e.g.:

- Ensuring the availability of touch guards.
- Handling overvoltages and undervoltages.
- Avoiding installation errors.
- Detecting ground faults or short circuits in externally installed lines.
- Guaranteeing the required interference immunity against electromagnetic interference.

9.4.2 Requirements

Use of safety relays

The requirements of the manufacturers of safety relays (such as protecting the output contacts against welding) or of other safety components must be strictly observed. The basic requirements for cable routing apply as described in this documentation.

For connecting the device to the safety relays, observe the installation requirements in accordance with the chapter "Installation requirements".

All instructions by the manufacturer of the safety relay used in the particular application must be observed.

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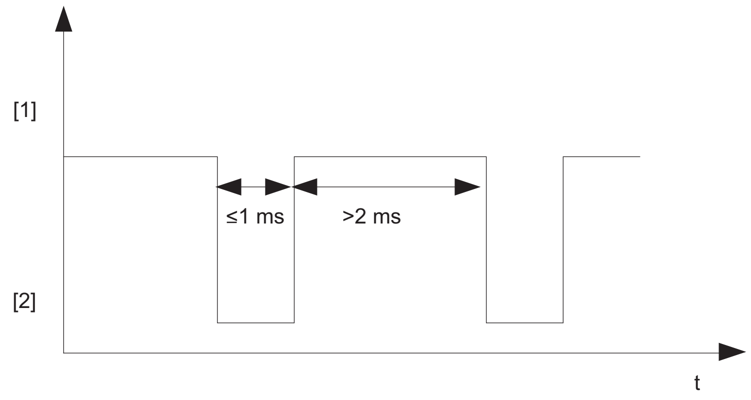
Use of safety controllers

The switch-off test pulse of the used safe digital outputs (F-DO) must be ≤ 1 ms and another switch-off test pulse must only occur 2 ms later at the earliest.



15214338827

[1] High
[2] Low

INFORMATION

If the safety-related control voltage at X6 is switched off (STO activated), you must observe the chapter "Requirements for the external safety controller" with regard to the test pulses.

INFORMATION

If F_STO_P1, F_STO_P2 are connected to DC 24 V, and F_STO_M is connected to GND, STO is deactivated.

STO signal for group disconnection

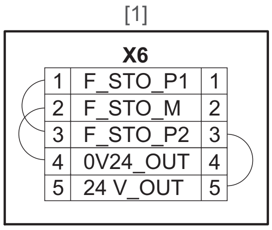
For group drives, the STO signal may be provided for several devices by a single safety relay. The following requirements must be met:

- The total cable length is limited to max. 100 m. Any other instructions published by the manufacturer on the use of the safety device (for the respective application) must also be observed.
- The maximum output current and the maximally permitted contact load of the safety device must be observed (see the chapter "Technical data" > "Electronic data – Drive safety functions").
- You must comply with the permitted signal levels at the STO input and all other technical data of the device. The respective routing of the STO control cables and the voltage drop must be considered.
- Other requirements of the safety device manufacturer (such as protecting the output contacts against welding) must be strictly observed. The basic requirements for cable routing also apply.
- A calculation based on the technical data of the device must be performed separately for each case of group drive disconnection.
- A maximum of 20 devices may be used in a group disconnection.

9.4.3 Wiring diagrams

Delivery state

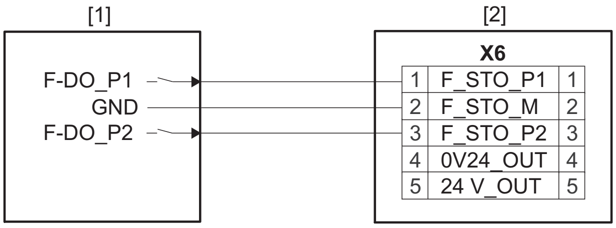
In the delivery state, the terminals at the port for safe disconnection X6 are jumpered.



27743538443

[1] STO terminal X6

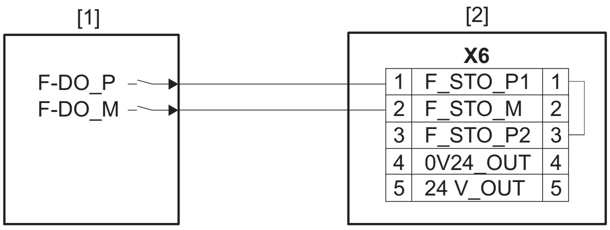
2-pole sourcing



27743543947

[1] External safety device
[2] STO terminal X6

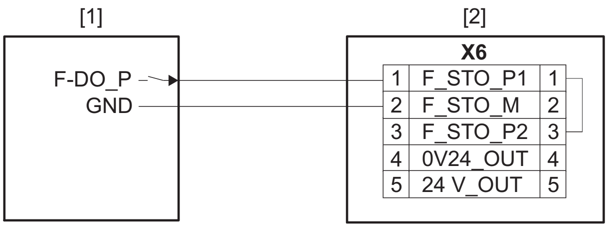
2-pole sourcing/sinking



27743625995

[1] External safety device
[2] STO terminal X6

1-pole sourcing



27743633163

[1] External safety device
[2] STO terminal X6

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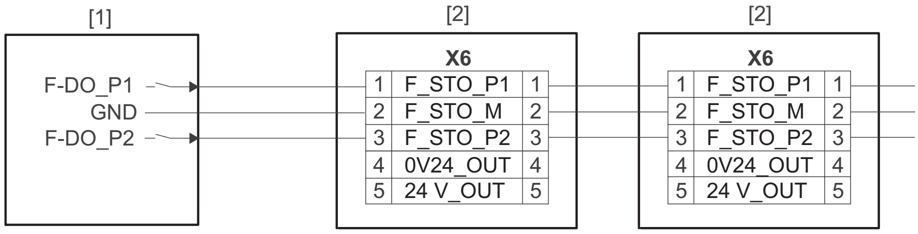
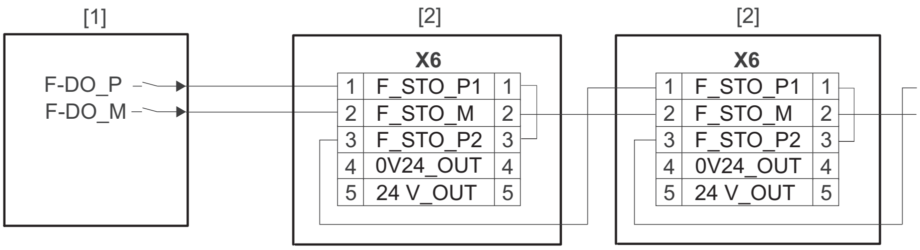
STO group disconnection, 2-pole, sourcing



27739017995

[1] External safety controller
[2] STO terminal X6

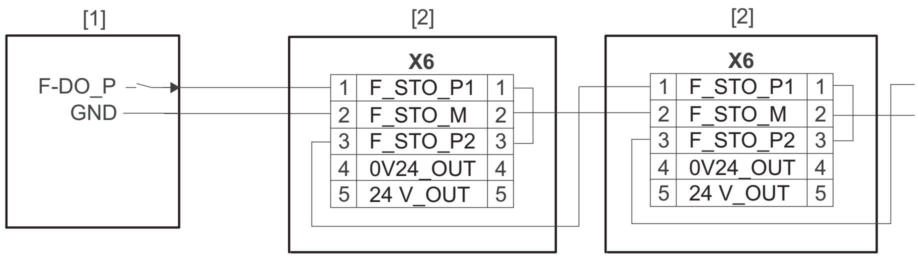
STO group disconnection, 2-pole, sourcing/sinking



27739021579

[1] External safety controller
[2] STO terminal X6

STO group disconnection, 1-pole, sourcing



27738973707

[1] External safety controller
[2] STO terminal X6

9.4.4 Port X6 on the device

The following figures show the STO connection X6 at the top of the axis modules.

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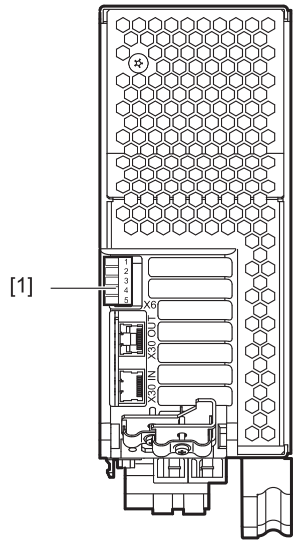
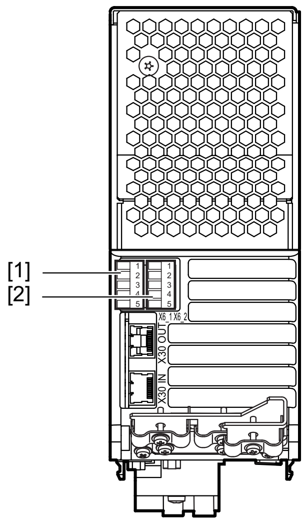
Single-axis module



14950796555

[1] X6: Connection for Safe Torque Off (STO)

Double-axis module



9007214205669003

[1] X6_1: Connection for safe torque off (STO) on axis 1
[2] X6_2: Connection for safe torque off (STO) on axis 2

9.5 Safety characteristics

	Characteristic values in accordance with	
	IEC 61800-5-2	ISO 13849-1
Tested safety class/underlying standards	Safety integrity level 3	Performance level e / category 3
Probability of a dangerous failure per hour (PFH value)	2.5×10^{-9} h-1	

	Characteristic values in accordance with	
	IEC 61800-5-2	**ISO 13849-1**
Service life	20 years, after which the component must be replaced with a new one.	
Proof test interval	> 20 years	–
Safe state	Safe Torque Off (STO)	
Drive safety function	STO, SS1[1)] in accordance with IEC 61800-5-2	

1) With suitable external control

INFORMATION

In the case of 1-pole wiring, the achievable performance level in accordance with ISO 13849-1 is reduced to PL d, and the achievable Safety Integrity Level in accordance with IEC 61800-5-2 is reduced to SIL 2. A fault exclusion is necessary for the wiring between the safety relay and the STO input.

10 Appendix

10.1 Abbreviation key

The following table lists the abbreviations that are used in this document together with their unit and meaning.

Abbreviation	Information on the nameplate	Unit	Meaning
ASM			Asynchronous motor
C	C	µF	Capacitance
f_{max}	f	Hz	Maximum output frequency
f_{line}	f	Hz	Line frequency
f_{PWM}		kHz	Frequency of the pulse width modulation
h		m	Installation altitude
I_{trip}		A	Tripping current (braking resistor)
I_{max}	Imax	A	Max. DC link current (specification on the nameplate)
I_{max}		A	Maximum output current (encoder cards)
I_{peak}		A	Output peak current (encoder cards)
$I_{A\ max}$		A	Max. output current
I_{Appl}		A	Total current of the application
I_N		A	Nominal output current/nominal current (filter, choke)
I_{line}	I	A	Nominal line current
I_{NDCL}	I	A	Nominal DC link current
L_N		mH	Inductance
LSPM			Line Start Permanent Magnet
P_{eff}		kW	Effective power (braking resistor)
P_{max}		kW	Maximum power (braking resistor)
P_{Mot}	P(ASM)	kW	Motor power of the asynchronous motor
P_N		kW	Nominal motor power (rated power)
P_V		W	Power loss
PWM			Pulse width modulation
R_{BW}		Ω	Value of the braking resistance
R_{BWmin}		Ω	Minimum value of the braking resistance
S_N	S	kVA	Apparent output power
SM			Synchronous motor
U_A	U	V	Motor output voltage
U_{BR}		V	Brake supply voltage
U_N		V	Nominal line voltage (filter, choke)
U_{line}	U	V	Connection voltage
U_{NDCL}	U	V	Nominal DC link voltage

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Abbreviation	Information on the nameplate	Unit	Meaning
U_{out}		V	DC 24 V to supply STO_P1 and STO_P2
U_S		V	Supply voltage of encoders
U_{S12VG}		V	DC 12 V supply voltage of encoders
U_{S24VG}		V	DC 24 V supply voltage of encoders
U_{I24}		V	Voltage supply for electronics and brake
ϑ_{amb}	T	°C	Ambient temperature
(+ES)			... with output stage inhibit

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11 Address list

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	Hamburg	SEW-EURODRIVE GmbH & Co KG Hasselbinnen 44 22869 Schenefeld	Tel. +49 40298109-60 Fax +49 40298109-70 dc-hamburg@sew-eurodrive.de
	Ludwigshafen	SEW-EURODRIVE GmbH & Co KG c/o BASF SE c/o BASF SE Gebäude W130 67056 Ludwigshafen	Tel. +49 7251 75 3759 Fax +49 7251 75 503759 dc-ludwigshafen@sew-eurodrive.de
	Saarland	SEW-EURODRIVE GmbH & Co KG Gottlieb-Daimler-Straße 4 66773 Schwalbach Saar – Hülzweiler	Tel. +49 6831 48946 10 Fax +49 6831 48946 13 dc-saarland@sew-eurodrive.de

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Germany			
	Ulm	SEW-EURODRIVE GmbH & Co KG Dieselstraße 18 89160 Dornstadt	Tel. +49 7348 9885-0 Fax +49 7348 9885-90 dc-ulm@sew-eurodrive.de
	Würzburg	SEW-EURODRIVE GmbH & Co KG Nürnbergerstraße 118 97076 Würzburg-Lengfeld	Tel. +49 931 27886-60 Fax +49 931 27886-66 dc-wuerzburg@sew-eurodrive.de
Drive Service Hotline / 24 Hour Service			0 800 SEWHELP 0 800 7394357
Great Britain			
Assembly Sales Service	Normanton	SEW-EURODRIVE Ltd. DeVilliers Way Trident Park Normanton West Yorkshire WF6 1GX	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
Greece			
Sales	Athens	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr
Hungary			
Sales Service	Budapest	SEW-EURODRIVE Kft. Csillaghegyí út 13. 1037 Budapest	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 http://www.sew-eurodrive.hu office@sew-eurodrive.hu
Iceland			
Sales	Reykjavik	Varma & Vélaverk ehf. Knarrarvogi 4 104 Reykjavík	Tel. +354 585 1070 Fax +354 585)1071 https://vov.is/ vov@vov.is
India			
Registered Office Assembly Sales Service	Vadodara	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200 Fax +91 265 3045300 http://www.seweurodriveindia.com salesvadodara@seweurodriveindia.com
Assembly Sales Service	Chennai	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com
	Pune	SEW-EURODRIVE India Private Limited Plant: Plot No. D236/1, Chakan Industrial Area Phase- II, Warale, Tal- Khed, Pune-410501, Maharashtra	Tel. +91 21 35 628700 Fax +91 21 35 628715 salespune@seweurodriveindia.com
Sales Service	Gurgaon	SEW-EURODRIVE India Private Limited Drive Center Gurugram Plot no 395, Phase-IV, UdyogVihar Gurugram , 122016 Haryana	Tel. +91 99588 78855 salesgurgaon@seweurodriveindia.com
Indonesia			
Sales	Medan	PT. Serumpun Indah Lestari Jl.Pulau Solor no. 8, Kawasan Industri Medan II Medan 20252	Tel. +62 61 687 1221 Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041 sil@serumpunindah.com serumpunindah@yahoo.com http://www.serumpunindah.com
	Jakarta	PT. Cahaya Sukses Abadi Komplek Rukan Puri Mutiara Blok A no 99, Sunter Jakarta 14350	Tel. +62 21 65310599 Fax +62 21 65310600 csajkt@cbn.net.id

Indonesia			
	Jakarta	PT. Agrindo Putra Lestari JL.Pantai Indah Selatan, Komplek Sentra Industri Terpadu, Pantai indah Kapuk Tahap III, Blok E No. 27 Jakarta 14470	Tel. +62 21 2921-8899 Fax +62 21 2921-8988 aplindo@indosat.net.id http://www.aplindo.com
	Surabaya	PT. TRIAGRI JAYA ABADI Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11 Surabaya 60111	Tel. +62 31 5990128 Fax +62 31 5962666 sales@triagri.co.id http://www.triagri.co.id
	Surabaya	CV. Multi Mas Jl. Raden Saleh 43A Kav. 18 Surabaya 60174	Tel. +62 31 5458589 Fax +62 31 5317220 sianhwa@sby.centrin.net.id http://www.cvmultimas.com
Ireland			
Sales Service	Dublin	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 http://www.alperton.ie info@alperton.ie
Israel			
Sales	Tel Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly Sales Service	Milan	SEW-EURODRIVE S.a.s. di SEW S.r.l. & Co. Via Bernini,12 20020 Solaro (Milano)	Tel. +39 02 96 980229 Fax +39 02 96 980 999 http://www.sew-eurodrive.it milano@sew-eurodrive.it
Ivory Coast			
Sales	Abidjan	SEW-EURODRIVE SARL Ivory Coast Rue des Pêcheurs, Zone 3 26 BP 916 Abidjan 26	Tel. +225 21 21 81 05 Fax +225 21 25 30 47 info@sew-eurodrive.ci http://www.sew-eurodrive.ci
Japan			
Assembly Sales Service	Iwata	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Kazakhstan			
Sales Service	Almaty	SEW-EURODRIVE LLP 291-291A, Tole bi street 050031, Almaty	Tel. +7 (727) 350 5156 Fax +7 (727) 350 5156 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz
	Tashkent	SEW-EURODRIVE LLP Representative office in Uzbekistan 96A, Sharaf Rashidov street, Tashkent, 100084	Tel. +998 71 2359411 Fax +998 71 2359412 http://www.sew-eurodrive.uz sew@sew-eurodrive.uz
	Ulaanbaatar	IM Trading LLC Olympic street 28B/3 Sukhbaatar district, Ulaanbaatar 14230, MN	Tel. +976-77109997 Fax +976-77109997 imt@imt.mn
Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C 1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.lv info@alas-kuul.com
Lebanon			
Sales (Lebanon)	Beirut	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb

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Lebanon			
Sales (Jordan, Kuwait , Saudi Arabia, Syria)	Beirut	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 http://www.medrives.com info@medrives.com
Lithuania			
Sales	Alytus	UAB Irseva Statybininku 106C 63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 http://www.irseva.lt irmantas@irseva.lt
Luxembourg			
Representation: Belgium			
Macedonia			
Sales	Skopje	Boznos DOOEL Dime Anicin 2A/7A 1000 Skopje	Tel. +389 23256553 Fax +389 23256554 http://www.boznos.mk
Malaysia			
Assembly Sales Service	Johor	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Mexico			
Assembly Sales Service	Quéretaro	SEW-EURODRIVE MEXICO S.A. de C.V. SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Querétaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Sales Service	Puebla	SEW-EURODRIVE MEXICO S.A. de C.V. Calzada Zavaleta No. 3922 Piso 2 Local 6 Col. Santa Cruz Buenavista C.P. 72154 Puebla, México	Tel. +52 (222) 221 248 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Mongolia			
Technical Office	Ulaanbaatar	IM Trading LLC Olympic street 28B/3 Sukhbaatar district, Ulaanbaatar 14230, MN	Tel. +976-77109997 Tel. +976-99070395 Fax +976-77109997 http://imt.mn/ imt@imt.mn
Morocco			
Sales Service Assembly	Bouskoura	SEW-EURODRIVE Morocco SARL Parc Industriel CFCIM, Lot. 55/59 27182 Bouskoura Grand Casablanca	Tel. +212 522 88 85 00 Fax +212 522 88 84 50 http://www.sew-eurodrive.ma sew@sew-eurodrive.ma
Namibia			
Sales	Swakopmund	DB MINING & INDUSTRIAL SUPPLIES CC Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 anton@dbminingnam.com
Netherlands			
Assembly Sales Service	Rotterdam	SEW-EURODRIVE B.V. Industrieweg 175 3044 AS Rotterdam Postbus 10085 3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl

New Zealand			
Assembly Sales Service	Auckland	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 30 Lodestar Avenue, Wigram Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Nigeria			
Sales	Lagos	Greenpeg Nig. Ltd Plot 296A, Adeyemo Akapo Str. Omole GRA Ikeja Lagos-Nigeria	Tel. +234-701-821-9200-1 http://www.greenpegltd.com bolaji.adekunle@greenpegltd.com
Norway			
Assembly Sales Service	Moss	SEW-EURODRIVE A/S Solgaard skog 71 1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no
Pakistan			
Sales	Karachi	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk
Paraguay			
Sales	Fernando de la Mora	SEW-EURODRIVE PARAGUAY S.R.L De la Victoria 112, Esquina nueva Asunción Departamento Central Fernando de la Mora, Barrio Bernardino	Tel. +595 991 519695 Fax +595 21 3285539 sewpy@sew-eurodrive.com.py
Peru			
Assembly Sales Service	Lima	SEW EURODRIVE DEL PERU S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe
Philippines			
Sales	Makati	P.T. Cerna Corporation 4137 Ponte St., Brgy. Sta. Cruz Makati City 1205	Tel. +63 2 519 6214 Fax +63 2 890 2802 mech_drive_sys@ptcerna.com http://www.ptcerna.com
Poland			
Assembly Sales Service	Łódź	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 92-518 Łódź	Tel. +48 42 293 00 00 Fax +48 42 293 00 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 293 0030 Fax +48 42 293 0043	24 Hour Service Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl
Portugal			
Assembly Sales Service	Coimbra	SEW-EURODRIVE, LDA. Av. da Fonte Nova, n.º 86 3050-379 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Romania			
Sales Service	Bucharest	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 http://www.sialco.ro sialco@sialco.ro

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Russia			
Assembly Sales Service	St. Petersburg	ЗАО «СЕВ-ЕВРОДРАЙФ» 188660, Russia, Leningrad Region, Vse-volozhsky District, Korabselki, Aleksandra Nevskogo str. building 4, block 1 P.O. Box 36 195220 St. Petersburg	Tel. +7 812 3332522 / +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Senegal			
Sales	Dakar	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 http://www.senemeca.com senemeca@senemeca.sn
Serbia			
Sales	Belgrade	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor 11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
Singapore			
Assembly Sales Service	Singapore	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Slovakia			
Sales	Bernolákovo	SEW-Eurodrive SK s.r.o. Priemyselná ulica 6267/7 900 27 Bernolákovo	Tel.+421 2 33595 202, 217, 201 Fax +421 2 33595 200 http://www.sew-eurodrive.sk sew@sew-eurodrive.sk
Slovenia			
Sales Service	Celje	Pakman - Pogonska Tehnika d.o.o. Ul. XIV. divizije 14 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net
South Africa			
Assembly Sales Service	Johannesburg	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 248-7289 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 48 Prospecton Road Isipingo Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 902 3815 Fax +27 31 902 3826 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PROPRIETARY) LIMITED 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za
South Korea			
Assembly Sales Service	Ansan	SEW-EURODRIVE KOREA CO., LTD. 7, Dangjaengi-ro, Danwon-gu, Ansan-si, Gyeonggi-do, Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-eurodrive.kr master.korea@sew-eurodrive.com

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South Korea			
	Busan	SEW-EURODRIVE KOREA CO., LTD. 28, Noksansandan 262-ro 50beon-gil, Gangseo-gu, Busan, Zip 618-820	Tel. +82 51 832-0204 Fax +82 51 832-0230
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sri Lanka			
Sales	Colombo	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
Swaziland			
Sales	Manzini	C G Trading Co. (Pty) Ltd Simunye street Matsapha, Manzini	Tel. +268 7602 0790 Fax +268 2 518 5033 charles@cgtrading.co.sz www.cgtradingswaziland.com
Sweden			
Assembly Sales Service	Jönköping	SEW-EURODRIVE AB Gnejsvägen 6-8 553 03 Jönköping Box 3100 S-550 03 Jönköping	Tel. +46 36 34 42 00 Fax +46 36 34 42 80 http://www.sew-eurodrive.se jonkoping@sew.se
Switzerland			
Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Taiwan			
Sales	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Huw S. Road Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
	Nan Tou	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
Tanzania			
Sales	Daressalam	SEW-EURODRIVE PTY LIMITED TANZANIA Plot 52, Regent Estate PO Box 106274 Dar Es Salaam	Tel. +255 0 22 277 5780 Fax +255 0 22 277 5788 http://www.sew-eurodrive.co.tz info@sew.co.tz
Thailand			
Assembly Sales Service	Chonburi	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Tunisia			
Sales	Tunis	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn
Turkey			
Assembly Sales Service	Kocaeli-Gebze	SEW-EURODRIVE Ana Merkez Gebze Organize Sanayi Böl. 400 Sok No. 401 41480 Gebze Kocaeli	Tel. +90 262 9991000 04 Fax +90 262 9991009 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

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Ukraine			
Assembly Sales Service	Dnipropetrovsk	SEW-EURODRIVE, LLC Robochya str., bld. 23-B, office 409 49008 Dnipro	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

United Arab Emirates			
Drive Technology Center	Dubai	SEW-EURODRIVE FZE PO Box 263835 Jebel Ali Free Zone – South, P.O. Box Dubai, United Arab Emirates	Tel. +971 (0)4 8806461 Fax +971 (0)4 8806464 info@sew-eurodrive.ae

Uruguay			
Assembly Sales	Montevideo	SEW-EURODRIVE Uruguay, S. A. Jose Serrato 3569 Esqina Corumbe CP 12000 Montevideo	Tel. +598 2 21181-89 Fax +598 2 21181-90 sewuy@sew-eurodrive.com.uy

USA			
Production Assembly Sales Service	Southeast Region	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Production +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly Sales Service	Northeast Region	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Wellford	SEW-EURODRIVE INC. 148/150 Finch Rd. Wellford, S.C. 29385	Tel. +1 864 439-7537 Fax +1 864 661 1167 IGOrders@seweurodrive.com
	Additional addresses for service provided on request!		

Vietnam			
Sales	Ho Chi Minh City	SEW-EURODRIVE PTE. LTD. RO at Hochiminh City Floor 8, KV I, Loyal building, 151-151 Bis Vo Thi Sau street, ward 6, District 3, Ho Chi Minh City, Vietnam	Tel. +84 937 299 700 huytam.phan@sew-eurodrive.com
	Hanoi	MICO LTD Quảng Trị - North Vietnam / All sectors except Construction Materials 8th Floor, Ocean Park Building, 01 Dao Duy Anh St, Ha Noi, Viet Nam	Tel. +84 4 39386666 Fax +84 4 3938 6888 nam_ph@micogroup.com.vn http://www.micogroup.com.vn

Zambia
Representation: South Africa

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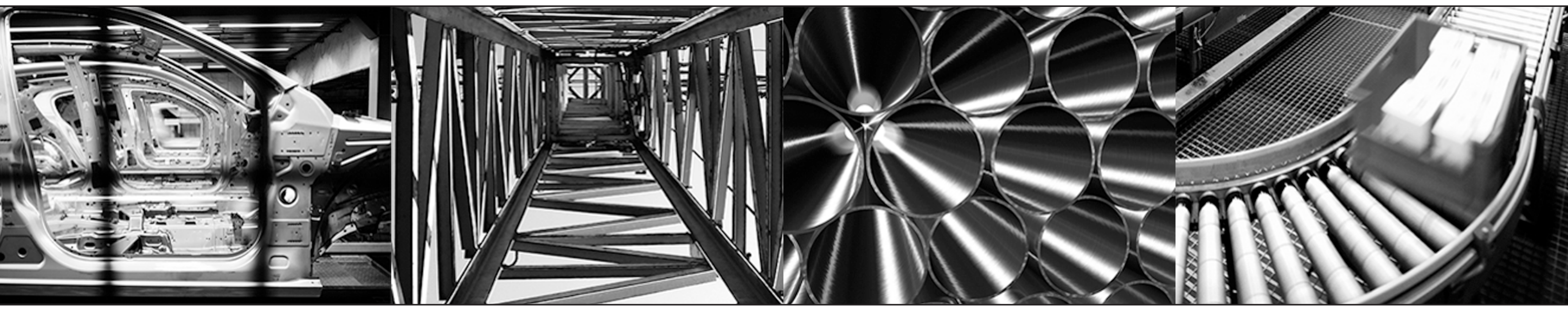

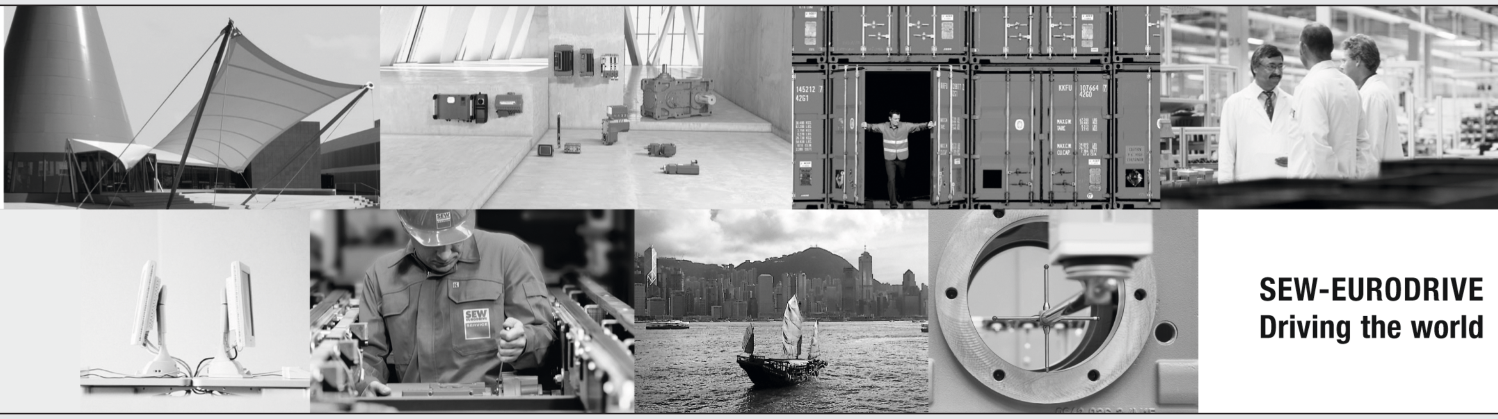

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Driving the world

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