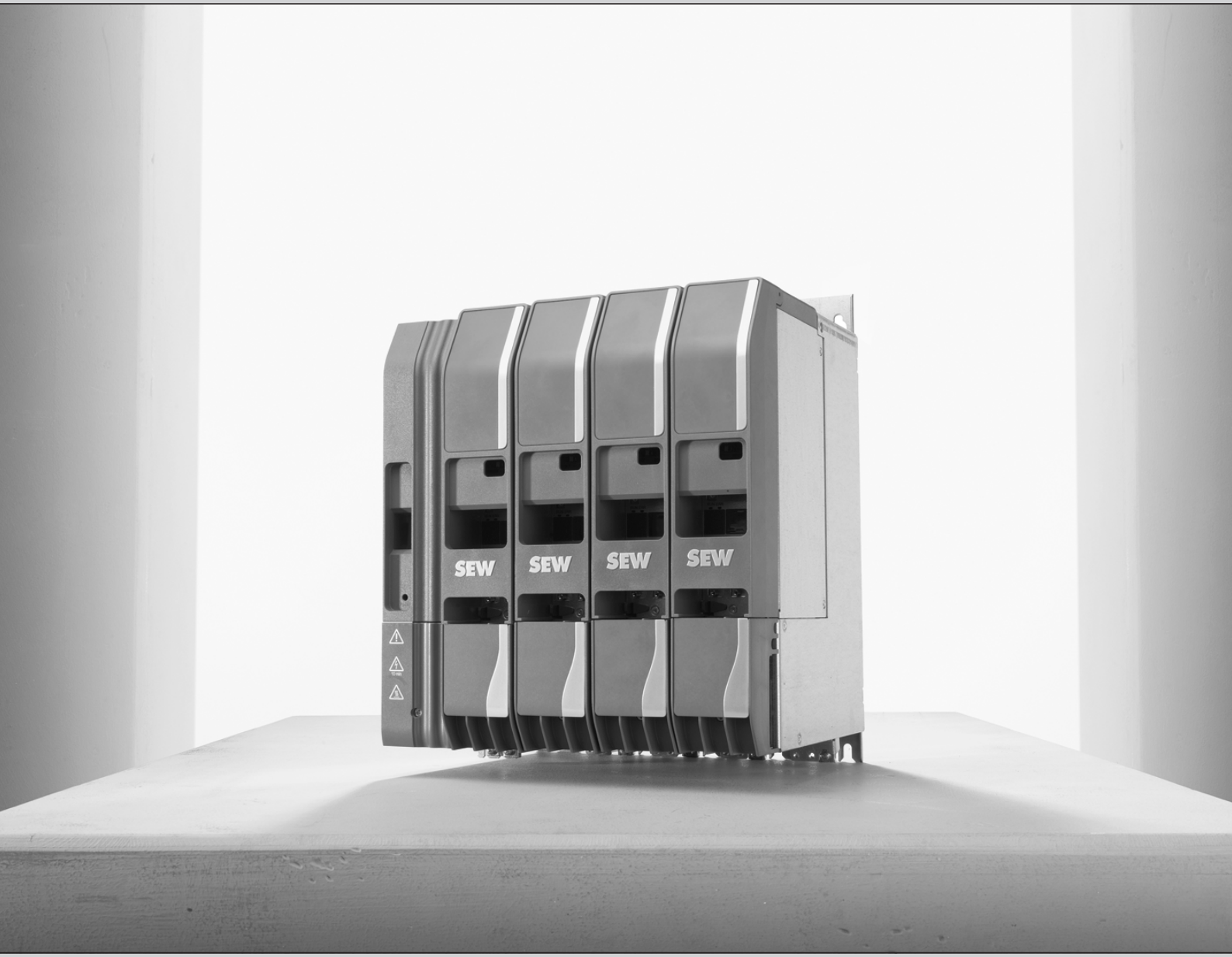
SEW EURODRIVE

Operating Instructions



Application Inverter

MOVIDRIVE® modular

Edition 11/2017

24748536/EN

Table of contents

24748536/EN – 11/2017

24748536/EN – 11/2017

24748536/EN – 11/2017

24748536/EN – 11/2017

24748536/EN – 11/2017

24748536/EN – 11/2017

1 General information

1.1 About this documentation

The current version of the documentation is the original.

This documentation is an integral part of the product. The documentation is written for all employees who assemble, install, start up, and service this product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the machinery and its 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 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.	

24748536/EN – 11/2017

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 of risk of crushing
	Warning of 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.

24748536/EN – 11/2017

1.3 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.

1.4 Content of the documentation

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

1.5 Exclusion of liability

Read the information in this documentation, otherwise safe operation is impossible. You must comply with the information contained in this documentation to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, SEW-EURODRIVE assumes no liability for defects.

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.

1.8 Copyright notice

24748536/EN – 11/2017

1.9 Device availability

This documentation lists modules of the application inverter and accessories that are not yet available at the time of the publication of this document.

The following table lists the available modules of the application inverter. Accessories required for the inverter operation such as braking resistors, chokes, and filters are available.

Module	Type designation
Power supply modules	MDP90A-0100-503-4-000
	MDP90A-0100-503-4-C00
	MDP90A-0250-503-4-000
	MDP90A-0500-503-4-000
	MDP90A-0750-503-4-000
Single-axis modules	MDA90A-0020-503-X-S00
	MDA90A-0040-503-X-S00
	MDA90A-0080-503-X-S00
	MDA90A-0120-503-X-S00
	MDA90A-0160-503-X-S00
	MDA90A-0240-503-X-S00
	MDA90A-0320-503-X-S00
	MDA90A-0480-503-X-S00
	MDA90A-0640-503-X-S00/01
	MDA90A-1000-503-X-S00
Double-axis modules	MDD90A-0020-503-X-S00/X
	MDD90A-0040-503-X-S00/X
	MDD90A-0020-503-X-S00
	MDD90A-0040-503-X-S00
	MDD90A-0080-503-X-S00
Master module	UHX45A/MDM90A

24748536/EN – 11/2017

2 Safety notes

2.1 Preliminary information

The following general safety notes have the purpose to avoid injury 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 User duties

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.

24748536/EN – 11/2017

2.3 Target group

Specialist for mechanical work

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

- Qualification in the mechanical area in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrotechnical work

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

- Qualification in the electrotechnical area in accordance with the national regulations
- Familiarity with this documentation

Additional qualification

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 units, 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 instruction is that the persons are capable of performing the required tasks and work steps in a safe and correct manner.

24748536/EN – 11/2017

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. The motors must be suitable for operation with inverters. 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.

2.4.1 Hoist applications

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

- Use mechanical protection devices.
- Perform a hoist startup.

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.

2.5 Functional safety technology

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

24748536/EN – 11/2017

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.
- Before transportation, cover the connections with the supplied protection caps.
- Only place the product on the cooling fins or on the side without connectors during transportation.
- Always use lifting eyes if available.

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 according to 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 components are not deformed and that insulation spaces are maintained, particularly during transportation. Electric components must not be mechanically damaged or destroyed.

Observe the notes in the chapter "Mechanical installation" of the documentation.

2.7.1 Restrictions of use

The following applications are prohibited unless explicitly permitted:

- Use in potentially explosive areas
- 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
- Operation at installation altitudes above 3800 m above sea level

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

- Taking the reduced continuous rated current into consideration, see chapter "Technical data" of the documentation.
- Above 2000 m asl, the air and creeping distances are only sufficient for overvoltage class II according to EN 60664. If the installation requires overvoltage category III according to EN 60664 you have to reduce the overvoltages on the system side from category III to II using additional external overvoltage protection.
- If a protective electrical separation is required, then implement this outside the product at altitudes of more than 2000 m above sea level (protective separation in accordance with EN 61800-5-1 and EN 60204-1)

24748536/EN – 11/2017

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.

24748536/EN – 11/2017

2.10 Startup/operation

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

Make sure that the present transport protection is removed.

Do not deactivate monitoring and protection devices of the machine or system even for a test run.

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.

Additional preventive measures may be required for applications with increased hazard potential. You have to check the protection devices after each modification.

When in doubt, switch off the product whenever changes occur in relation to normal operation. Possible changes are e.g. increased temperatures, noise, or oscillation. Determine the cause. Contact SEW-EURODRIVE if necessary.

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

Do not separate the connection to the product during operation.

This may result in dangerous electric arcs damaging the product.

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

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 safety functions of the product can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive re-starting 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 chapter "Service" > "Shutdown".

24748536/EN – 11/2017

3 Unit 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).

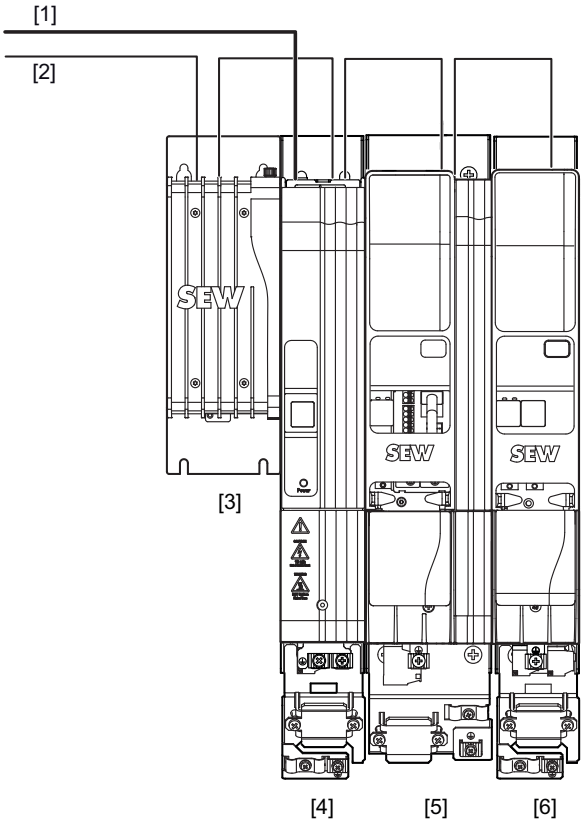
Separate operation of individual modules will damage the application inverter and is not permitted.

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

24748536/EN – 11/2017

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

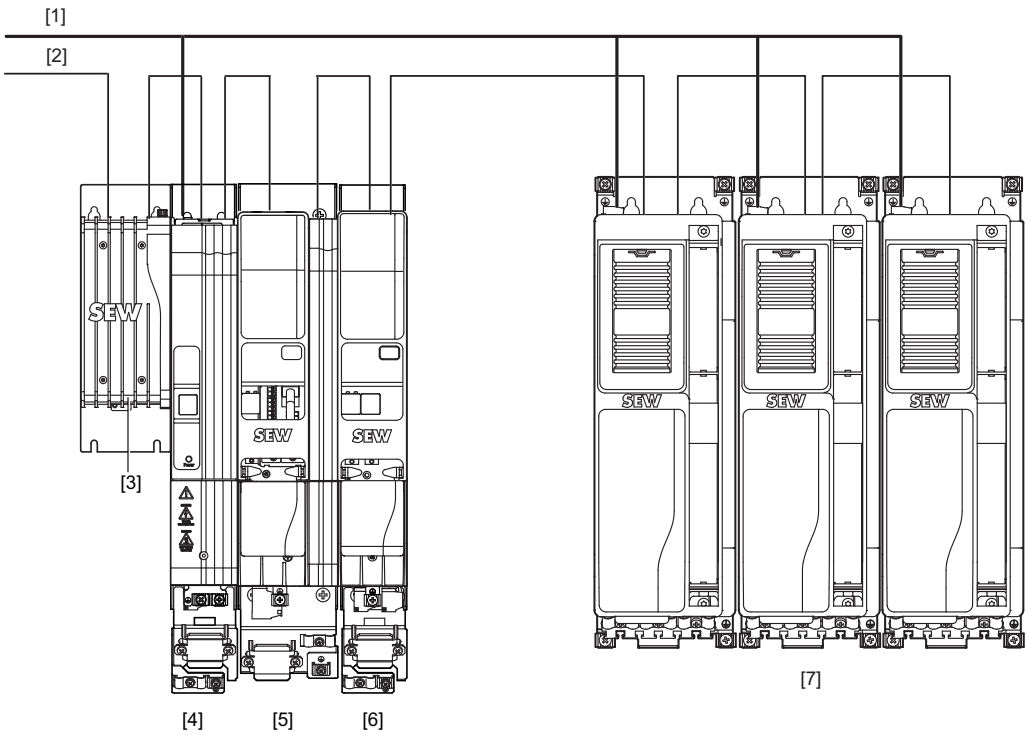
[4] MOVIDRIVE® modular power supply module MDP..

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

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

24748536/EN – 11/2017

MOVIDRIVE® modular and MOVIDRIVE® system



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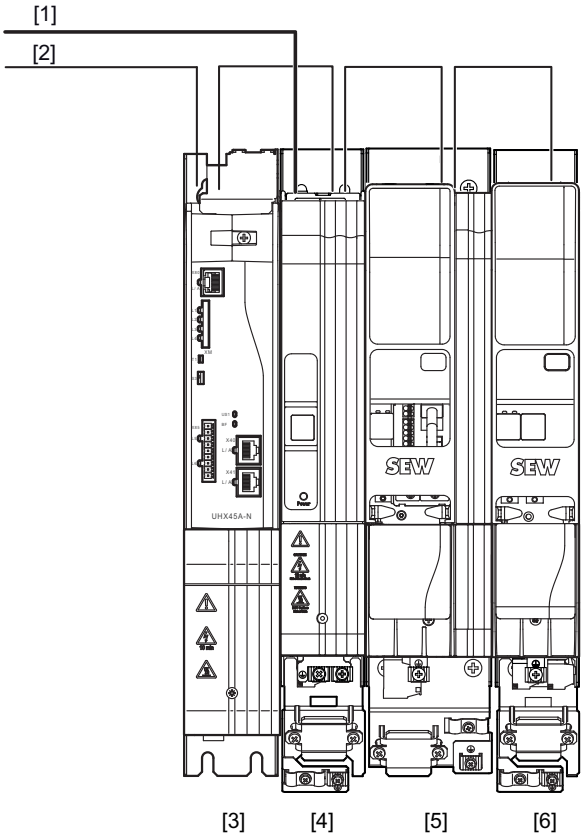
[1] Line voltage 3 × AC 380 – 500 V
[2] Industrial Communication
[3] MOVI-C® CONTROLLER
[4] MOVIDRIVE® modular power supply module MDP..
[5] MOVIDRIVE® modular single-axis module MDA.
[6] MOVIDRIVE® modular double-axis module MDD..
[7] MOVIDRIVE® system

24748536/EN – 11/2017

3.1.2 Axis system with master module UHX45A/MDM90A

MOVIDRIVE® modular



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[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

[3] MOVIDRIVE® modular master module UHX45A/MDM90A

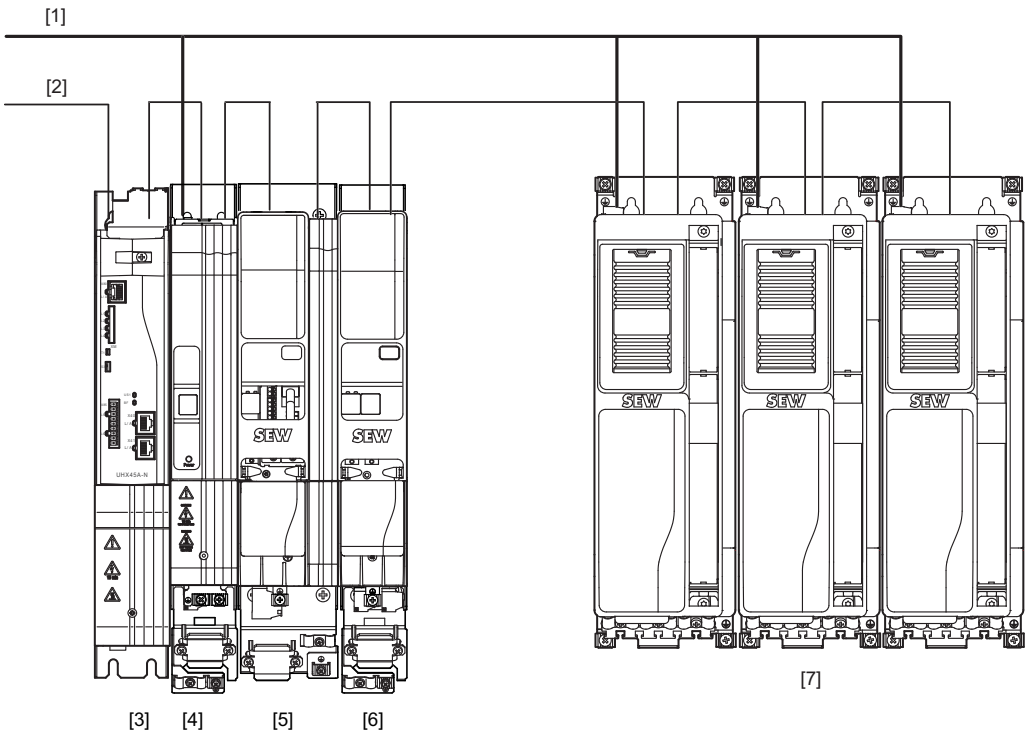
[4] MOVIDRIVE® modular power supply module MDP..

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

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

24748536/EN – 11/2017

MOVIDRIVE® modular and MOVIDRIVE® system



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[2] Industrial Communication

[3] MOVIDRIVE® modular master module UHX45A/MDM90A

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

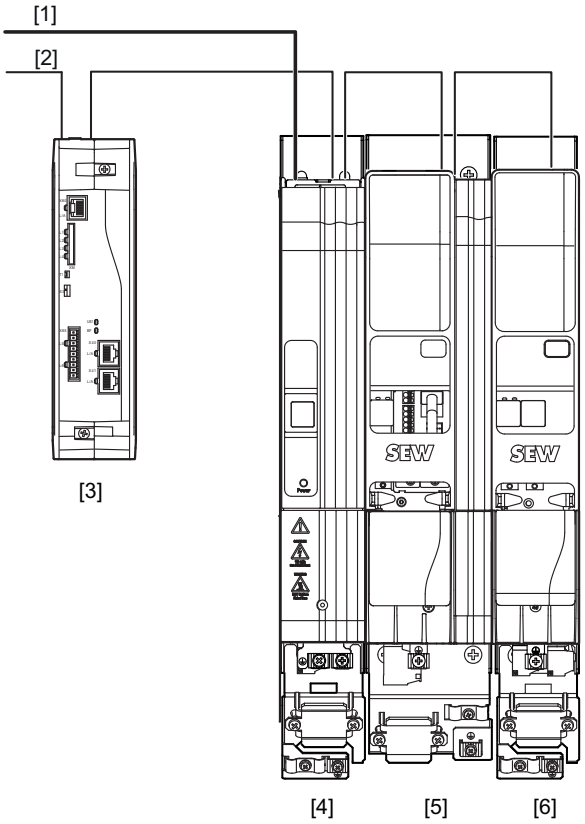
[5] MOVIDRIVE® modular single-axis module MDA.

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

[7] MOVIDRIVE® system

3.1.3 Axis system with MOVI-C® CONTROLLER advanced

MOVIDRIVE® modular



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[2] Industrial Communication

[3] MOVI-C® CONTROLLER advanced

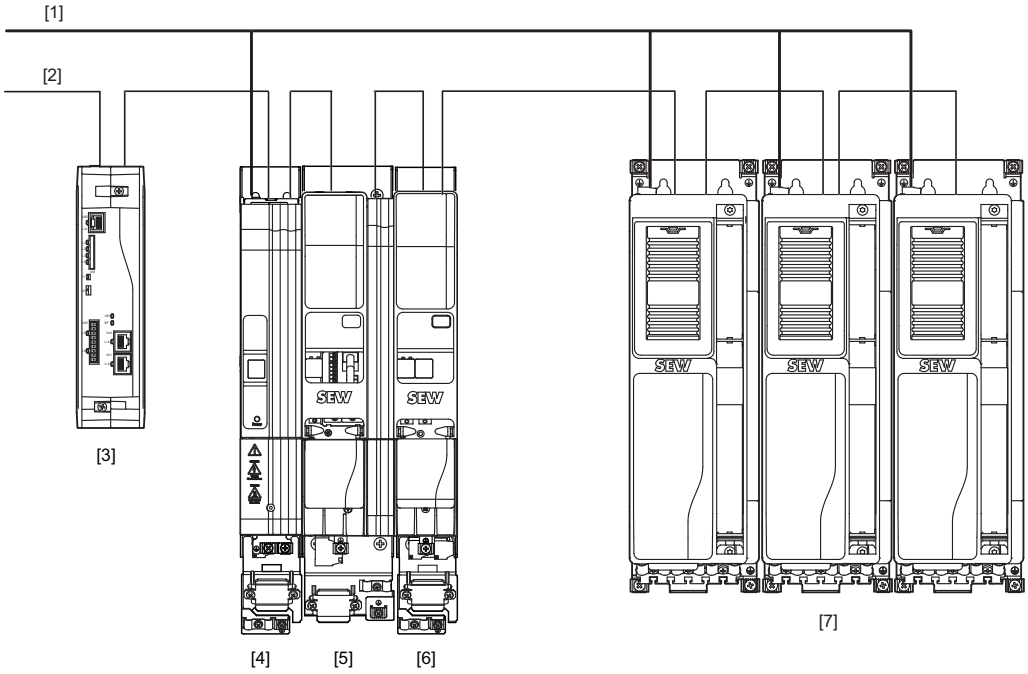
[4] MOVIDRIVE® modular power supply module MDP..

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

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

24748536/EN – 11/2017

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..

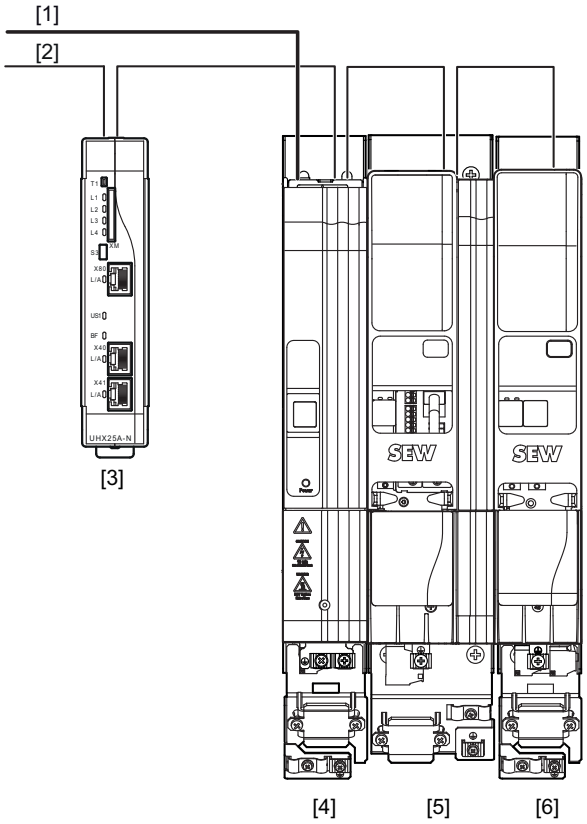
[5] MOVIDRIVE® modular single-axis module MDA.

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

[7] MOVIDRIVE® system

3.1.4 Axis system with MOVI-C® CONTROLLER standard

MOVIDRIVE® modular



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[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

[3] MOVI-C® CONTROLLER standard

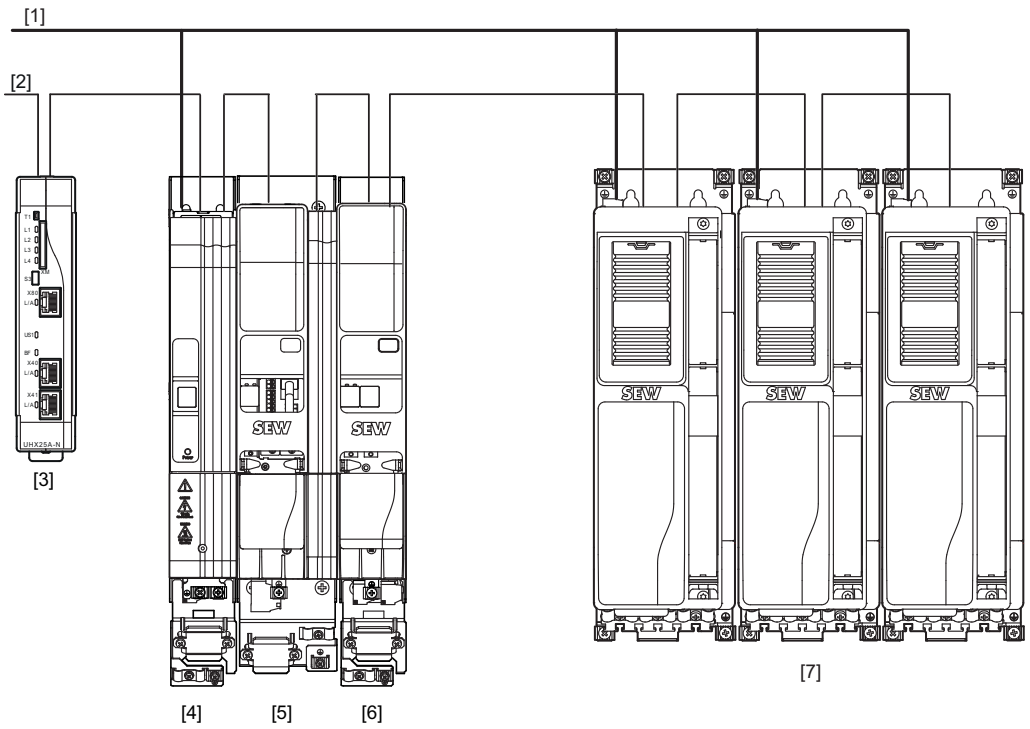
[4] MOVIDRIVE® modular power supply module MDP..

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

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

24748536/EN – 11/2017

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.

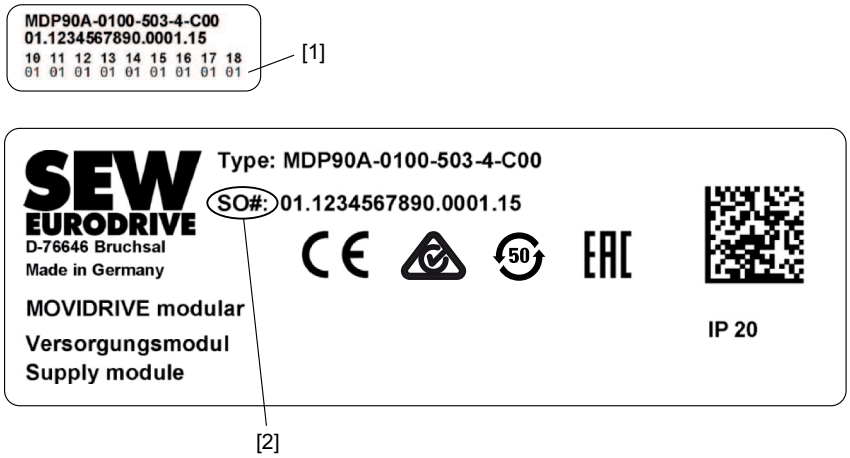
[6] MOVIDRIVE® modular double-axis module MDD..

[7] MOVIDRIVE® system

3.2 Nameplates of MOVIDRIVE® modular

3.2.1 Power supply module

System nameplate

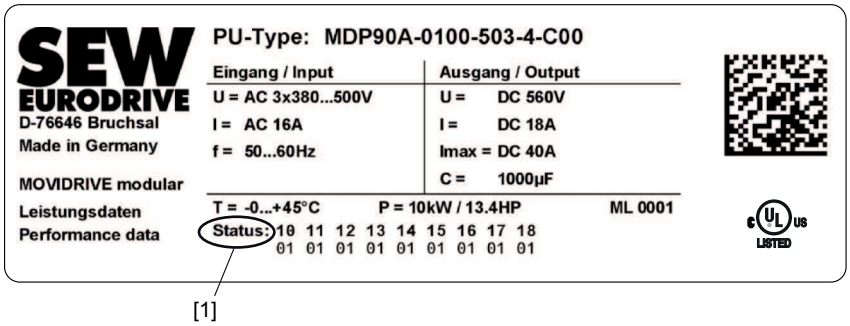


9007214313636491

[1] Device status

[2] Serial number

Performance data nameplate



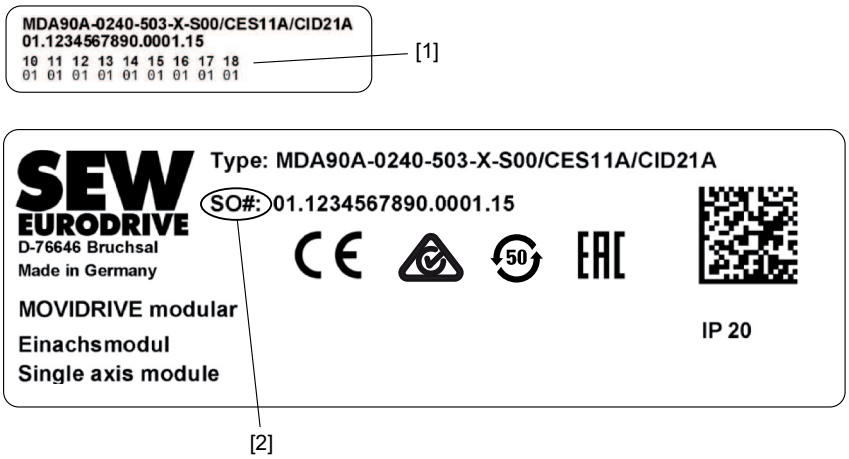
9007214313645451

[1] Device status

24748536/EN – 11/2017

3.2.2 Single-axis module

System nameplate

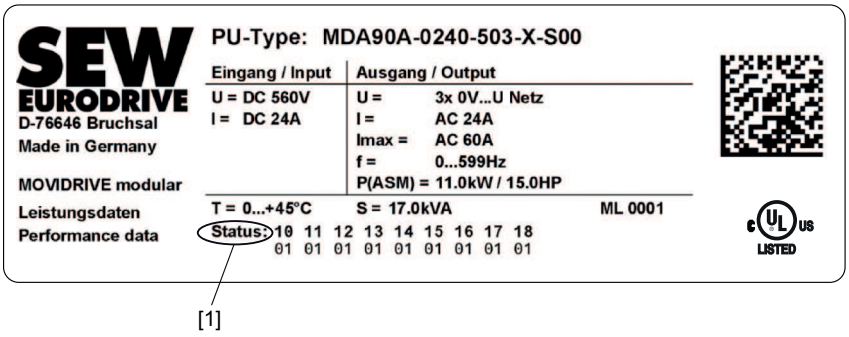


9007214313687563

[1] Device status

[2] Serial number

Performance data nameplate



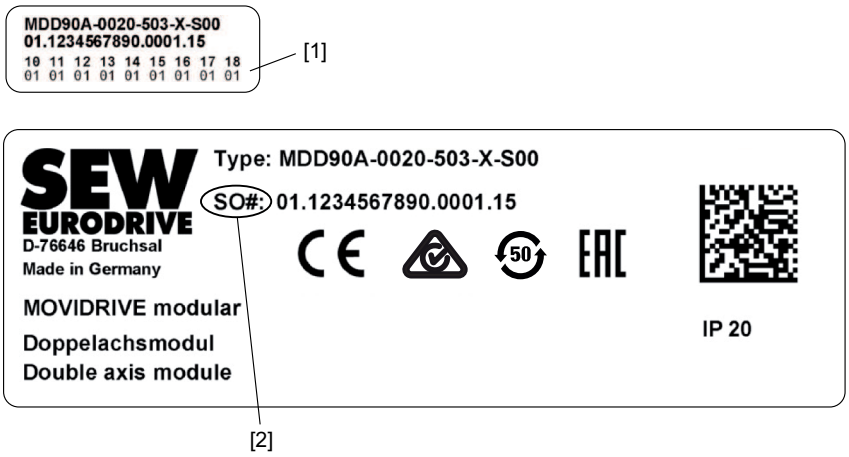
9007214313691915

[1] Device status

24748536/EN – 11/2017

3.2.3 Double-axis module

System nameplate



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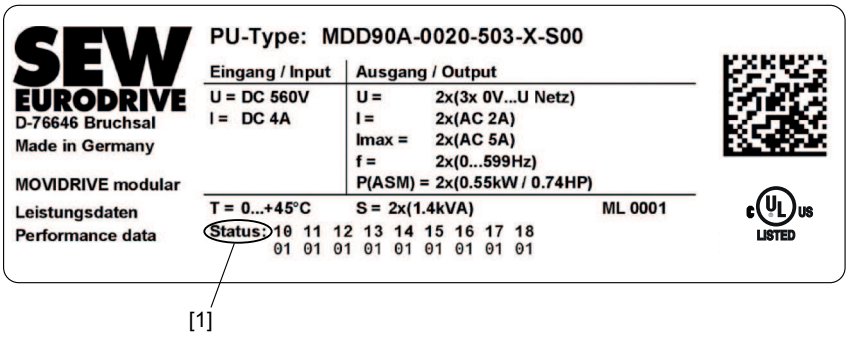
[1] Device status

[2] Serial number

Performance data nameplate



9007214314814475

[1] Device status

24748536/EN – 11/2017

3.3 Type code of MOVIDRIVE® modular

The following type code applies to MOVIDRIVE® modular.

Example: MDA90A-0080-503-X-S00		
Product name	MD	• MD = MOVIDRIVE®
Device type	A	• A = Single-axis module • D = Double-axis module • P = Power supply module with brake chopper • M = Master module UHX45A/MDM90A
Series	90	• 90 = Standard design
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
Connection voltage	5	• 5 = AC 380 – 500 V
EMC variant of power section	0	• 0 = Interference suppression integrated
Number of phases	3	• 3 = 3-phase connection type
Operating mode	X	• 4 = 4Q operation (with brake chopper) • X = Not relevant
Variants	0	• 0 = Not relevant • S = Control MOVI-C® CONTROLLER • C = Power supply module with integrated braking resistor and capacitor • E = Inverter with CiA402 drive profile
Designs	00	• 00 = Standard design • 01 = Axis module MDA90A-0640-.. in size 5
Options		• /X = MOVIDRIVE® modular without card slots The following list serves as an example: • /CES11A = Multi-encoder card • /CID21A, /CIO21A = I/O expansion card • /CS..A = Safety card

24748536/EN – 11/2017

3.4 Unit structure of the MDP power supply module

⚠ WARNING

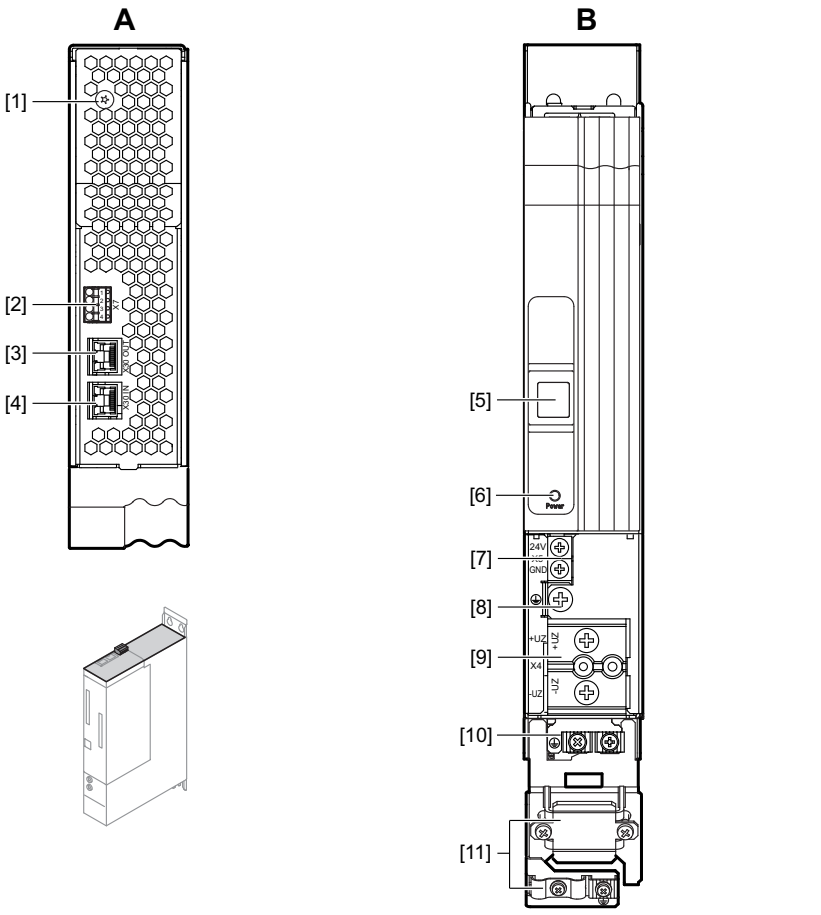
Some of the modules shown in this chapter are depicted without touch guards. Touch guards secure the live parts such as DC link, line connections and braking resistor connections.

Uncovered power 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: Temperature monitoring braking resistor
[3] X30 OUT: System bus
[4] X30 IN: System bus

B: View from front

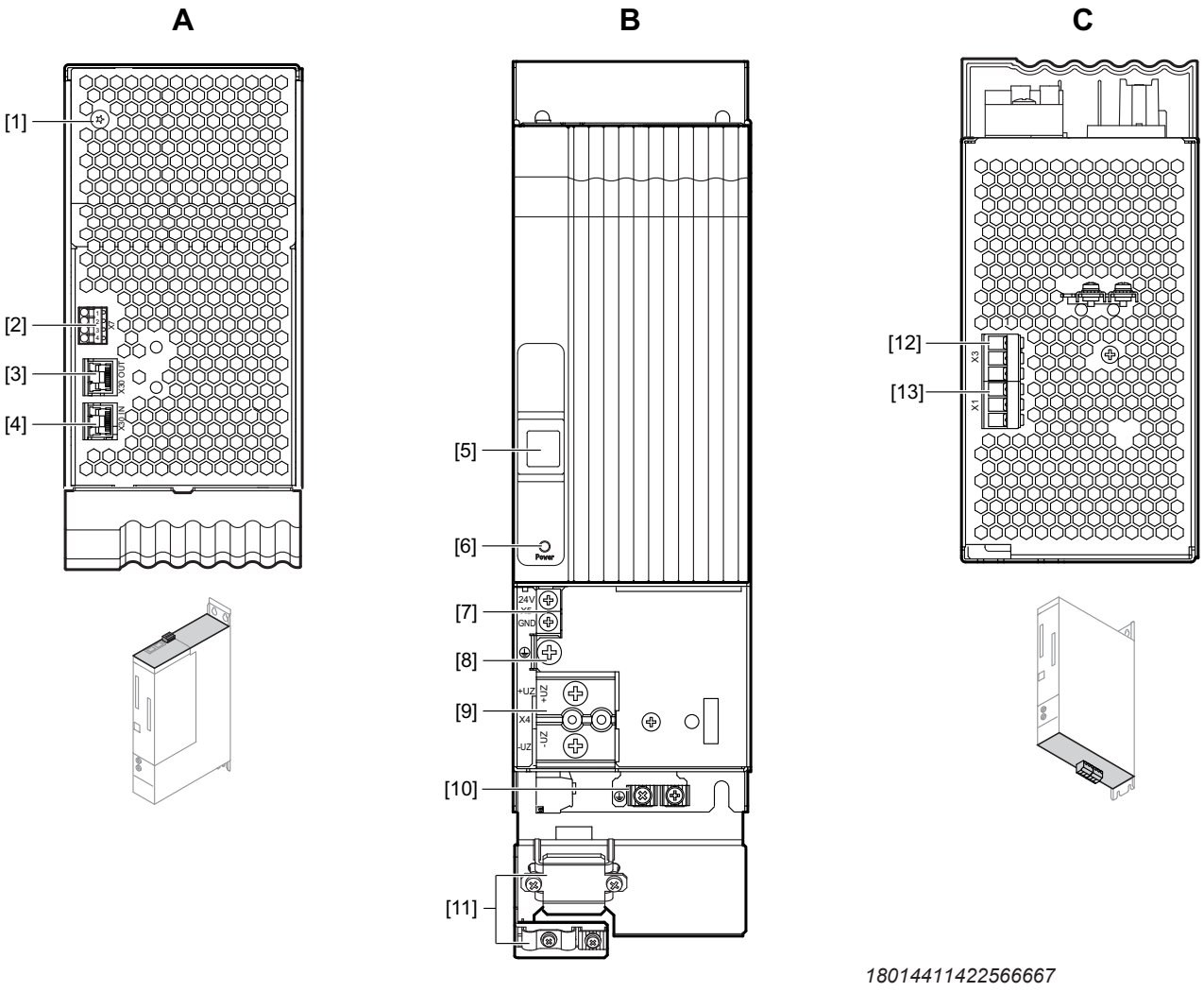
[5] 7-segment display
[6] Standby display (Power)
[7] X5: Connection +24 V supply voltage
[8] PE connection
[9] X4: DC link connection
[10] PE connection housing
[11] Shield terminal

C: View from bottom

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

24748536/EN – 11/2017

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

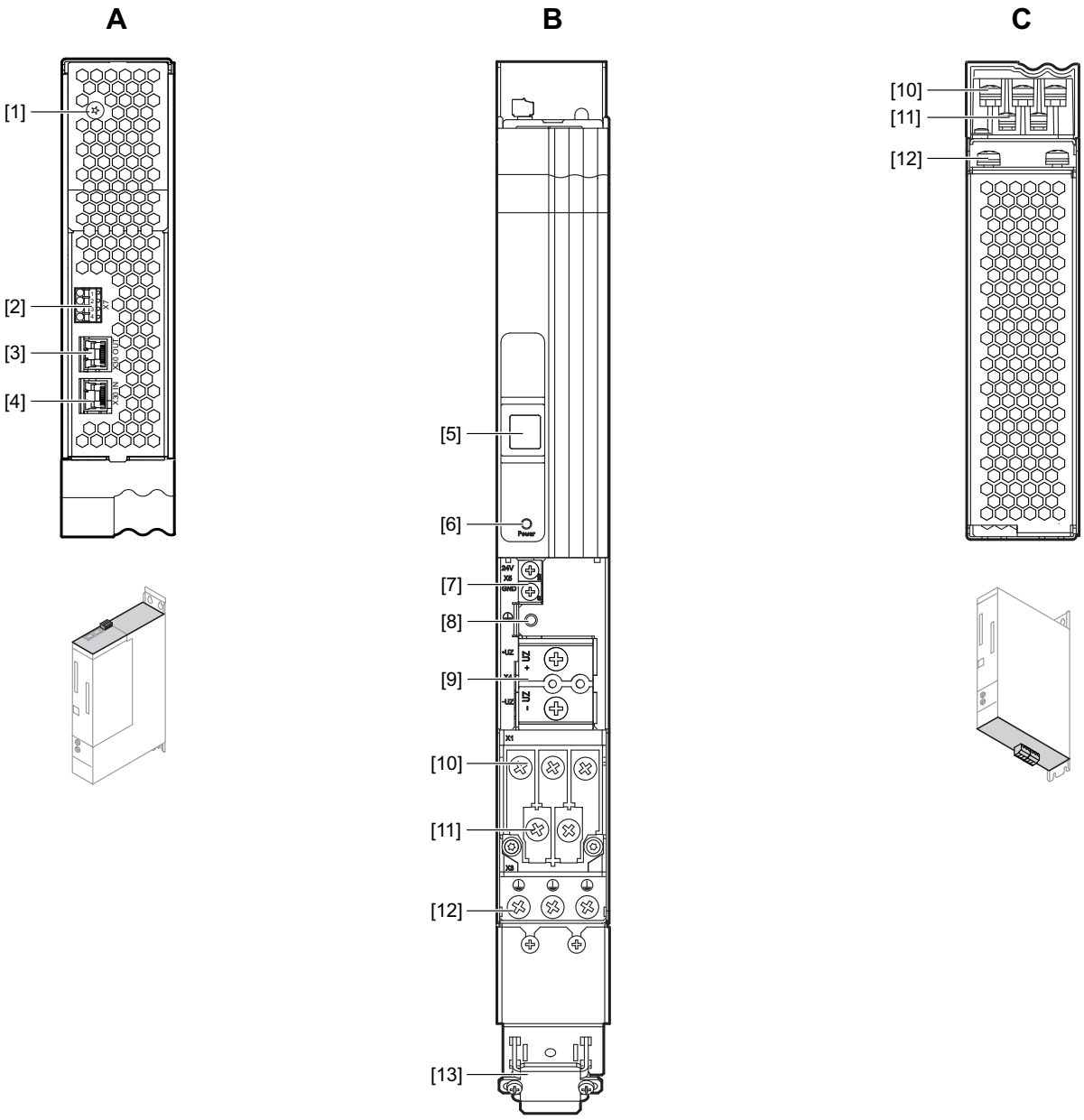
B: View from front

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

C: View from bottom

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

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

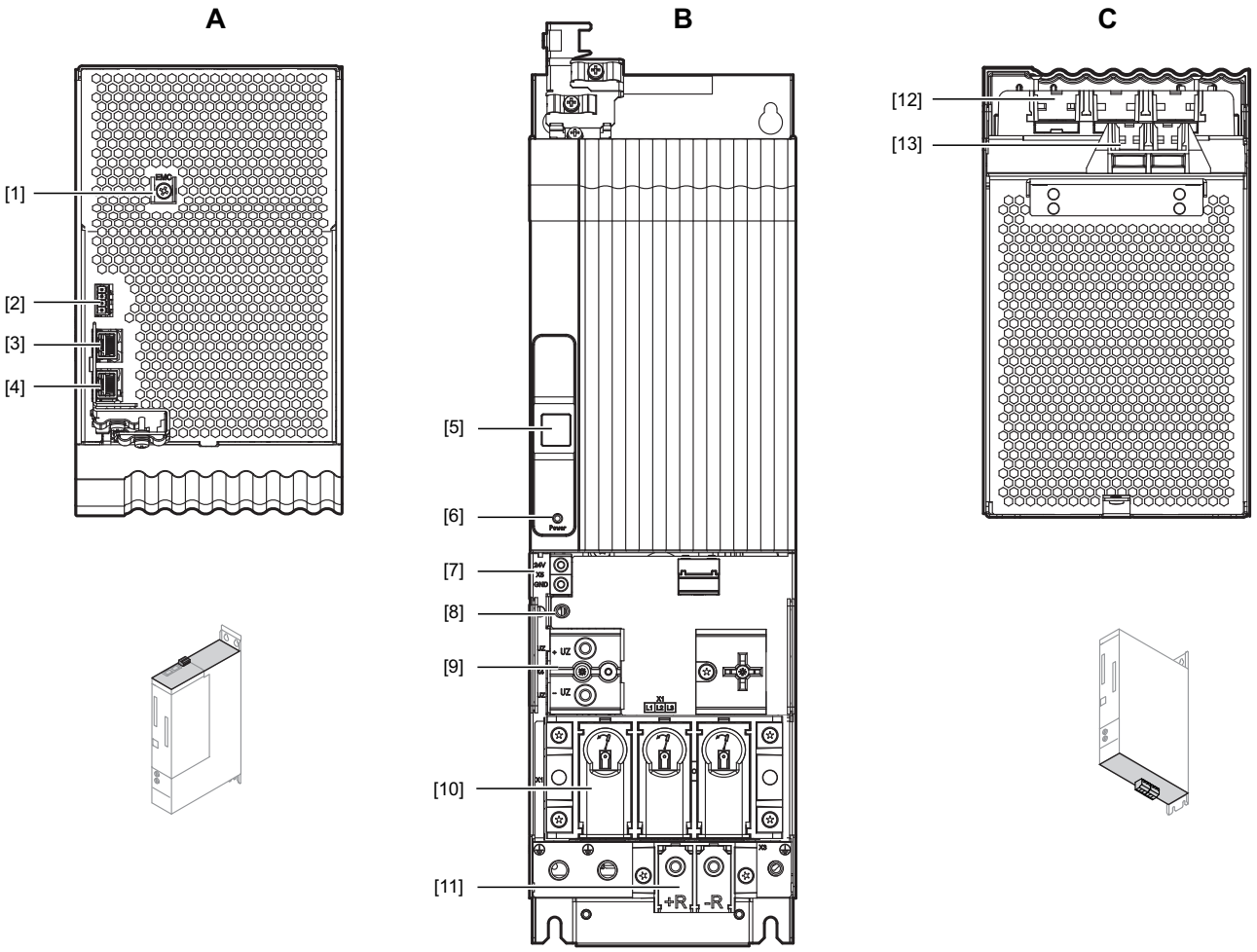
[5] 7-segment display
[6] Standby display (Power)
[7] X5: Connection +24 V supply voltage
[8] PE connection
[9] X4: DC link connection
[10] X1: Line connection
[11] X3: Braking resistor connection
[12] 3 × PE connection housing
[13] Shield terminal

C: View from bottom

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

24748536/EN – 11/2017

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



2010602650

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] Standby display (Power)
[7] X5: Connection +24 V supply voltage
[8] PE connection
[9] X4: DC link bus connection
[10] X1: Line connection
[11] X3: Braking resistor connection

C: View from bottom

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

3.5 Unit structure of the MDA and MDD axis modules

⚠ WARNING

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.

Uncovered power connections.

Severe or fatal injuries from electric shock.

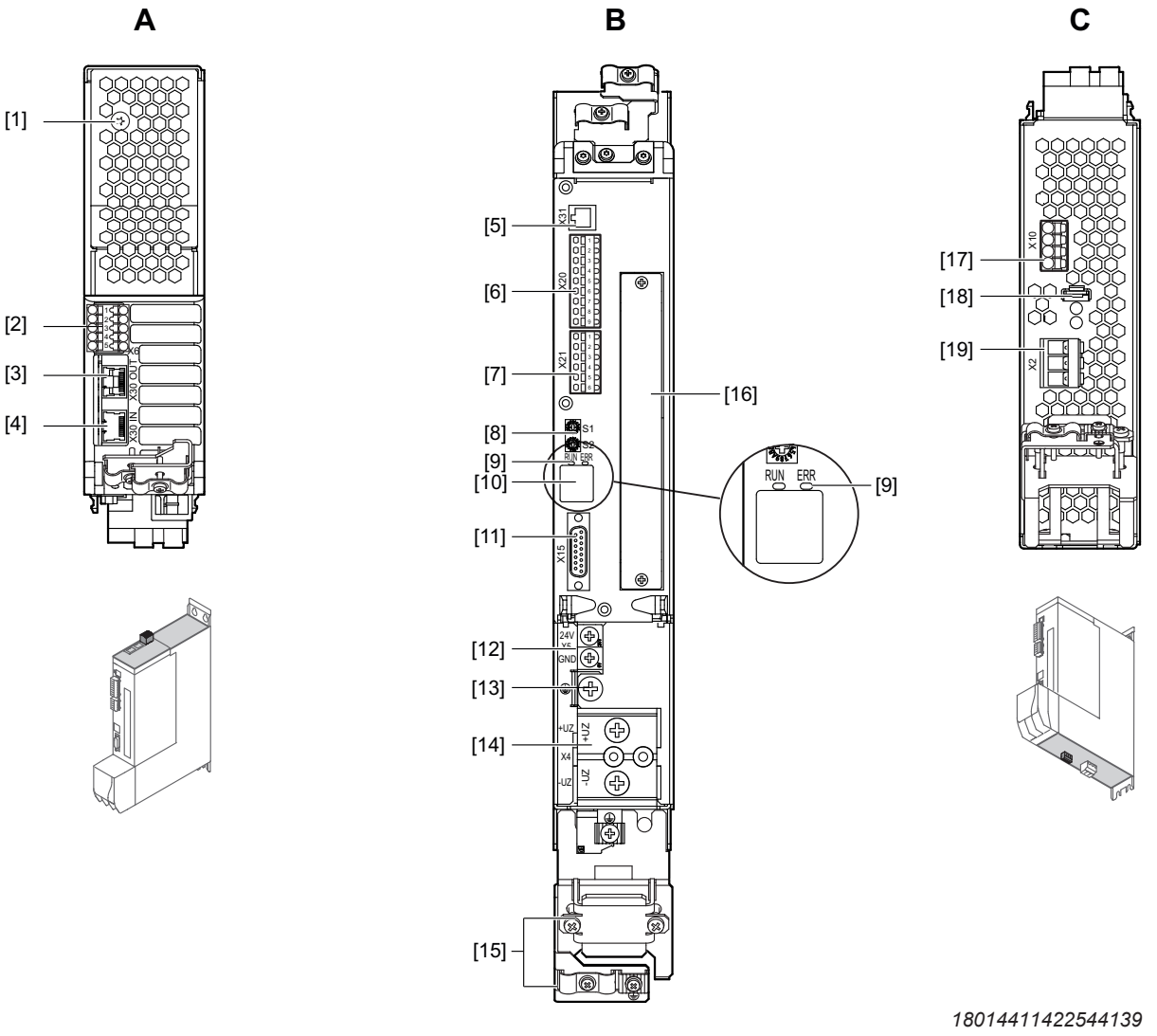
- Never start up the application inverter without installed closed touch guards.

MDA: Single-axis module

MDD: Double-axis module

24748536/EN – 11/2017

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



18014411422544139

A: View from top

[1] 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 bus connection

[15] Shield plate

[16] Card slot

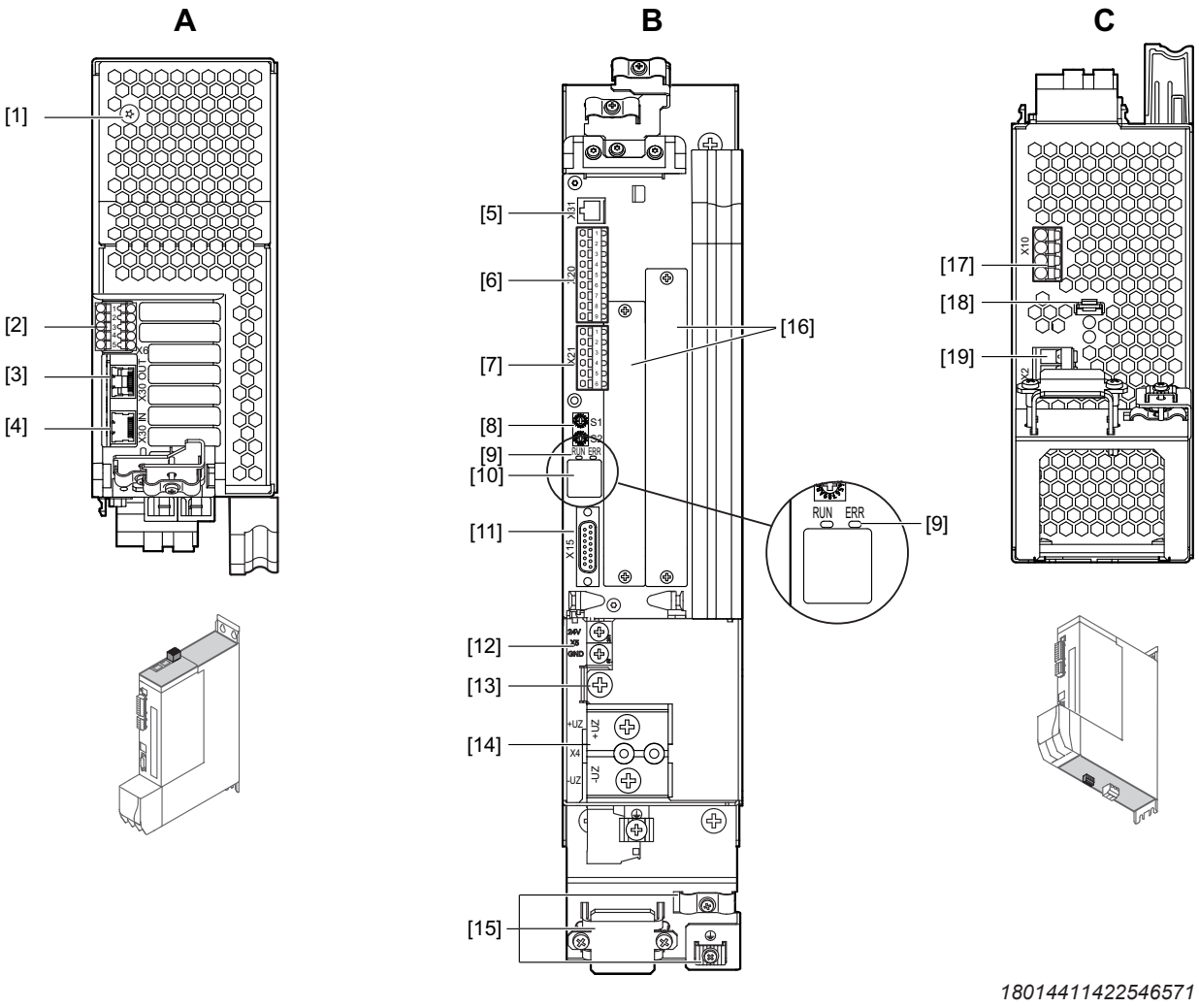
C: View from bottom

[17] X10: Brake control and temperature monitoring motor

[18] PE connection housing

[19] X2: Motor connection

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



18014411422546571

A: View from top

[1] 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 bus connection

[15] Shield plate

[16] Card slots

C: View from bottom

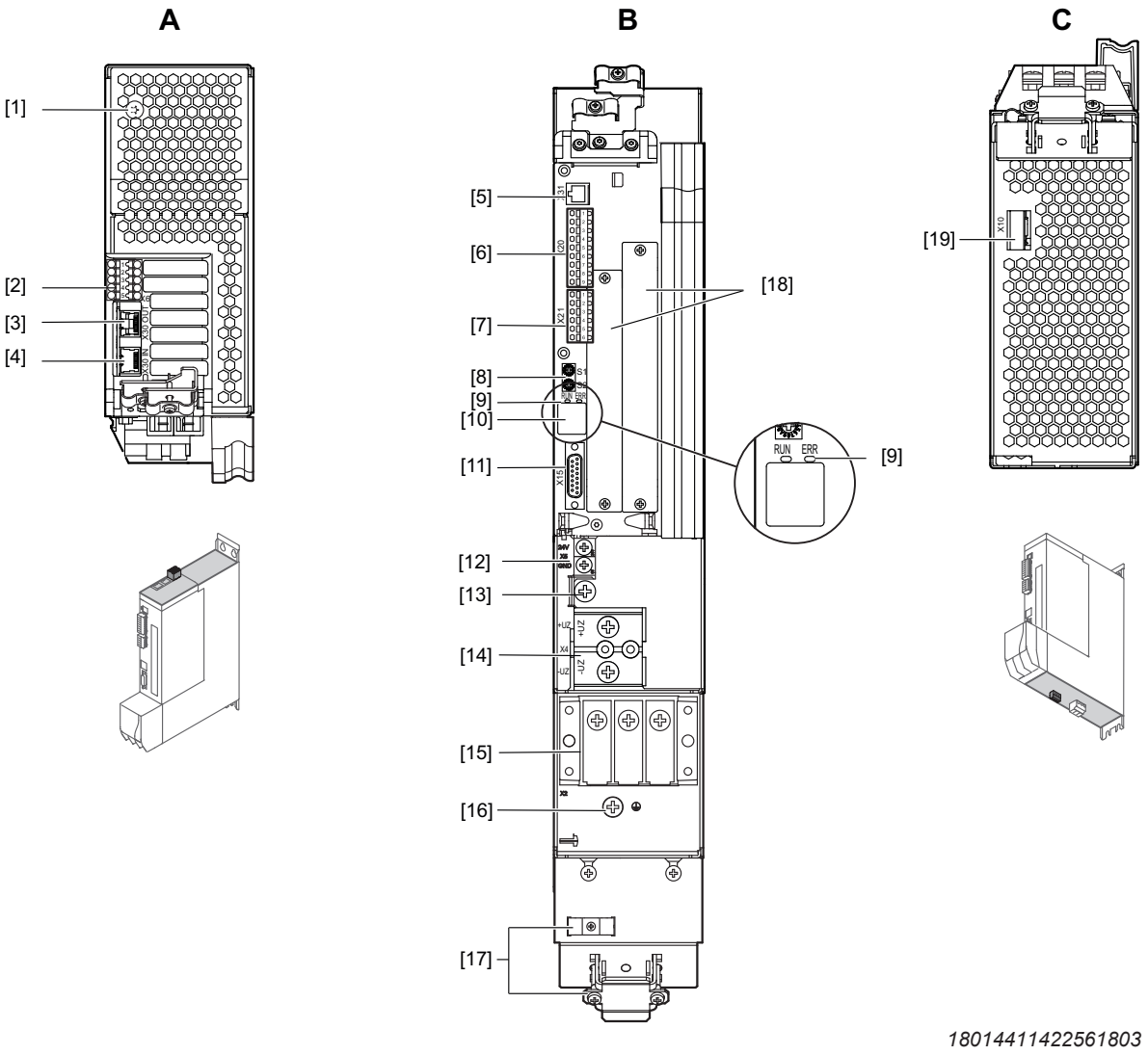
[17] X10: Brake control and temperature monitoring motor

[18] PE connection housing

[19] X2: Motor connection

24748536/EN – 11/2017

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



18014411422561803

A: View from top

[1] 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 bus connection

[15] X2: Motor connection

[16] PE connection housing

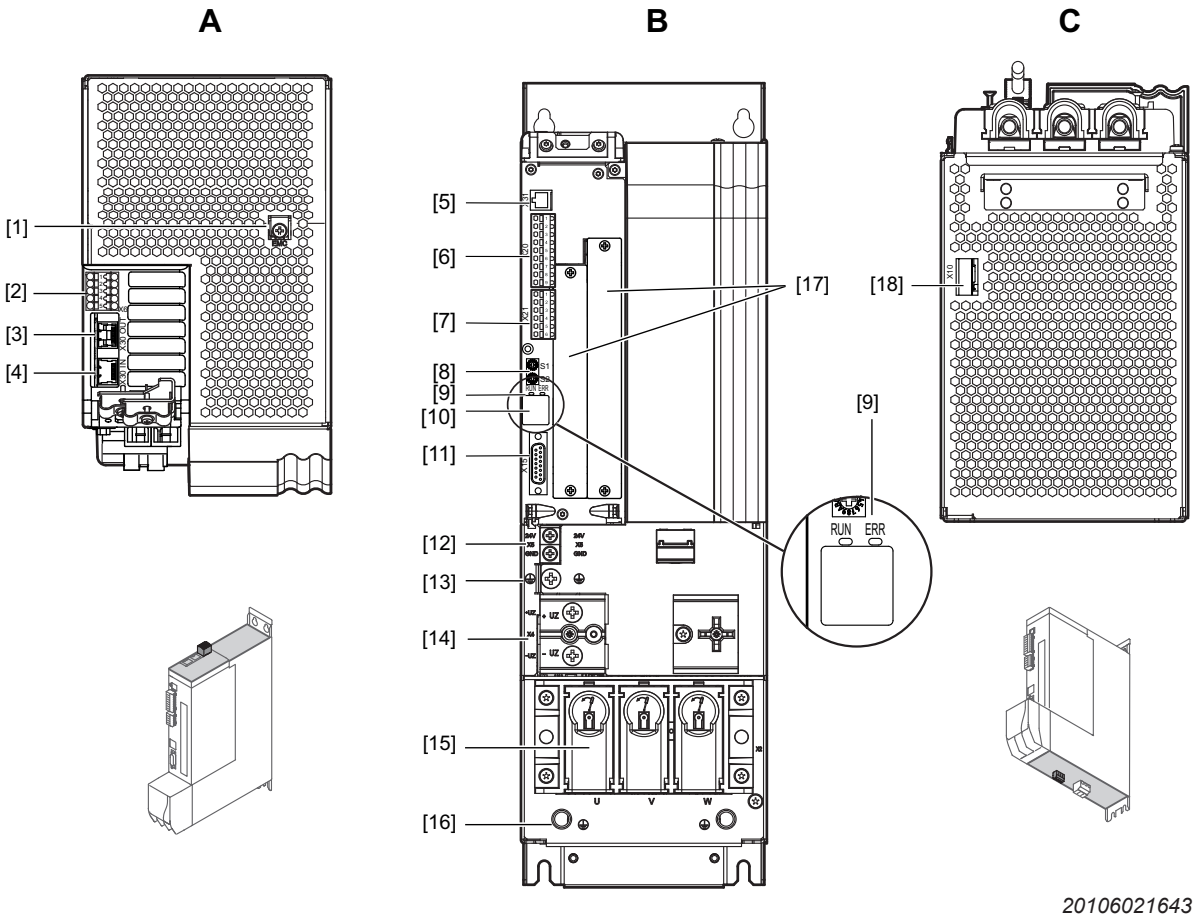
[17] Shield plate

[18] Card slots

C: View from bottom

[19] X10: Brake control and temperature monitoring motor

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



A: View from top

[1] 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 bus connection

[15] X2: Motor connection

[16] PE connection housing

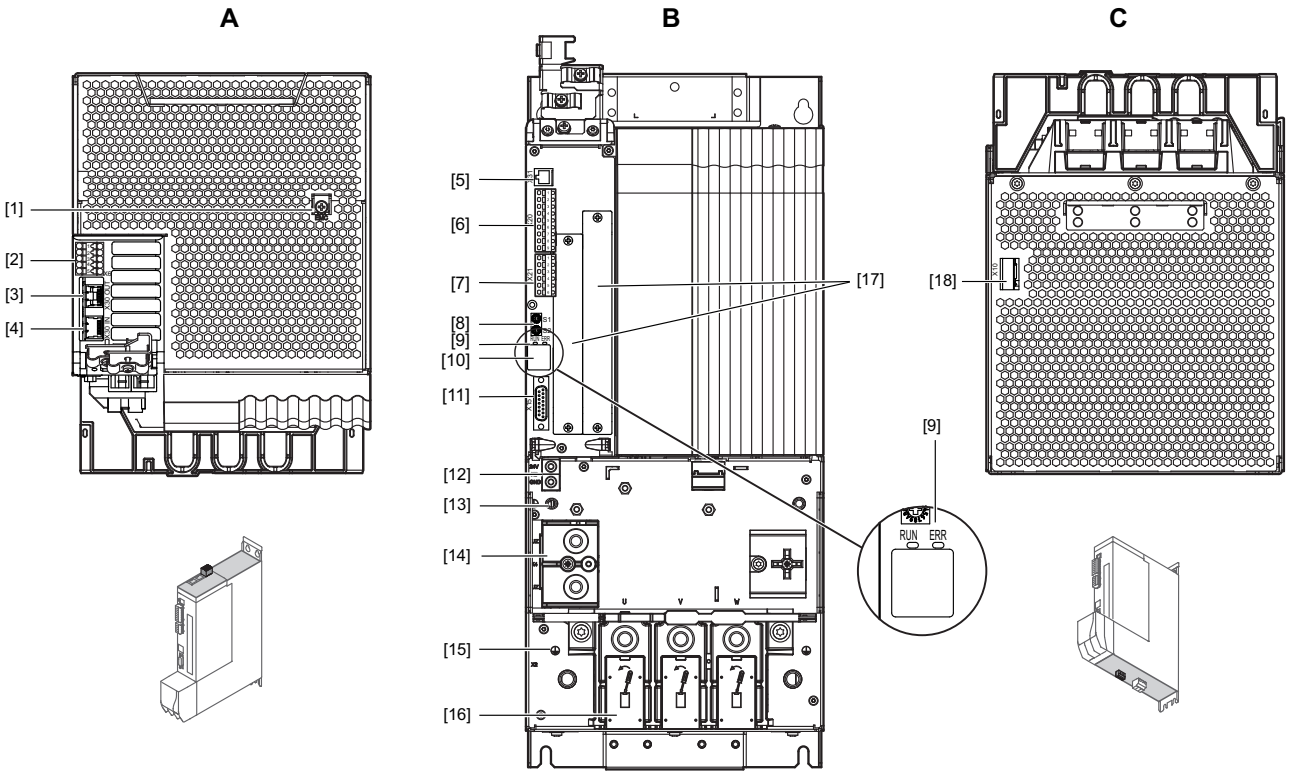
[17] Card slots

C: View from bottom

[18] X10: Brake control and temperature monitoring motor

24748536/EN – 11/2017

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



A: View from top

[1] 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 bus connection

[15] PE connection housing

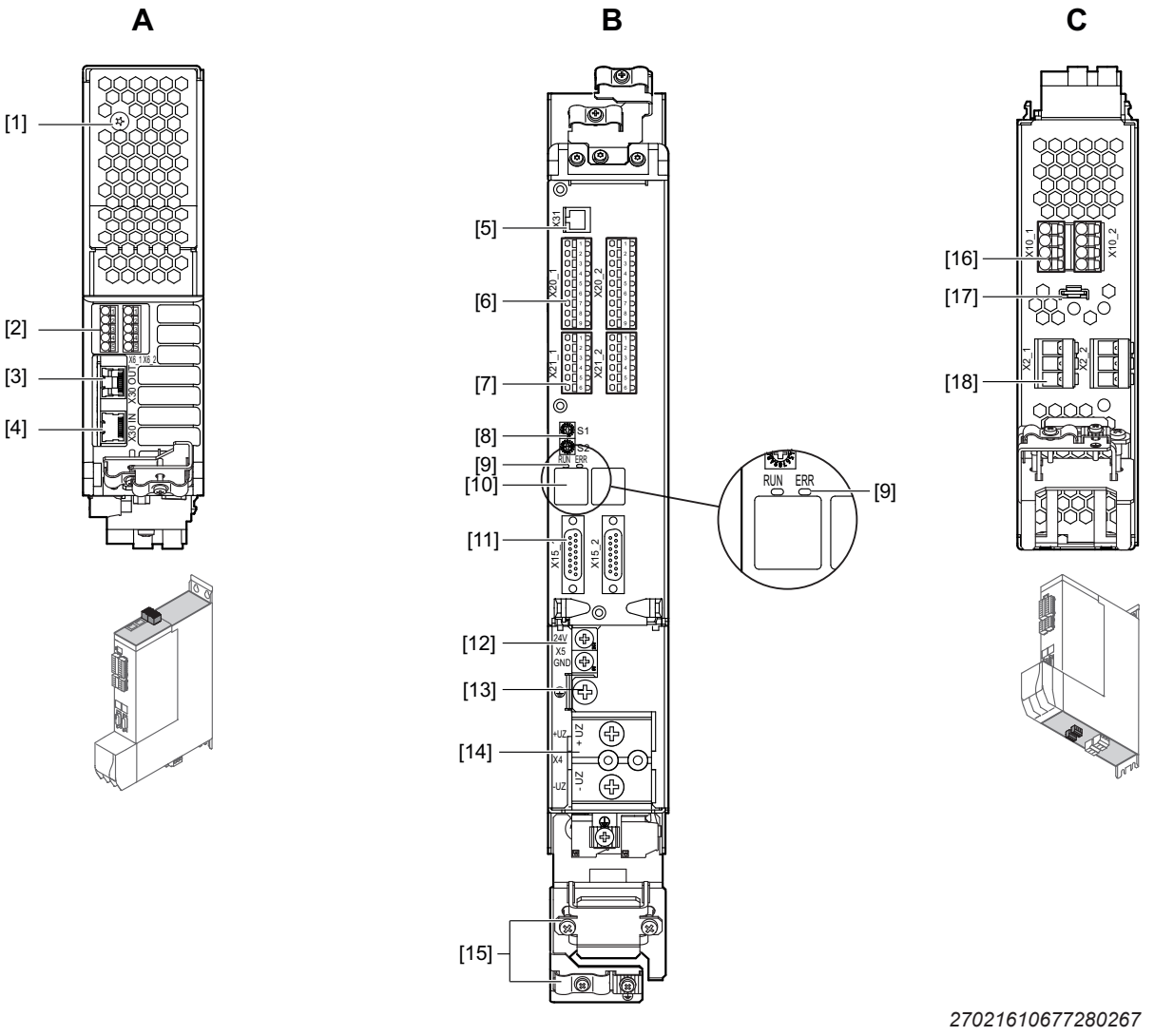
[16] X2: Motor connection

[17] Card slots

C: View from bottom

[18] X10: Brake control and temperature monitoring motor

3.5.6 MDD90A-0020, 0040 (size 1) – Double-axis module



27021610677280267

A: View from top

[1] 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

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link bus connection

[15] Shield plate

C: View from bottom

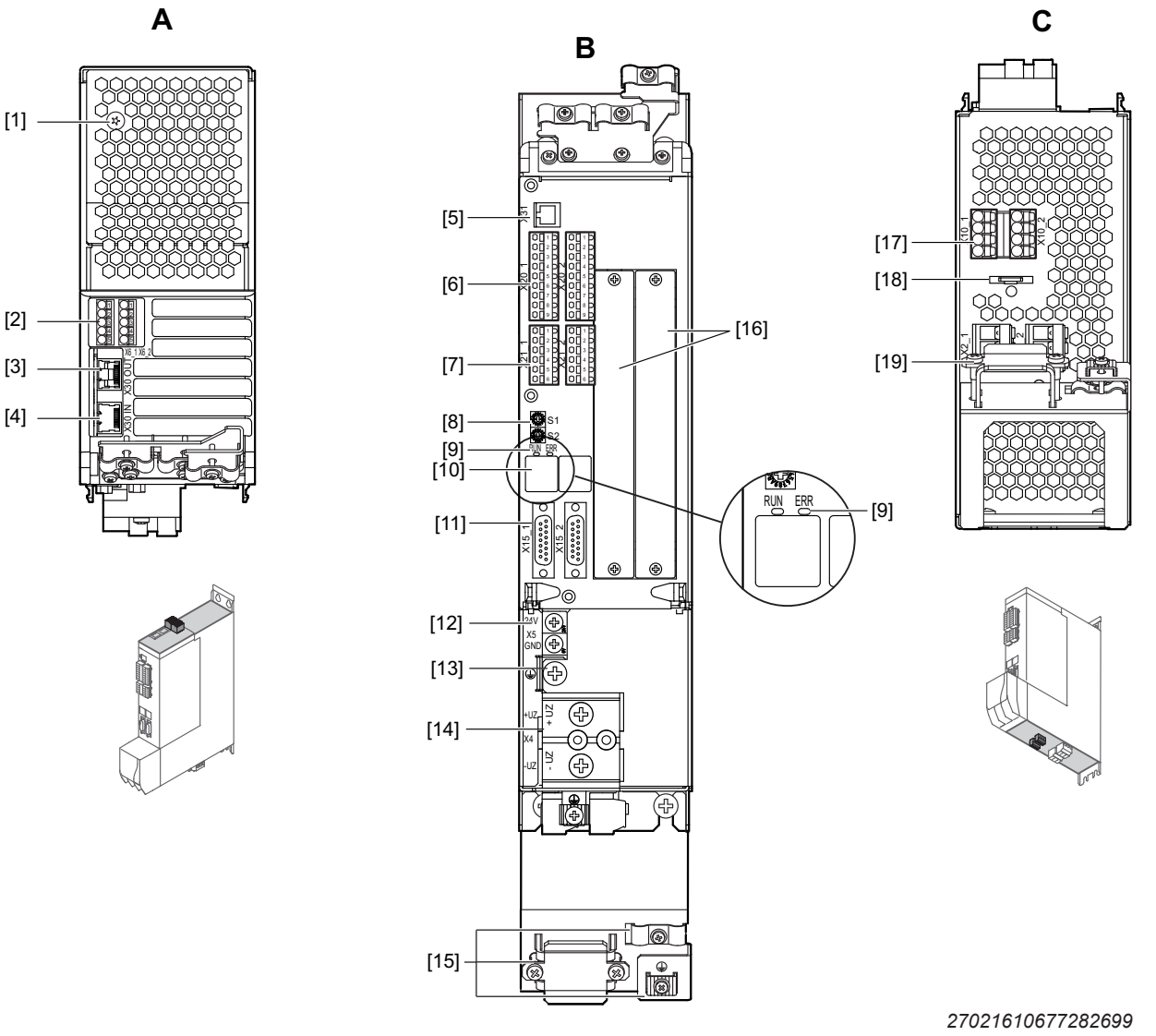
[16] X10: 2 × brake control and temperature monitoring motor

[17] PE connection housing

[18] X2: 2 × motor connection

24748536/EN – 11/2017

3.5.7 MDD90A-0020, 0040, 0080 (size 2) – Double-axis module



27021610677282699

A: View from top

[1] 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

[12] X5: Connection +24 V supply voltage

[13] PE connection

[14] X4: DC link bus connection

[15] Shield plate

[16] Card slots

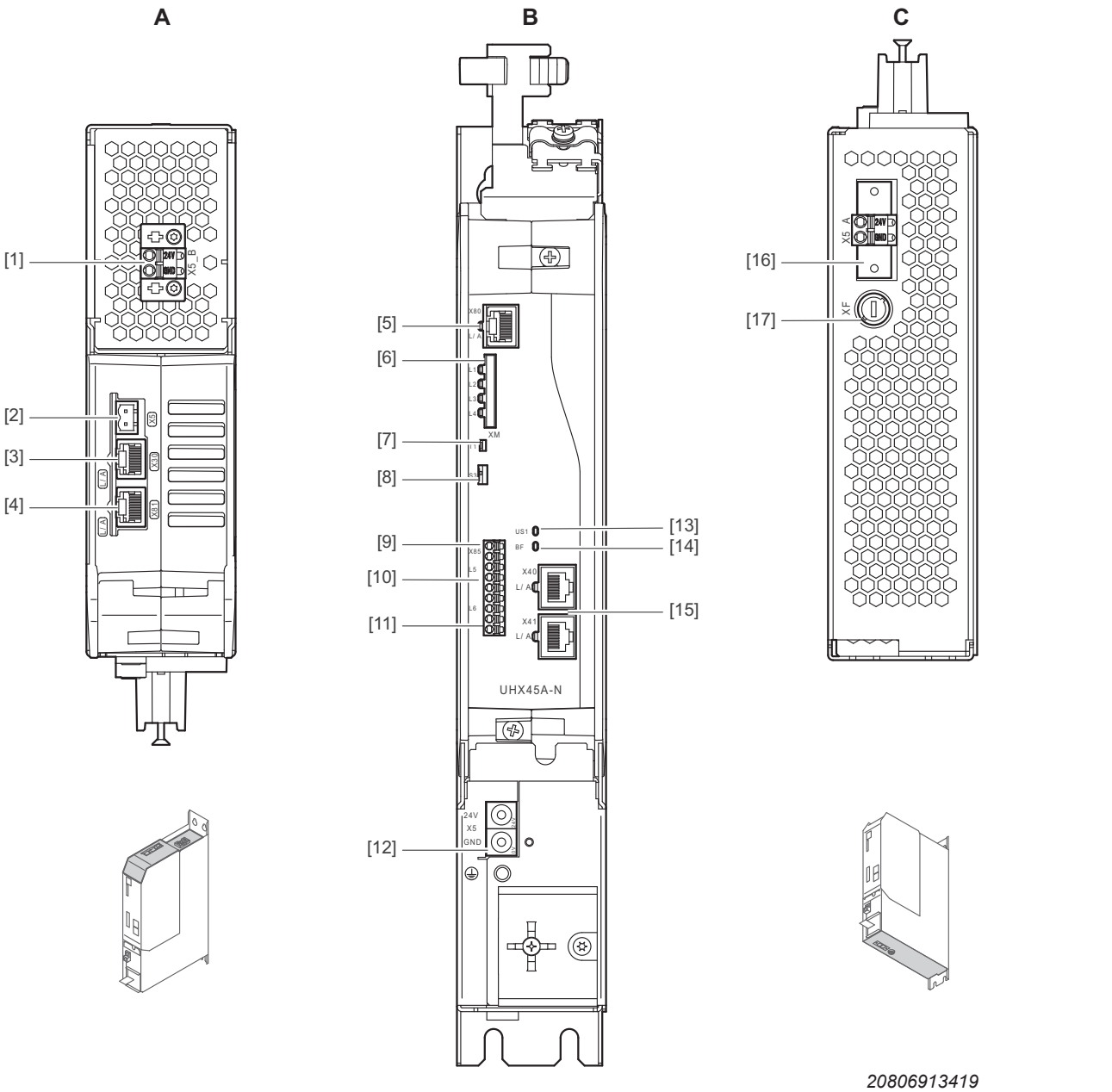
C: View from bottom

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

[18] PE connection housing

[19] X2: 2 × motor connection

3.6 Device structure of master module UHX45A/MDM90A



20806913419

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/L5: CAN bus 1

[10] X85/L6: CAN-Bus 2

[11] RS485

[12] X5: Connection +24 V supply voltage

[13] US1: Operating state of the fieldbus

[14] BF: Bus error

[15] X41: Fieldbus - slave interface

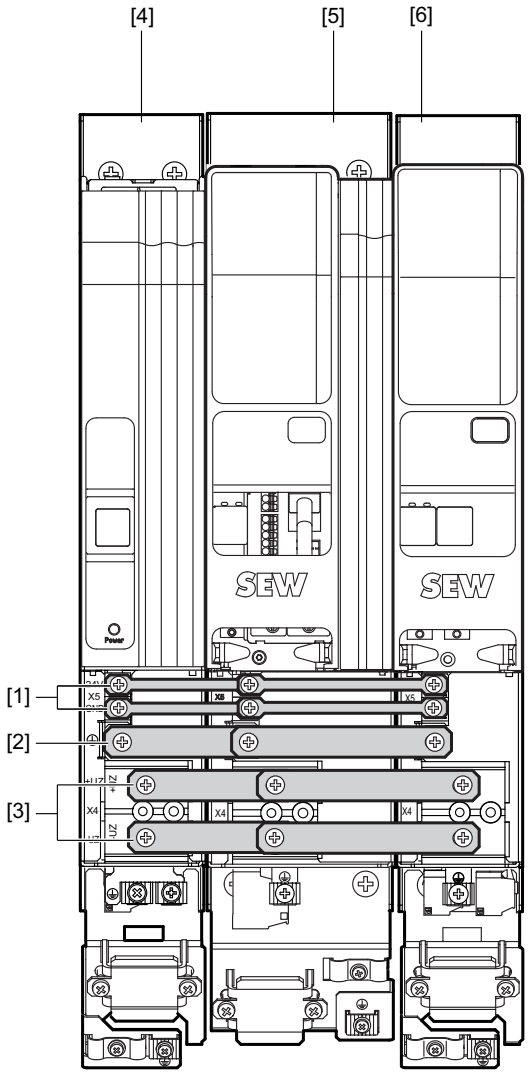
C: View from bottom

[16] X5_A: External 24 V supply voltage

[17] Fuse for DC 24 V supply UHX45A

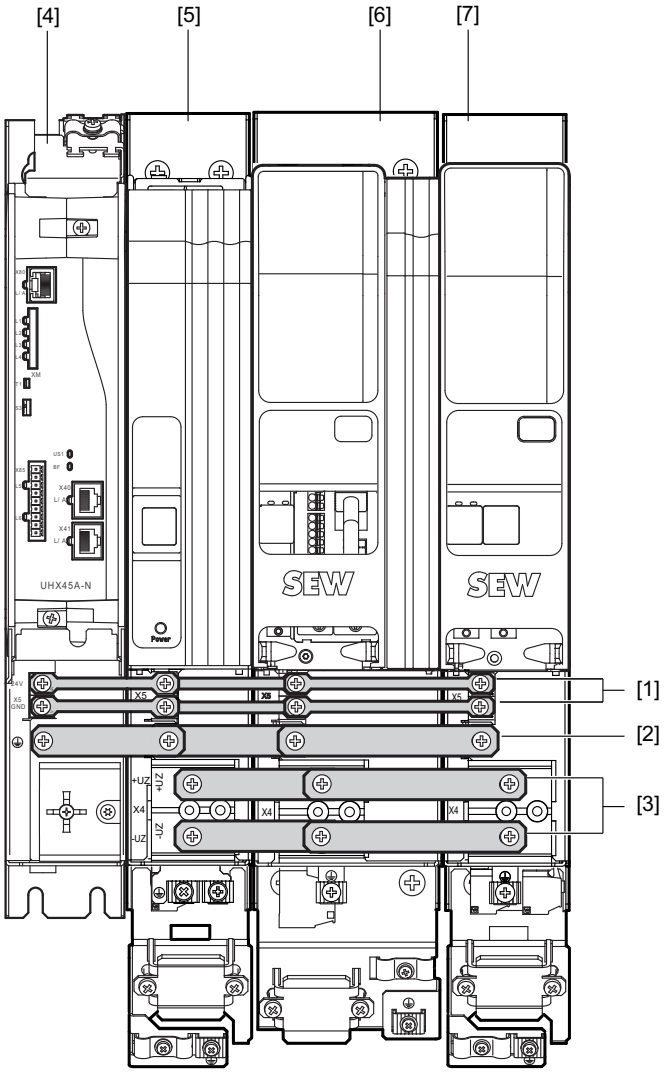
24748536/EN – 11/2017

3.7 Example for axis system connection without master module



[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

3.8 Example for axis system connection with master module



[1] X5: Connection +24 V supply voltage

[2] PE connection

[3] X4: DC link bus connection

[4] Master module UHX45A/MDM90A

[5] MDP.. power supply module

[6] MDA.. single-axis module

[7] MDD.. double-axis module

24748536/EN – 11/2017

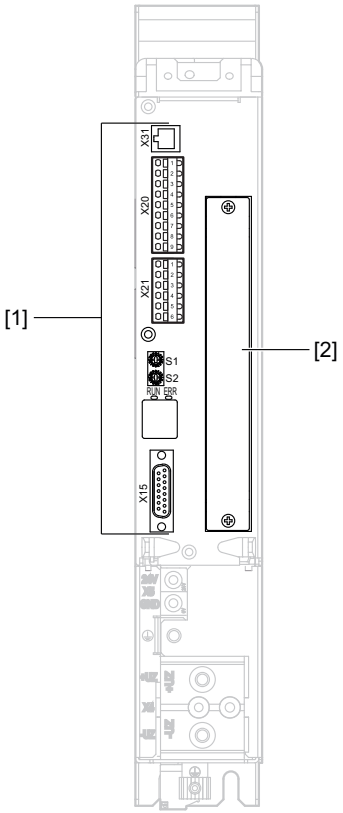
3.9 Card slots

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

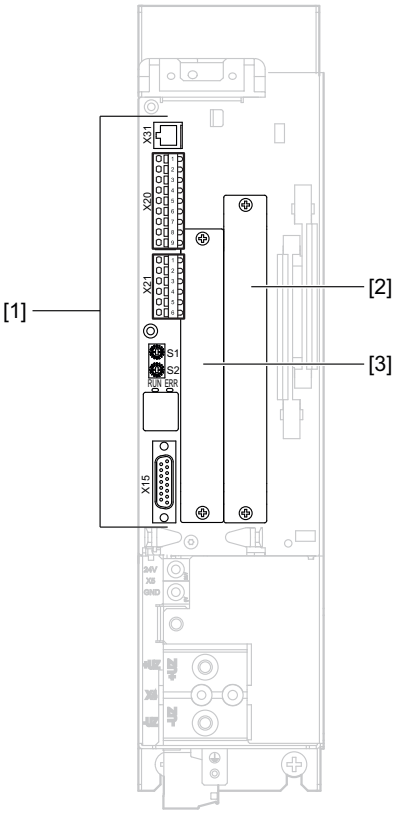
Type designation	Description	Slot in			
		MDA90A-... single-axis module		MDD90A-... double-axis module	
		0020 – 0120	0160 – 1800	0020 – 0040	0020 – 0080
CES11A	Multi-encoder card	[2]	[2]	-	-
CID21A, CIO21A	Input/output cards	-	[3]	-	-
CS..A	Safety card	[2]	[2]	[2]	[2]

3.9.1 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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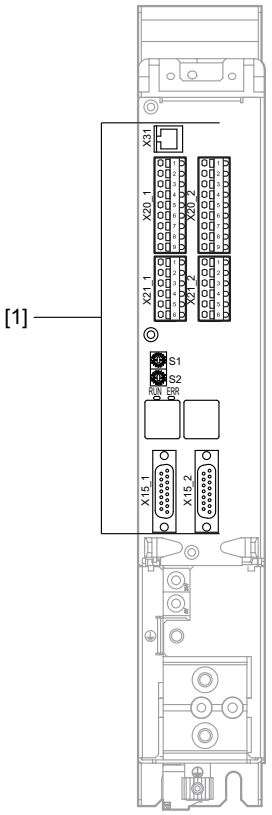
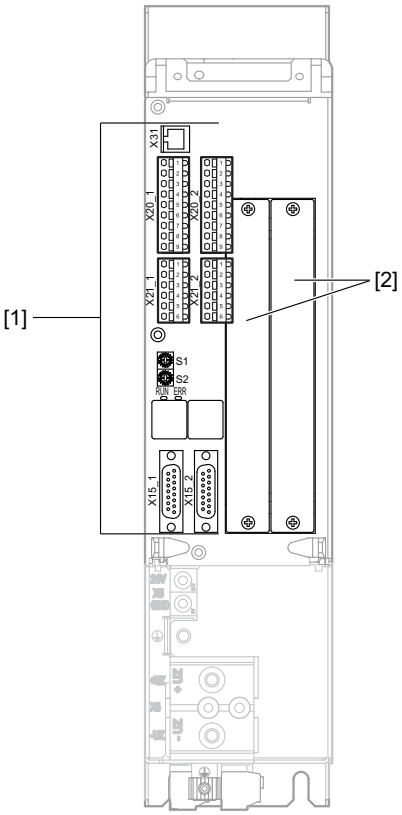
3.9.2 Double-axis modules

MDD90A-0020, 0040 (size 1)



MDD90A-0020, 0040, 0080 (BG 2)



9007212170096139

[1] Connector panel of basic device for the first and second axis

[2] Safety card/additional encoder slot

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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

Designation	Power supply module				Single-axis module				Double-axis module		Master module
	MDP90A-				MDA90A-				MDD90A-		MDM90A
	0100 (BG1)	0100 (BG1A)	0250	0500, 0750	0020, 0040, 0080, 0120	0160, 0240	0320, 0480	0640, 1000	0020, 0040	0020, 0040, 0080	
Electronics shield clamp	1×										

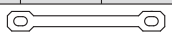
Designation	Power supply module				Single-axis module				Double-axis module	
	MDP90A-				MDA90A-				MDD90A-	
	0100 (BG1)	0100 (BG1A)	0250	0500, 0750	0020, 0040, 0080, 0120	0160, 0240	0320, 0480	0640, 1000	0020, 0040	0020, 0040, 0080
Power shield clamp	1×									

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

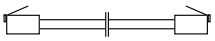
Module	Part number accessory pack
MDP90A.- power supply module	0100 (BG1): 28223756
	0100 (BG1A): 28225198
	0250: 28224507
	0500, 0750: 28232984
Single-axis module MDA90A-	0020, 0040, 0080, 0120: 28223756
	0160, 0240: 28233530
	0320, 0480: 28220714
	0640: 28226151
	1000: 28231635
MDD90A- double-axis module	0020, 0040 (BG1): 28223756
	0020, 0040, 0080 (BG2): 28220455
Master module UHX45A/MDM90A	28244389

24748536/EN – 11/2017

Standard accessories – electrical accessories

Designation	Power supply module				Single-axis module				Double-axis module		Master module
	0100 (BG1)	0100 (BG1A)	0250	0500, 0750	0020, 0040, 0080, 0120	0160, 0240	0320, 0480	0640, 1000	0020, 0040	0020, 0040, 0080	
+24 V supply voltage											
	2×										

Designation	Power supply module				Single-axis module				Double-axis module		Master module
	0100 (BG1)	0100 (BG1A)	0250	0500, 0750	0020, 0040, 0080, 0120	0160, 0240	0320, 0480	0640, 1000	0020, 0040	0020, 0040, 0080	
DC link connection, PE connection											
	3×										1×

Designation	Power supply module				Single-axis module				Double-axis module	
	0100 (BG1)	0100 (BG1A)	0250	0500, 0750	0020, 0040, 0080, 0120	0160, 0240	0320, 0480	0640, 1000	0020, 0040	0020, 0040, 0080
8-pole module bus cable, system bus EtherCAT®/ SBus^{PLUS}										
	1×									

Designation	Power supply module				Single-axis module				Double-axis module	
	0100 (BG1)	0100 (BG1A)	0250	0500, 0750	0020, 0040, 0080, 0120	0160, 0240	0320, 0480	0640, 1000	0020, 0040	0020, 0040, 0080
DC link closing cover										
	2×									

Designation	Power supply module	Single-axis module
	MDP90A-0250-..	MDA90A-0480-..
Power connection closing cover		
	1×	

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

Module	Part number	
	Accessory pack[1)]	Module bus cable
MDP90A.- power supply module	0100 (BG1): 28224876	18166989
	0100 (BG1A): 28225201	18167004
	0250: 28230027	18166989
	0500, 0750: 28232992	18167012
	1100: 28234324	
MDA90A-. single-axis module	0020, 0040, 0080, 0120: 28223764	18166989
	0160, 0240: 28220463	18166997
	0320, 0480: 28225236	18167004
	0640: 28226178	
	0640, 1000: 28231643	18167012
	1400, 1800: 28233212	
MDD90A- double-axis module	0020, 0040 (BG1): 28223764	18166989
	0020, 0040, 0080 (BG2): 28220463	18166997
Master module UHX45A/MDM90A	28244397	18166989

1) Accessory pack contains module bus cable

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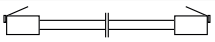
4.1.2 Optional accessories

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

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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		9 – 11
DC link connection	X4	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 MDD90A-		Master module MDM90A
		0020, 0040, 0080, 0120	0160, 0240	0320, 0480	0640, 1000	1400, 1800	0020, 0040 (size 1)	0020, 0040, 0080 (size 2)	
Motor connection	X2	0.5 – 0.6	1.5 – 1.7	3 – 4	18 – 22		0.5 – 0.6	1.5 – 1.7	-
DC link connection	X4	3 – 4				9 – 11	3 – 4		-
PE connection	X4	3 – 4					3 – 4		3 – 4
Connection 24 V voltage supply	X5	1.2 – 1.5					1.2 – 1.5		1.2 – 1.5
Terminal screw for TN/TT systems	EMC	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
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.
- A too high tightening torque may cause damage.

24748536/EN – 11/2017

4.3 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.

4.3.1 Hole pattern

Preparing the control cabinet

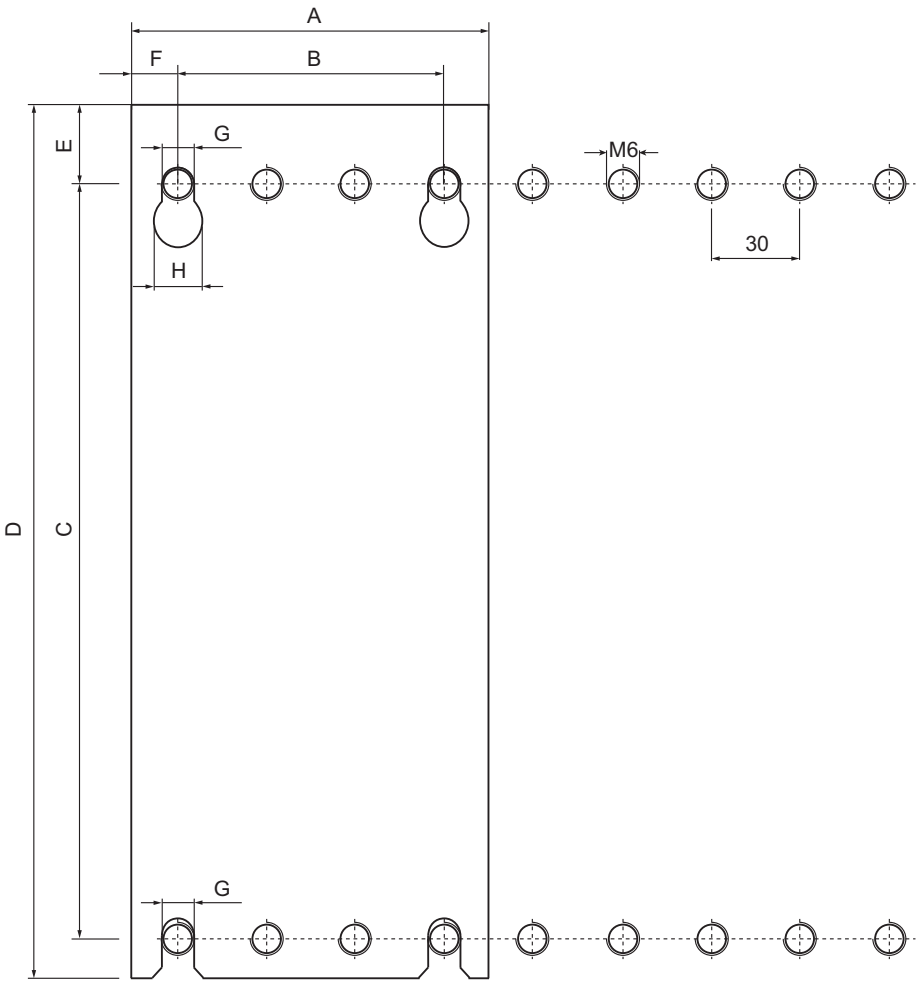
You can prepare the control cabinet for the installation of differently assembled axis systems by drilling tapped holes every 30 mm for mounting the modules. The modules can be attached to this grid irrespective of their width, see figure below.

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	433	473	28	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	30	455	483	19	15	7	13
MDA90A-0640, 1000 (size 5)	150	120	455	483	19	15	7	13
MDD90A-0020, 0040 (size 1)	60	30	355	383	19	15	7	13
MDD90A0020, 0040, 0080 (size 2)	90	60	355	383	19	15	7	13
MDM90A	60	30	355	383	19	15	7	13

24748536/EN – 11/2017

Mounting grid



27021610488337547

For dimension sheets of the application inverter, refer to chapter "Technical data" (→ 🗎 221).

24748536/EN – 11/2017

4.3.2 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.

4.4 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.

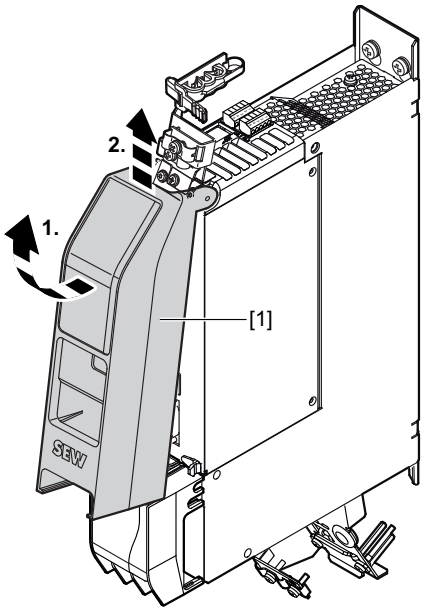
Remove this protection before startup.

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

4.4.1 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

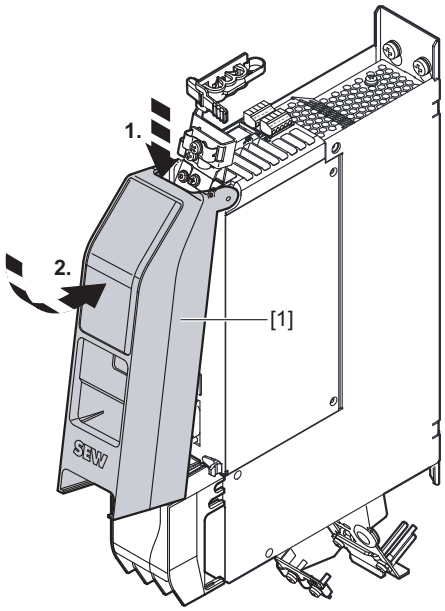


27021611749935499

- 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.
- Pivot the safety cover forward and lift it to remove it from the application inverter.

24748536/EN – 11/2017

Installing the safety cover



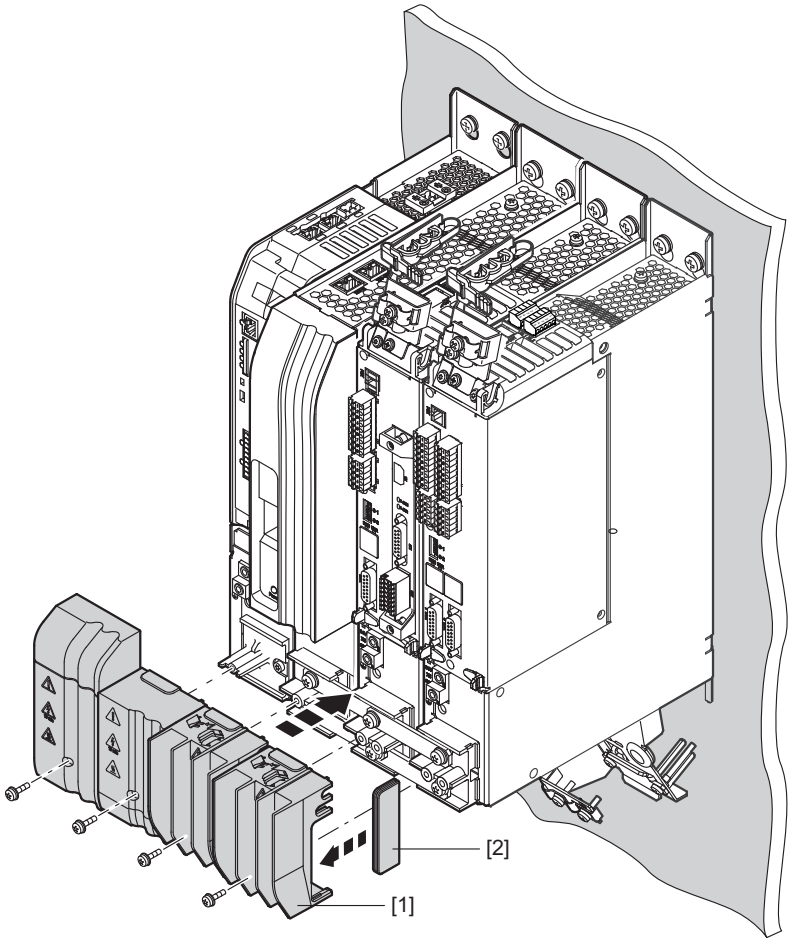
9007214394878475

- 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.

4.4.2 Touch guards

Axis system with master module

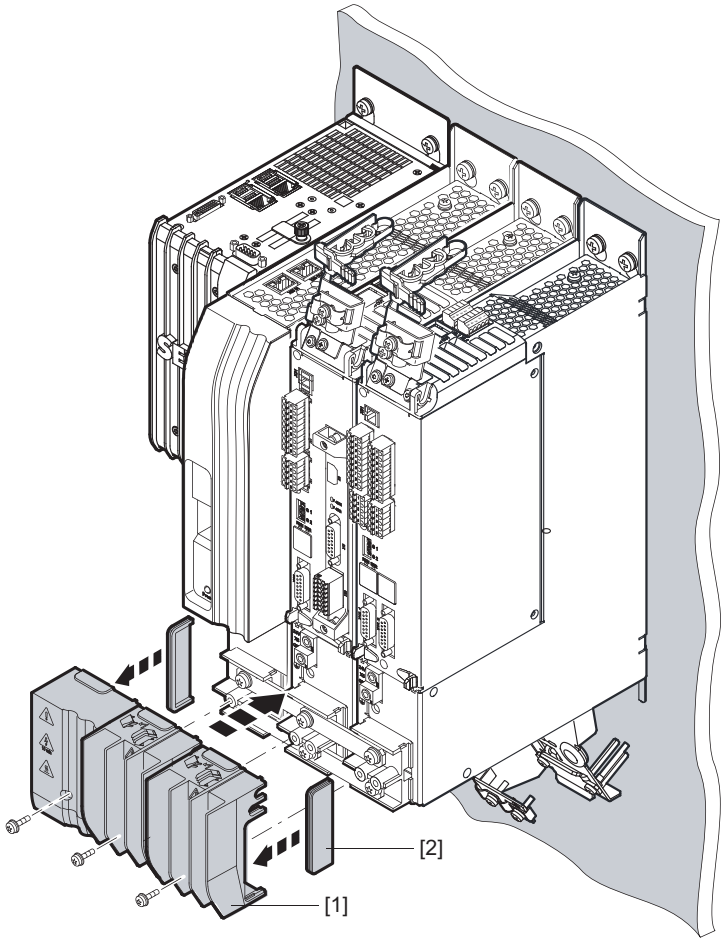


20918974091

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 (→ 🗎 52).

24748536/EN – 11/2017

Axis system without master module



18014412466136331

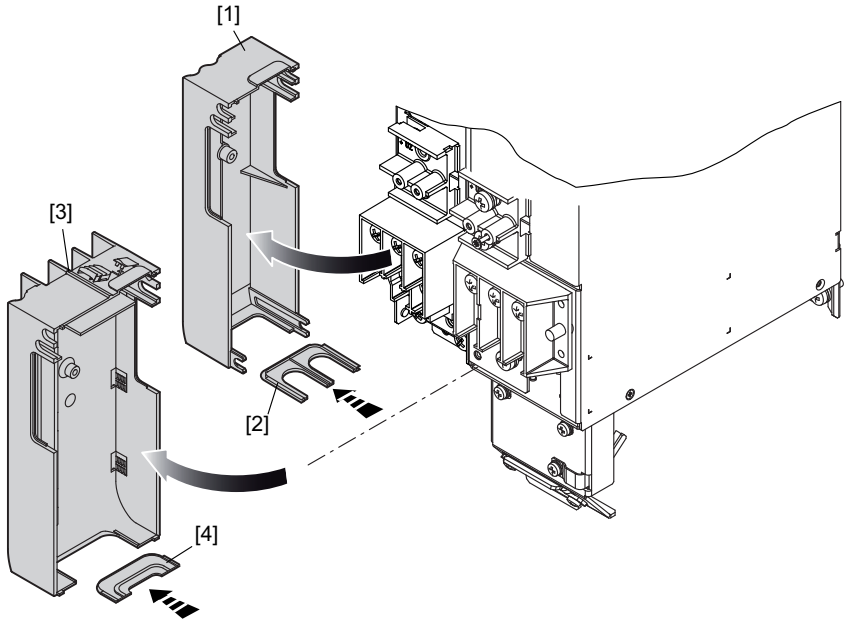
1. Insert closing covers [2] into the touch guards covers [1] of the first and last module in the axis system.
2. Attach the touch guard covers [1] to the modules. Insert the screws and tighten them securely with the specified tightening torque (→ 🗎 52).

24748536/EN – 11/2017

4.4.3 Power connection closing cover

To maintain the degree of protection IP20, a closing cover must be inserted into the touch guard of the following modules.

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



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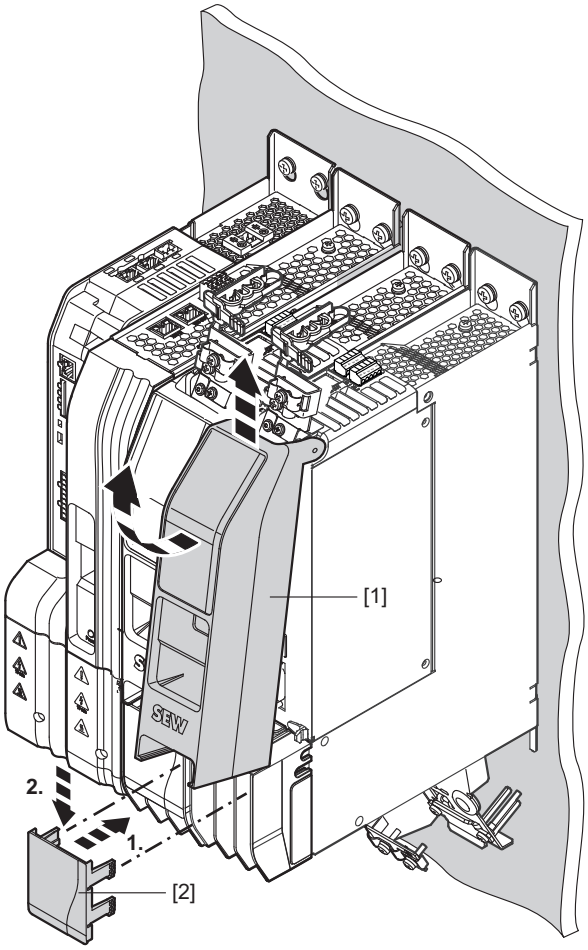
[1] Power supply module touch guard
[2] Power supply module closing cover
[3] Axis module touch guard
[4] Axis module closing cover

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 (→ 🗎 52).

The closing covers are included in the delivery.

24748536/EN – 11/2017

4.4.4 Front cover



20806974603

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

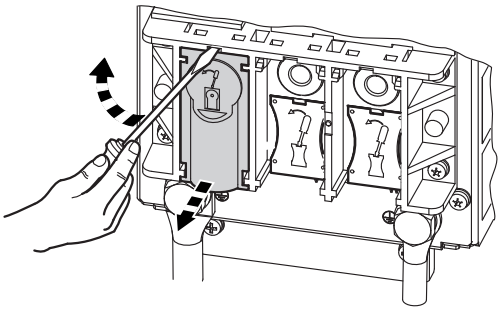
4.4.5 Protection caps

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.

- Power supply modules MDP90A-0500-.. and larger, line connection X1, braking resistor connection X3
- Supply and regenerative modules MDR91A-0500-.. and larger
- Axis modules MDA90A-0640-.. and larger: Motor connection X2

Protection caps installed can be remove as depicted in the following figures.

Line connection, motor connection



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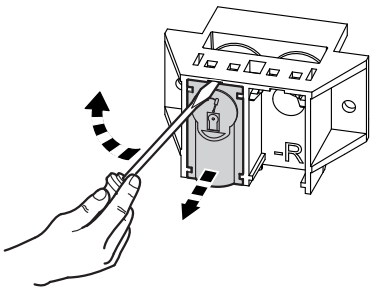
Braking resistor connection



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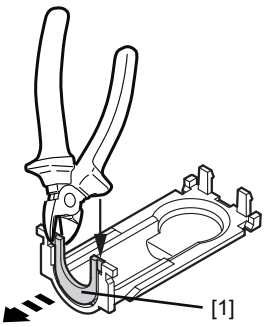
To ensure degree of protection IP20, the protection caps must be reinstalled after the cables are connected.

24748536/EN – 11/2017

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.



20549049227

4.5 Control cabinet installation

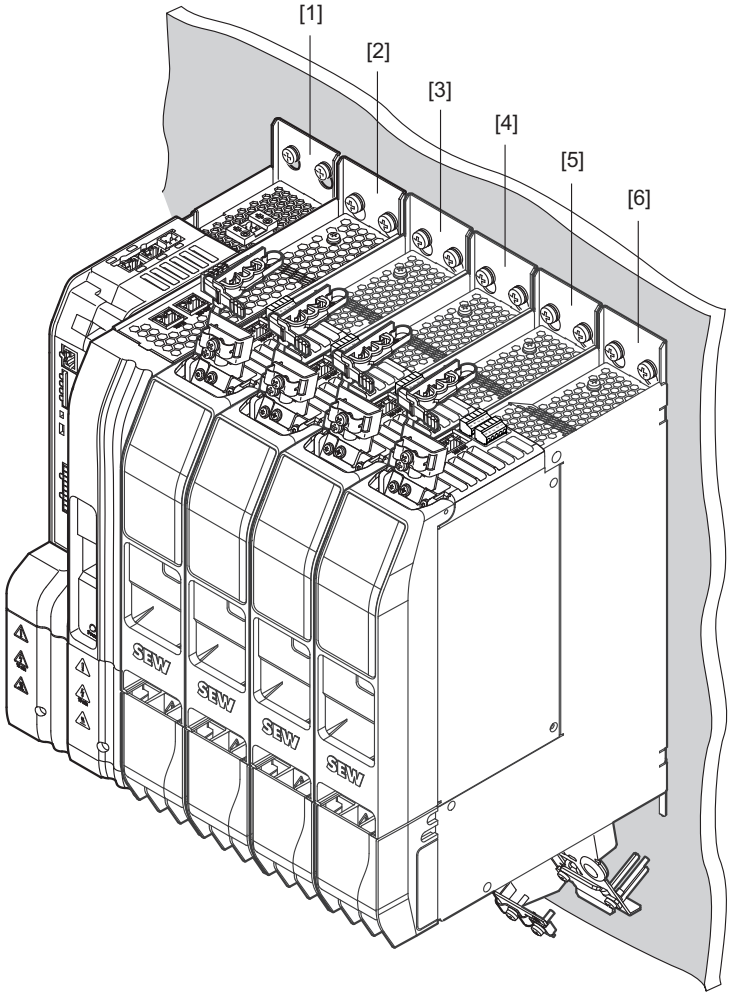
The following steps are depicted at the example of an axis system with 1 power supply module, several axis modules, and 1 MOVI-C® CONTROLLER.

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

4.5.1 Arrangement of the axis modules within the axis system

When arranging the axis system, observe that the nominal output current I_N 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 output current.

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



20806249227

[1] Master module

[2] Power supply module

[3] Example: MDA90A-0120... single-axis module: I_N = 12 A

[4] Example: MDD90A-0040... double-axis module: I_N = 2 × 4 A = 8 A

[5] Example: MDA90A-0040... single-axis module: I_N = 4 A

[6] Example: MDA90A-0020... single-axis module: I_N = 2 A

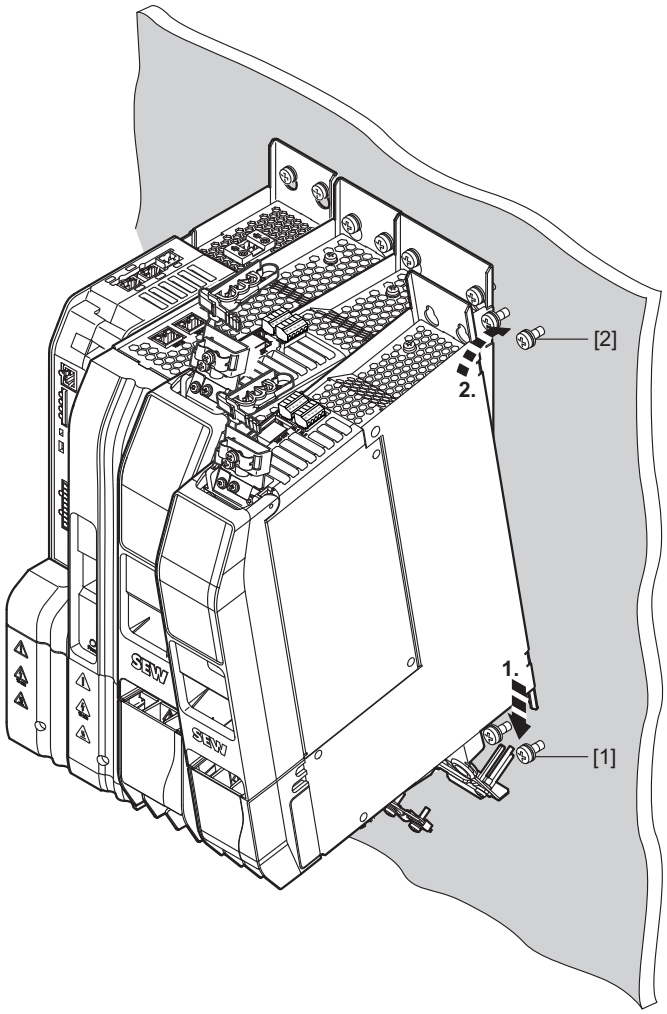
In one axis system, up to 15 axis modules can be used, both as single-axis modules and double-axis modules.

24748536/EN – 11/2017

4.5.2 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.

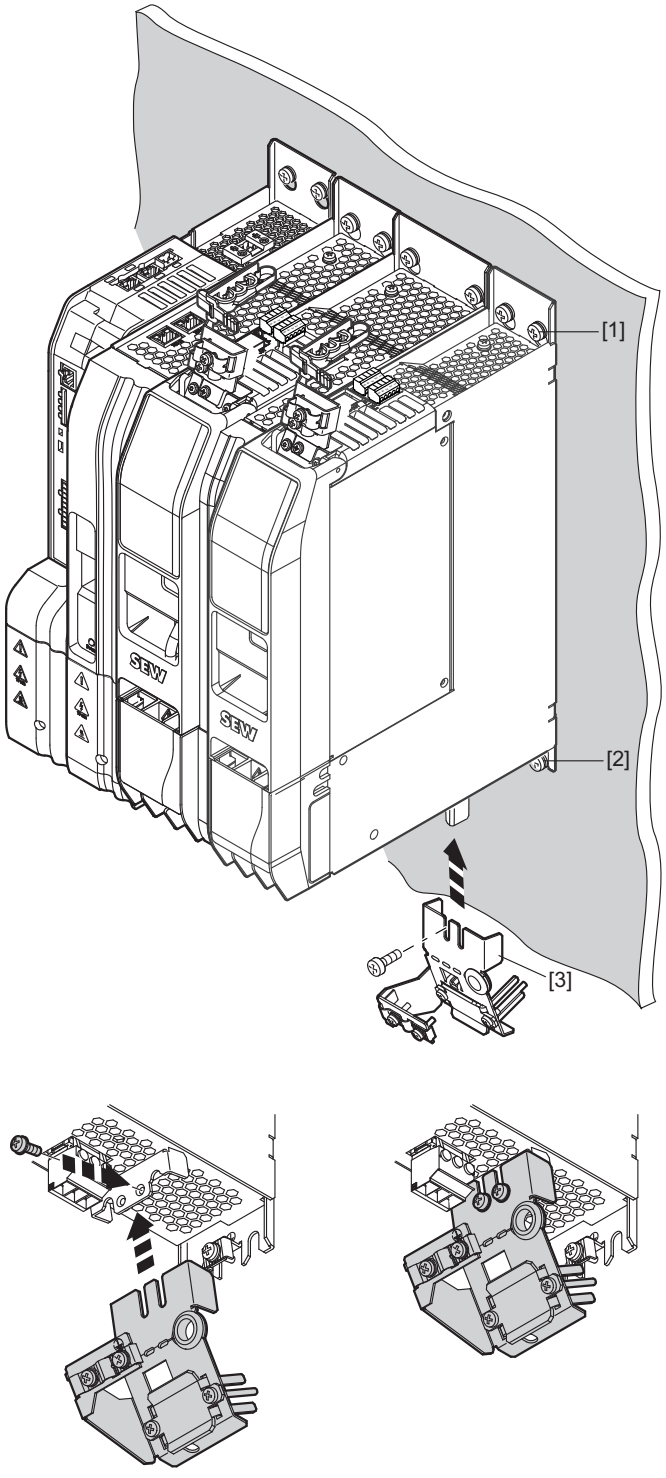


20806979851

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].

4.5.3 Installing shield plates

Bottom shield plate



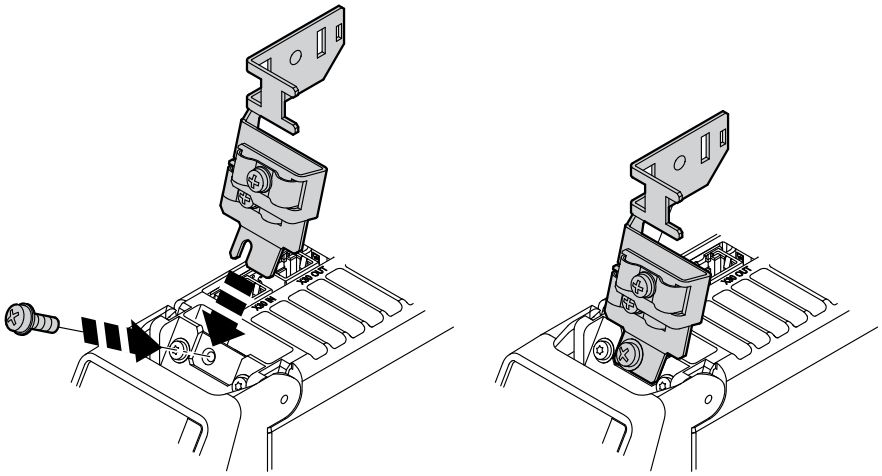
20806998283

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

24748536/EN – 11/2017

Top shield plate

1. Install the top shield plate as shown.



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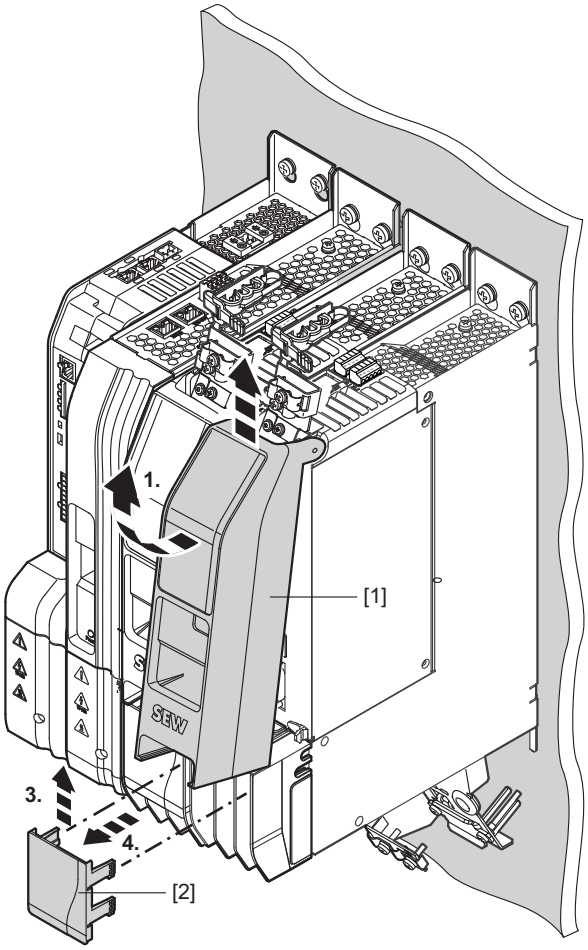
24748536/EN – 11/2017

4.5.4 Removing the covers



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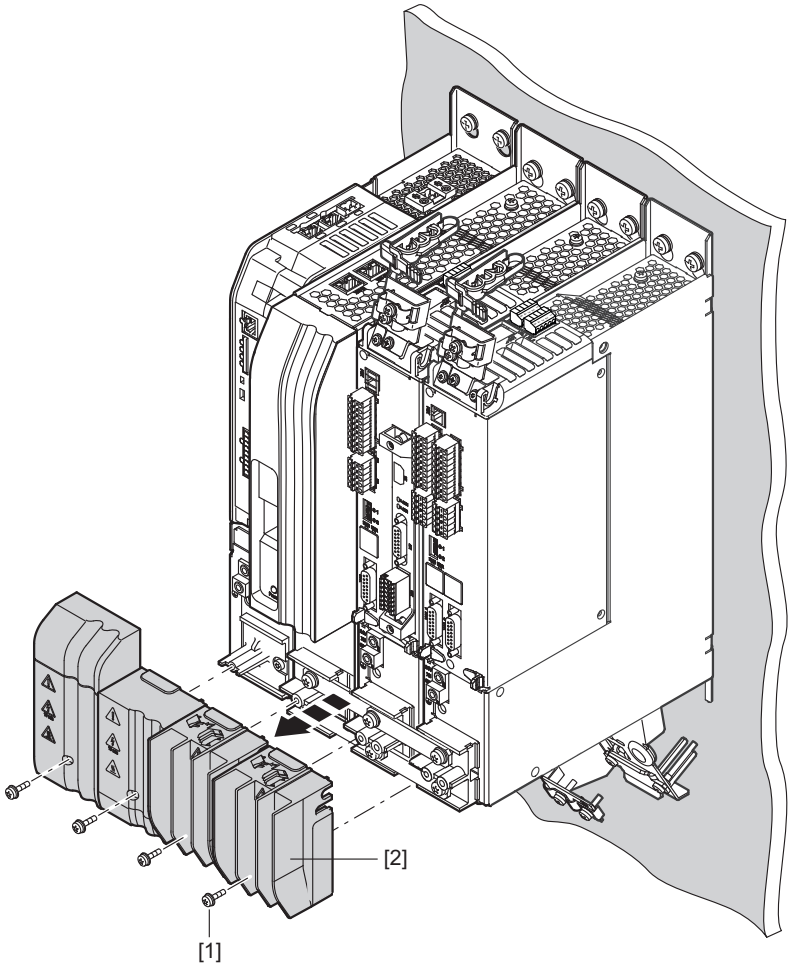
1. Pivot the safety cover [1] forward and lift it to remove it from the application inverter.
2. Move the front cover [2] upwards and remove them by pulling them away from the application inverter.

24748536/EN – 11/2017

4.5.5 Removing the touch guards

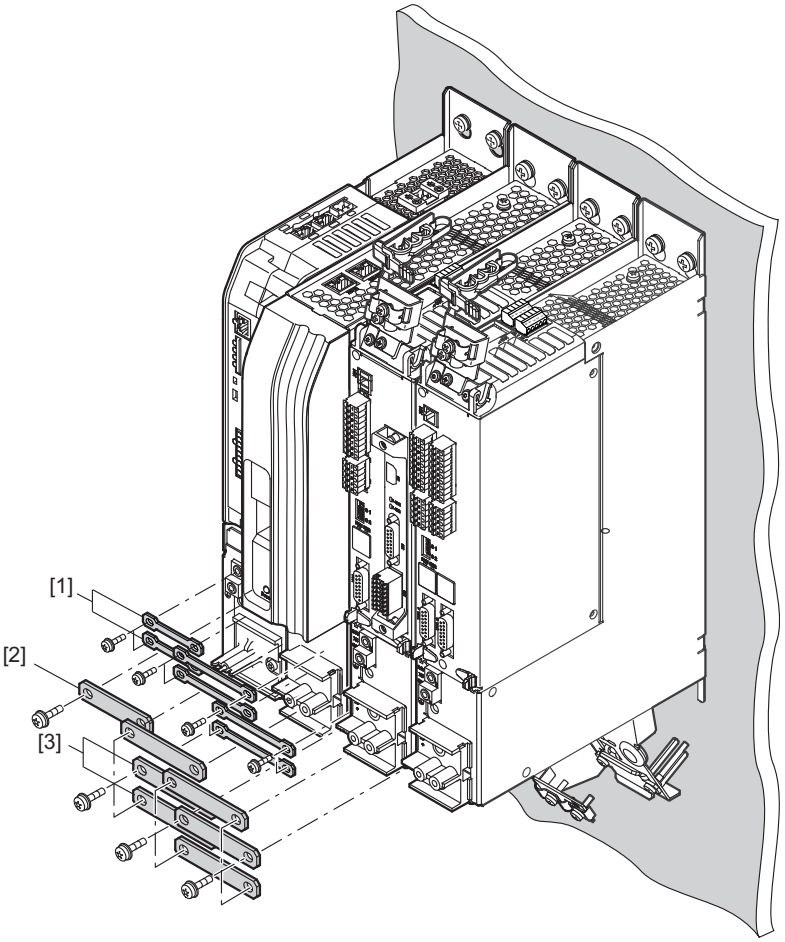


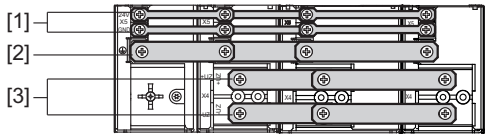
20918971659

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

24748536/EN – 11/2017

4.5.6 Installing the busbar





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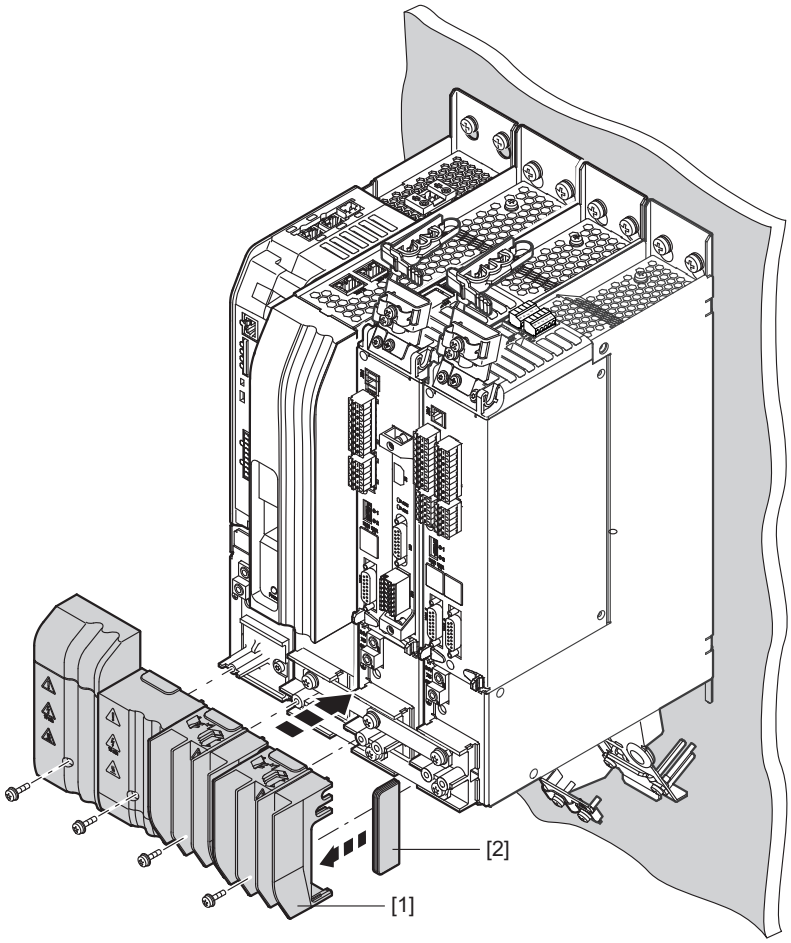
1. Install the busbar [1] for the 24 V supply voltage as shown in the figure. Tighten the screws with the specified tightening torque (→ 🗎 52).
2. Install the busbar [2] for the PE connection as shown in the figure. Tighten the screws with the specified tightening torque (→ 🗎 52).
3. Install the busbar [3] for the DC link connection X4 as shown in the figure. Tighten the screws with the specified tightening torque (→ 🗎 52).

24748536/EN – 11/2017

4.5.7 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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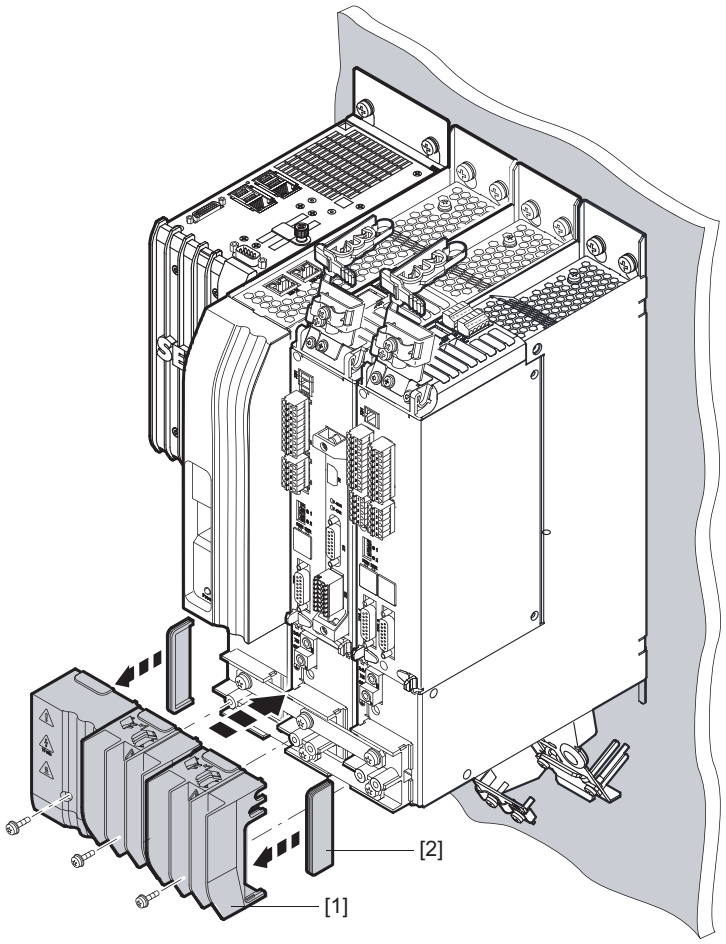
Axis system without master module



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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 with the specified tightening torque "Permitted tightening torques" (→ 🗎 52).

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

⚠ WARNING

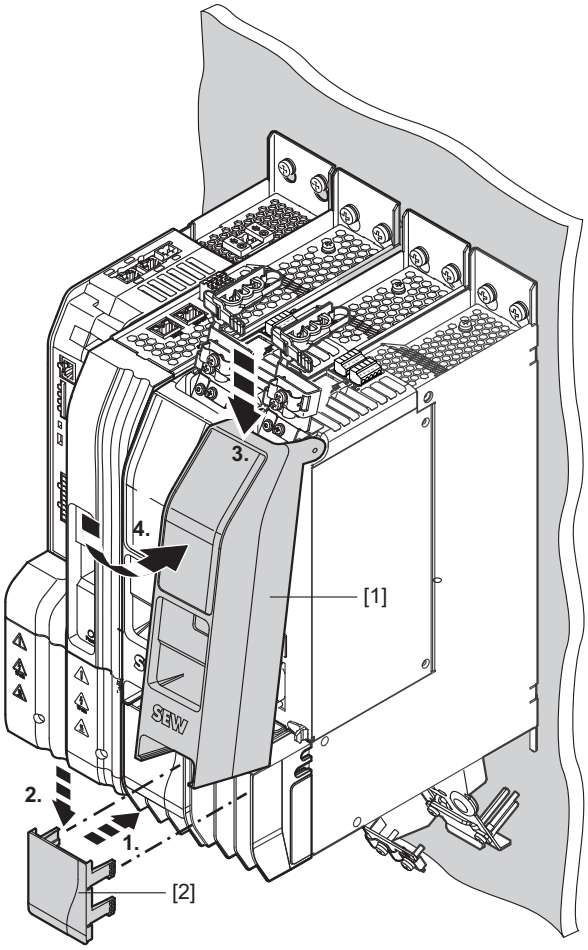
Missing touch guards and closing covers.

Severe or fatal injuries from electric shock.

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

24748536/EN – 11/2017

4.5.8 Installing front covers and covers



20807031691

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

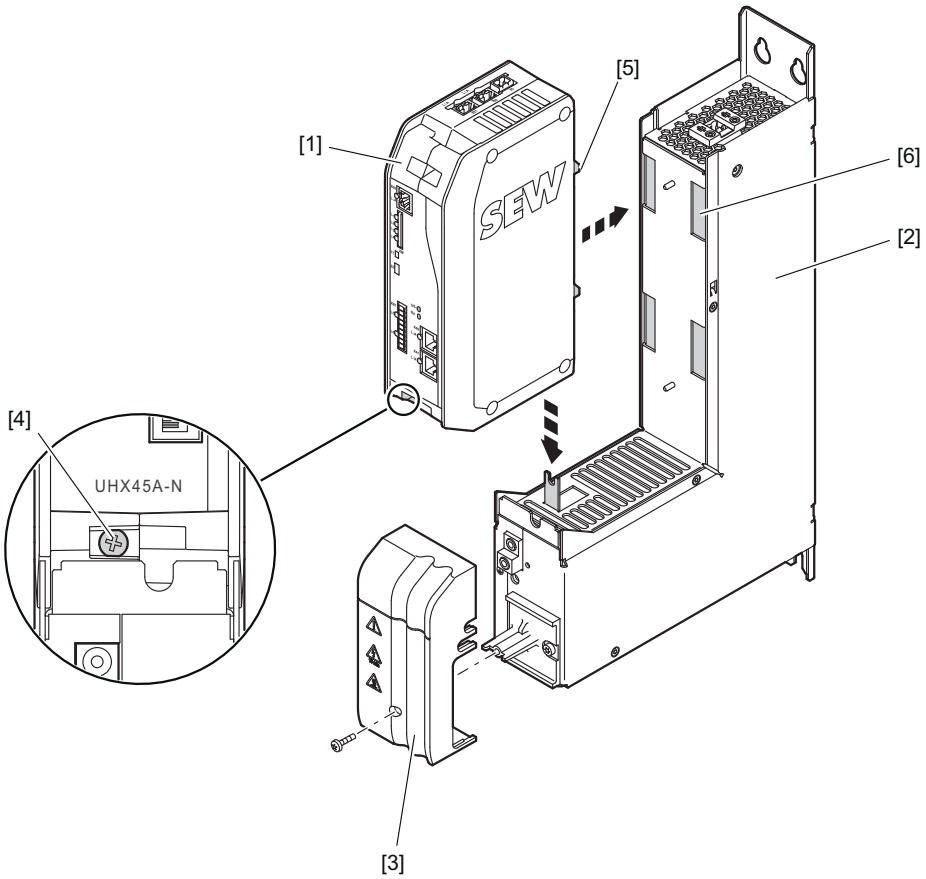
4.5.9 Removing an axis module

To remove an axis module from the axis system proceed in the opposite order compared to installation, see chapter "Control cabinet installation" (→ 🗎 64).

Also observe the safety notes in chapter "Electrical installation" (→ 🗎 75).

24748536/EN – 11/2017

4.5.10 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

24748536/EN – 11/2017

4.6 Electrical installation

⚠ DANGER

Dangerous voltage levels may still be present inside the unit and at the terminal strips up to 10 minutes after the complete axis system has been disconnected from the supply system.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the axis system from the supply system and wait 10 minutes before removing the protective covers.
- After maintenance work, do not operate the axis system unless you have replaced the covers because the unit only has degree of protection IP00 without the cover.

⚠ 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, strictly observe the following:

- Supply system lead < 10 mm^2:
  - Route a second PE conductor with the cable cross section of the supply system lead in parallel to the protective earth via separate terminals or use a copper PE conductor with a cable cross section of 10 mm^2.
- Supply system lead 10 mm^2 – 16 mm^2:
  - Route a copper protective earth conductor with the cable cross section of the supply system lead.
- Supply system lead 16 mm^2 – 35 mm^2:
  - Route a copper protective earth conductor with a cable cross section of 16 mm^2.
- Supply system cable > 35 mm^2:
  - Route a copper protective earth conductor with half the cable cross section of the supply cable.
- If an earth leakage circuit breaker is used for protection against direct and indirect contact, it must be universal current sensitive (RCD type B).

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 have to 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.

24748536/EN – 11/2017

4.6.1 General information

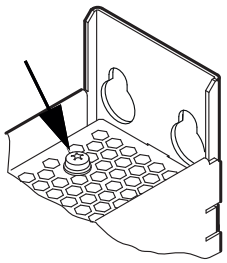
- Take suitable measures to prevent the motor starting up inadvertently, for example by removing the electronics terminal block X20 on the axis module. Take additional safety measures depending on the application to prevent possible injuries to people and damage to machinery.
- SEW-EURODRIVE recommends to use only closed cable lugs for connection to the bolts in order to prevent litz strands from escaping.

4.6.2 Permitted voltage systems

Information on the 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. The measures are described in chapter "Use in IT systems" (→ 🗎 76).
Voltage systems with grounded outer conductor.	This is not permitted.

4.6.3 Use in IT systems

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



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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.

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

24748536/EN – 11/2017

4.6.4 Line fuses, fuse types

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

Type class	Prerequisite
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 circuit breaker currents must be 10% above the nominal line current of the supply module.

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

24748536/EN – 11/2017

4.6.5 Line connection

For the terminal assignment for line connection of the various size, refer to the chapter "Terminal assignment" (→ 🗎 123).

Operation without line contactor is permitted if the temperature of the braking resistor is monitored according to the specifications in chapter "Protection against thermal overload of the braking resistor" (→ 🗎 107) after the MDP90A-0250-.. power supply module.

NOTICE

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

Irreparable damage to the application inverter or unforeseeable malfunctions.

The specified times and intervals must be observed.

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

24748536/EN – 11/2017

4.6.6 Motor connection

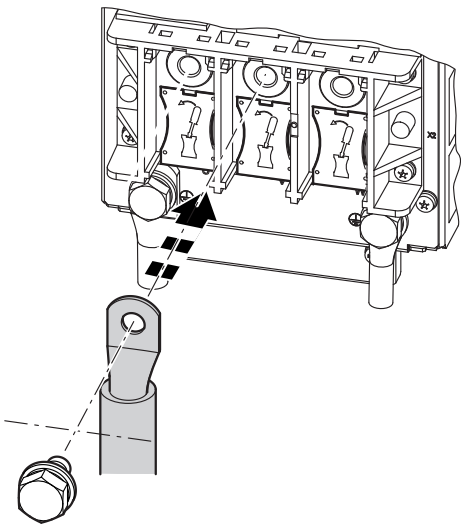
For the terminal assignment for motor connection of the various size, refer to the chapter "Terminal assignment" (→ 🗎 123).

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

Connection with 1 cable



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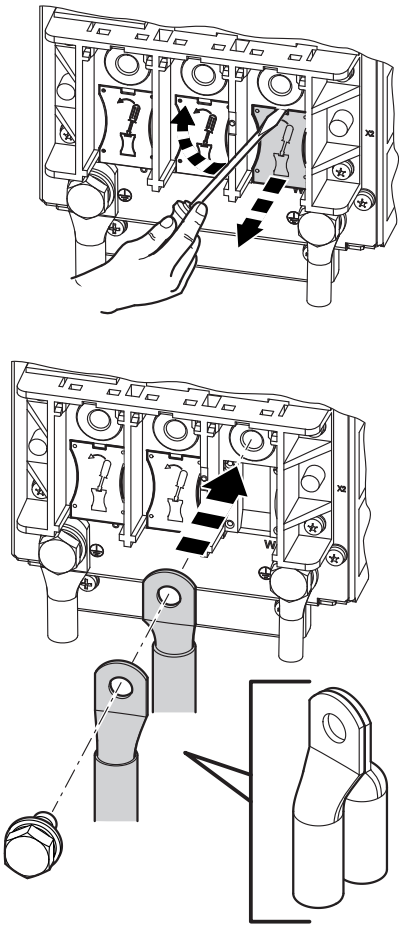
1. Attach the heat shrink tubing at the ring lug.
2. Connect the cable as depicted in the figure.
3. Attach the protection caps, see chapter "Protection caps" (→ 🗎 62).

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" (→ 🗎 62).

24748536/EN – 11/2017

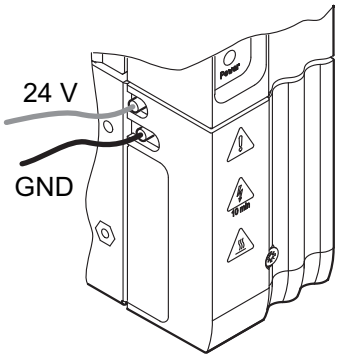
4.6.7 24 V supply voltage

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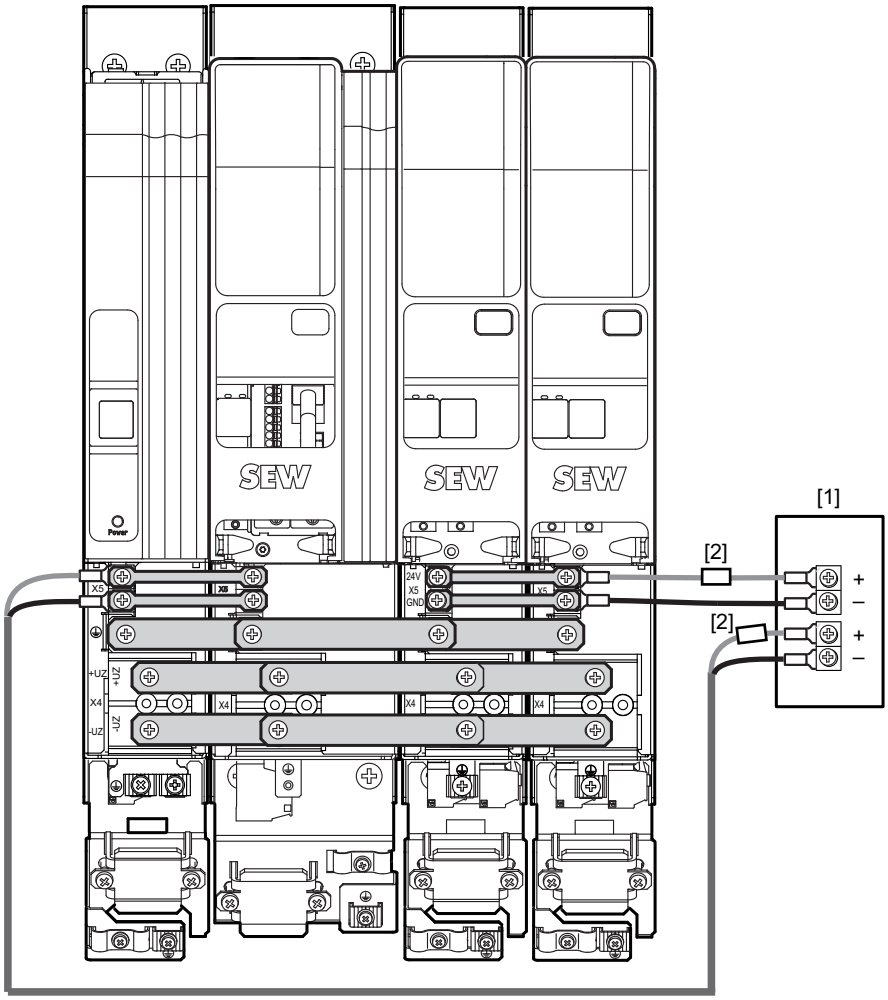
Select the cross section of the supply cable according to the power demand of the device to be supplied. Note the additionally required power of the directly supplied 24 V brake for CMP motors with BK or BP brake without brake control.

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

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.



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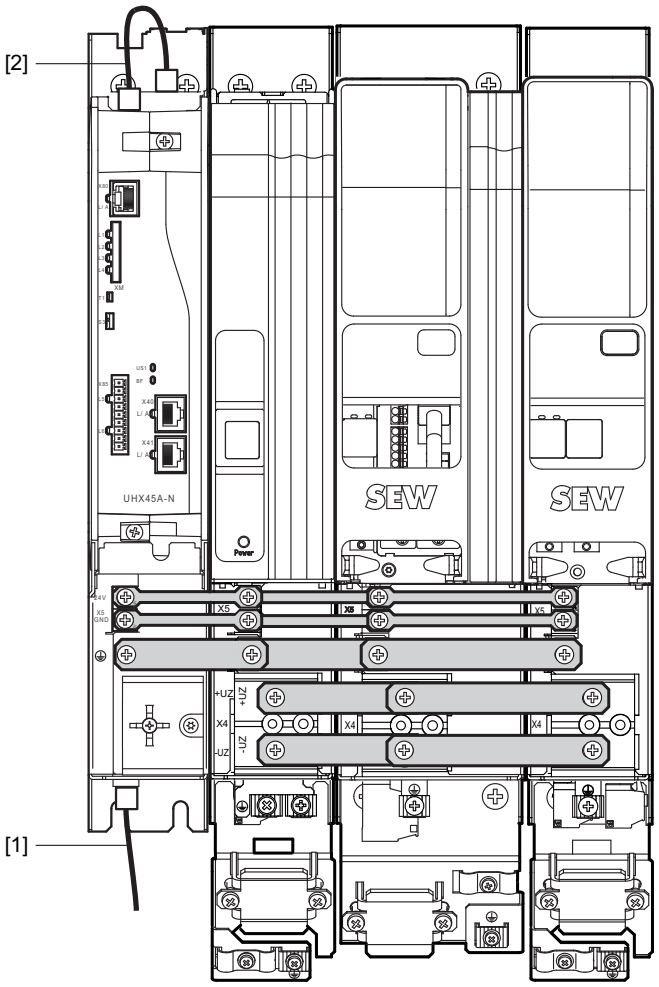
[1] External DC 24 V voltage supply

[2] DC 24 V fuse

24748536/EN – 11/2017

4.6.8 24 V supply voltage with master module UHX45A/MDM90A



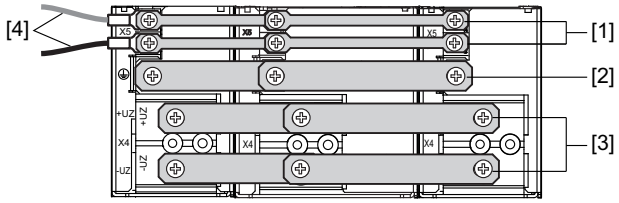
20950090123

[1] X5_A: External DC 24 V supply

[2] 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.

4.6.9 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

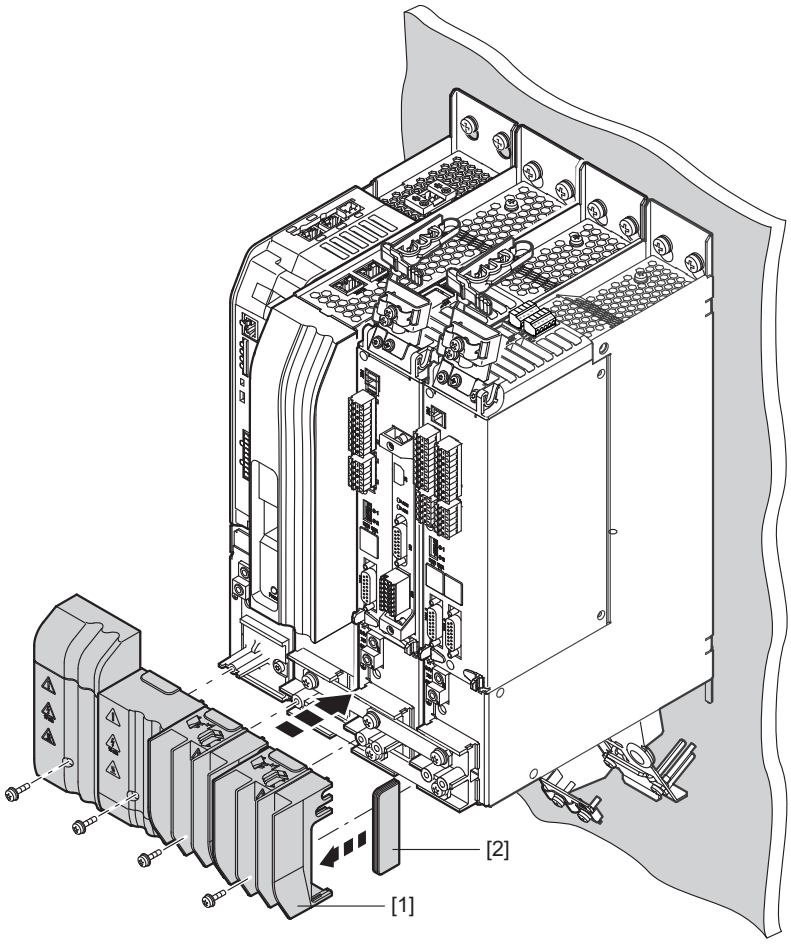
For information on how to connect a DC link, refer to chapter "Installing the busbar" (→ 🗎 70).

24748536/EN – 11/2017

4.6.10 Installing touch guards and closing covers

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.

With master module



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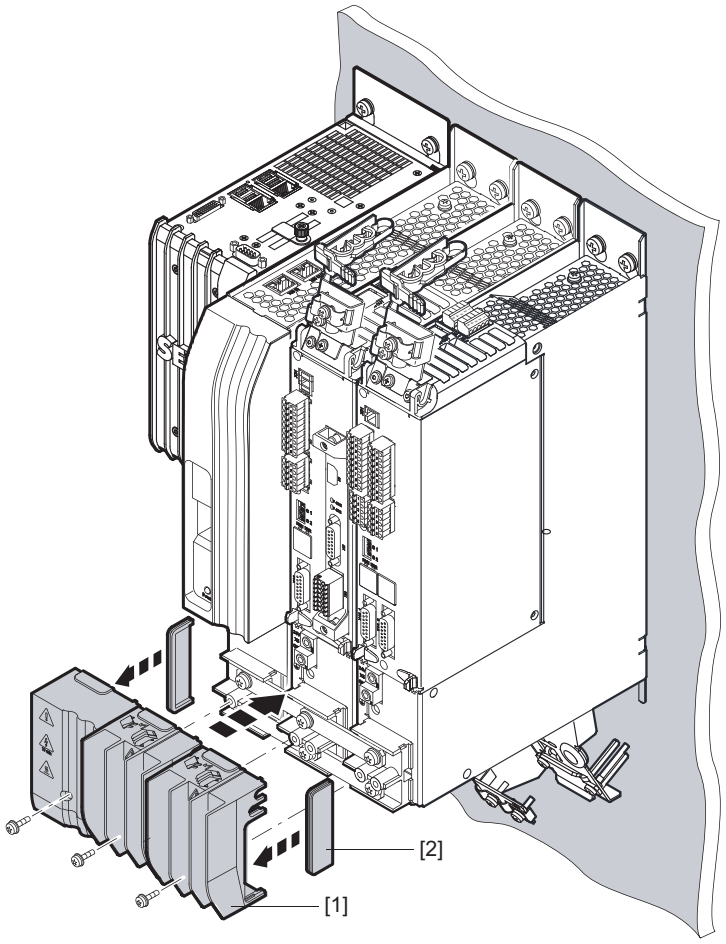
Without master module



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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 with the specified tightening torque "Permitted tightening torques" (→ 🗎 52).

Install one closing cover [2] each at the outer modules of the axis system. The closing covers prevent that the DC link can be 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.

24748536/EN – 11/2017

4.6.11 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.

4.6.12 Output brake chopper

NOTICE

Connecting capacitive loads to the power supply module.

Connecting 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.

4.6.13 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.

4.6.14 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.

4.6.15 Inputs/outputs

NOTICE

Damage to the digital inputs and digital outputs.

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

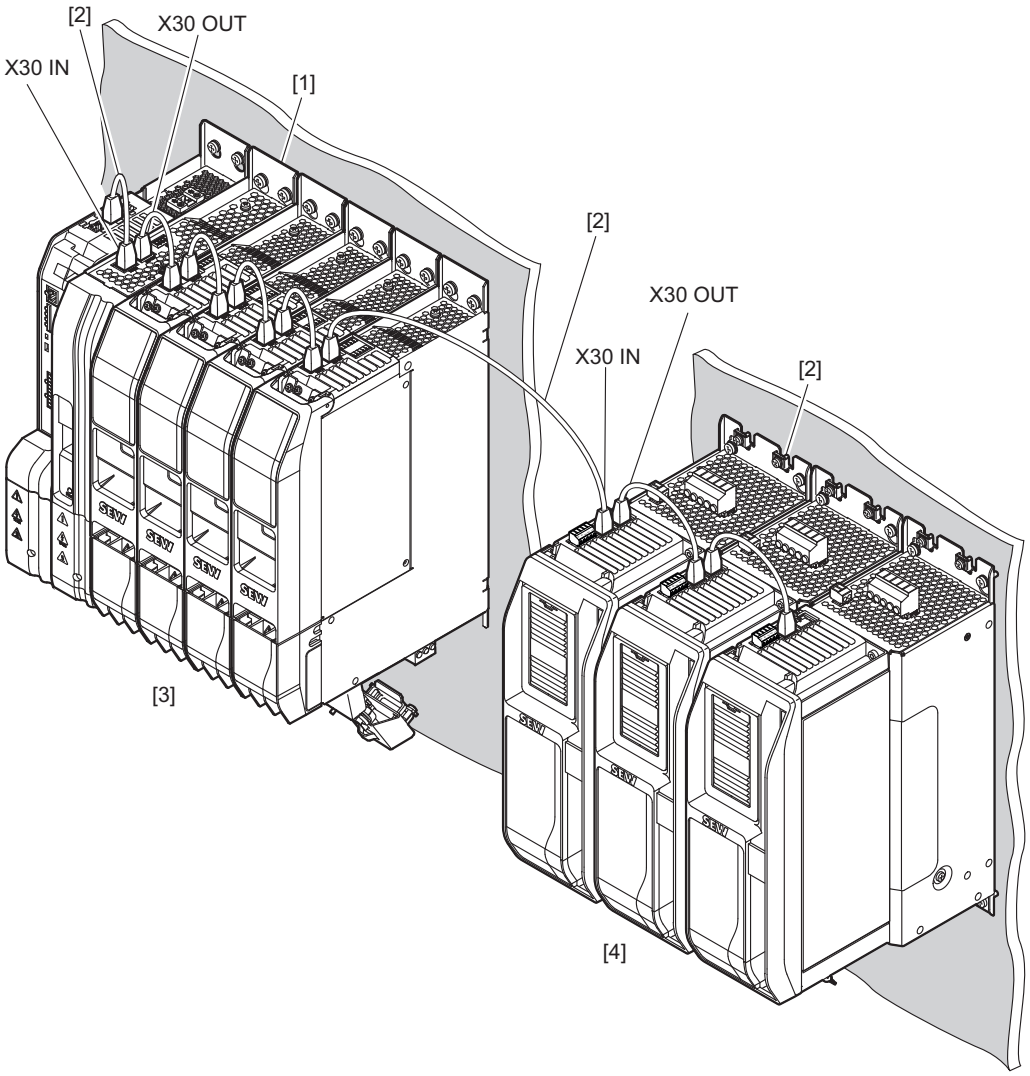
- Do not apply external voltages to the digital outputs.
- The digital inputs and outputs are dimensioned according to IEC 61131-2.

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

24748536/EN – 11/2017

4.6.16 System bus EtherCAT®/SBus^{PLUS}

For connecting the EtherCAT®/SBus^{PLUS} system bus, SEW-EURODRIVE recommends to use only prefabricated cables from SEW-EURODRIVE.



20807102347

[1] Module bus cable, 8-pin, color: anthracite gray. The cable is included in the delivery.

[2] System bus cable, 4-pin, color: light gray. The cable is **not** included in the delivery.

[3] MOVIDRIVE® modular

[4] MOVIDRIVE® system

Cabling

The connectors of the module bus cable are red and black to simplify correct installation.

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

Axis systems are interconnected using the system bus cable, see figure above.

4.6.17 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" (→ 🗎 126).

⚠ WARNING

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

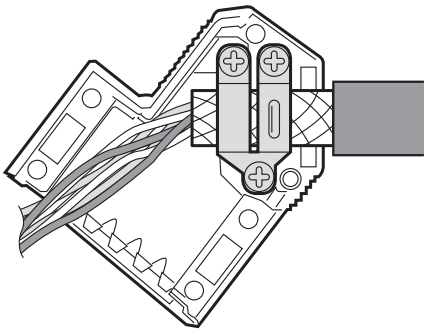
Severe or fatal injuries from electric shock.

- 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.



13887834891

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

24748536/EN – 11/2017

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

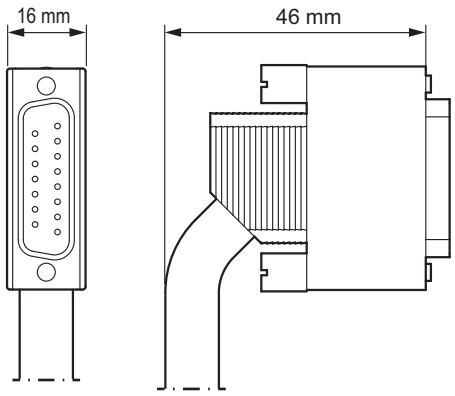
The maximum cable length might be reduced depending on the technical data of the respective encoder. Observe the manufacturer specifications.

4.6.18 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 fulfilled 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-.

24748536/EN – 11/2017

4.7 Installing options and accessories

4.7.1 Installing a card

Observe the safety notes in chapter "Electrical installation" (→ 🗎 75).

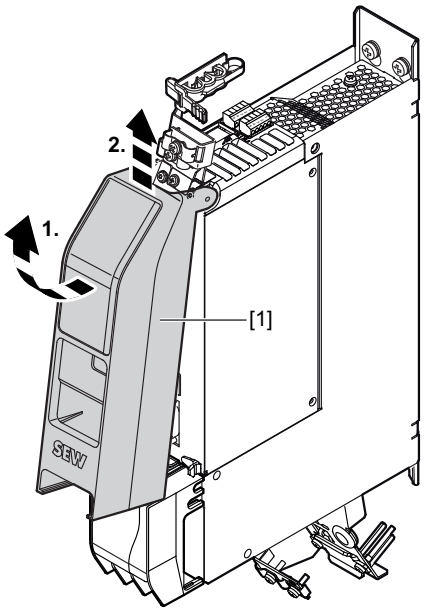
INFORMATION

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" (→ 🗎 47).

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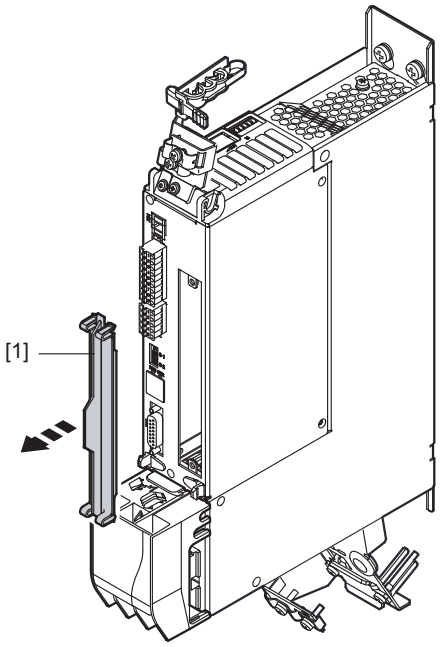
4. Remove the plastic cover [1] at the card slot.



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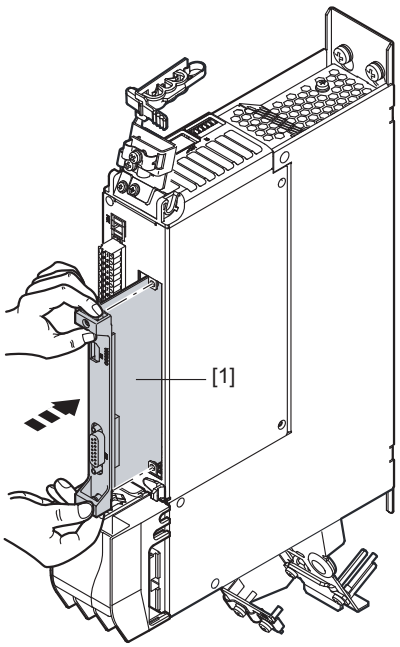
INFORMATION

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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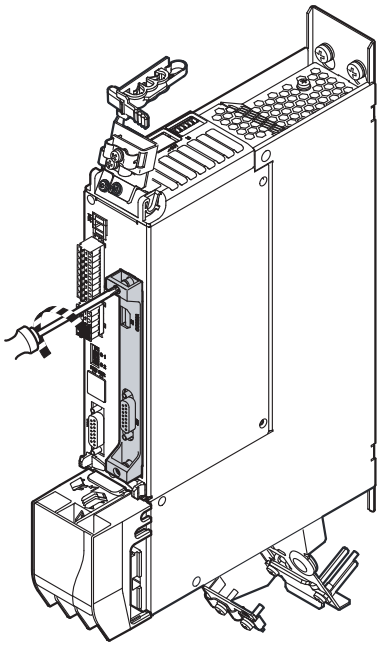
24748536/EN – 11/2017

6. Screw in the card with the specified tightening torque (→ 🗎 52).



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

24748536/EN – 11/2017

4.7.2 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.

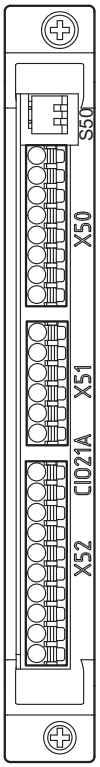
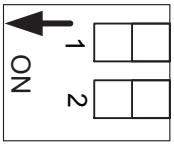
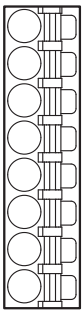
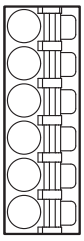
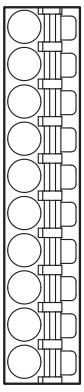
INFORMATION

Shielding the cables.

Cables outside the control cabinet must be shielded.

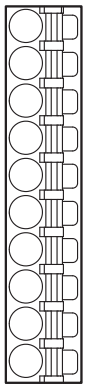
24748536/EN – 11/2017

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

CID21A terminal assignment

	Terminal		Connection	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

24748536/EN – 11/2017

4.7.3 CES11A multi-encoder card

INFORMATION

Technical data of the cards

For technical data and a detailed description of the encoder interface, refer to 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

Resolvers cannot be evaluated with the CES11A multi-encoder card.

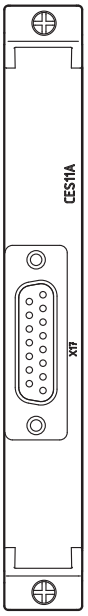
Encoder connection/cable lengths

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

INFORMATION

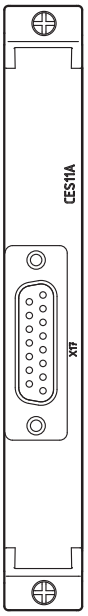
The maximum cable length might be reduced depending on the technical data of the respective encoder. Observe the manufacturer specifications.

Terminal assignment of TTL, HTL, SIN/COS encoder

card	Terminal		Connection	Short 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	V_{S24VG}	24 V encoder supply
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	V_{S12VG}	12 V encoder supply

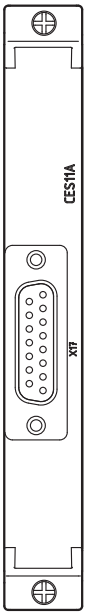
1) For encoders from SEW-EURODRIVE with electronic nameplate in type E.7S

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

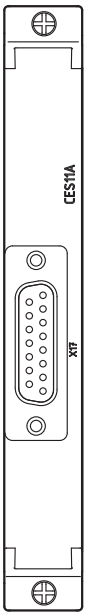
card	Terminal		Connection	Short description
		X17:1	A (COS+) (K1)	Signal track A (COS+) (K1)
		X17:2	B (SIN+) (K2)	Signal track B (SIN+) (K2)
		X17:3	Reserved	–
		X17:4	DATA+	Data line
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		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	V_{S24VG}	24 V encoder supply
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	V_{S12VG}	12 V encoder supply

24748536/EN – 11/2017

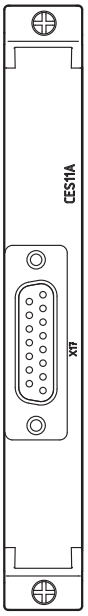
Terminal assignment EnDat encoder

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	V_{S24VG}	24 V encoder supply
	X17:14	+TEMP_M	–
	X17:15	V_{S12VG}	12 V encoder supply

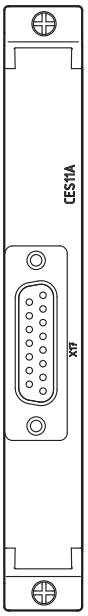
Terminal assignment SSI encoder

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	V_{S24VG}	24 V encoder supply
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	V_{S12VG}	12 V encoder supply

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

24748536/EN – 11/2017

4.7.4 Safety cards CS..A

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

24748536/EN – 11/2017

4.8 Braking resistors

Observe the following points if braking resistors are installed:

- The supply cables to the braking resistors carry a high pulsed DC voltage during rated 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 supply system 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 get 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 braking resistor.
- Select a suitable installation location for the braking resistors such as the control cabinet roof.

24748536/EN – 11/2017

4.8.1 Permitted installation of braking resistors

The surfaces of the resistors get very hot if loaded with nominal power. Make sure that you select an installation site that will accommodate these high temperatures. Braking resistors are therefore usually mounted on the control cabinet roof.

NOTICE

Braking resistors can overheat.

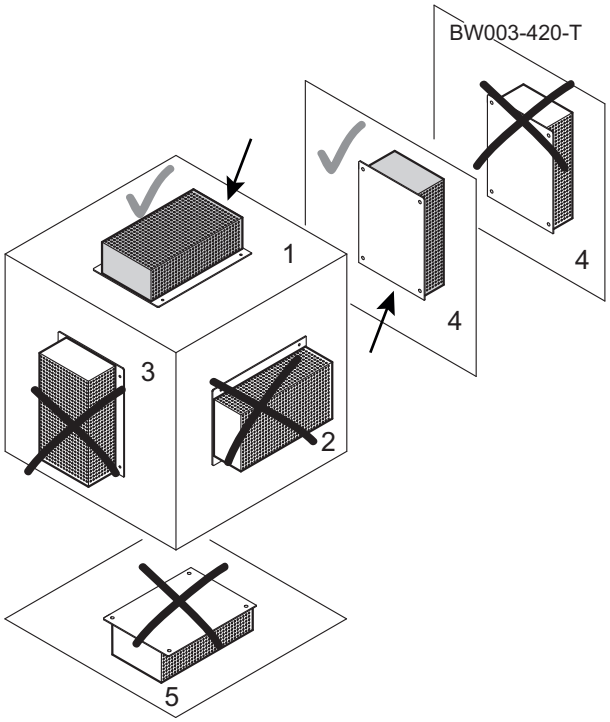
Non-permissible installation might lead to an accumulation of heat in the braking resistor due to reduced convection. A tripping temperature contact or an overheated braking resistor can lead to a system standstill.

✓ Adhere to the following minimum clearances:

- About 200 mm to adjacent components and walls.
- About 300 mm to above components/ceilings.

Observe the following permitted mounting positions when installing the resistors:

- Grid resistor



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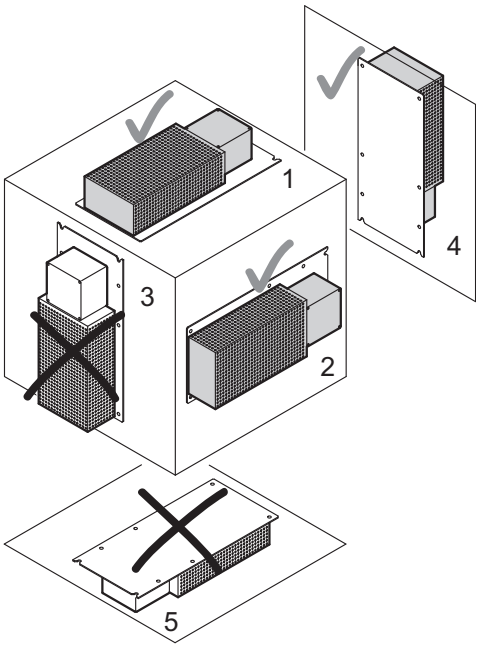
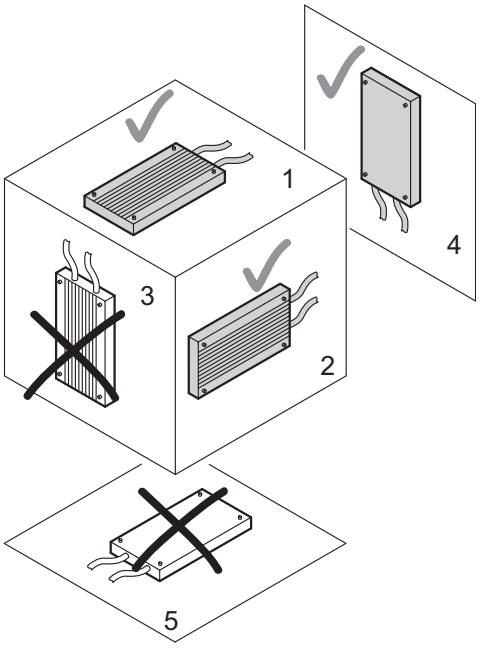
The arrow marks the connection side.

- Wire resistor



18512455307

- Flat type resistor



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24748536/EN – 11/2017

4.8.2 Protection against thermal overload of the braking resistor

INFORMATION

Guards for supply modules with nominal power larger than 10 kW

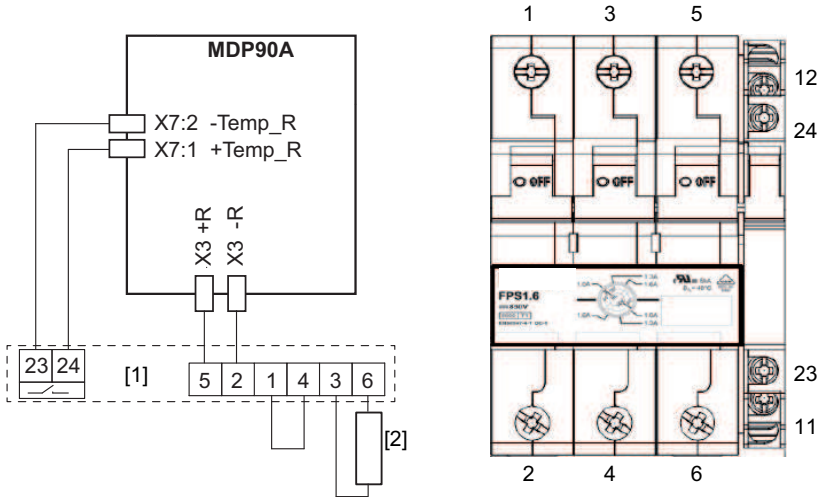
It is not permitted to separate the connection between power supply module and braking resistor. Isolating protection devices, such as fuses or miniature circuit breakers are not permitted.

External thermal circuit breaker TCB

MDP90A power supply module 10 kW

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

Connection



[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 inhibit".

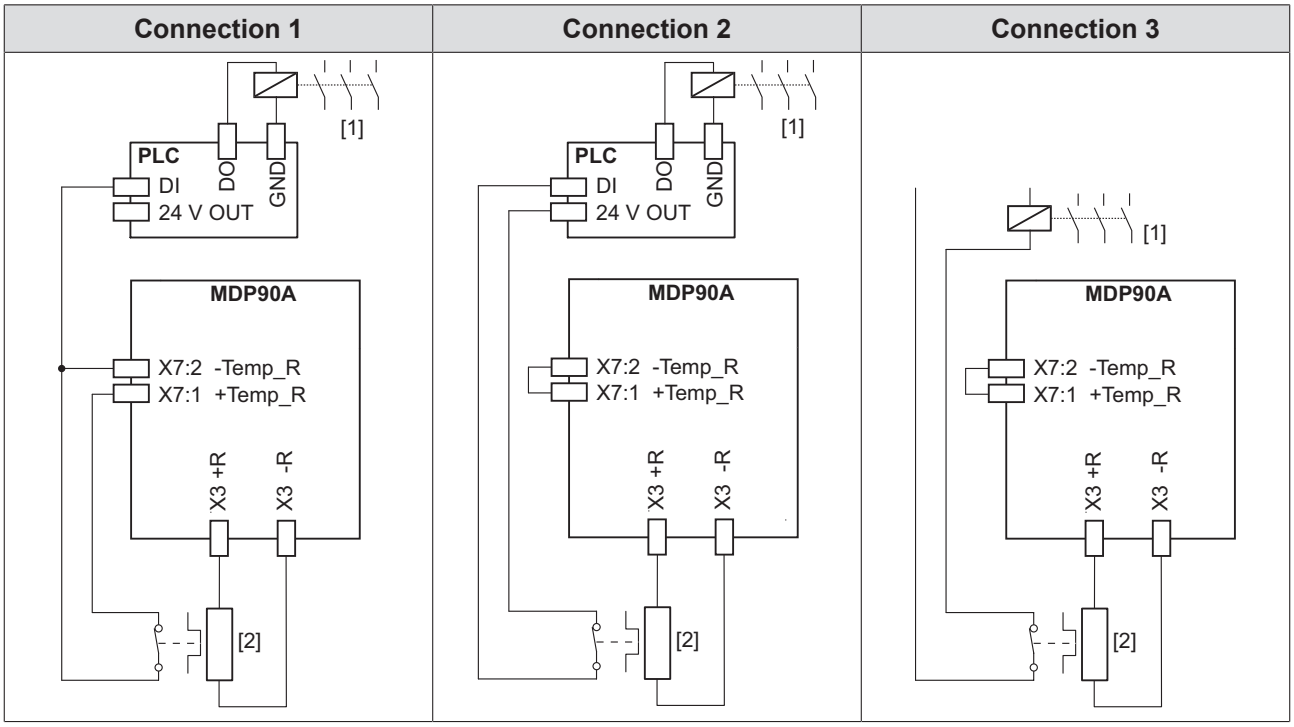
- Set the control knob of the thermal circuit breaker TCB to the tripping current I_F of the connected braking resistor. Set the scaling 40 °C.
- After all cables are connected, the 3 upper screw holes must be covered with 3 touch guard caps. The touch guard caps are included in the delivery.

24748536/EN – 11/2017

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.



[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 inhibit".
- Connection 2
  - If the thermal circuit breaker trips, the signal in the PLC is evaluated.
  - 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, the power supply is 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.

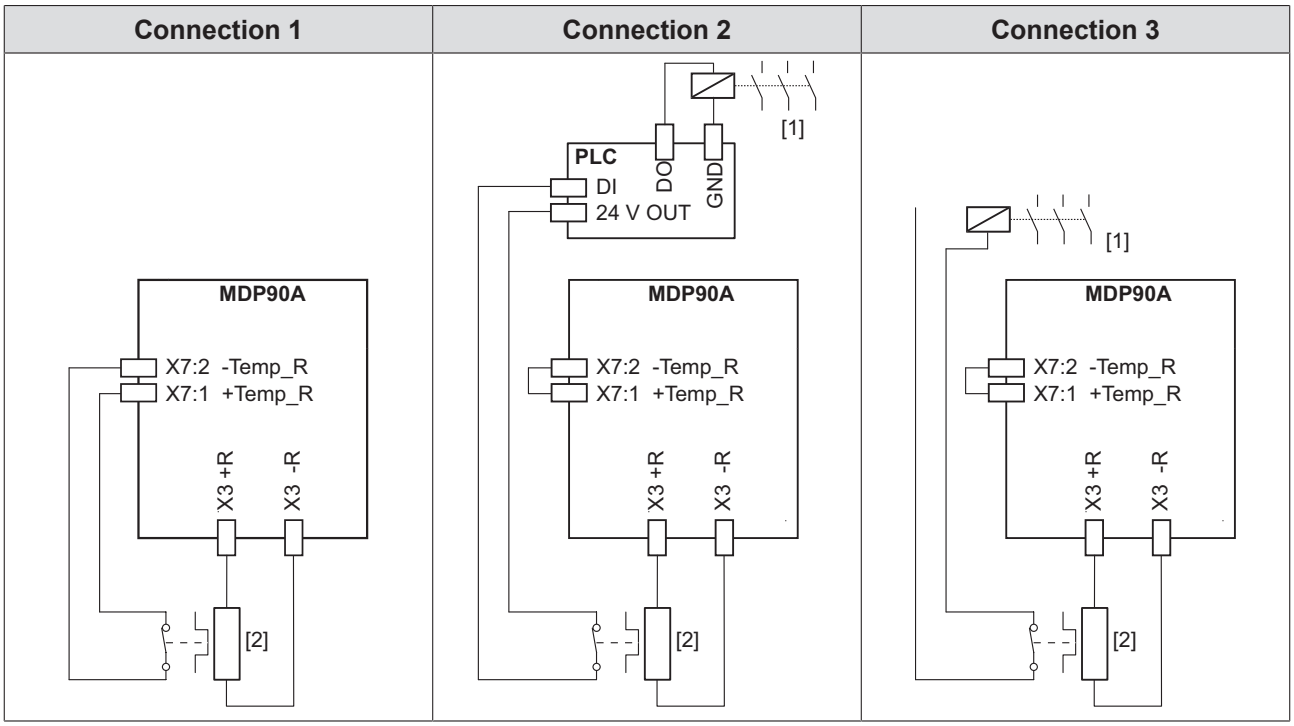
24748536/EN – 11/2017

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

24748536/EN – 11/2017

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.



[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 interrupts the power supply by inhibiting the rectifier.
  - If the thermal circuit breaker trips, the power supply module switches all axis modules to "Output stage inhibit".
- Connection 2
  - If the thermal circuit breaker trips, the signal in the PLC is evaluated.
  - 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, the power supply is disconnected. In this case, the residual braking energy $W_{Rest} = R_{BRnom} \times 20$ s must not be exceeded.
- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.

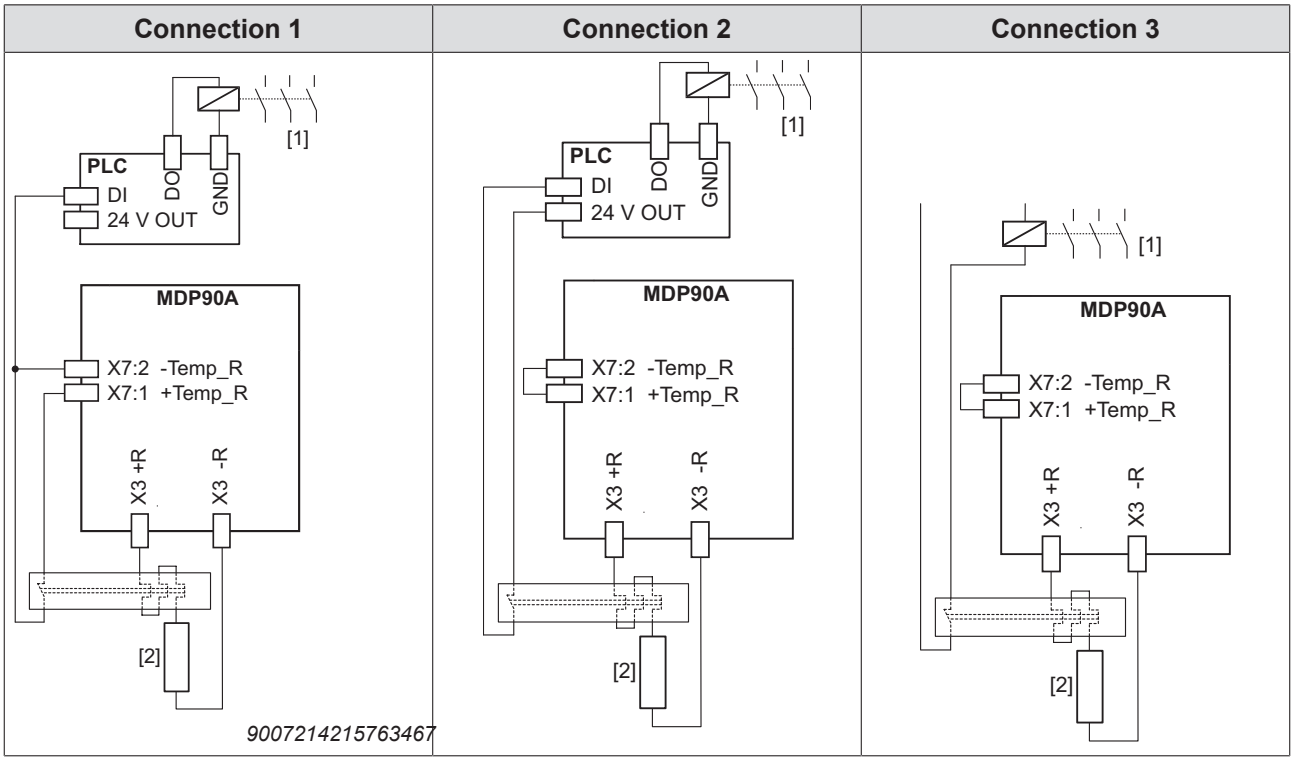
– This does not require a response by the PLC.
– If the thermal circuit breaker trips, there is no direct response in the application inverter.

24748536/EN – 11/2017

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.



[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.

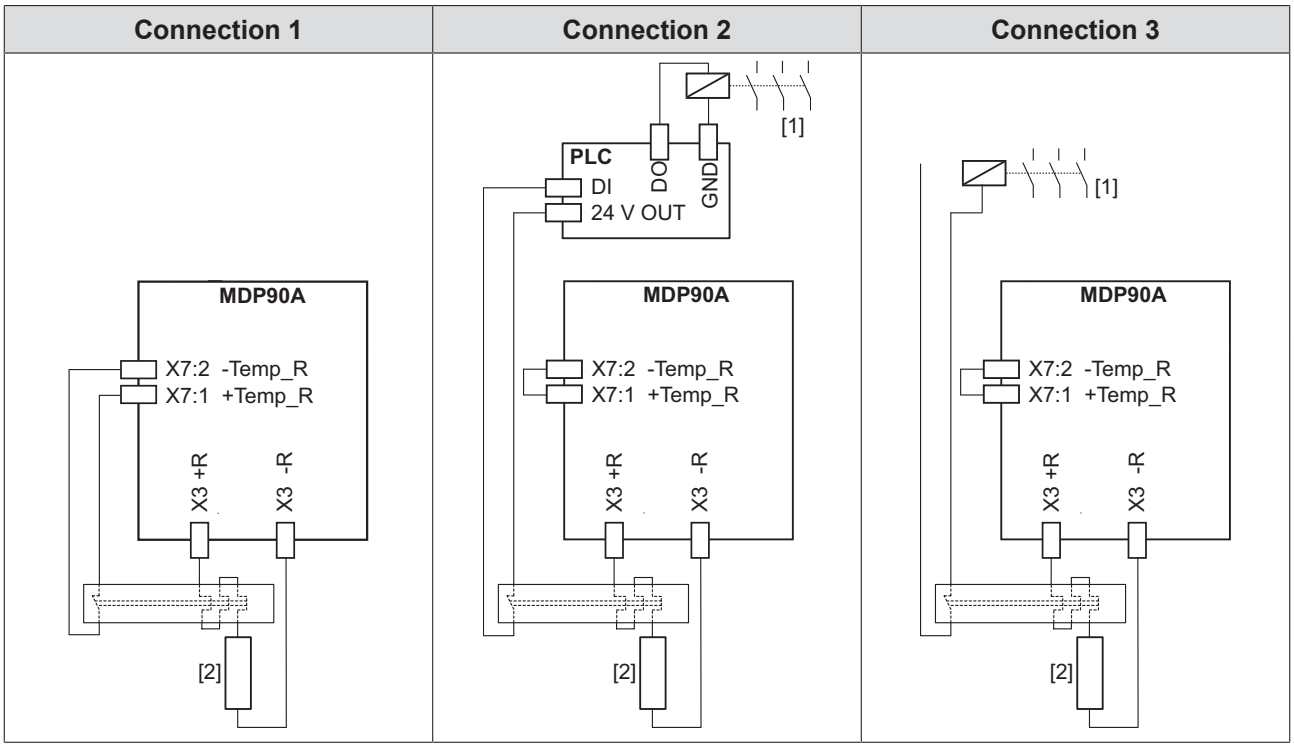
- Connection 1
  - If the thermal circuit breaker trips, the signal in the power supply module and in the PLC is evaluated.
  - If the thermal circuit breaker trips, the PLC must interrupt the power supply.
  - If the thermal circuit breaker trips, the power supply module switches all axis modules to "Output stage inhibit".
- Connection 2
  - If the thermal circuit breaker trips, the signal in the PLC is evaluated.
  - 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, the power supply is 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.

24748536/EN – 11/2017

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.



[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 interrupts the power supply by inhibiting the rectifier.
  - If the thermal circuit breaker trips, the power supply module switches all axis modules to "Output stage inhibit".
- Connection 2
  - If the thermal circuit breaker trips, the signal in the PLC is evaluated.
  - 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, the power supply is disconnected. In this case, the residual braking energy $W_{Rest} = R_{BRnom} \times 20$ s must not be exceeded.
- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.

24748536/EN – 11/2017

– This does not require a response by the PLC.
– If the thermal circuit breaker trips, there is no direct response in the application inverter.

24748536/EN – 11/2017

4.9 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.

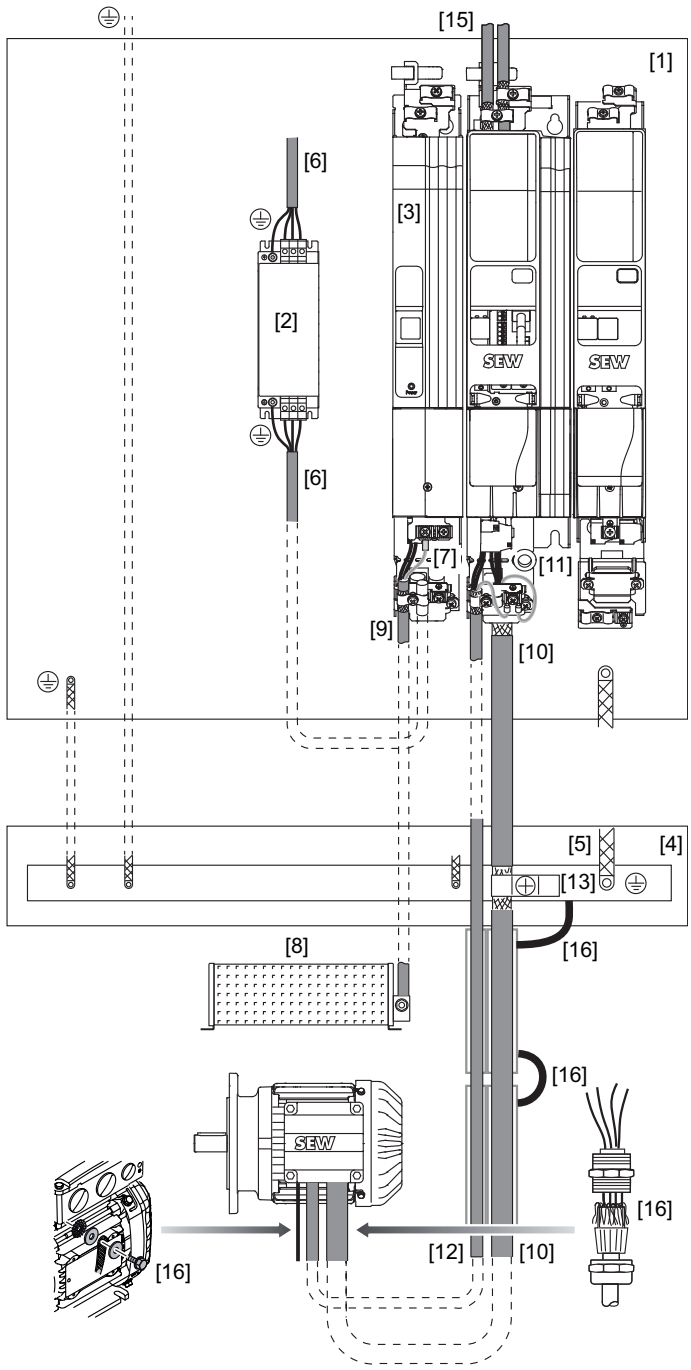
- Install the line choke before the line filter.
- The connection cable between line choke and line filter does not have to be shielded.
- Limit the length of the cable between the line choke and the line filter to the absolute minimum needed.

4.10 Line filter

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

24748536/EN – 11/2017

4.11 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

24748536/EN – 11/2017

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".

4.11.1 Control cabinet

Use a control cabinet with conducting (galvanized) mounting plate. In cased more than one mounting plate is used, connect the plate over a large area.

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

4.11.2 HF equipotential bonding in the system

In general, a suitable equipotential bonding between system, control cabinet, machine structure, cable ducts, and drives must be ensured.

Connect the individual sections in a HF-compatible manner.

From an electrical safety perspective, the PE busbar is the star point. The PE conductor replaces neither HF grounding nor 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 a HF-compatible manner.
- Connect the shield metal cable ducts to the control cabinet in a HF-compatible manner.
- Connect the cable ducts with the mounting plate in the control cabinet using an HF litz wire.
- Connect the parts of the shield metal cable ducts in a HF-compatible manner.
- Connect the shield metal cable ducts to the gearmotor in a HF-compatible manner.

4.11.3 Cable installation

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

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

All cables must be as short as possible. Avoid spare loops.

4.11.4 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 can increase the EMC.

24748536/EN – 11/2017

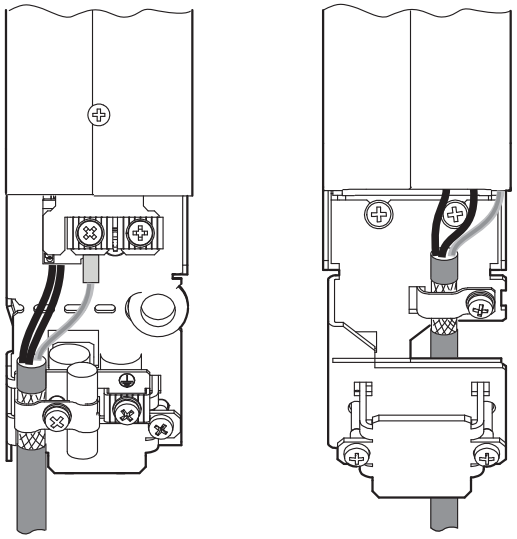
4.11.5 Line filter connection

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

In general, filtered and unfiltered cables must not be routed together. For this reason, route incoming and outgoing line filter cables separately.

4.11.6 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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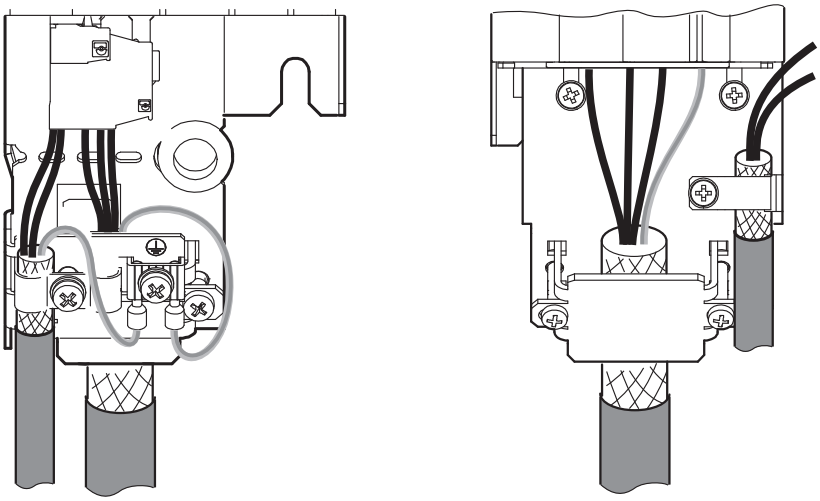
24748536/EN – 11/2017

4.11.7 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. In addition, the cables have an overall shield.



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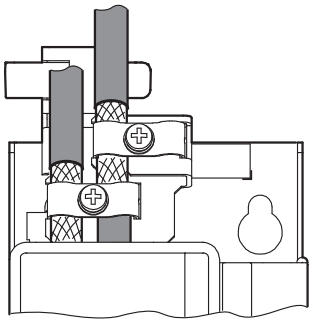
SEW-EURODRIVE recommends to use prefabricated cables.

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).

4.11.8 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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4.11.9 Encoder connection

SEW-EURODRIVE recommends to use prefabricated encoder cables.

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

4.11.10 Shielding connection

Ensure a shield connection suitable for HF, e.g. by using grounding clamps, or EMC cable glands, so that the braided shield has a large connection surface.

24748536/EN – 11/2017

4.12 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

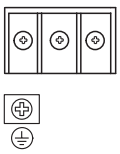
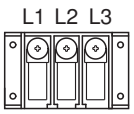
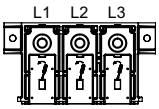
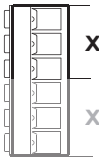
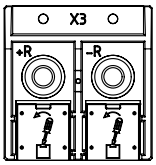
The assignment "reserved" means that no cable must be connected to this connection.

INFORMATION

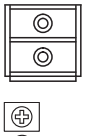
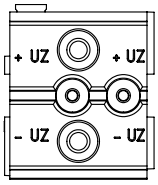
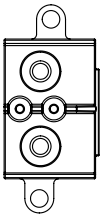
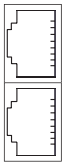
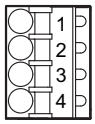
The technical data for the connection of power electronics and control electronics are listed in chapter "Technical Data" (→ 🗎 211).

24748536/EN – 11/2017

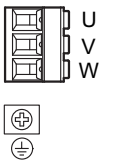
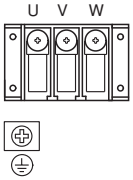
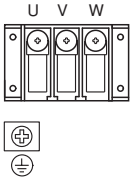
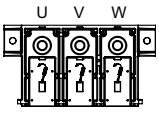
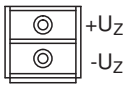
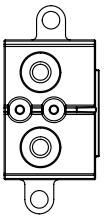
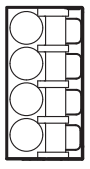
4.12.1 Terminal assignment at MDP power supply module

Representation	Terminal	Connection	Short 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 resistance 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 resistance connection MDP90A-0250 – 0750-.. (Sizes 2, 3)
	X3:-R	-R	
	⏚	PE	PE connection
	X3:+R	+R	Braking resistance connection MDP90A-1100-.. (size 4)
	X3:-R	-R	
	⏚	PE	PE connection

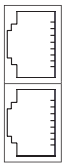
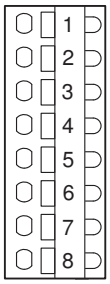
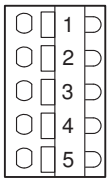
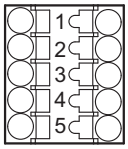
24748536/EN – 11/2017

Representation	Terminal	Connection	Short description
	X4: +$V_{DC\ link}$	+$V_{DC\ link}$	DC link connection
	X4:- $V_{DC\ link}$	-$V_{DC\ link}$	
	⏚	PE	PE connection
	X4: +$V_{DC\ link}$	+$V_{DC\ link}$	DC link connection left side MDP90A-1100-.. (size 4)
	X4:- $V_{DC\ link}$	-$V_{DC\ link}$	
	⏚	PE	PE connection
	X4: +$V_{DC\ link}$	+$V_{DC\ link}$	DC link connection right side MDP90A-1100-.. (size 4)
	X4:- $V_{DC\ link}$	-$V_{DC\ link}$	
	⏚	PE	PE connection
	X5:24 V	V_I24 V	+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	–

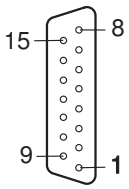
4.12.2 Terminal assignment at MDA single-axis module

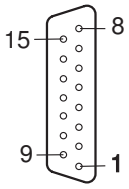
Representation	Terminal	Connection	Short description
	X2:U	rev	Motor connection MDA90A-0020 – 0120-.. (Sizes 1, 2)
	X2:V	V	
	X2:W	W	
	⏚	PE	PE connection
	X2:U	rev	Motor connection MDA90A-0160 – 0240-.. (size 3)
	X2:V	V	
	X2:W	W	
	⏚	PE	PE connection
	X2:U	rev	Motor connection MDA90A-0640 – 1000-.. (size 5)
	X2:V	V	
	X2:W	W	
	⏚	PE	PE connection
	X2:U	rev	Motor connection MDA90A-1400 – 1800 (size 6)
	X2:V	V	
	X2:W	W	
	⏚	PE	PE connection
	X4:+$V_{DC\ link}$	+$V_{DC\ link}$	DC link connection
	X4:-$V_{DC\ link}$	-$V_{DC\ link}$	
	⏚	PE	PE connection
	X4:+$V_{DC\ link}$	+$V_{DC\ link}$	DC link connection MDA90A-1400 – 1800-.. (size 6)
	X4:-$V_{DC\ link}$	-$V_{DC\ link}$	
	⏚	PE	PE connection
	X5:24 V	V_i24 V	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

24748536/EN – 11/2017

Representation	Terminal	Connection	Short description
	X30 OUT		System bus
	X30 IN		
	X31		SEW-EURODRIVE Service interface
	X20:1	DI00	Digital input 1, with fixed assignment "Output stage enable"
	X20:2	DI01	Digital input 2, freely programmable
	X20:3	DI02	Digital input 3, freely programmable
	X20:4	DI03	Digital input 4, freely programmable
	X20:5	DI04	Digital input 5, freely programmable
	X20:6	DI05	Digital input 6, freely programmable
	X20:7	GND	Reference potential
	X20:8	+24 V	DC 24 V voltage output
	X21:1	DO00	Digital output 1, freely programmable
	X21:2	DO01	Digital output 2, freely programmable
	X21:3	DO02	Digital output 3, freely programmable
	X21:4	DO03	Digital output 4, freely programmable
	X21:5	GND	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	V_{out} = DC 24 V supply of F_STO_P1 and F_STO_P2

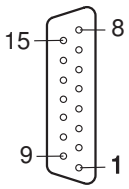
24748536/EN – 11/2017

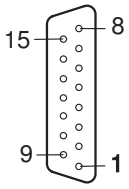
Representation	Terminal	Connection	Brief description motor encoder resolver
	X15:1	S2 (SIN +)	Signal track
	X15:2	S1 (COS +)	Signal track
	X15:3	Reserved	-
	X15:4	Reserved	-
	X15:5	R1 (REF +)	Supply voltage resolver
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	-
	X15:8	Reserved	-
	X15:9	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	-

Representation	Terminal	Connection	Brief description motor encoder Sin/Cos encoder, TTL encoder
	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+[1)]	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-[1)]	Data cable for electronic nameplate
	X15:13	U_{S24VG}	24 V encoder supply
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	12 V encoder supply

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

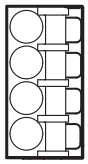
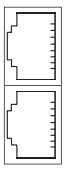
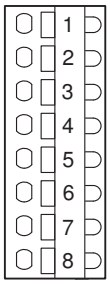
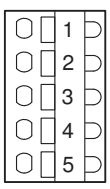
24748536/EN – 11/2017

Representation	Terminal	Connection	Brief description motor encoder HTL encoder
	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}	24 V encoder supply
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	12 V encoder supply

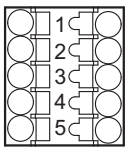
Representation	Terminal	Connection	Brief description motor encoder HIPERFACE® and SEW-EURODRIVE encoder (RS485)
	X15:1	A (COS +) (K1)	Signal track A (COS+) (K1)
	X15:2	B (SIN +) (K2)	Signal track B (SIN+) (K2)
	X15:3	Reserved	–
	X15:4	DATA+	Data line RS485
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature 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}	24 V encoder supply
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	12 V encoder supply

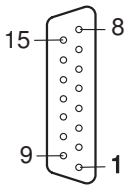
24748536/EN – 11/2017

4.12.3 Terminal assignment at MDD double-axis module

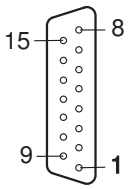
Representation	Terminals		Connection	Short description
	X2_1:U	X2_2:U	rev	Motor connection MDD90A-0020 – 0080-.. (Sizes 1, 2)
	X2_1:V	X2_2:V	V	
	X2_1:W	X2_2:W	W	
	⏚		PE	PE connection
	X4:+$V_{DC\ link}$		+$V_{DC\ link}$	DC link connection
	X4:-$V_{DC\ link}$		-$V_{DC\ link}$	
	⏚		PE	PE connection
	X5:24 V		V_I 24	DC 24 V supply voltage
	X5:GND		GND	Reference potential
	X10_1:DB0	X10_2:DB00	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, freely programmable
	X20_1:3	X20_2:3	DI02	Digital input 3, freely programmable
	X20_1:4	X20_2:4	DI03	Digital input 4, freely programmable
	X20_1:5	X20_2:5	DI04	Digital input 5, freely programmable
	X20_1:6	X20_2:6	DI05	Digital input 6, freely programmable
	X20_1:7	X20_2:7	GND	Reference potential
	X20_1:8	X20_2:8	+24 V	DC 24 V voltage output
	X21_1:1	X21_2:1	DO00	Digital output 1, freely programmable
	X21_1:2	X21_2:2	DO01	Digital output 2, freely programmable
	X21_1:3	X21_2:3	DO02	Digital output 3, freely programmable
	X21_1:4	X21_2:4	DO03	Digital output 4, freely programmable
	X21_1:5	X21_2:5	GND	Reference potential

24748536/EN – 11/2017

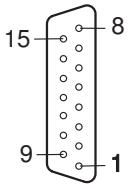
Representation	Terminals		Connection	Short description
	X6_1:1	X6_2:1	F_STO_P1	DC +24 V input F_STO_P1
	X6_1:2	X6_2:2	F_STO_M	DC 0 V input F_STO_M
	X6_1:3	X6_2:3	F_STO_P2	DC +24 V input F_STO_P2
	X6_1:4	X6_2:4	GND	Reference potential
	X6_1:5	X6_2:5	24 V STO_OUT	V_{out} = DC 24 V supply of F_STO_P1 and F_STO_P2

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	-

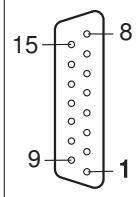
24748536/EN – 11/2017

Representation	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}	12 V encoder supply

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

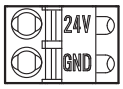
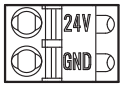
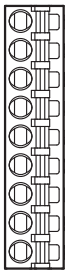
Representation	Terminals		Connection	Brief description motor encoder HTL encoder
	X15_1:1	X15_2:1	A (K1)	Signal track A (K1)
	X15_1:2	X15_2:2	B (K2)	Signal track B (K2)
	X15_1:3	X15_2:3	C (K0)	Signal track C (K0)
	X15_1:4	X15_2:4	Reserved	–
	X15_1:5	X15_2:5	Reserved	–
	X15_1:6	X15_2:6	-TEMP_M	Motor temperature 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}	12 V encoder supply

24748536/EN – 11/2017

Representation	Terminals		Connection	Brief description motor encoder HIPERFACE® and SEW-EURODRIVE encoder (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}	12 V encoder supply

24748536/EN – 11/2017

4.12.4 Terminal assignment of master module UHX45A/MDM90A

Representation	Terminal	Connection	Short description
	X5_A:24V	V_I24 V	External DC 24 V supply voltage from housing MDM90A
	X5_A:GND	GND	Reference potential housing MDM90A
	X5_B:24V	V_I24 V	Output of DC 24 V supply voltage from housing MDM90A
	X5_B:GND	GND	Reference potential housing MDM90A
	X5:24 V	V_I24 V	DC 24 V supply voltage UHX45A
	X5:GND	GND	Reference potential UHX45A
	X85:1-3	RS485	RS485 interface (in preparation)
	X85:4-6	CAN1	System bus CAN 1 – non-floating (in preparation)
	X85:7-9	CAN2	System bus CAN 2 – non-floating (in preparation)

24748536/EN – 11/2017

4.13 Wiring diagrams

4.13.1 General information on the wiring diagrams

- For technical data of the power electronics and the control electronics, refer to chapter Technical data.
- For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 123).

4.13.2 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

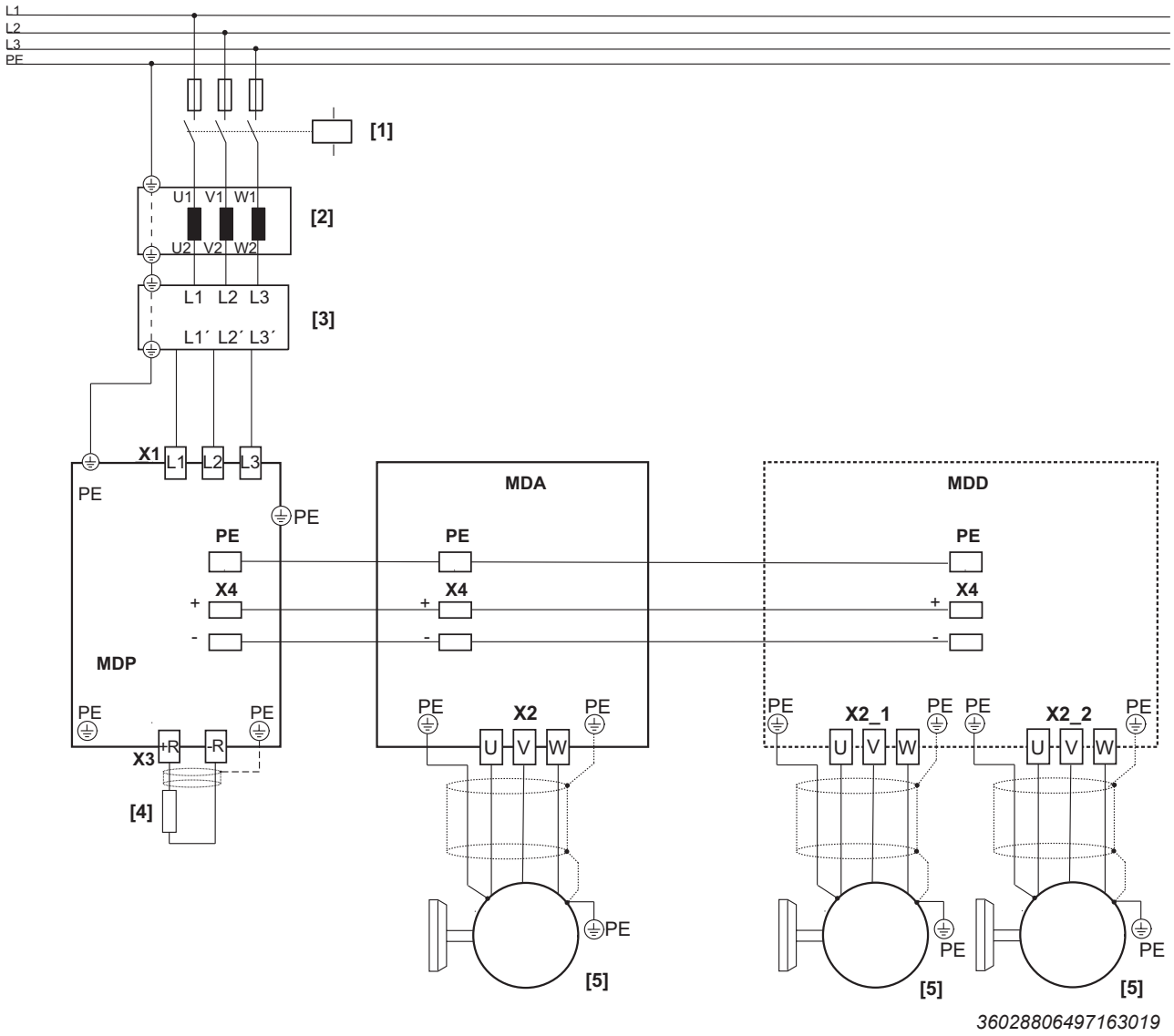
Overtemperature of line filter and line choke.

Destruction of line filter and line choke.

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

24748536/EN – 11/2017

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

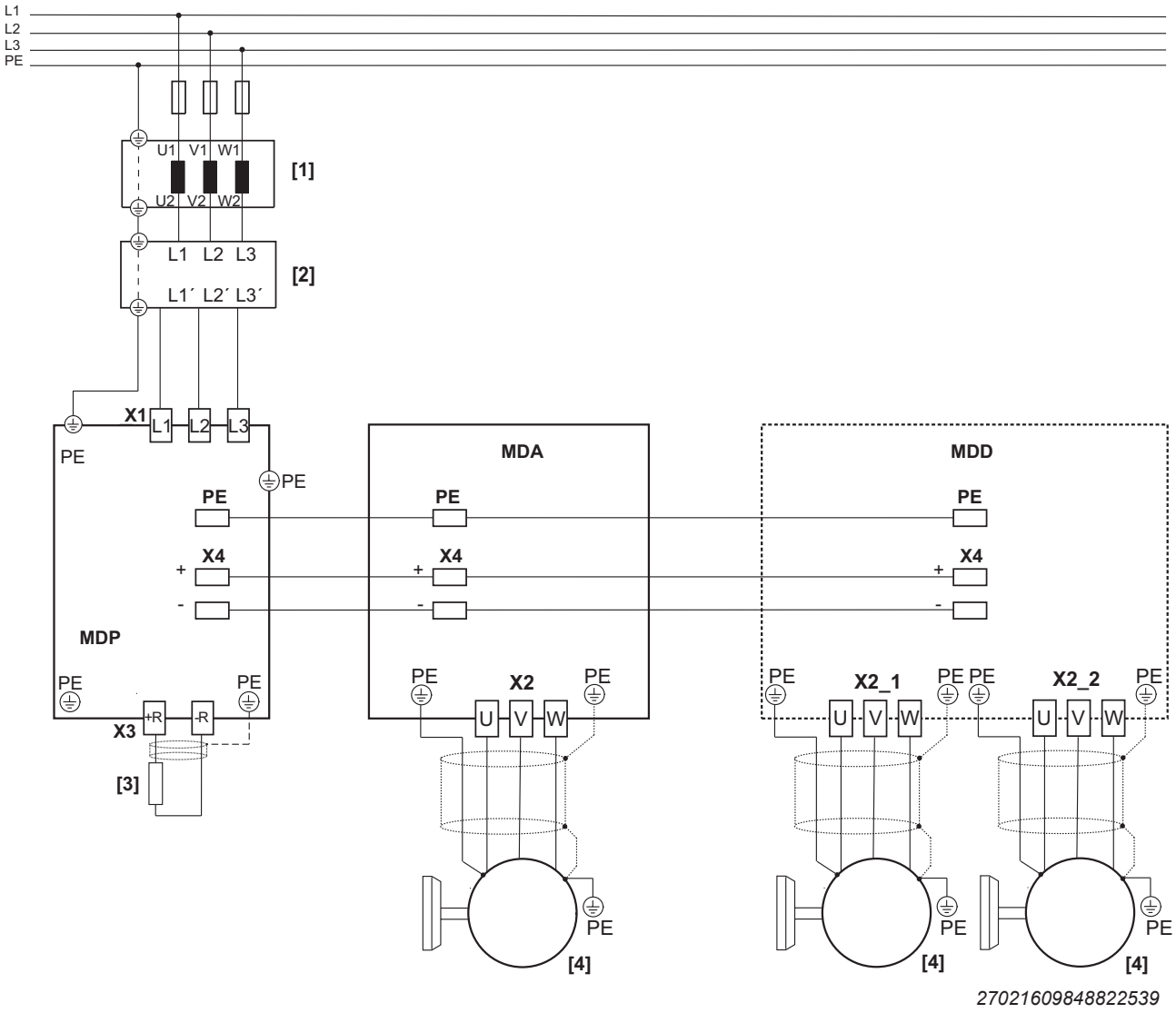


[1]	Line contactor
[2]	Line choke (optional)
[3]	Line filter
[4]	Connection of the braking resistor. The power supply module must not be operated without braking resistor.
[5]	Motor
MDP	Power supply module
MDA	Single-axis module
MDD	Double-axis module

24748536/EN – 11/2017

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.

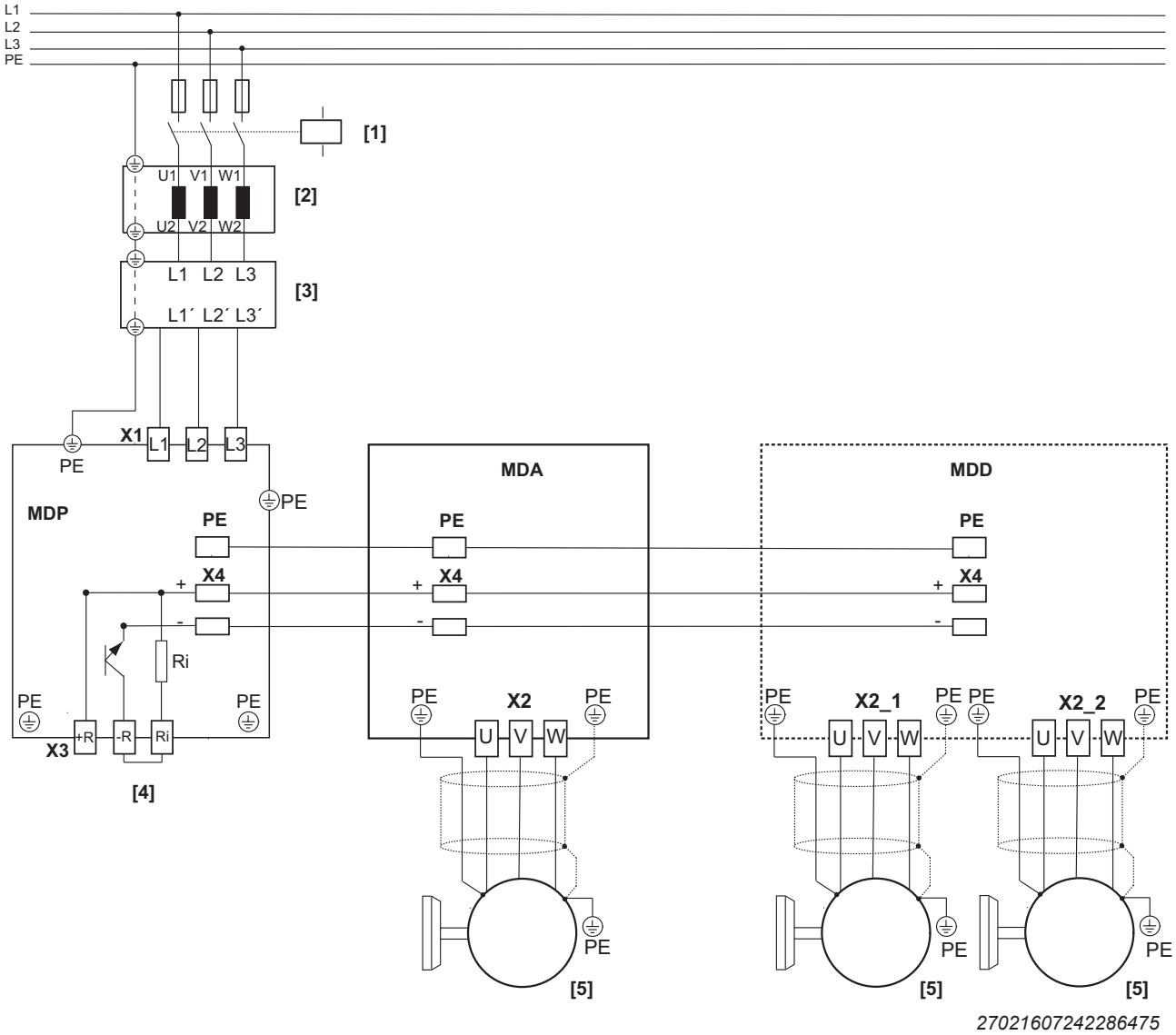


[1] Line choke (optional)
[2] Line filter
[3] Connection of the braking resistor. The power supply module must not be operated without braking resistor.
[4] Motor
MDP Power supply module
MDA Single-axis module
MDD Double-axis module

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.

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

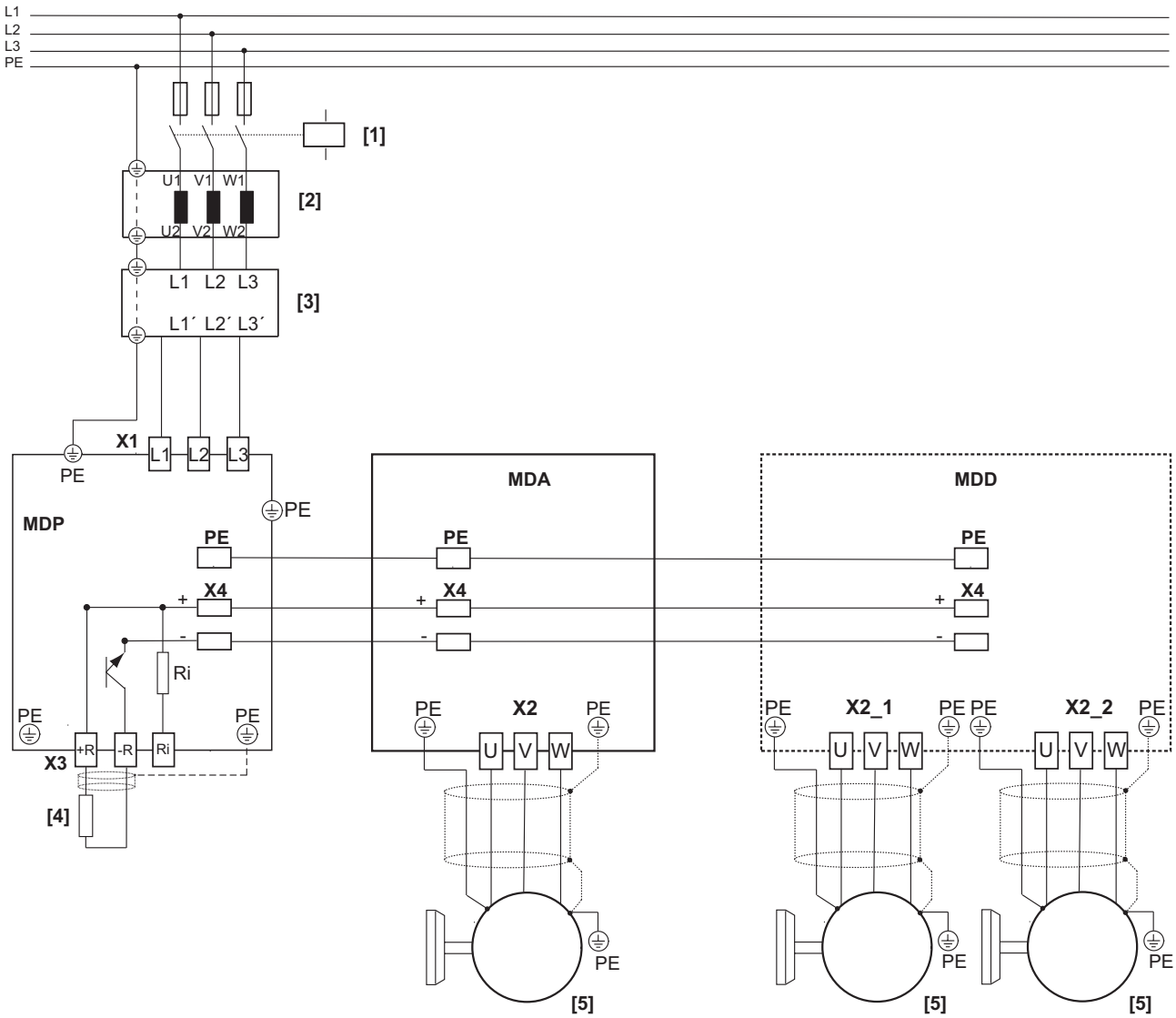


27021607242286475

[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

24748536/EN – 11/2017

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

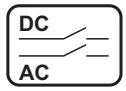


36028806505258635

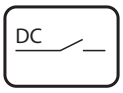
[1]	Line contactor
[2]	Line choke (optional)
[3]	Line filter
[4]	Connection of the braking resistor.
[5]	Motor
MDP	Power supply module
MDA	Single-axis module
MDD	Double-axis module

4.13.3 Brake control

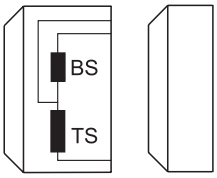
Legend:



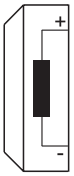
Cut-off in the DC and AC circuits
(rapid brake application)



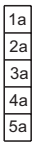
Cut-off in the DC circuit



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

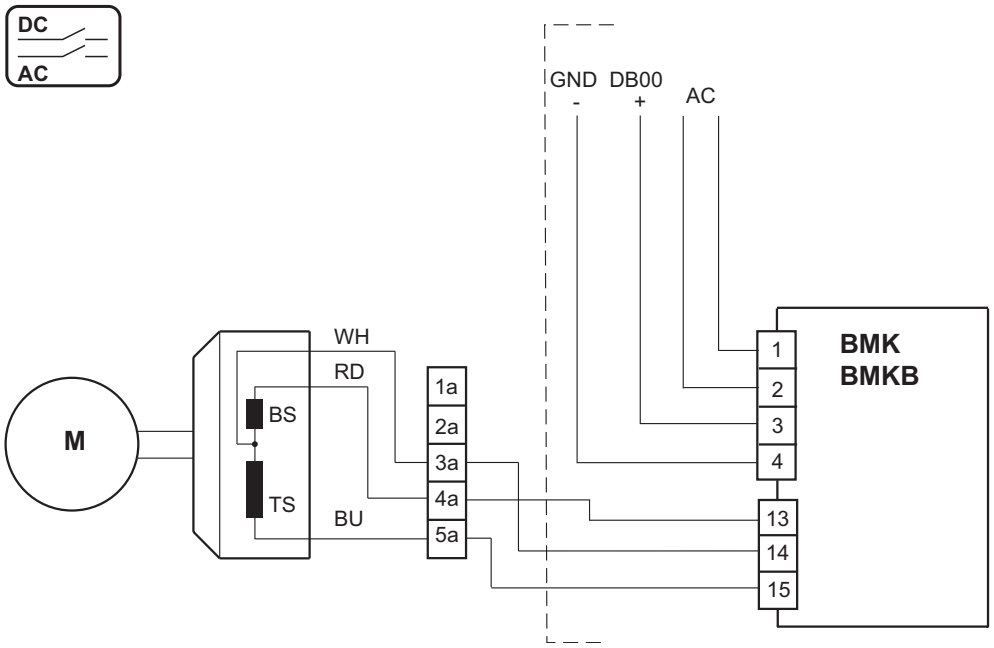
INFORMATION

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.

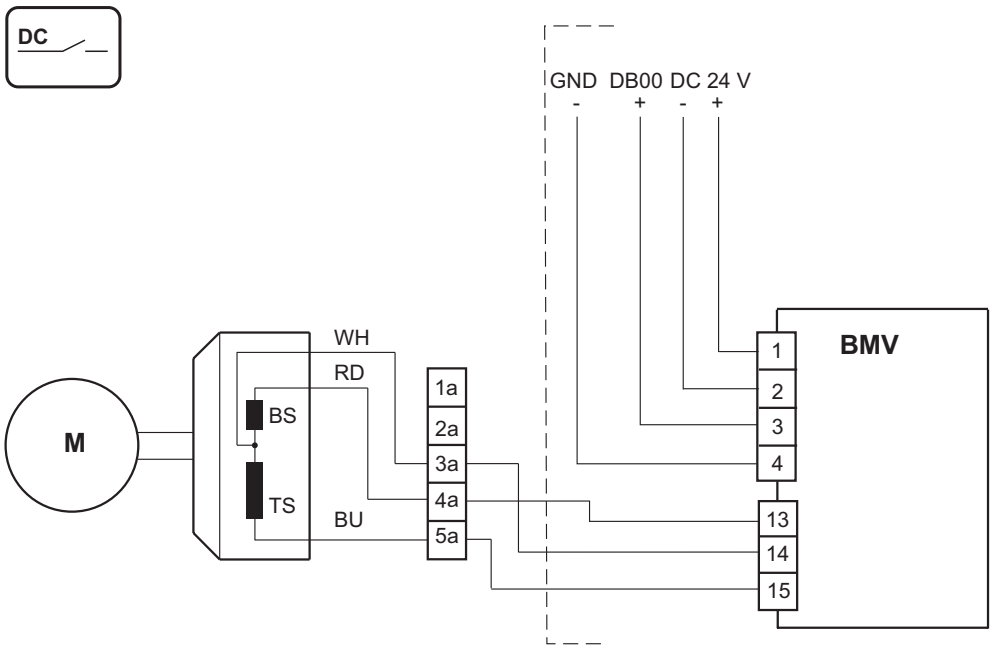
24748536/EN – 11/2017

BMK. brake control



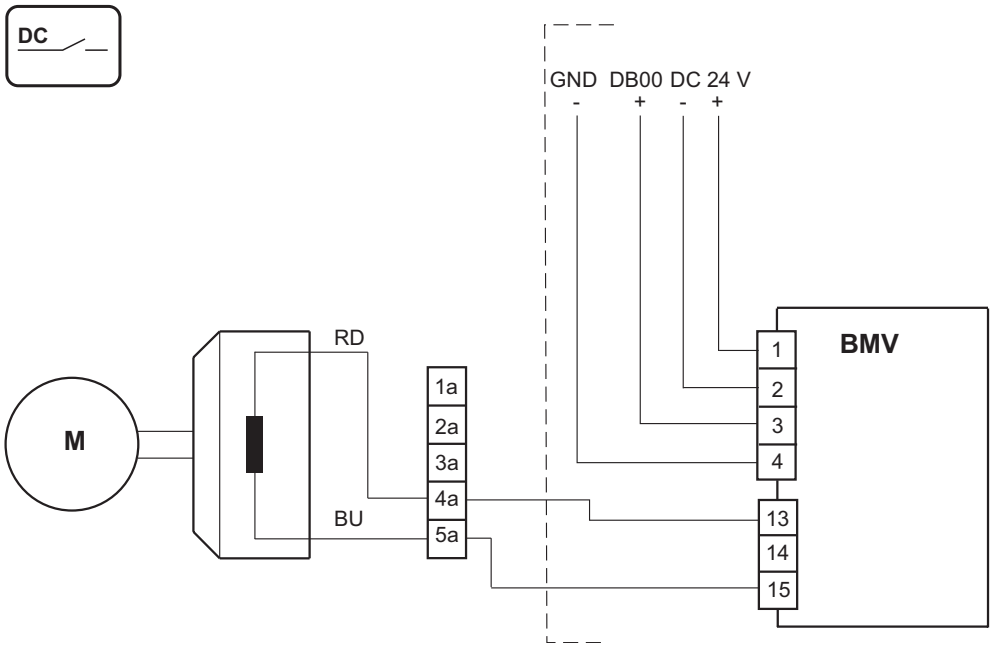
14324495755

BMV brake control – 2 coils



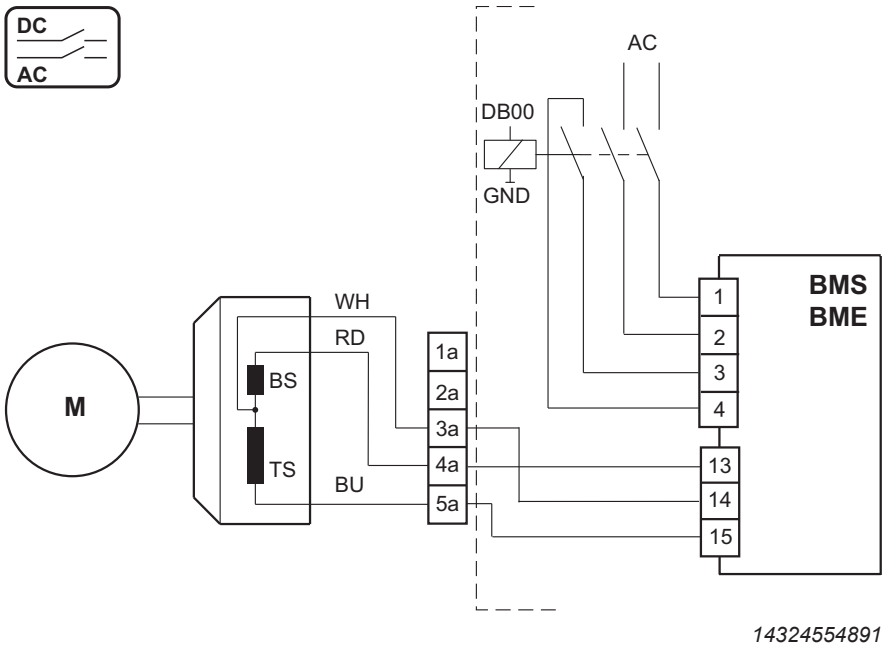
14373482507

BMV brake control – 1 coil



14373494923

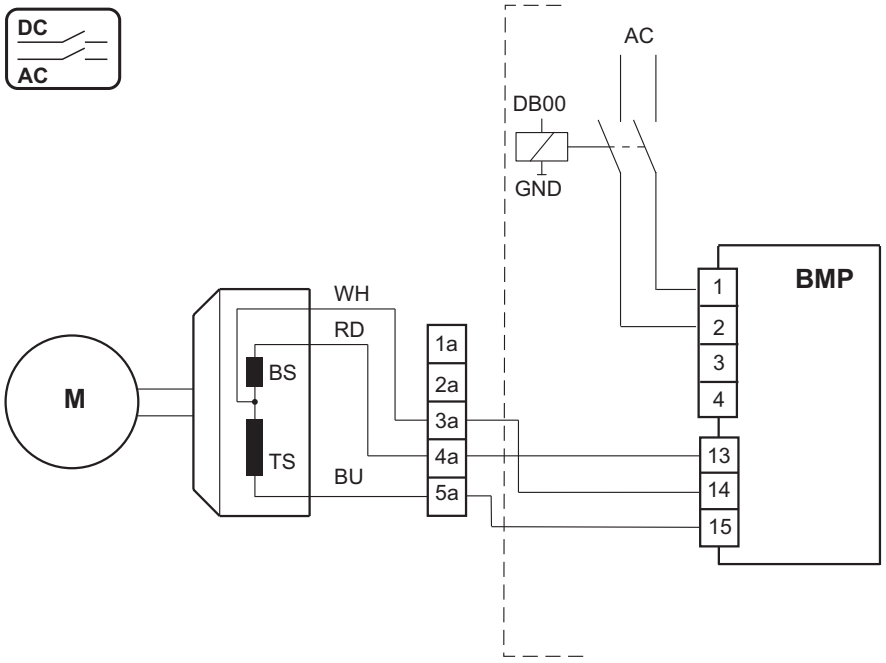
BMS, BME brake control



14324554891

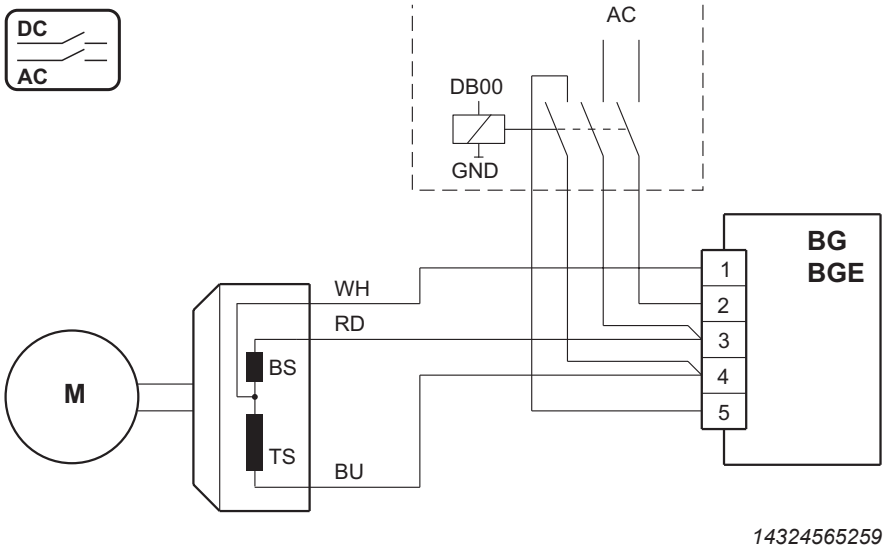
24748536/EN – 11/2017

BMP brake control



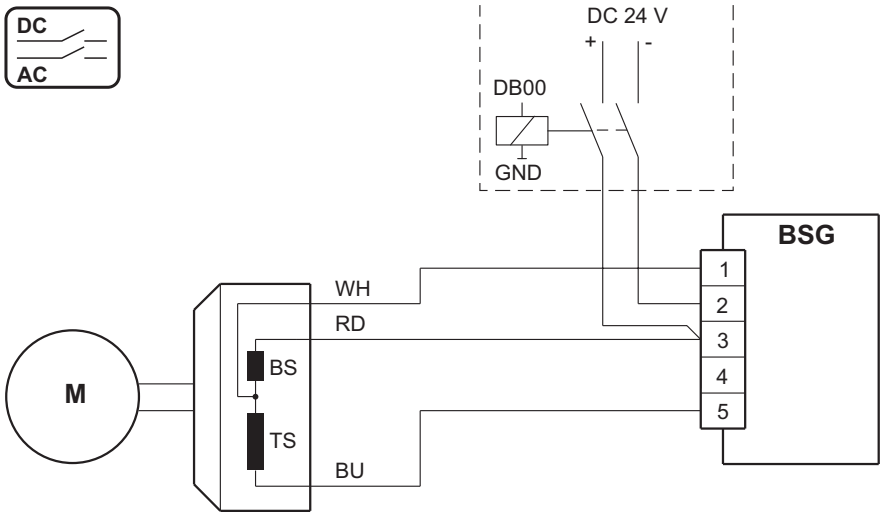
14324544523

BG, BGE brake control



14324565259

BSG brake control



14324597131

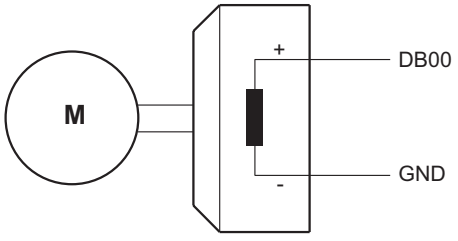
Direct control DC 24 V brake

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.



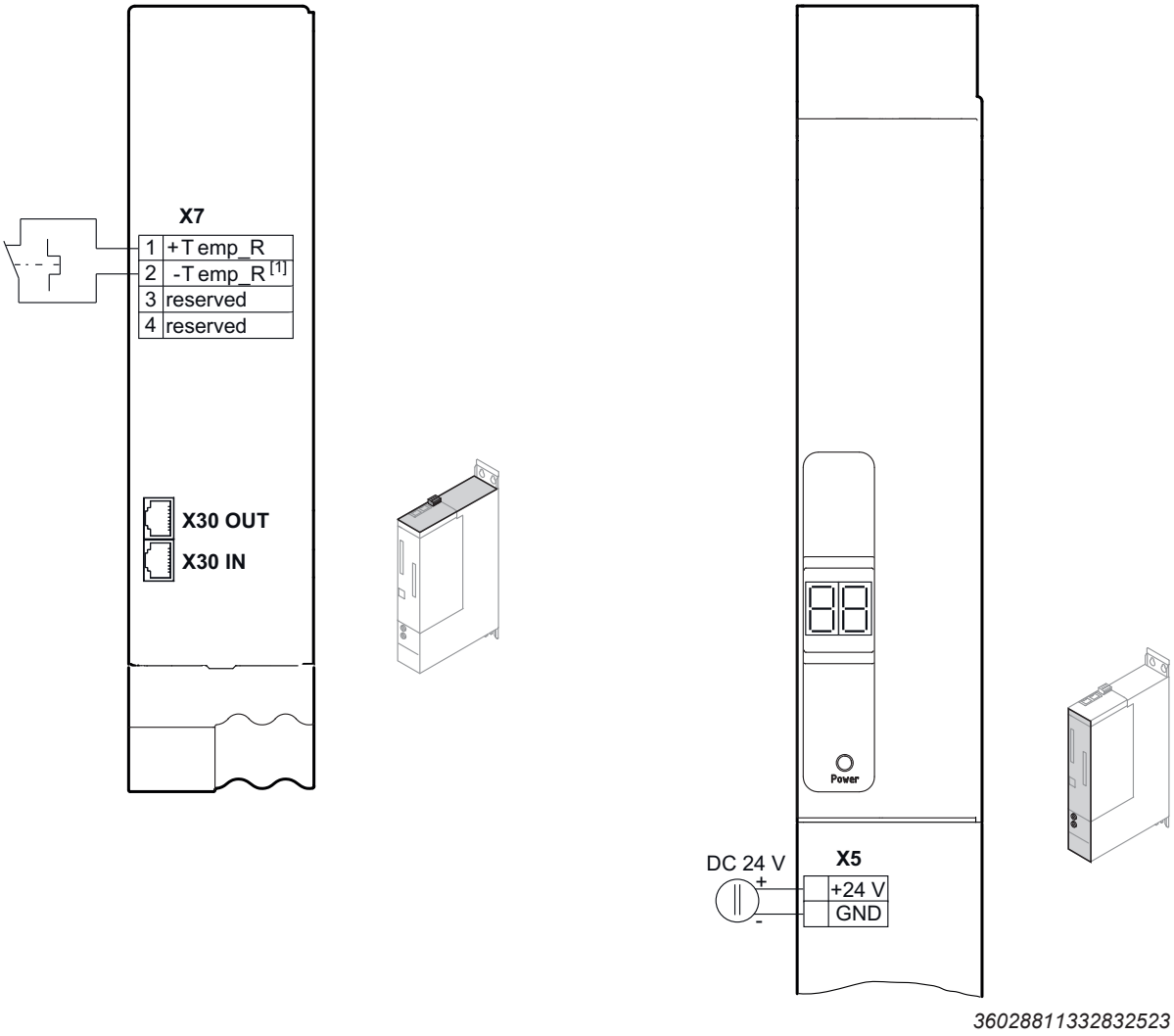
14333605771

24748536/EN – 11/2017

4.13.4 Electronics connection MDP90A.. power supply module

Wiring the control electronics

For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 123).



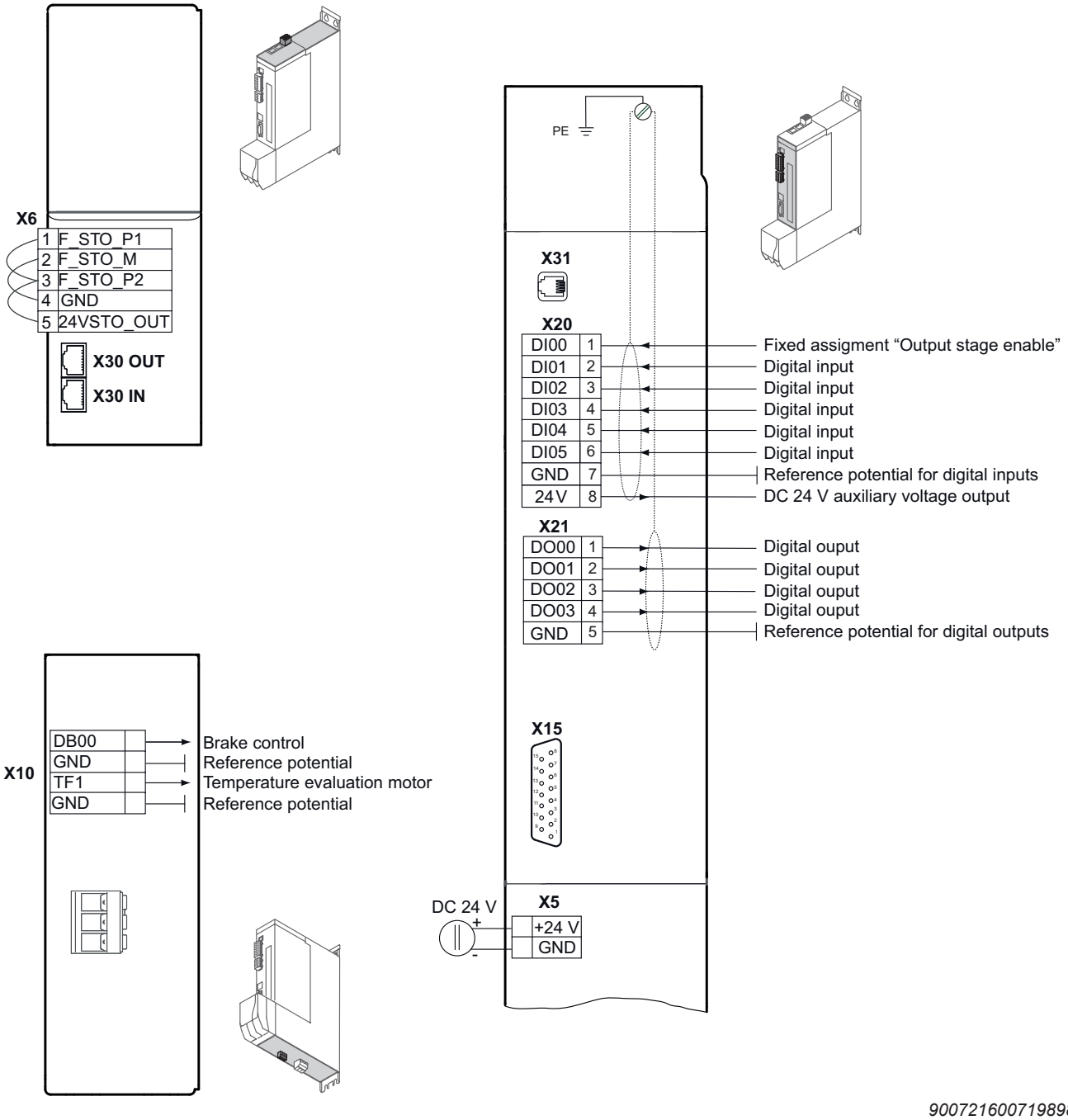
36028811332832523

[1] Signal contact of the thermal monitoring of the braking resistor
X5 Connection +24 V supply voltage
X7 Control DC link discharge module, temperature monitoring braking resistor
X30 System bus

4.13.5 Electronics connection MDA90A.. single-axis module

Wiring the control electronics

For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 123).



9007216007198987

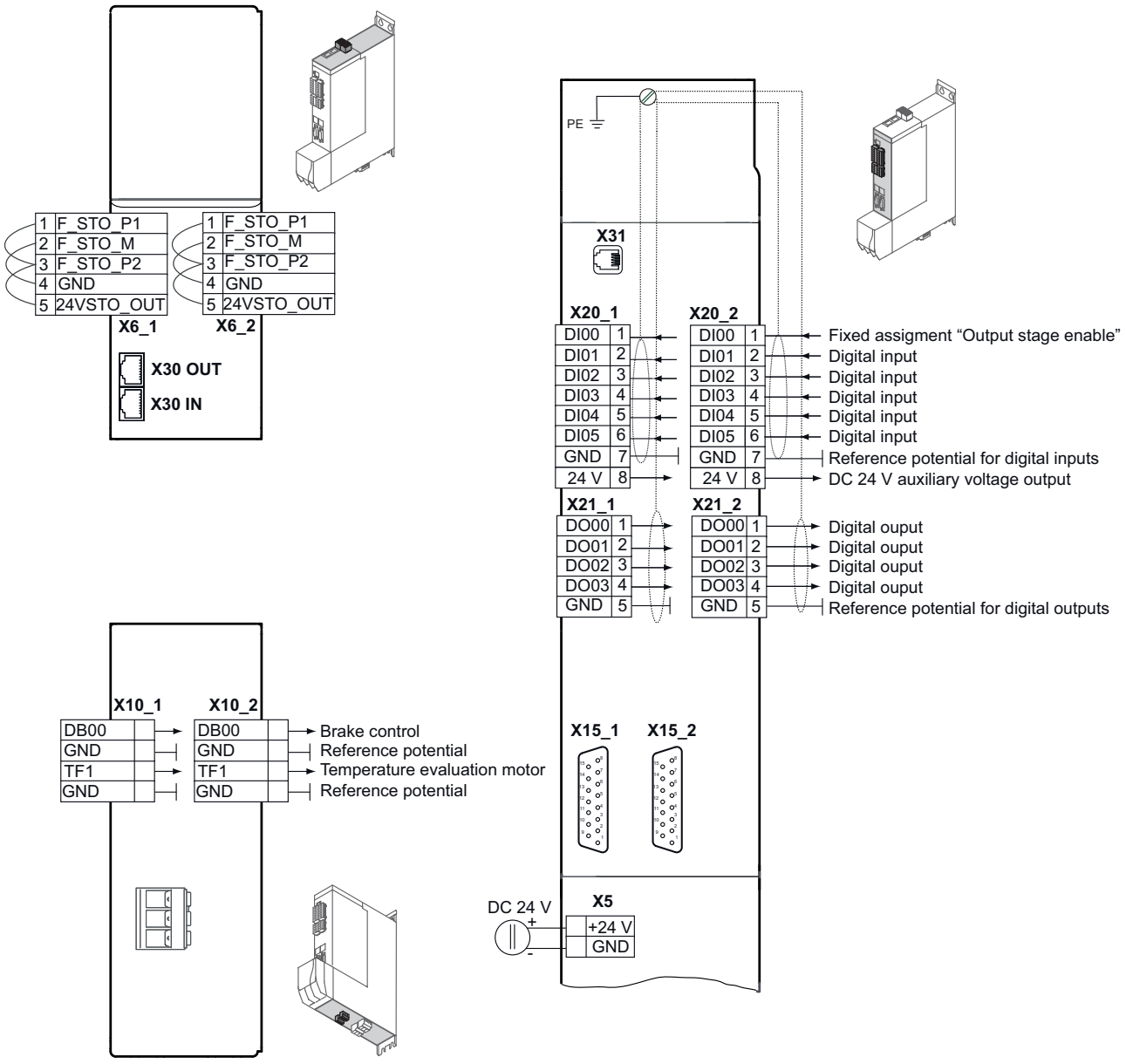
X5	Connection +24 V supply voltage	X20	Digital inputs
X6	Connection for safe disconnection (STO). Cable jumpers are installed at factory.	X21	Digital outputs
X10	Brake control and temperature monitoring motor	X30	System bus
X15	Motor encoder connection	X31	SEW-EURODRIVE Service interface

24748536/EN – 11/2017

4.13.6 Electronics connection MDD90A.. double-axis module

Wiring the control electronics

For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 123).

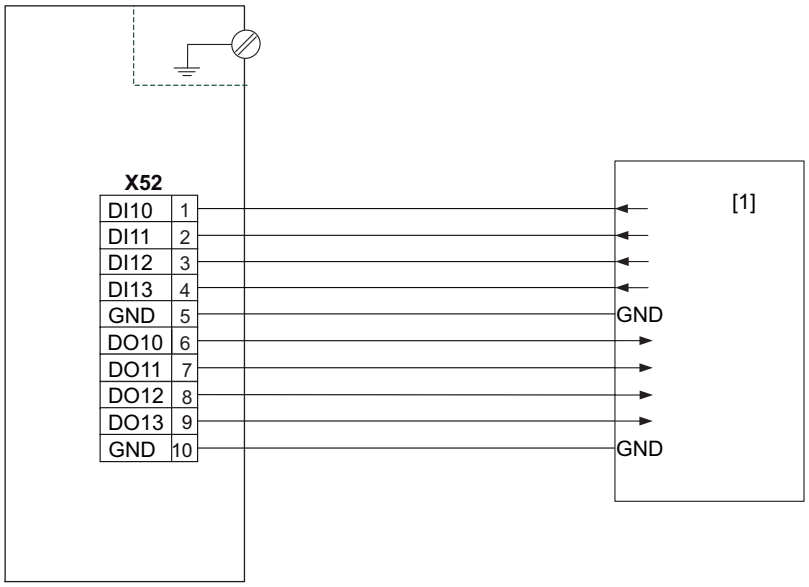


27021612907815819

X5 Connection +24 V supply voltage
X6 Connection for safe disconnection (STO). Cable jumpers are installed at factory.
X10 Brake control and temperature monitoring motor
X15 Motor encoder connection
X20 Digital inputs
X21 Digital outputs
X30 System bus
X31 SEW-EURODRIVE Service interface

4.13.7 Connection diagram CIO21A and CID21A input/output card

Digital inputs and outputs

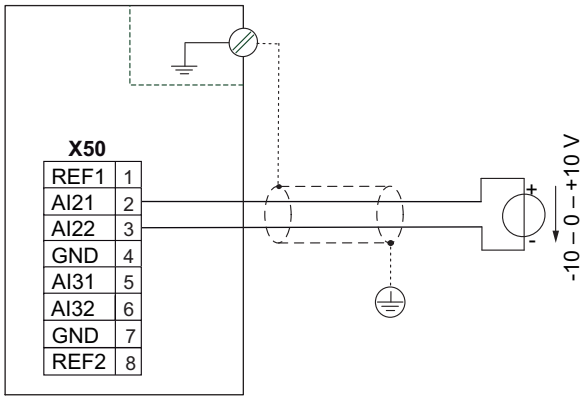


18014412829087243

[1] Higher-level controller

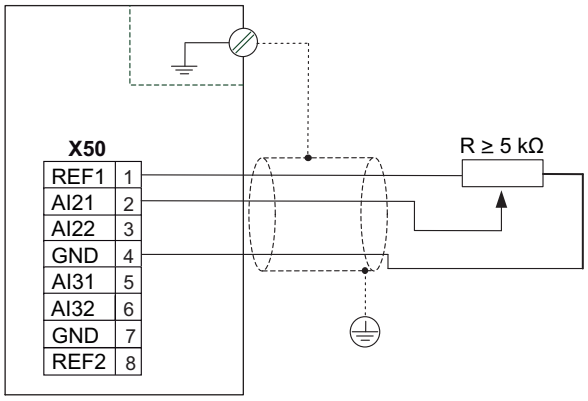
24748536/EN – 11/2017

Voltage input



9007213575393675

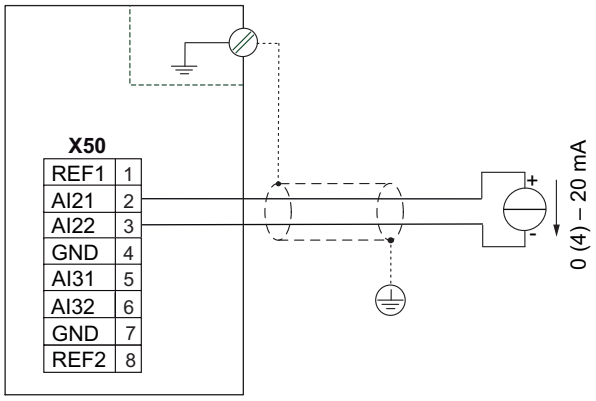
Connection to the terminals AI31 and AI32 is carried out analogously to the connection to the terminals AI21 and AI22 shown in the wiring diagrams.



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

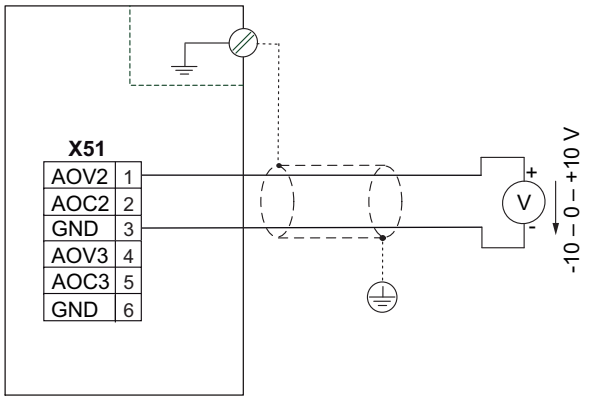


9007213575398539

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

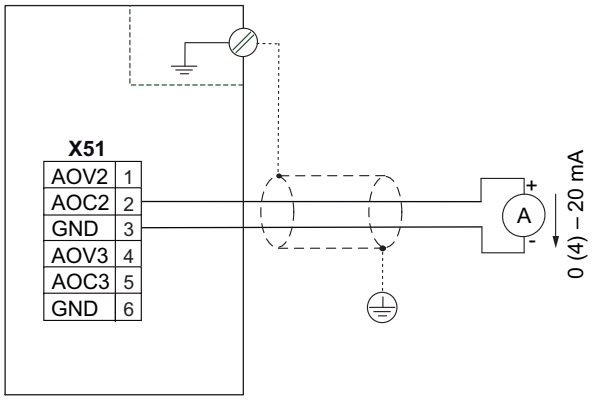


18014412830141963

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.

24748536/EN – 11/2017

Current output



18014412830272395

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.

4.14 Information regarding UL

INFORMATION

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

4.14.1 Field Wiring Power Terminals

- Use 60/75 °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	4.4254 – 5.3105 (0.5 – 0.6)	X3	4.4254 – 5.3105 (0.5 – 0.6)
0100 (size 1A)	X1	4.4254 – 5.3105 (0.5 – 0.6)	X3	4.4254 – 5.3105 (0.5 – 0.6)
0250	X1	23.552 – 35.403 (3.0 – 4.0)	X3	23.552 – 35.403 (3.0 – 4.0)
MDA90A-...-	Single-axis module			
	Motor connection		-	
0020 – 0120	X2	4.4254 – 5.3105 (0.5 – 0.6)	-	-
0160 – 0240	X2	13.276 – 15.046 (1.5 – 1.7)	-	-
0320 – 0480	X2	23.552 – 35.403 (3.0 – 4.0	-	-
MDD90A-...-	Double-axis module			
	Motor connection		-	
0020 – 0040	X2	4.4254 – 5.3105 (0.5 – 0.6)	-	-
0020 – 0080	X2	13.276 – 15.046 (1.5 – 1.7)	-	-
	All modules			
	DC link connection		PE connection	
	X4	23.552 – 35.403 (3.0 – 4.0		23.552 – 35.403 (3.0 – 4.0

4.14.2 Short Circuit Current Rating

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

- 5000 rms symmetrical amperes when protected by fuses and circuit breakers as described in the tables below.
- 1800 rms symmetrical amperes when protected by fuses, circuit breakers and Type E Combination Motor Controllers as described in the tables below.

Max. voltage is limited to 500 V.

24748536/EN – 11/2017

4.14.3 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.

Module MDP90A-..	SCCR: 5 kA/ 500 V	SCCR: 18 kA/ 500 V	SCCR: 5 kA/ 500 V	SCCR: 18 kA/ 500 V	SCCR: 18 kA/ 500 V
	when protected by:				
	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/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/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)
0250	50 A / 600 V Class: K5	50 A/600 V Class: CA, CD, CF, G, J, K1, T	-	50 A / 500 V min.	Siemens Sirius 3RV1031-4HA10 (40 – 50 A)

- 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.

4.14.4 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.

4.14.5 Ambient Temperature

The units are suitable for a maximum surrounding air temperature of 45 °C.

INFORMATION

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

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" (→ 🗎 56).
- Install the closing covers according to the regulations, see chapter "Covers" (→ 🗎 56).
- 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

Cables may only be connected and disconnected in a de-energized state.

Irreparable damage to the application inverter or unforeseeable malfunctions.

- Power plug connectors (motor, supply system braking resistor, brake) must only be plugged in de-energized state.

24748536/EN – 11/2017

5.2 Setting the EtherCAT®/SBus^{PLUS} ID

The hexadecimal switches S1 and S2 must be set to "0".

5.3 Startup requirements

The following conditions apply to startup:

- You installed the application inverter correctly both mechanically and electrically.
- You configured the application inverter and connected drives correctly.
- Safety measures prevent accidental drive startup.
- Safety measures prevent danger to persons or machines.

Required hardware:

- PC or laptop with Ethernet interface.
- Standard Ethernet cables for connection between PC and MOVI-C® CONTROLLER.
- MOVI-C® CONTROLLER with completed startup

Required software:

- Engineering software MOVISUITE® standard from SEW-EURODRIVE.

24748536/EN – 11/2017

5.4 Startup procedure

The application inverters are taken 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

Default		Basic settings of the installed interfaces • EtherCAT® • Standard I/O • Encoder 1
Optional		Basic settings of the options • Fieldbus • I/O card • Encoder 2 • MOVISAFE® CS..

Functions segment

Inputs/outputs		• Standard I/O • I/O card DI/DO • I/O card AI/AO
Setpoints		• Basic settings • PO data • Setpoint buffer • Fixed setpoints • Control word 1 – 3

24748536/EN – 11/2017

Actual values		• PI data • Status word 1 – 3
Drive functions		• FCB 05 Speed control • FCB 06 Interpolated speed control • FCB08 Interpolated torque control • FCB 09 Positioning • FCB10 Interpolated position control • FCB12 Reference travel • FCB 01 Output stage inhibit • FCB 20 Jog mode • FCB21 Brake test • FCB 26 Stop at user limit
Extended functions		• Parameter set • Auto reset • Standby mode
Monitoring functions		• Reference signals • Limit values 1 • Limit values 2 • Output stage • Monitoring functions 1 • Monitoring functions 2 • Energy-saving function

Information on the application inverter

Device data is available via the project nodes.

Device data		• Device identification • Main component • Subcomponent • Production label
Overview of fault responses		• Axis module • Power supply monitoring • Functions
Setup		• Permissions • Resetting device parameters.

24748536/EN – 11/2017

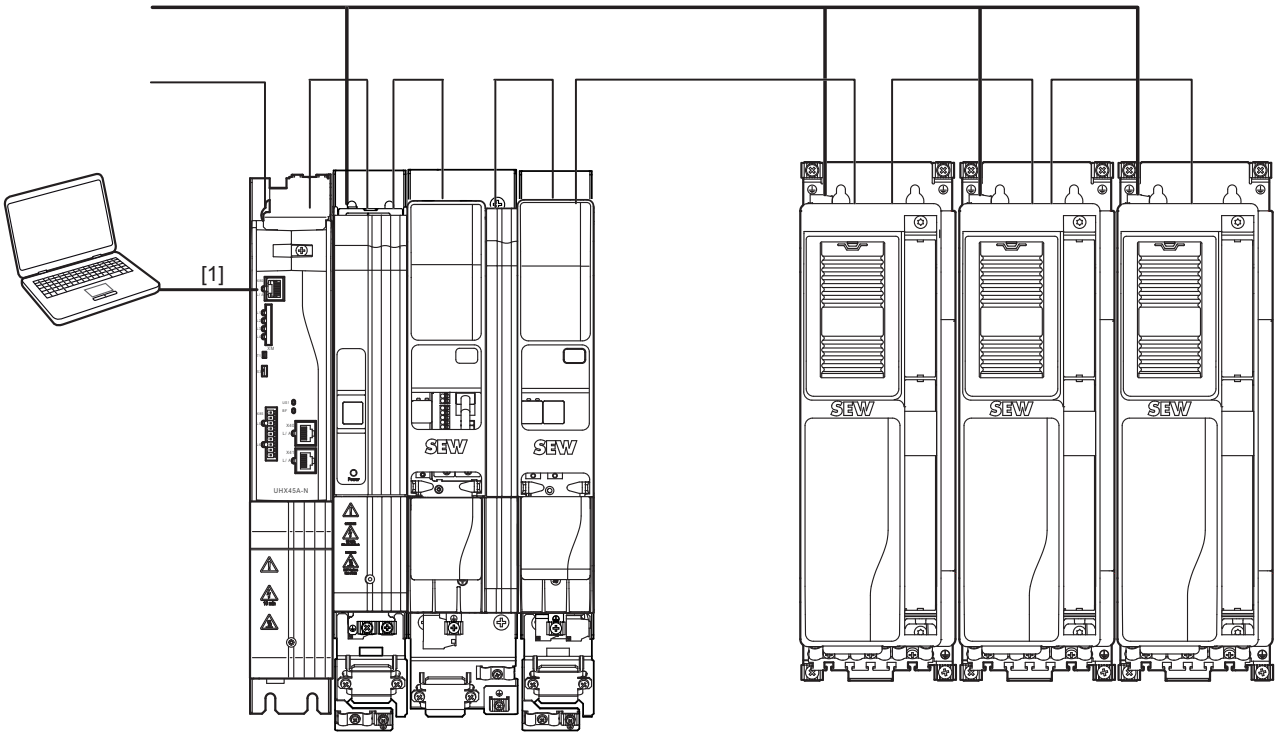
5.4.1 Check list for startup

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.



18014413831237515

[1] Ethernet

24748536/EN – 11/2017

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.
- Before you touch the power terminals, check to see that the application inverter has been disconnected from the supply system.
- Wait 10 minutes after disconnection from the supply system before removing the power terminals.
- 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" (→ 🗎 13).

⚠ 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 people and damage to machinery.

NOTICE

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

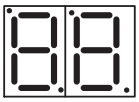
Damage to the application inverter.

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

24748536/EN – 11/2017

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.

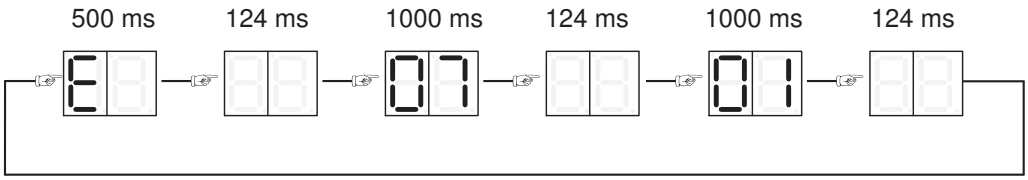
6.2.2 Fault display

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.

24748536/EN – 11/2017

6.3 Operating displays

6.3.1 Operating displays at the power supply module

Display	Description	State	Comment/action
Displays during normal operation			
rd	Ready for operation (ready).	No fault/warning: V_{DCL} ≥ 100 V.	Only status display.

Display	Description	State	Comment/action
Displays of different device statuses			
00	DC link voltage missing or below 100 V.	24 V backup mode	Check supply system.

6.3.2 Operating displays at the axis module

Message	Description	State	Comment / action
Displays during boot process			
b0 b1 b3 br	Unit passes through several states when loading the firmware (boot) to get ready for operation.	• Status: Not ready. • Output stage is inhibited. • No communication possible.	• Waiting for boot process to finish. • Device stays in this condition: Unit defective.

Message	Description	State	Comment / action
Displays of different device statuses			
.	Energy-saving mode		Energy-saving mode active.
C0 Flashing	Module bus is not ready		Check the module bus connection.
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 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.

Message	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.		

Message	Description	State	Comment / action
Displays in normal operation			

Message	Description	State	Comment / action
01	Output stage inhibit	• 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.
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		Position mode with internal ramp generator.
10	Interpolated position 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.

24748536/EN – 11/2017

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 the SEW-EURODRIVE Service.

Subfault: 49.2 **Description: EEPROM memory – hardware faulty**		
	Response: Remote – critical fault	
	Cause	Measure
	EEPROM cannot be read; initialization error.	Contact the 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 the 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 the 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 the SEW-EURODRIVE Service.

Subfault: 49.6 **Description: CRC error – power section data**		
	Response: Remote – critical fault	
	Cause	Measure
	Device not yet calibrated.	Contact the SEW-EURODRIVE Service.
	Initialization error	Contact the SEW-EURODRIVE Service.

Subfault: 49.7 **Description: EEPROM data error**		
	Response: Remote – critical fault	
	Cause	Measure
	Calibration data not plausible.	Contact the 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.

24748536/EN – 11/2017

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 or short circuit in braking resistor.

Subfault: 49.10 Description: Brake chopper short circuit		
	Response: Remote – critical fault	
	Cause	Measure
	A failed brake chopper was detected in the device. For units 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 the SEW-EURODRIVE Service.

Subfault: 49.11 Description: Collector emitter voltage monitoring		
	Response: Remote – critical fault	
	Cause	Measure
	The voltage supply for the brake chopper is defective.	Check the connection of the braking resistor.
	UCE monitoring of brake chopper trips	Switch the power off and on again. Contact the 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 the 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 the SEW-EURODRIVE Service.

Subfault: 49.14 Description: Temperature evaluation defective		
	Response: Remote – critical fault	
	Cause	Measure
	Failed to transfer temperature signals	Contact the SEW-EURODRIVE Service.

Subfault: 49.15 Description: Capacity utilization 105%		
	Response: Remote – critical fault	
	Cause	Measure
	An electromechanical utilization of > 105% was detected by the I2xT model.	– Check the project planning and installation of the axis system. – Contact the 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 braking resistor installation.

24748536/EN – 11/2017

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 detected.	– 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 error		
	Response: Remote – critical fault	
	Cause	Measure
	Another module bus station has requested external emergency shutdown.	Eliminate emergency shutdown condition at the module bus station.

Subfault: 49.20 Description: Capacity utilization 100%		
	Response: Remote – standard fault	
	Cause	Measure
	An electromechanical utilization of > 100% was detected by the I2xT model.	– Check the project planning and installation of the axis system. – Contact the 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 the SEW-EURODRIVE Service.

Subfault: 49.22 Description: Overtemperature 100%		
	Response: Remote – standard fault	
	Cause	Measure
	The permitted heat sink temperature was 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
	The slave does not receive any 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 stations.

Subfault: 49.27 Description: Fan function fault		
	Response: Remote – warning	
	Cause	Measure
	One of the fans is not connected, or is 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
	The temperature of the heat sink has reached the 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
	An electromechanical utilization greater than the electromechanical utilization of the prewarning threshold was detected by the 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 projected range	Check the connection and project planning of the braking resistor.
	Short circuit in the 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.

24748536/EN – 11/2017

6.5 Axis module fault

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 current supply.
Current transformer	Check current transformer.
Ramp limit is deactivated and set ramp time is too short.	Increase ramp time.
Phase module defective	Check phase module.
Supply voltage 24 V or 24 V generated from it is instable.	Check 24 V supply voltage.
Interruption or short circuit on the signal lines of the phase modules.	Check signal lines.

6.5.2 Fault 3 Ground fault

Subfault: 3.1 **Description: Ground fault**	
Response: Output stage inhibit	
Cause	Measure
Ground fault in motor lead.	Eliminate ground fault in motor lead.
Ground fault in inverter.	Eliminate ground fault in inverter.
Ground fault in 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 deceleration ramps.
Short circuit detected in braking resistor circuit	Check supply cable to braking resistor.
Braking resistance too high	Check technical data of braking resistor.

Subfault: 4.2 **Description: Brake chopper defective**	
Response: Output stage inhibit	
Cause	Measure
Output stage of brake chopper defective	Replace 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 power supply cable.
DC link voltage periodically too low.	Check the configuration of the supply system.
Inadequate line voltage quality.	Check supply (fuses, contactor).

6.5.5 Fault 7 DC link fault

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

6.5.6 Fault 8 Speed monitoring fault

Subfault: 8.1 **Description: Speed monitoring – motor mode**	
Response: Output stage inhibit	
Cause	Measure
The 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 encoder connection and direction of rotation. If necessary, increase current limiting or reduce 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
The speed controller operates at setting limit (mechanical overload or phase failure in the supply system or the motor).	Increase the delay time set for speed monitoring, or reduce the regenerative load.
Encoder not connected correctly	Check encoder connection and direction of rotation. If necessary, increase current limiting or reduce deceleration values.
Encoder has incorrect direction of rotation	– Check encoder connection and direction of rotation. If necessary, increase current limiting or reduce deceleration values. – Check motor cable and motor. Check 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 (index 8360.9/8361.9). This limit value is set at startup matching 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
User current limit or output stage monitoring reduced possible maximum current to such a degree that required magnetizing current cannot be set.	– Reduce output stage utilization (e.g. by reducing the PWM frequency or by reducing the load). – Increase the user current limit.

Subfault: 9.2 **Description: Requested operating mode not possible with active control mode**	
Response: Output stage inhibit	
Cause	Measure
The current FCB has activated an operating mode. The active control mode does not support this operating mode, for example "position control" or "torque control" with V/f control mode.	Start up control mode that supports the required operating mode. Connect encoder is necessary. Select an operating mode that is supported by the current control mode.

24748536/EN – 11/2017

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 is 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 maximum speed.

Subfault: 9.6 Description: Maximum model speed exceeded		
	Response: Output stage inhibit	
	Cause	Measure
	The speed of the drive calculated in ELSM® control mode is 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
	The rotor flux calculated by the motor model is not plausible, or the calculated internal voltage is too small.	– Check configuration data. – Check motor data. – Check machine: Idle state or too low speed. – Contact the SEW-EURODRIVE Service.

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

6.5.8 Fault 10 Data flexibilization layer

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

24748536/EN – 11/2017

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

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

Subfault: 10.4 Description: Stack		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Overflow of data flexibilization layer 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 the code.	Load the program again. The program memory is corrupt. Invalid write access to the program memory.

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

24748536/EN – 11/2017

Subfault: 10.11 Description: No application program loaded		
	Response: Output stage inhibit	
	Cause	Measure
	No data flexibilization layer application program loaded	Load the program or disable the data flexibilization layer.

Subfault: 10.99 Description: Unknown error		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Unknown data flexibilization layer error	Contact the 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 current value – 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 rms value of 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 PWM frequency.
	Ambient temperature too high.	Ensure sufficient cooling.
	Unfavorable air convection	Check air convection.
	Fan defective	Check 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 current value – Reduce the ambient temperature.

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

Subfault: 11.8 Description: Short circuit on the temperature sensor of the heat sink		
	Response: Output stage inhibit	
	Cause	Measure
	Short circuit on the temperature sensor of the heat sink.	Contact the 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 the brake control.
	Overload due to excessive connection (> 0.5 Hz)	Check the sequential profile of the 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 DC 24 V supply voltage.
	Monitoring is only active with parameter settings “Brake installed” and “Brake applied”.	Check parameter setting.

6.5.11 Fault 13 Encoder 1

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 source (e.g. from EMC). – Replace encoder. – Replace card. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

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

24748536/EN – 11/2017

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 startup parameters. – Replace encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 wiring. – Check interference source (e.g. from EMC). – Check encoder. Replace if necessary. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

Subfault: 13.5 Description: Internal warning		
	Response: Encoder – warning	
	Cause	Measure
	Encoder signaled warning	– Check wiring. – Check interference source (light beam interrupted, reflector, data cable, etc.). – Clean 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 wiring. – Check interference source (e.g. from EMC). – Check encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 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 encoder mounting position. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

Subfault: 13.9 Description: Quadrant check		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error while checking quadrants (sine encoder)	Switch the device off and on again. – Check wiring. – Check interference source (e.g. from EMC). – Check encoder. Replace if necessary. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 startup parameters. – Check wiring. – Check interference source (light beam interrupted, reflector, data cable, etc.). – Replace encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 source (e.g. from EMC). – Check startup parameters. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 source (e.g. from EMC). – Check startup parameters. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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. – Make sure that the CANopen interface at the encoder (node ID) is set correctly. – Check wiring. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

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

24748536/EN – 11/2017

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

24748536/EN – 11/2017

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

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

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

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

Subfault: 13.24 Description: Travel range exceeded		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Current position mode (parameter P8381.10) does not allow for a larger travel range.	Check travel range. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 if the external position encoder is faulty.

24748536/EN – 11/2017

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 source (e.g. from EMC). – Replace encoder. – Replace card. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 inverter.	– Check encoder type. – Contact the SEW-EURODRIVE Service. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 startup parameters. – Replace encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 wiring. – Check interference source (e.g. from EMC). – Check encoder. Replace if necessary. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

Subfault: 14.5 Description: Internal warning	
Response: Encoder – warning	
Cause	Measure
Encoder signaled warning	– Check wiring. – Check interference source (light beam interrupted, reflector, data cable, etc.). – Clean 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 wiring. – Check interference source (e.g. from EMC). – Check encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

24748536/EN – 11/2017

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 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 encoder mounting position. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

Subfault: 14.9 Description: Quadrant check		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error while checking quadrants (sine encoder)	Switch the device off and on again. – Check wiring. – Check interference source (e.g. from EMC). – Check encoder. Replace if necessary. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 startup parameters. – Check wiring. – Check interference source (light beam interrupted, reflector, data cable, etc.). – Replace encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 source (e.g. from EMC). – Check startup parameters. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 source (e.g. from EMC). – Check startup parameters. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

24748536/EN – 11/2017

Subfault: 14.13 Description: Error during initialization		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Communication error during initialization	– Check parameterization. – Check baud rate. – Make sure that the CANopen interface at the encoder (node ID) is set correctly. – Check wiring. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

Subfault: 14.14 Description: Communication		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Faulty communication with encoder.	– Check voltage supply. – Check interference source (e.g. from EMC). – Check wiring. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 multi-turn encoder is within the configured track area. – Check limits. – Check correct settings of encoder numerator/denominator factors. – Check interference source (e.g. from EMC). – Check startup parameters. Switch the device off and on again. – If the error occurs repeatedly, contact the SEW-EURODRIVE Service. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 detected.	– Check wiring. – Check encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 detected.	– Check wiring. – Check encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

24748536/EN – 11/2017

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 detected.	– Check wiring. – Check encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 detected.	– Check wiring. – Check encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 startup parameters. – Check the settings at the SSI encoder (error bit). – Check wiring. – Check interference source (light beam interrupted, reflector, data cable, etc.). – Replace encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.21 Description: SSI error bit		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Error bit set in SSI protocol.	– Check startup parameters. – Check the settings at the SSI encoder (error bit). – Check wiring. – Check interference source (light beam interrupted, reflector, data cable, etc.). – Replace encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.22 Description: Internal fault – critical		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder signaled internal fault	– Check wiring. – Check interference source (light beam interrupted, reflector, data cable, etc.). – Replace encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

24748536/EN – 11/2017

Subfault: 14.23 Description: Internal error		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Encoder signaled internal fault	– Check wiring. – Check interference source (light beam interrupted, reflector, data cable, etc.). – Replace encoder. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder if the external position encoder is faulty.

Subfault: 14.24 Description: Travel range exceeded		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Current position mode (parameter P8381.10) does not allow for a larger travel range.	Check travel range. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder 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 if the external position encoder is faulty.

6.5.13 Fault 16 Startup

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

Subfault: 16.2 Description: Cannot calculate controller parameters		
	Response: Output stage inhibit	
	Cause	Measure
	The dead time of the encoder in use is too long to calculate the required filter coefficients.	Use an encoder with shorter dead time, 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 has not been completed yet.	Check the parameters of the thermal motor model, and perform startup.

Subfault: 16.5 Description: Current limit smaller than magnetizing current of motor		
	Response: Output stage inhibit	
	Cause	Measure
	The current limit is smaller than the magnetizing current of the motor calculated by the active control mode.	Increase 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
The specified PWM frequency is not allowed for this power output stage.	Select different PWM frequency. Possible PWM frequencies; see device configuration data.

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

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

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

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

Subfault: 16.12 Description: Motor data write sequence	
Response: Output stage inhibit	
Cause	Measure
Subindex 1 was not written to zero before writing the electrical startup parameters 8357, 8360, 8394, 8420 or 8358, 8361, 8395, 8421.	Reset error. 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.

24748536/EN – 11/2017

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 PWM frequency "2.5 kHz", only the speed controller sampling cycle of 2 ms is permitted. For the ELSM® control mode, only the speed controller sampling times 1 ms and 2 ms are permitted.	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.

Subfault: 16.25 Description: User current limit too low for standstill current		
	Response: Output stage inhibit	
	Cause	Measure
	The user current limit value is too small for the minimum standstill current.	Increase the user 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 not entered or 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 maximum current and maximum torque.

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

6.5.14 Fault 17 Internal processor error

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

6.5.15 Fault 18 Software error

Subfault: 18.1 Description: Motor management		
	Response: Output stage inhibit System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	Error detected at motor management interface.	– Switch the device off and on again. – Contact SEW-EURODRIVE service if the error is still present.

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

Subfault: 18.4 Description: Task system		
	Response: Output stage inhibit System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	Error detected while processing internal task system. This can for example be a timeout for cyclic tasks.	– Switch the device off and on again. – Contact SEW-EURODRIVE service if the error is still present.

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

Subfault: 18.8 Description: Invalid error code		
	Response: Output stage inhibit	
	Cause	Measure
	Invalid error code requested	– Switch the device off and on again. – Contact SEW-EURODRIVE service if the error is still present.

Subfault: 18.9 Description: Internal software error		
	Response: Output stage inhibit System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	Group software error.	– Switch the device off and on again. – Contact SEW-EURODRIVE service if the error is still present.

Subfault: 18.10 Description: Watchdog		
	Response: Output stage inhibit	
	Cause	Measure
	The software no longer works within the intended cycle time.	– Switch the device off and on again. – Contact SEW-EURODRIVE service if the error is still present.

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

24748536/EN – 11/2017

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

6.5.16 Error 19 Process data

Subfault: 19.1 Description: Torque violation		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	The specified torque values are not plausible.	Adjust torque values.

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

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

Subfault: 19.4 Description: Acceleration setpoint violation		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Specified acceleration setpoints not plausible.	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: 19.7 Description: Referencing missing		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Activated function only permitted 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
	Data set 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.

24748536/EN – 11/2017

6.5.17 Fault 20 Device monitoring

Subfault: 20.1
Description: Supply voltage fault

Response: Output stage inhibit
System state: Fault ackn.with CPU reset

Cause	Measure
Internal electronics supply voltage or externally connected 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 fault. – Replace the device if the fault reoccurs. Contact SEW-EURODRIVE Service if you require further support.

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 in the device is too high. The device signal output of the device was de-energized because of the fault message.	Identify the consumer that causes the overload at the internal supply voltage: 1. Remove all external consumers: – from the digital output terminals of the basic device. – from other installed options. – from all encoder connections. – from all other consumers at the 24 V output voltage terminals. 2. Acknowledge fault. 3. Connect the consumer to the device again, one after the other, until the fault message is issued again. 4. To eliminate the fault, use 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
Error detected in device hardware	– Acknowledge fault. – Replace the device if the fault reoccurs. Contact SEW-EURODRIVE Service if you require further support.

Subfault: 20.8
Description: Fan warning

Response: Warning with self reset

Cause	Measure
Fan function impaired	Check fan for proper functioning.

Subfault: 20.9
Description: Fan fault

Response: Application stop + output stage inhibit

Cause	Measure
Fan defective	Replace the fan.

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. – Before acknowledging the fault, make sure that both STO signals are switched to low level.

24748536/EN – 11/2017

6.5.18 Fault 23 Power section

Subfault: 23.1
Description: Warning

Response: Warning with self reset

Cause	Measure
Power section fault with fault response of the type "warning".	See also "power section subcomponent" fault status.

Subfault: 23.2
Description: Fault

Response: Emergency stop + output stage inhibit

Cause	Measure
Power section fault with fault response of the type "standard".	See also "power section subcomponent" fault status.

Subfault: 23.3
Description: Critical fault

Response: Output stage inhibit

Cause	Measure
Power section fault with fault response of the type "critical fault".	See also "power section subcomponent" fault status.

Subfault: 23.4
Description: Hardware fault

Response: Output stage inhibit

Cause	Measure
A fault occurred in a hardware component of the power section, e.g.: Overcurrent hardware comparator.	– Check the current supply. – Check the current transformer. – Increase the ramp time. – Check the phase modules. – Check for correct motor size (the motor current is too high). – Perform a power section update.
SMPS fault, hardware fault.	– Check the current supply. – Check the 24 V supply voltage.
Fault at the gate driver of an IGBT.	Defect in the power output stage. Contact the SEW-EURODRIVE Service.
Invalid process data configuration Status of control section and power section are not compatible.	Perform power section update.

Subfault: 23.5
Description: Invalid process data configuration

Response: Output stage inhibit

Cause	Measure
Invalid process data configuration	Perform power section update.

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 reoccurs repeatedly: Inform the 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 reoccurs repeatedly: Inform the SEW-EURODRIVE Service.

Subfault: 23.8
Description: Parameter communication error

Response: Emergency stop + output stage inhibit

Cause	Measure
Power section communication interface detected error in parameter communication.	If the fault reoccurs repeatedly: Inform the SEW-EURODRIVE Service.

6.5.19 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.

6.5.20 Error 25 Parameter memory monitoring

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

Subfault: 25.6 Description: NV memory – incompatible data	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Incompatible data detected while reading non-volatile memory.	The data on the (mobile) non-volatile memory might have been formatted for another device. You can rectify the error by re-formatting the data (basic initialization).

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

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

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

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

24748536/EN – 11/2017

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

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

Subfault: 25.16 Description: Calibration of power section – CRC error	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Faulty calibration data of power section.	Contact the SEW-EURODRIVE Service.

Subfault: 25.17 Description: Calibration data of control electronics – CRC error	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Faulty calibration data of control electronics	Contact the SEW-EURODRIVE Service.

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

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

Subfault: 25.20 Description: Initialization error – basic unit memory	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Initialization error of the basic unit memory.	Contact the SEW-EURODRIVE Service.

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

Subfault: 25.30 Description: Initialization error – replaceable memory module	
Response: Output stage inhibit System state: Fault ackn.with CPU reset	
Cause	Measure
Initialization error of the replaceable memory module.	Contact the SEW-EURODRIVE Service.

Subfault: 25.31 Description: Runtime error – replaceable memory module	
Response: Output stage inhibit System state: Fault ackn.with CPU reset	
Cause	Measure
Runtime error of the replaceable memory module.	Contact the SEW-EURODRIVE Service.

24748536/EN – 11/2017

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

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

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

Subfault: 25.70 Description: NV memory – incompatible option card configuration	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Incompatible option card configuration detected. The current configuration of the option card does not match the state of the stored startup. An option card that was installed during startup has been removed, for example.	Restore the initial option setup. – Acknowledge the changed configuration in MOVISUITE®: Diagnostics/Status/Error status/Reset = "with parameter acceptance". – Reset the device to delivery state in MOVISUITE®: Reset setup/device parameters / Reset delivery state = "Yes".

6.5.21 Fault 26 External fault

Subfault: 26.1 Description: Terminal	
Response: External fault	
Cause	Measure
Error message from external error source	Programmable via 8622.5 (default: application stop (+ES)).

Subfault: 26.2 Description: Emergency shutdown	
Response: Output stage inhibit	
Cause	Measure
Another module bus station has requested external emergency shutdown.	Check other module bus stations for errors.

Subfault: 26.3 Description: Power section emergency shutdown	
Response: Output stage inhibit	
Cause	Measure
Power section requested external emergency shutdown	The power section has detected a critical fault.

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 braking resistor mounting position. – Clean the braking resistor. – Check project planning of the resistor. – Install a larger braking resistor. – Check trip switch settings. – Optimize travel cycle so that less regenerative energy is generated.

24748536/EN – 11/2017

6.5.22 Fault 28 FCB drive functions

Subfault: 28.1
Description: FCB 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 encoder wiring.

Subfault: 28.2
Description: FCB 12 – Hardware limit switch before 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 behind the hardware limit switch.

Subfault: 28.3
Description: FCB 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 properly	Make sure that reference cam and hardware limit switch are installed so they overlap.

Subfault: 28.4
Description: FCB 12 – Reference offset error

Response: Emergency stop + output stage inhibit

Cause	Measure
Error while determining reference offset.	– Make sure that the reference offset is not set to a larger value than the "Modulo max." limit value. – When using a single-turn absolute encoder, make sure that the reference offset is not set to a larger value than one encoder revolution.

Subfault: 28.5
Description: FCB 12 – Referencing not possible

Response: Emergency stop + output stage inhibit

Cause	Measure
In active drive train, "Actual position source" parameter is set to "No encoder"	Assign "Actual position source", or do not perform referencing.

Subfault: 28.6
Description: FCB 12 – Limit switch/reference cam not flush/overlapping with fixed stop

Response: Emergency stop + output stage inhibit

Cause	Measure
A hardware limit switch or reference cam that was not selected was hit 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 hitting 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 was started with an incremental encoder but was aborted prematurely.	– Restart the rotor position identification. – Check whether the encoder is connected correctly. – Check whether encoder is defective.
The result of rotor position identification cannot be stored in the encoder.	Select "inverter" as storage location.
The combination of "Automatic" mode and "Encoder" storage location is 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 the SEW-EURODRIVE Service.

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

6.5.23 Fault 29 HW limit switch

Subfault: 29.1 Description: Positive limit switch hit	
Response: HW limit switches – current drive train	
Cause	Measure
Positive hardware limit switch hit	– Check hardware limit switch wiring. – Check target position. – Move clear with negative speed.

24748536/EN – 11/2017

Subfault: 29.2 Description: Negative limit switch hit		
	Response: HW limit switches – current drive train	
	Cause	Measure
	Negative hardware limit switch hit	– Check hardware limit switch wiring. – Check target position. – Move clear with positive speed.

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

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

6.5.24 Fault 30 SW limit switch

Subfault: 30.1 Description: Positive limit switch hit		
	Response: SW limit switches – current drive train	
	Cause	Measure
	The positive software limit switch was hit.	– Check software limit switch position. – Check target position. – Move clear with negative speed.

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

Subfault: 30.3 Description: Limit switches reversed		
	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.

6.5.25 Error 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 temperature sensor wiring.

Subfault: 31.2 Description: Temperature sensor short circuit – motor 1		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Short circuit in the connection to the temperature sensor of motor 1.	Check 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.	– Let motor cool down. – Check for motor overload.

Subfault: 31.4 Description: Temperature model overtemperature – motor 1		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of motor 1 signals overtemperature	– Let motor cool down. – Check for motor overload.

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

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

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

Subfault: 31.9 Description: Temperature too low – temperature sensor – motor 1		
	Response: Warning with self reset	
	Cause	Measure
	The temperature signaled by the temperature sensor of motor 1 is below -50 °C.	– Check if a KTY temperature sensor is installed in the motor but the parameterization is 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 temperature sensor wiring.

Subfault: 31.12 Description: Temperature sensor short circuit – motor 2		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Short circuit in the connection to the temperature sensor of motor 2.	Check 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.	– Let motor cool down. – Check for motor overload.

24748536/EN – 11/2017

Subfault: 31.14 Description: Temperature model overtemperature – motor 2		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of motor 2 signals overtemperature	– Let motor cool down. – Check for motor overload.

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 sensor of motor 2 exceeds prewarning threshold.	– Check for motor overload.

Subfault: 31.19 Description: Temperature too low – temperature sensor – motor 2		
	Response: Warning with self reset	
	Cause	Measure
	The temperature signaled by the temperature sensor of motor 2 is below -50 °C.	– Check if a KTY temperature sensor is installed in the motor but the parameterization is carried out for a PT1000 temperature sensor. – Heat the motor.

6.5.26 Error 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 system bus and module bus. – Check for correct setting of the EtherCAT®/SBus^{PLUS} configuration in the MOVI-C® CONTROLLER. – Check EtherCAT®/SBus^{PLUS} timeout configuration in the device.

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

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

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

Subfault: 32.6 Description: Copy parameter set		
	Response: Output stage inhibit	
	Cause	Measure
	Error while downloading parameter set to device	– Check the wiring of 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 IEC program. – Restart IEC program.

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 error. – Restart the manual mode.
	Scope measurement loaded from device	– Reset error. – Restart the manual mode.

6.5.27 Error 33 System initialization

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

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

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

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

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

24748536/EN – 11/2017

Subfault: 33.10 Description: Boot timeout		
	Response: Output stage inhibit System state: Fault ackn.with CPU reset	
	Cause	Measure
	Timeout during system boot	Contact the SEW-EURODRIVE Service.

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

Subfault: 33.12 Description: Memory module plugged		
	Response: Output stage inhibit System state: Fault ackn.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 device. Remove the memory module and restart the device. – Change the parameter non-volatile memory source to "Arbitrary" or "Replaceable memory module". Switch device off and on again.

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

6.5.28 Error 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.

6.5.29 Error 35 Function activation

Subfault: 35.1 Description: Invalid TAN		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Incorrect TAN entered	Enter TAN again.
	The TAN was not created for this device.	Check TAN.
	When using a double axis, the TAN was generated for the wrong subaddress in the device.	Enter a TAN for the assigned subaddress.

Subfault: 35.2 Description: Application requires a higher license		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Activated application module requires higher license.	Enter a TAN for higher application activation.

Subfault: 35.3 Description: Technology activation missing		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	An activated technology function requires a license level that is not available.	– Enter a TAN to activate the required technology function. – Activate the technology function that can be operated with the current technology activation.

Subfault: 35.4 Description: Technology activation for wrong device variant		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	This device does not support the technology activation included in this TAN.	– Activate a technology function that is supported by this device. – Use a device that supports the required technology function.

6.5.30 Error 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 encoder connection.
	Inverted position encoder or position encoder that was incorrectly installed at the track.	Check installation and connection of the position encoder.
	Wiring faulty.	Check wiring of encoder, motor, and line phases.
	Acceleration ramps too short	Extend acceleration ramps.
	P component of position controller too small.	Set larger P component of position controller.
	Incorrectly set speed controller parameters.	Check controller parameters.
	Value of lag error tolerance too small.	Increase lag error tolerance.
	Mechanical components cannot move freely or are blocked.	Make sure mechanical parts can move freely, 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 encoder connection.
	Inverted position encoder or position encoder that was incorrectly installed at the track.	Check installation and connection of the position encoder.
	Wiring faulty.	Check wiring of encoder, motor, and line phases.
	Acceleration ramps too short	Extend acceleration ramps.
	P component of position controller too small.	Set larger P component of position controller.
	Incorrectly set speed controller parameters.	Check controller parameters.
	Value of lag error tolerance too small.	Increase lag error tolerance.
	Mechanical components cannot move freely or are blocked.	Make sure mechanical parts can move freely, check whether they are blocked.

24748536/EN – 11/2017

Subfault: 42.3 Description: Standard lag error		
	Response: Output stage inhibit	
	Cause	Measure
	A lag error occurred outside a positioning process. Incorrect encoder connection.	Check the encoder connection.
	Inverted position encoder or position encoder that was incorrectly installed at the track.	Check installation and connection of the position encoder.
	Wiring faulty.	Check wiring of encoder, motor, and line phases.
	Acceleration ramps too short	Extend acceleration ramps.
	P component of position controller too small.	Set larger P component of position controller.
	Incorrectly set speed controller parameters.	Check controller parameters.
	Value of lag error tolerance too small.	Increase lag error tolerance.

6.5.31 Fault 46 Safety card

Subfault: 46.1 Description: No response		
	Response: Output stage inhibit	
	Cause	Measure
	Failed to synchronize with subcomponent.	– Check the device assignment of basic device and option. Check the card slot and installation and correct if necessary. – Perform a device restart. – Contact the SEW-EURODRIVE Service.

Subfault: 46.2 Description: Invalid variant		
	Response: Output stage inhibit	
	Cause	Measure
	Plugged safety card variant does not match inverter type.	– Remove option. – Use the correct variant of the safety card.
	For double axes, only variants without encoder interface can be used.	– Remove option. – Use the variant 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 the 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 the 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"	

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"	

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"	

6.5.32 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.	

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 axis performs a fault response that is determined by the driver for the supply unit implemented on the axis.	

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 axis performs a fault response that is determined by the driver for the supply unit implemented on the axis.	

6.5.33 Error 48 Module bus

Subfault: 48.1 **Description: Incompatible**	
Response: Output stage inhibit	
Cause	Measure
Module bus slave and module bus master not compatible	

Subfault: 48.2 **Description: Timeout**	
Response: Emergency stop + output stage inhibit	
Cause	Measure
Timeout detected by module bus.	Check cable connections and voltage supply of module bus stations.

6.5.34 Fault 50 I/O card

Subfault: 50.1 **Description: Boot synchronization timeout**	
Response: Output stage inhibit	
Cause	Measure
Card is plugged in device but cannot be addressed.	– 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 the card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

Subfault: 50.3 **Description: CRC fault of option card**	
Response: Output stage inhibit	
Cause	Measure
Option card signals CRC error on SPI bus	Check the card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

24748536/EN – 11/2017

Subfault: 50.4 Description: Option card timeout error	
Response: Output stage inhibit	
Cause	Measure
Option card signals timeout error on SPI bus	Check the card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

Subfault: 50.5 Description: Watchdog error of option card	
Response: Output stage inhibit	
Cause	Measure
Micro controller of the option card signals a watchdog error.	Check the 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
The card has booted but cyclic communication is not possible.	Check the 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 unit	–

6.5.35 Error 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 input current.

6.5.36 Error 52 Explosion protection category 2 function

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

Subfault: 52.2 Description: Illegal system function	
Response: Output stage inhibit	
Cause	Measure
Illegal system function activated	

Subfault: 52.3 Description: Inverter too large	
Response: Output stage inhibit	
Cause	Measure
Ratio of inverter current and nominal motor current too large	

Subfault: 52.4 Description: Parameterization of current limit characteristic	
Response: Output stage inhibit	
Cause	Measure
Error while setting parameters for current limit characteristic.	

24748536/EN – 11/2017

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	

24748536/EN – 11/2017

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 the SEW-EURODRIVE Service.

24748536/EN – 11/2017

6.7 Responses to error acknowledgement

6.7.1 Error 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.

6.7.2 Error 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.

24748536/EN – 11/2017

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 an fault, the fault message is deleted. The system changes to the state "Waiting for data".

24748536/EN – 11/2017

6.8 Fault responses

6.8.1 Default – fault response

Fault response	Description
No response	The inverter ignores the event
Warning with self reset	The inverter issues 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 83750-13 Parameter set 2 Index 83758-13 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 83750-20 Parameter set 2 Index 83758-20
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.

6.8.2 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 error	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

24748536/EN – 11/2017

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

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

24748536/EN – 11/2017

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 the 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
- Error message on the status display
- Nature of the fault
- Accompanying circumstances
- 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" (→ 🗎 58).
- Install the closing covers according to the regulations, see chapter "Touch guards" (→ 🗎 58).
- Never start up the application inverter without installed closed touch guards and closing covers.

24748536/EN – 11/2017

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 steps are recommended:

AC 400/500 V devices:

- Step 1: 0 V to AC 350 V within a few seconds.
- Step 2: AC 350 V for 15 minutes.
- Step 2: AC 420 V for 15 minutes.
- Step 3: 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 from capacitors that have not been fully discharged.

Severe or fatal injuries.

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

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 (circuit boards)
- Plastics
- Sheet metal
- Copper
- Aluminum

24748536/EN – 11/2017

8 Technical Data

8.1 Markings

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

Marking	Meaning
CE	The CE marking 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.
EAC	The EAC marking states compliance with the requirements of the technical regulations of the Customs Union of Russia, Kazakhstan, and Belarus.
RCM	The RCM marking states compliance with the technical regulations of the Australian Communications and Media Authority ACMA.
50	The China RoHS marking states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
c UL us LISTED	The UL and cUL marking state the UL approval.[1)] cUL is equivalent to CSA approval.

1) The UL and cUL marking for the following devices are still in preparation at the time of publication of this document: MDA90A-0640 – 1800-… , MDP90A-0500 – 1100-… and UHX45A-N/MDM90A

24748536/EN – 11/2017

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

MOVIDRIVE® modular	
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 installed, speed-controlled fan.

Environmental conditions	
Climatic requirements	• Extended storage: EN 60721-3-1 class 1K2 temperature -25 °C to +70 °C • Transportation: EN 60721-3-2 class 2K3 temperature -25 °C to +70 °C • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3K3 temperature 0 °C to +45 °C
Chemically active substances	• Extended storage: EN 60721-3-1 class 1C2 • Transportation: EN 60721-3-2 class 2C2 • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3C2
Mechanically active substances	• Extended storage: EN 60721-3-1 class 1S1 • Transportation: EN 60721-3-1 class 2S1 • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3S1
Vibration testing	• 3M5 according to EN 60721-3-3 • 5M1 according to EN 60721-3-5

Degree of protection according to EN 60529	
Power supply modules MDP90A-0100-... – MDP90A-0250-...	IP20
Power supply modules MDP90A-0500-... and larger	IP10
Axis modules MDA90A-0020-... – MDA90A-0480-... MDD90A-0020-... – MDD90A-0080-...	IP20
Axis modules MDA90A-0640-... – MDA90A-1800-...	IP10, optional IP20

Pollution class	2 according to IEC 60664-1
Overvoltage category	III according to IEC 60664-1
Installation altitude	Up to h ≤ 1000 m without restrictions. The following restrictions apply to heights ≥ 1000 m: • From 1000 m to max. 3800 m: I_N reduction by 1% per 100 m • From 2000 m to max. 3800 m: To maintain protective separation and the air gaps and creepage distances according to EN 61800-5-1, you have to connect an overvoltage protection device in order to reduce the overvoltages from category III to category II.

24748536/EN – 11/2017

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 V_{line}	V	3 × 380 – 500 V					
Nominal line current AC I_{line}	A	16		40	82	120	175
Line frequency f_{line}	Hz	50 – 60 Hz ± 10%					
Controlled rectifier		No		Yes			
X1 connection		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[1]		Screw M6 × 16 Max. 16 mm²	Screw M10 × 18 Max. 70 mm²		Screw M10 × 25 Max. 120 mm²
PE connection				M6 × 16	M10 × 18		M10 × 25
Output (DC link)							
Nominal DC link voltage V_{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 bars					
		Screw M6 × 16					Screw M8 × 20
PE connection		Screw M6 × 16					
Brake chopper and braking resistor							
Minimum braking resistance R_{BRmin}	Ω	26		10	4.7	3.6	2.3
Maximum brake chopper power	kW	250% × P_N					
Mean regenerative dissipatable power	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 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[1]		Screw M6 × 16 Max. 10 mm²	Screw M6 × 16 Max. 35 mm²		Screw M10 × 25 Max. 70 mm²
		M6 × 16					M10 × 25
General							
Nominal power loss 24 V	W	15			20		30
Nominal power loss power section	W	40		90	190	290	420
Permitted number of times power may be switched on/off		< 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

8.3.2 Electronics data – signal terminals

MDP.. power supply module	Terminal	General electronics data
DC 24 V voltage supply	X5	DC 24 V -10%, +20% according to EN 61131
Cross section and contacts	X5	Copper busbar, M4 × 12
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 closes: No overtemperature. • Signal contact open: Overtemperature. Connect isolated signal contacts only.
	X7.3/4	Reserved
Connection		Plug connector - 1 core: 0.25 – 0.5 mm^2

24748536/EN – 11/2017

8.4 Technical data for 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**	**1000**	**1400**	**1800**
Size		1				2		3		5		6	
Nominal output current I_N PWM = 4 kHz	A	2	4	8	12	16	24	32	48	64	100	140	180
Input													
Nominal DC link voltage V_{NDCL}		DC 560 V											
Nominal DC link current I_{NDCL} [1]	A	2	4	8	12	16	24	32	48	64	100	140	180
Connection for UZ-/UZ+		CU bars											
		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	45	75	90
Nominal output current I_N PWM = 4 kHz	A	2	4	8	12	16	24	32	48	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 with PWM 4 kHz										200%: 3 s with PWM 4 kHz	
Apparent output power S_N [2]	kVA	1.4	2.8	5.5	8.5	11	17	22	33	44	69		
PWM frequency f_{PWM}	kHz	4, 8, 16 (adjustable)										2.5, 4, 8 (adjustable)	
Max. output frequency f_{max}		V/f: 599 Hz VFC^{PLUS}: 250 Hz CFC: 500 Hz ELSM®: 500 Hz											
X2 connection		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[3]				Plug connector - 1 core: 0.5 – 16 mm² - 2 cores: 0.25 – 6 mm² (Twin-AEH)[2]		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)[2]											
General													
Nominal power loss 24 V	W	20				22	25	30		75		115	
Nominal power loss power section	W	15	35	65	90	110	185	240	360	430	670	980	1250
Mass	kg	4			4.1	5.3		7.1		14		18	
Dimensions													
Width	mm	60				90				150		210	300
Height	mm	328						428					
Depth	mm	265											

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

2) In relation to PWM = 4 kHz

3) AEH: Conductor end sleeve

8.4.2 MDD performance data

MOVIDRIVE® modular	Unit	MDD90A-...-503-X-...		MDD90A-...-503-X-... With card slot		
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 V_{NDCL}		DC 560 V				
Nominal DC link current I_{NDCL} [1]	A	4	8	4	8	16
Connection for UZ-/UZ+		CU bars				
		Screw M6 × 16				
PE connection		Screw M6 × 16				
Motor output						
Output voltage V_{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 [2]	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}		V/f: 599 Hz VFC^{PLUS}: 250 Hz CFC: 500 Hz ELSM®: 500 Hz				
X2 connection		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH) [3]				
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 connector - 1 core: 0.25 – 2.5 mm² - 2 cores: 0.5 – 1 mm² (Twin-AEH) [2]				
General						
Nominal power loss 24 V	W	20				25
Nominal power loss power section	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) The nominal DC link current is defined for cosφ = 0.82

2) In relation to PWM = 4 kHz

3) AEH: Conductor end sleeve

24748536/EN – 11/2017

8.4.3 Electronics data – signal terminals

	Terminal designation		Specification
	Single-axis module	Double-axis module	
General			
Design			According to IEC 61131-2
Supply voltage			
Connection	X5		External power supply 24 V according to EN 61131
Connection	X5		Copper busbar, M4 × 12
Digital inputs			
Cycle time I/O			1 ms
Quantity			6
Response Time			100 µs plus cycle time
Assignment	X20: 1 – 6	X20_1: 1 – 6 X20_2: 1 – 6	DI00: "Output stage enable" fixedly assigned. DI01 – DI05: Selection option, see 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). DI04: Primary frequency input (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)[1)] Shield terminals for control cables available.
Digital outputs			
Cycle time I/O			1 ms
Quantity			• 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: Selection option, see 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			
Assignment	X10:DB0	X10_1:DB0 X10_2:DB0	DB00: – Direct control DC 24 V BK brake: CMP40 63 – Direct control DC 24 V BP brake: CMP71 - Brake control
	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 input			
	X15:13	X15:13_1 X15:13_2	X15:13 DC 24 V, I_{max} = 500 mA

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

1) AEH: Conductor end sleeve

INFORMATION

Freewheeling diode application

If inductive loads are connected to the 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 according to 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 the deactivation of the rotating field		–	1.5 ms	10 ms
Time from connecting the safety voltage until the activation of the rotating field		–	–	110 ms
Connection		Plug connector - 1 core: 0.25 – 1.5 mm^2 - 2 cores: 0.25 – 0.5 mm^2 (Twin-AEH)[1)]		

1) AEH: Conductor end sleeve

24748536/EN – 11/2017

8.4.5 Different functionality of the axis modules MDA/MDD

Functionality	MDA90A-.. single-axis module	MDD90A-..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	2.5 kHz/4 kHz/8 kHz/16 kHz	4 kHz/8 kHz
PWM frequency 4 kHz noise	Yes	-
Process data processing basic cycle	500 µs/1 ms/1ms PLC	1 ms
Simple encoder evaluation via digital inputs (DI04/DI05)	Yes	-
Primary frequency input (DI04)	Yes	-
Sampling cycle n/X control	0.25 ms/0.5 ms/1 ms/2 ms	0.5 ms/1 ms/2 ms

24748536/EN – 11/2017

8.5 Technical data of the master module UHX45A/MDM90A

MOVIDRIVE® modular	Terminal	UHX45A/MDM90A
Input		
DC 24 V supply[1]	X5_A	40 A
Connecting contacts		2-pole plug connector • 1 core: 0.5 – 10 mm² • 2 core: 0.5 – 6 mm²
Output		
DC 24 V voltage output UHX45A[2]	X5_B	Maximum 40 A
Fuse for voltage output UHX45A		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

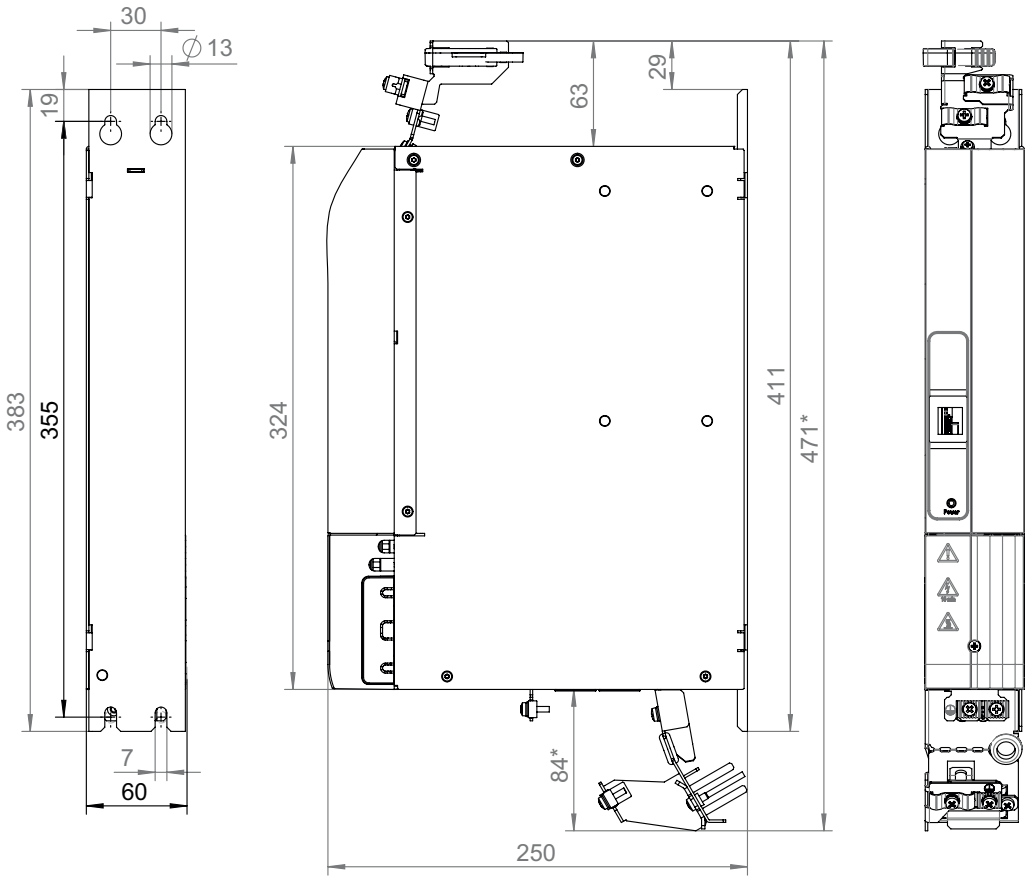
1) The master module can be used to supply the DC 24 V supply voltage for the entire axis system
2) Auxiliary output X5_B for supply of MOVI-C® CONTROLLER advanced UHX45A

24748536/EN – 11/2017

8.6 Dimension sheets of the modules

8.6.1 Dimension sheets of the power supply modules

MDP90A-0100-..
(size 1)



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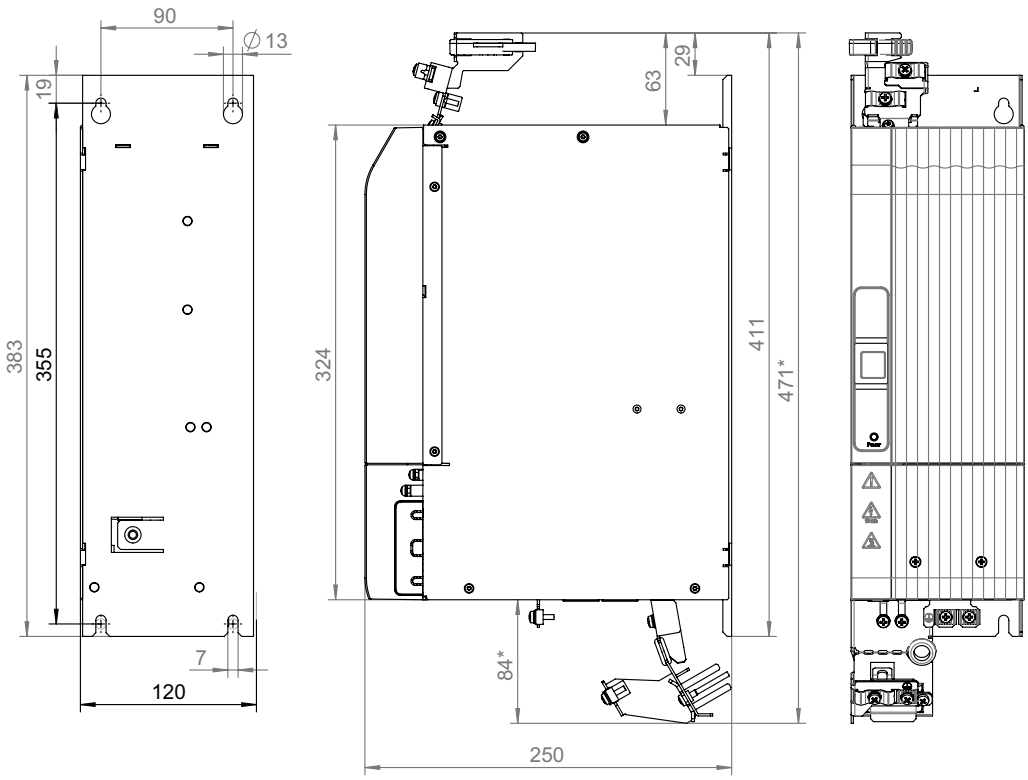
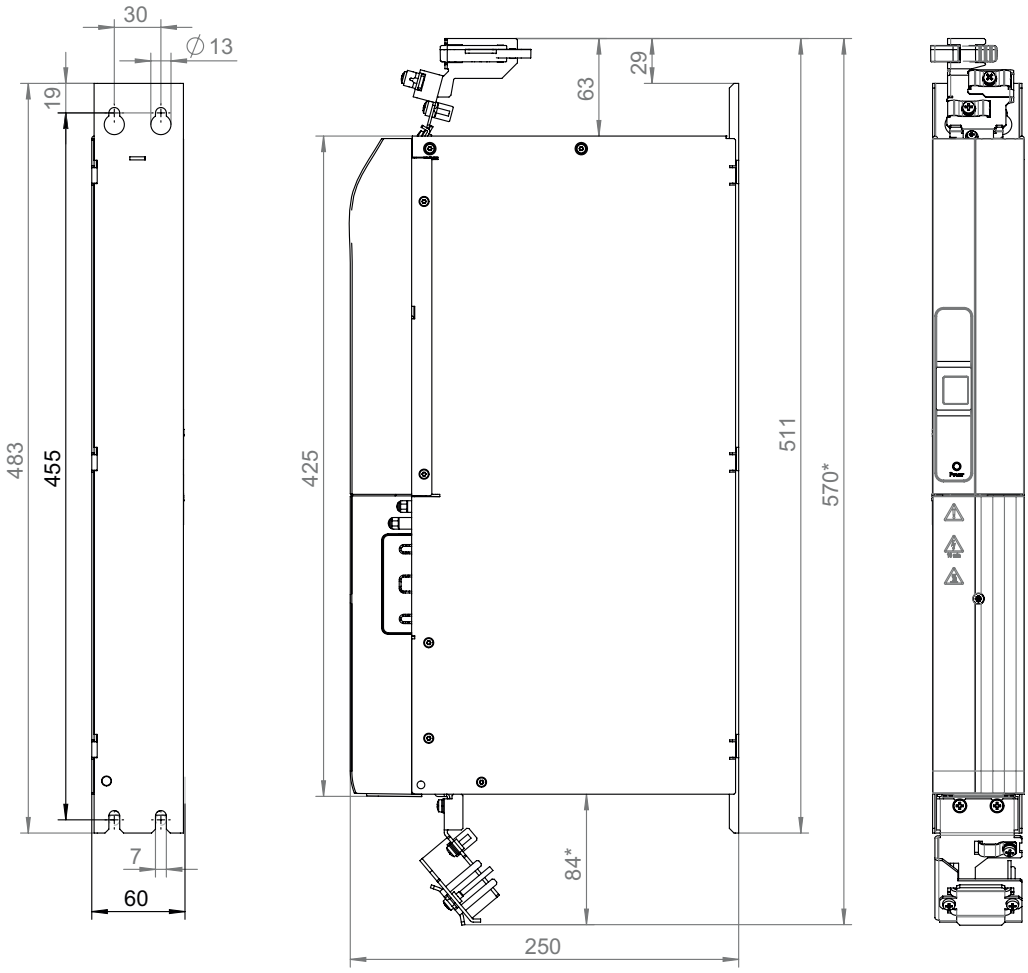
MDP90A-0100-..-
C00 (size 1A)



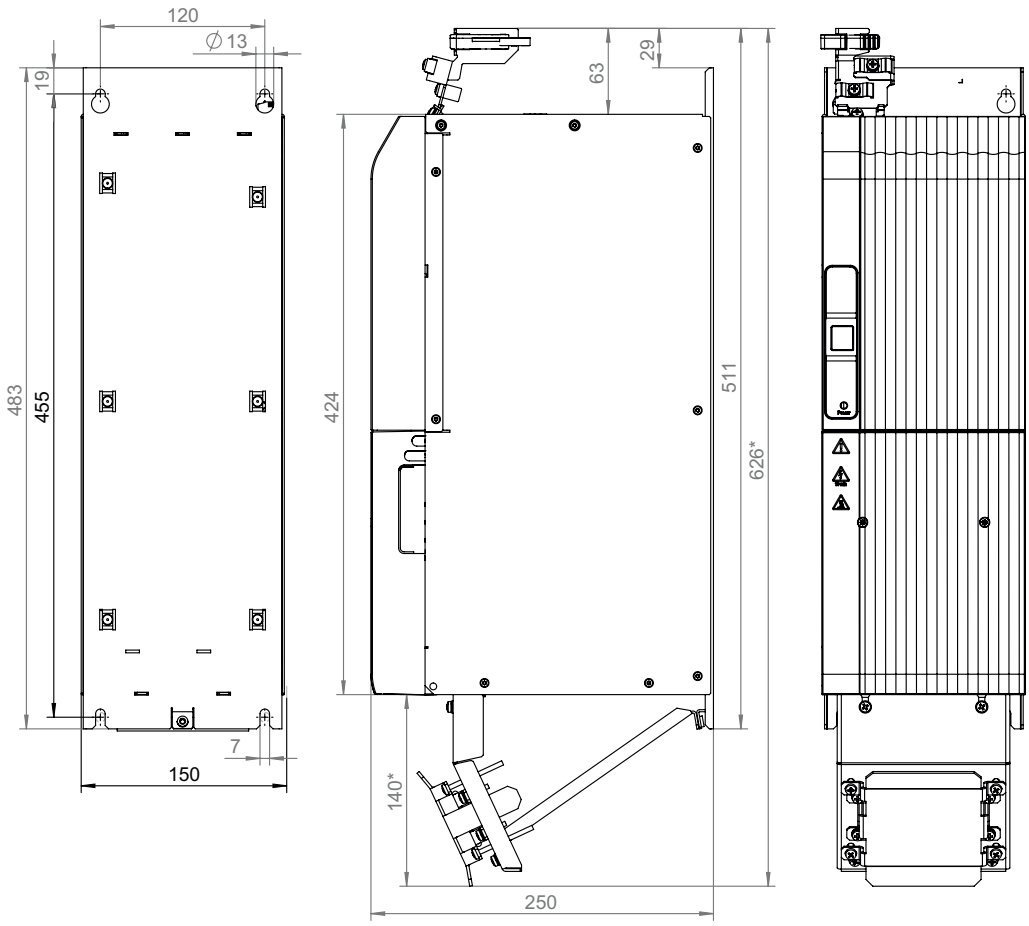
9007215213291147

MDP90A-0250-..
(size 2)



18014414468034571

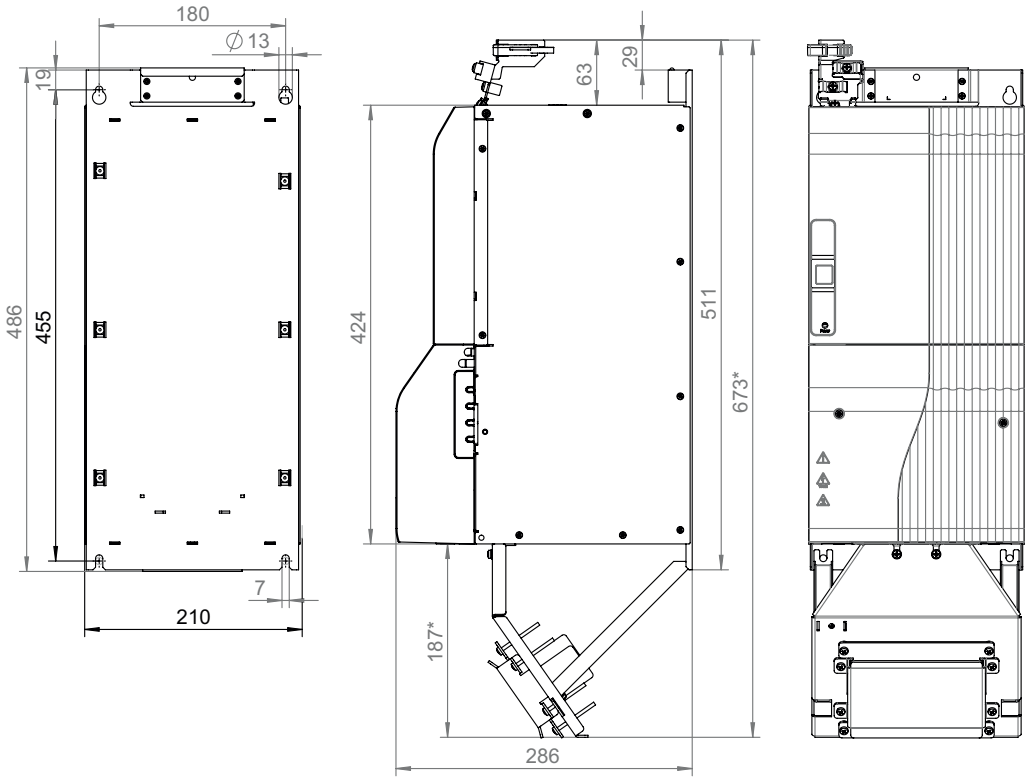
MDP90A-0500 –
0750-.. (size 3)



9007217317195275

24748536/EN – 11/2017

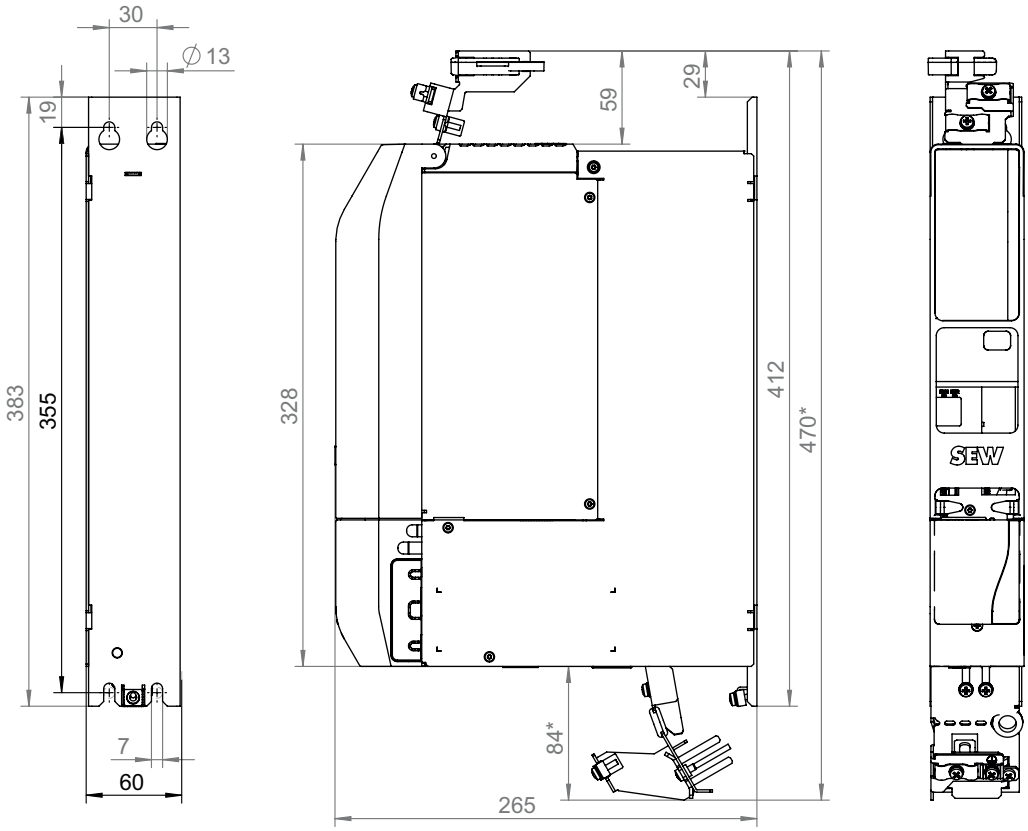
MDP90A-1100-..
(size 4)



9007218299154443

8.6.2 Dimension sheets of the axis modules

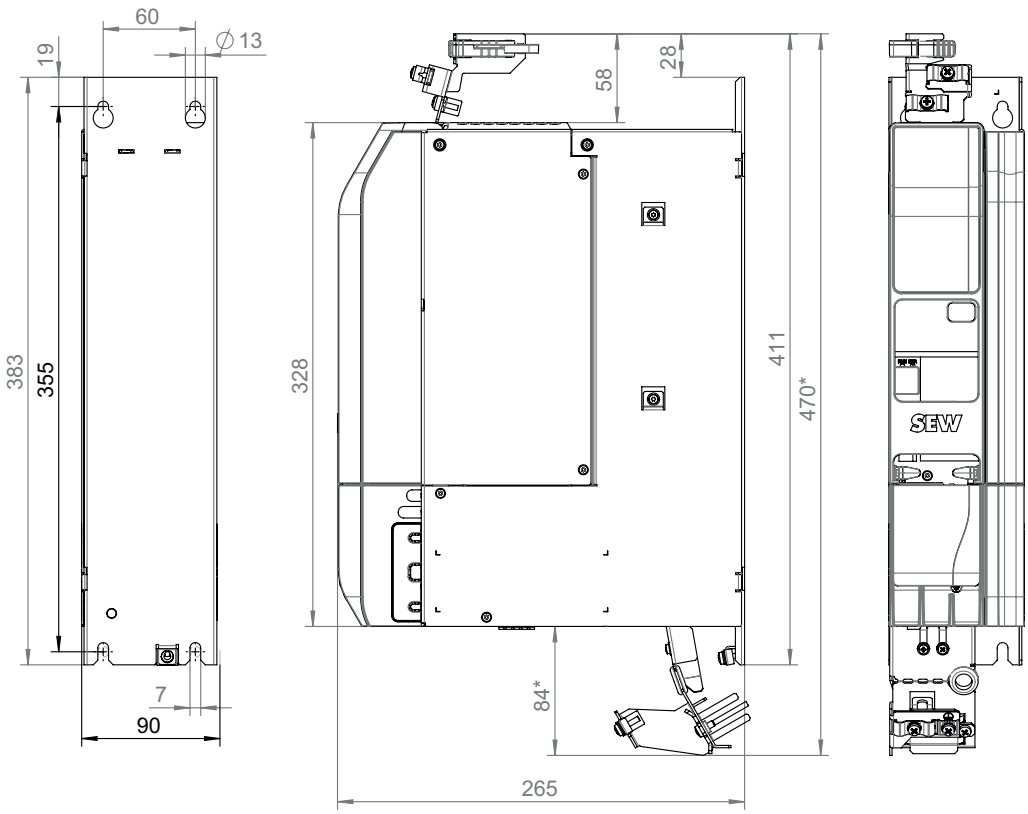
MDA90A-0020 –
0120-.. (size 1)



9007215212815755

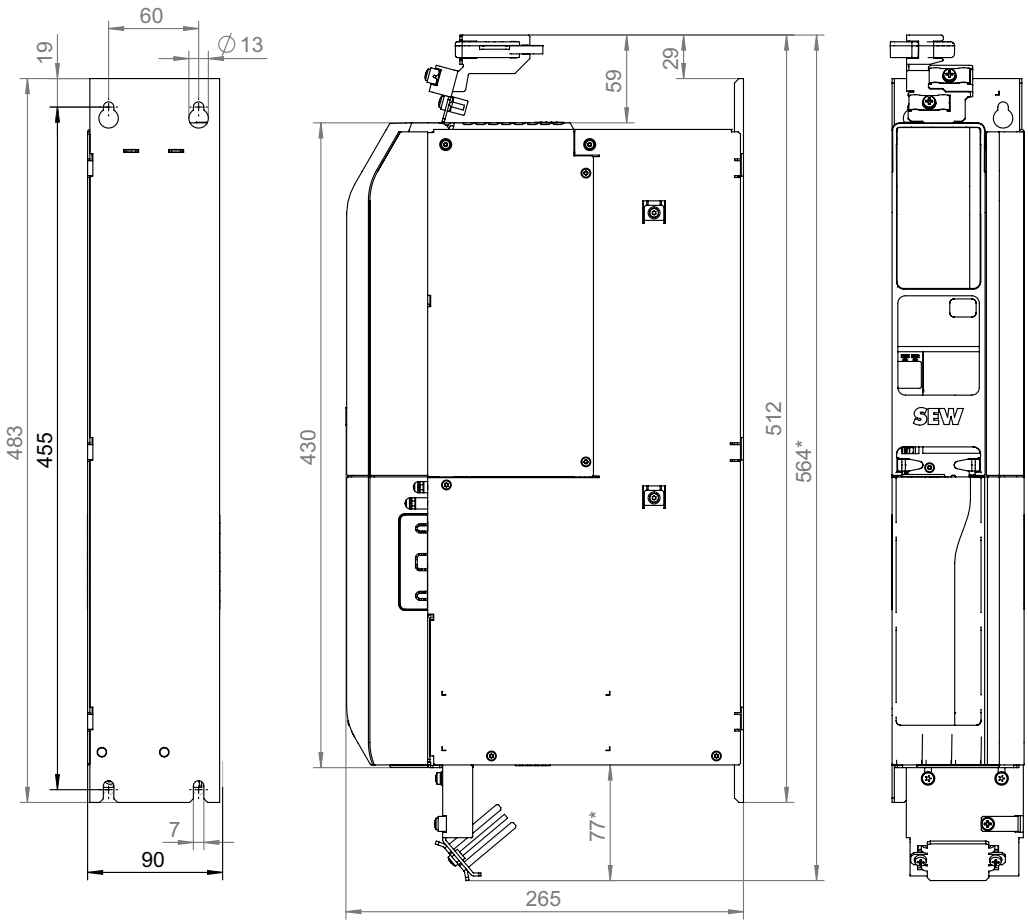
24748536/EN – 11/2017

MDA90A-0160 –
0240-.. (size 2)



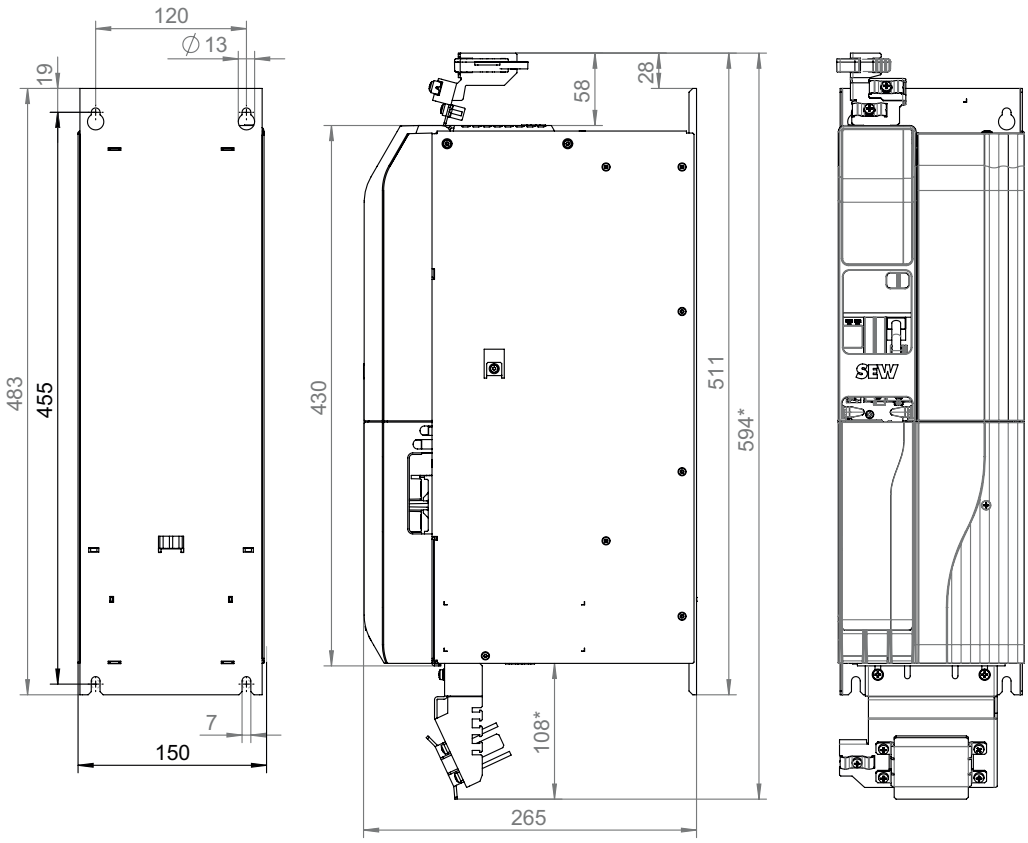
9007215212818187

MDA90A- 0320 –
0480-.. (size 3)



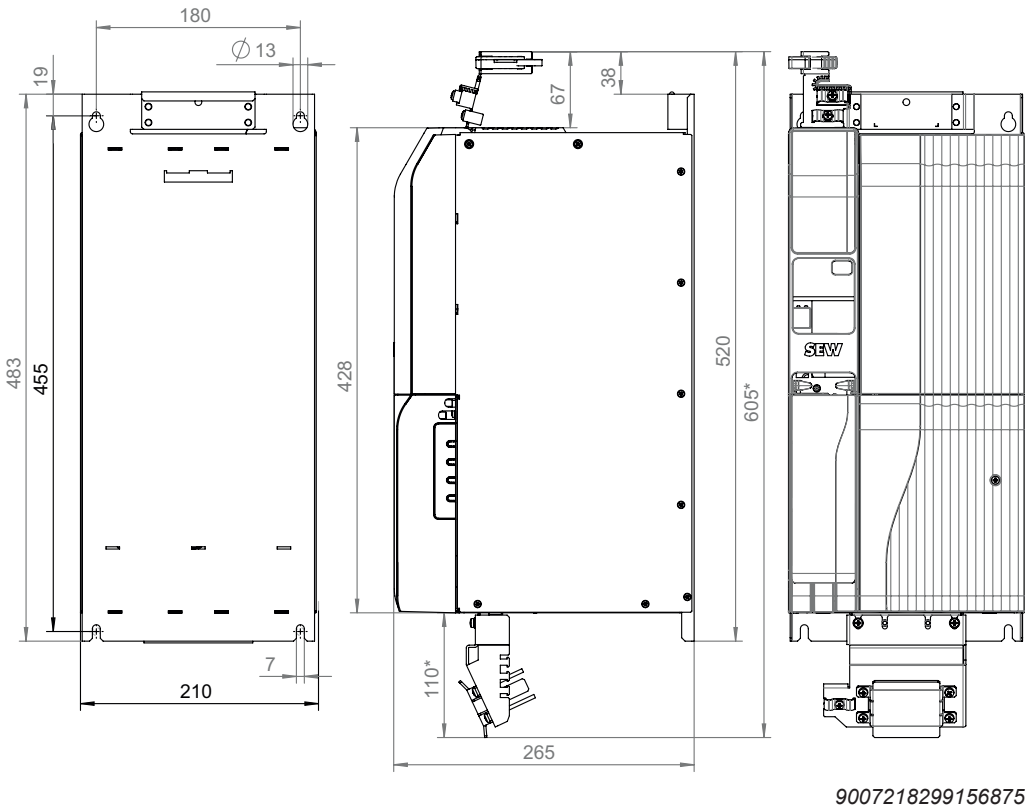
18014414468022411

MDA90A-0640 –
1000.. (size 5)



9007217317192843

MDA90A-1400 –
1800-.. (size 6)



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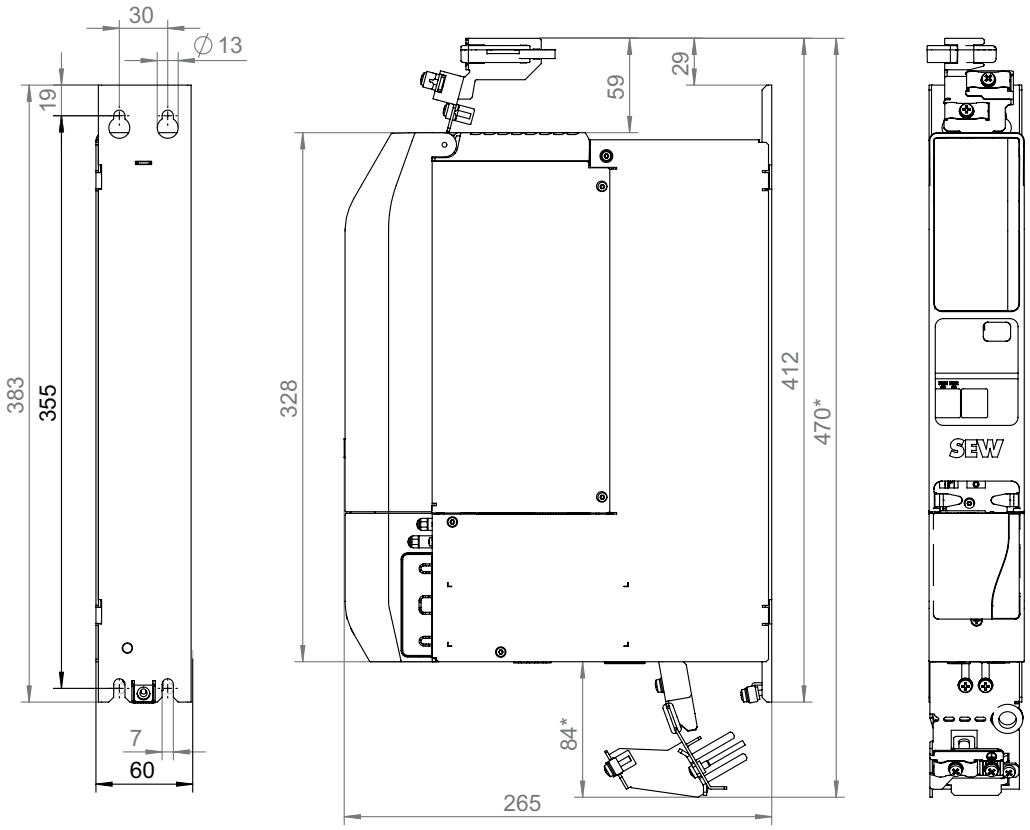
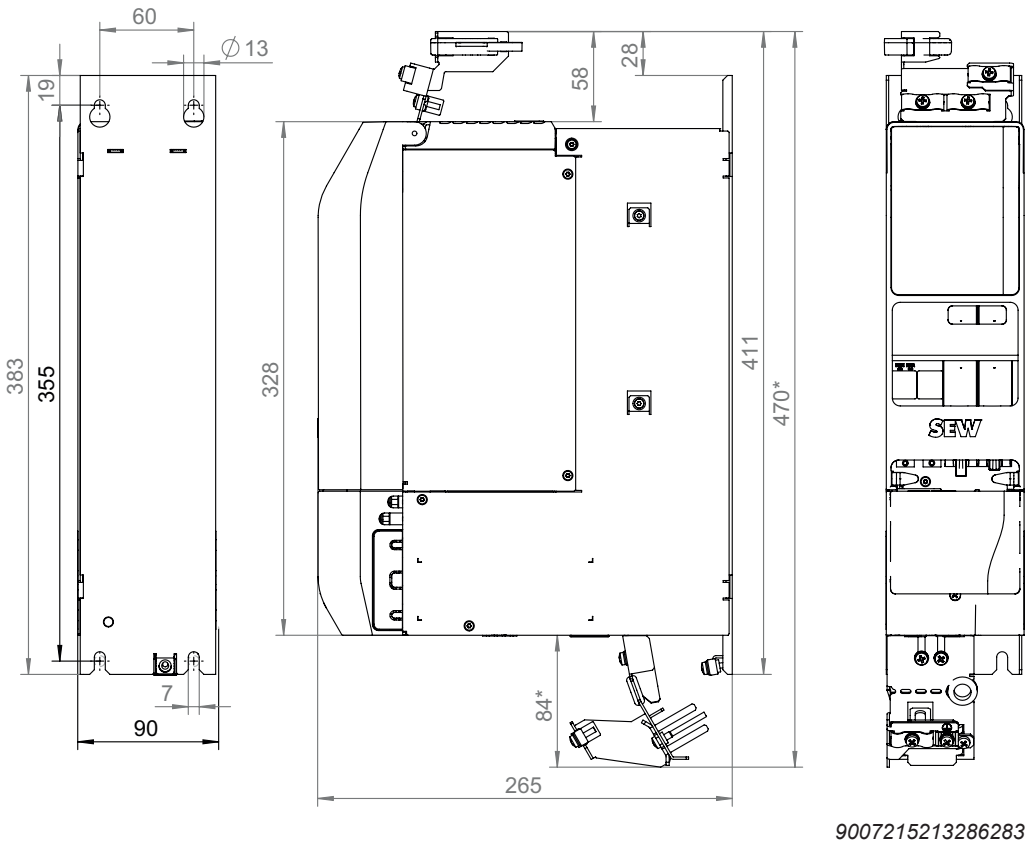
MDD90A-0020 –
0040-.. (size 1)



9007215213283851

MDD90A-0020 –
0080-.. (size 2)



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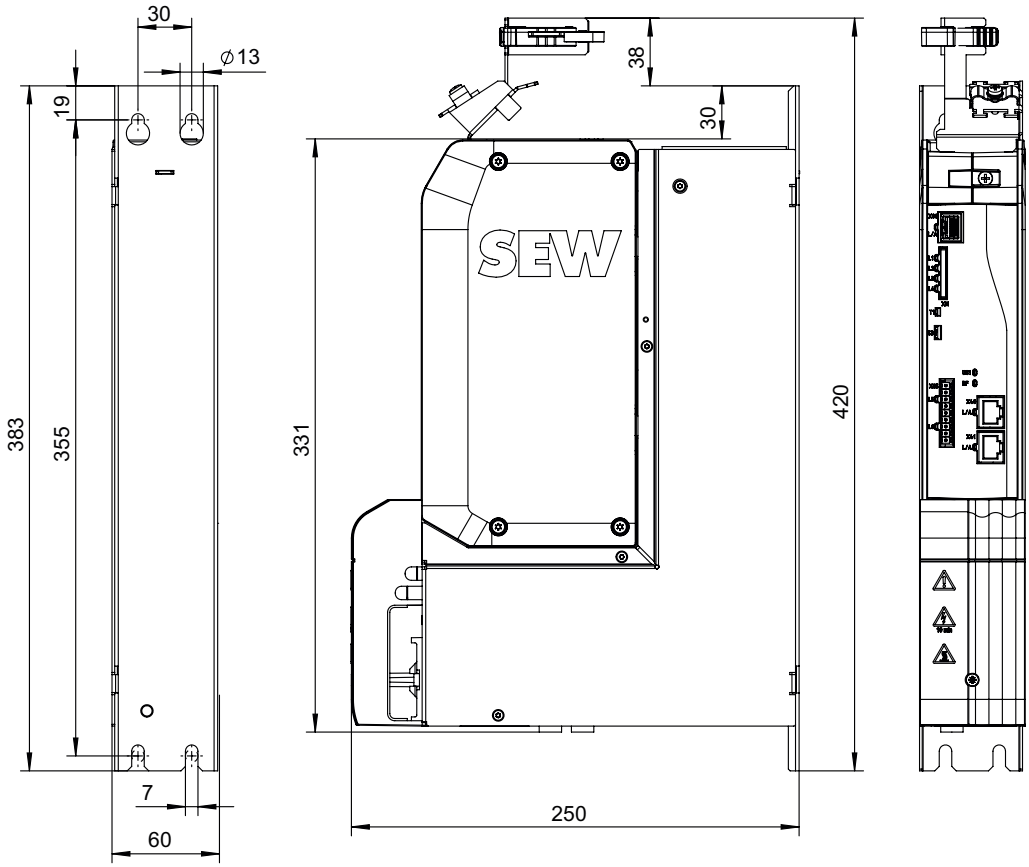
24748536/EN – 11/2017

8.6.3 Dimension drawing of the master module



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8.7 Technical data of the cards

8.7.1 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		Specification
	CIO21A	CID21A	
Part number	28229495	28229487	
General			
Design			According to 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)
Connecting contacts			Plug connector - 1 core: 0.25 – 0.5 mm² Shield terminals for control cables available.
Digital inputs			
Quantity			4
Response Time			160 µs plus cycle time
Assignment	X52: 1 – 4		DI10 – DI13: Selection option, see parameter menu.
	X52: 5		GND
Digital outputs			
Quantity			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: Selection option, see parameter menu.
	X52: 10		GND
Analog inputs			
Quantity			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 Bits), -10 V to +10 V (12 Bits)
Tolerance			±0.5%
Overvoltage immunity			DC -20 V – 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 – DC +10 V
Analog outputs			
Quantity			2
Short-circuit protection			Yes

24748536/EN – 11/2017

	Terminal designation/ specification		Specification
	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)

INFORMATION

Freewheeling diode application

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

24748536/EN – 11/2017

8.7.2 CES11A multi-encoder card

Voltage supply

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

Technical data of encoder supply

	Terminal designation	Specification
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% according to EN 61131
Nominal output current 12 V or 24 V		500 mA
Peak output 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

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

24748536/EN – 11/2017

8.7.3 Safety cards CS..A

Safe digital inputs

F-DI00 – F-DI03	Value/description
Properties	DC 24 V input according 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
Minimum input signal duration[1)]	Input filter time + 50 ms + 4 ms
Response time (input switches -> bit F-DI. in the PROFIsafe user data updated)	• Transition 1 → 0: Input filter time + 2 ms + 4 ms • Transition 0 → 1: Input filter time + 50 ms + 4 ms
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

1) Minimum duration of an activation or deactivation pulse that is guaranteed to be processed by the system and sent with the PROFIsafe user data for at least one bus cycle.

24748536/EN – 11/2017

Sensor supply

F-SS0, F-SS1	Value/description
Properties	• DC 24 V output according to EN 61131-2 • Short circuit and overload protection • No electrical isolation
Rated current	150 mA
Inrush current (≤ 10 ms)	300 mA
Short-circuit protection	180 mA
Internal voltage drop	< DC 1.3 V
Pulsed voltage supply (if activated)	• 1.9 ms – 2.1 ms open (LOW) • Period duration, pulsed voltage supply: 7.5 ms – 8.5 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
Properties	• DC 24 V output according to 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
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 decoupling	≤ 12 µF
Load inductance	≤ 100 µH
Load inductance with freewheeling diode	≤40 H
Minimum load resistance	> 130 Ω

24748536/EN – 11/2017

8.8 Technical data of encoder interfaces

8.8.1 Basic device

	Terminal designation	Specification
Encoder interfaces	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 V_{S24VG}		DC 24 V -10%, +20% according to EN 61131
Nominal output voltage V_{S12VG}		DC 12 V ± 10%
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.

8.8.2 CES11A multi-encoder card

	Terminal designation	Specification
Encoder interfaces	X17:1 – 15	Supported encoders
		SIN/COS
		TTL/HTL
		HIPERFACE®
		EnDat2.1
		SSI
		CANopen
		Encoders with RS422 signals
Connecting contacts		15-pin socket
Encoder supply		
Nominal output voltage V_{S24VG}		DC 24 V -10%, +20% according to EN 61131
Nominal output voltage V_{S12VG}		DC 12 V ± 10%
I_{max}		500 mA
I_{peak} for 150 µs		1000 mA

24748536/EN – 11/2017

8.9 Technical data of braking resistors, filters and chokes

8.9.1 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 (→ 🗎 239).

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" (→ 🗎 107).

UL and cUL approval

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

24748536/EN – 11/2017

Technical data and assignment to an inverter

Technical Data

Braking resistor	Unit	BW047-002	BW047-010-T	BW027-016-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_F	A	1.6	4.6	7.7	9.4
Design		Flat-type resistor	Wire resistor		
Power connections		-	0.75 – 10 mm²		
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

Assignment to an inverter

Braking resistor	Unit	BW047-002	BW047-010-T	BW027-016-T	BW027-024-T
Assignment to MDP90A.		0100 – 1100			

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_F	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 Nm		3
Degree of protection		IP20		
Ambient temperature ϑ_{amb}		-20 °C to +40 °C		
Mass	kg	5.8	8	12

Assignment to an inverter

Braking resistor	Unit	BW012-016	BW012-024	BW012-050-T
Assignment to MDP90A.		0250 – 1100		

Technical Data

Braking resistor	Unit	BW106-T	BW206-T	BW005-070	BW004-050-01	BW002-070	BW003-420-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_F	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 to an inverter

Braking resistor	Unit	BW106-T	BW206-T	BW005-070	BW004-050-01	BW003-420-T	BW002-070
Assignment to MDP90A.		0500 – 1100			0750 – 1100	1100	

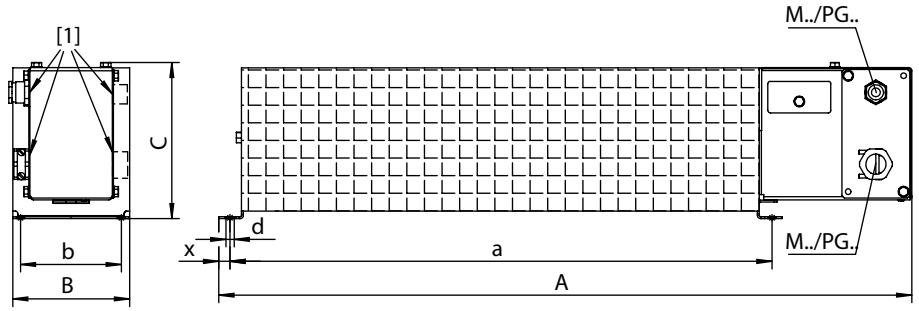
Technical data BW..-T signal contact

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

24748536/EN – 11/2017

Dimension drawings and dimensions

Wire resistor



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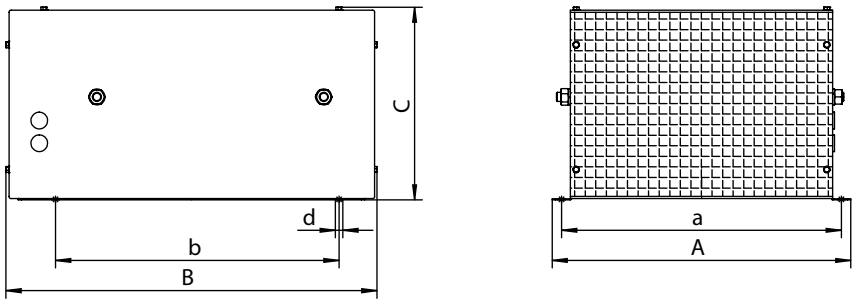
[1] Cable entry is possible from both sides.

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW47-010-T	749	92	125	630	80	6.5	8	M25+M12
BW027-016-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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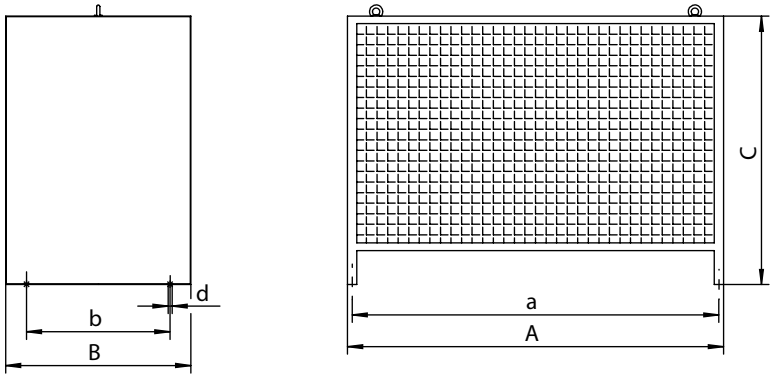
Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW012-050-T	395	490	260	370	380	10.5	-	-
BW106-T	795	490	270	770	380	10.5	-	-
BW206-T	995	490	270	970	380	10.5	-	-
BW005-070	395	490	260	370	380	10.5	-	-
BW004-050-01	395	490	260	370	380	10.5	-	-
BW002-070	395	490	260	370	380	10.5	-	-

24748536/EN – 11/2017

Grid resistor mounting position 2



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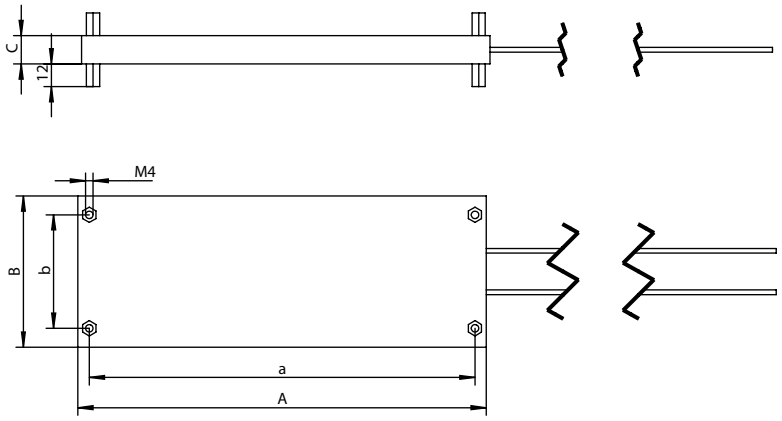
Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW003-420-T	995	490	710	970	380	10.5	-	-

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	-	-	-

24748536/EN – 11/2017

8.9.2 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 thermal circuit breaker has the cRUus approval, independent of the application 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		

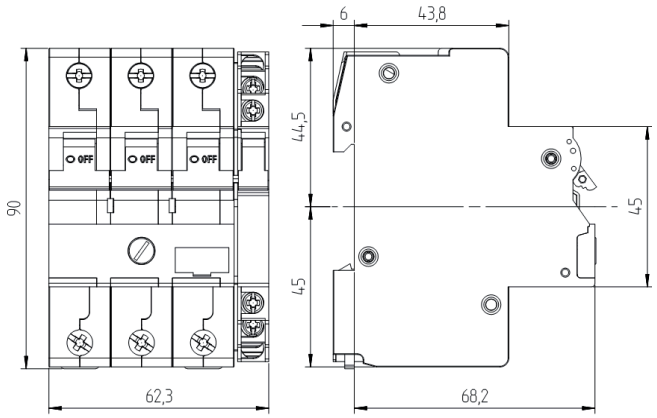
Circuit breaker type	Unit	TCB0160	TCB0200	TCB0250	TCB0320	TCB0400
Part number		19170459	19148658	19170467	19170475	19170483
Setting range	A	10 – 16	16 – 20	20 – 25	25 – 32	32 – 40
Connection cross section main contact	mm^2	2.5 – 16	4 – 16		6 – 16	10 – 16
Tightening torque	Nm	2.5				
Signal contact connection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

24748536/EN – 11/2017

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 drawing



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24748536/EN – 11/2017

8.9.3 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 cRUus approvals independent of the application inverter.

Technical data

Line filter	NF0420-513	NF0420-523
Part number	17983789	17983797
Nominal line voltage V_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	
Terminal contacts L1/L2/L3 - L1'/L2'/L3'	2.5 – 16 mm²	
Tightening torque L1/L2/L3 - L1'/L2'/L3'	2 – 4 Nm	2 – 2.3 Nm
PE terminal 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 V_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	
Terminal contacts L1/L2/L3 - L1'/L2'/L3'	25 – 50 mm²	16 – 120 mm²
Tightening torque L1/L2/L3 - L1'/L2'/L3'	6 – 8 Nm	12 – 20 Nm
PE terminal contact	M8	M10
Tightening torque PE	12 Nm	23 Nm
Degree of protection	IP20 according to EN 60529	
Weight	5 kg	9 kg

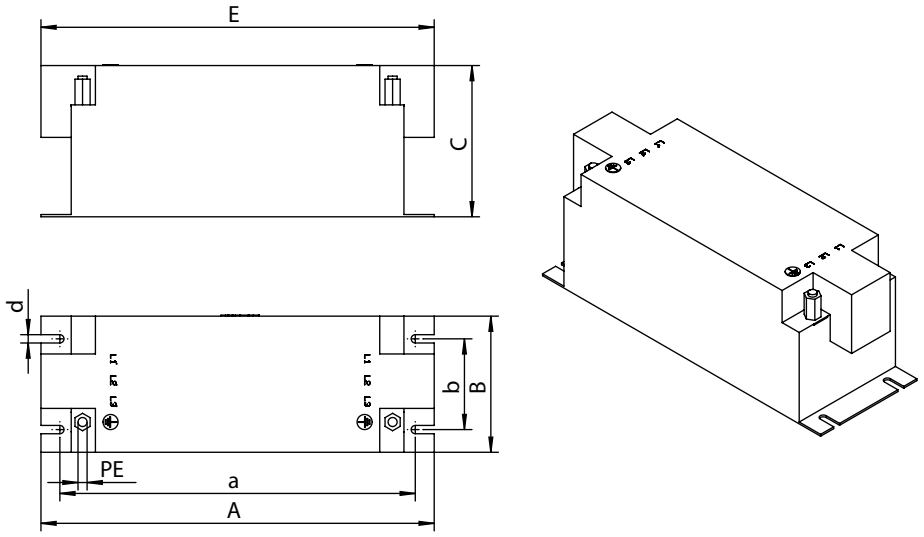
Assignment to an inverter

Line filter	NF0420-513	NF0420-523
Assignment to MDP90A-	0100, 0250	

Line filter	NF0910-523	NF1800-523
Assignment to MDP90A-	0500	0750

24748536/EN – 11/2017

Dimension drawings and dimensions



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Line filter	Main dimensions in mm				Mounting dimensions in mm			
	A	B	C	E	a	b	d	PE
NF0420-513	250	88	97	255	235	60	5.5	M6
NF0420-523	330	83	187	340	314	55	6.5	M6
NF0910-503	270	100	152	320	255	65	6.5	M8
NF1800-503	380	132	185	465	365	102	6.5	M10

24748536/EN – 11/2017

8.9.4 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 application inverter.

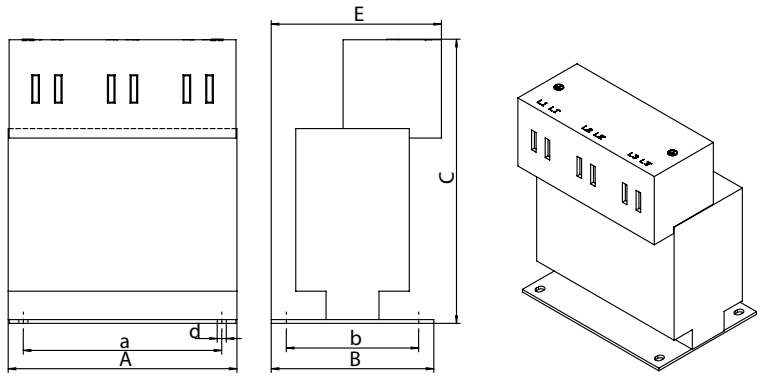
Technical data

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	
Ambient temperature ϑ_{amb}	0 °C to 45 °C			
Terminal contacts L1/L2/L3 - L1'/ L2'/L3'	0.2 – 10 mm²	2.5 – 16 mm²	25 – 50 mm²	16 – 120 mm²
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			
Weight	1.95 kg	1.82 kg	4.6 kg	

Assignment to an inverter

Line choke	ND0300-503	ND0420-503	ND0910-503	ND1800-503
Assignment to MDP90A-	0100	0250	0500	0750

Dimension drawings and dimensions



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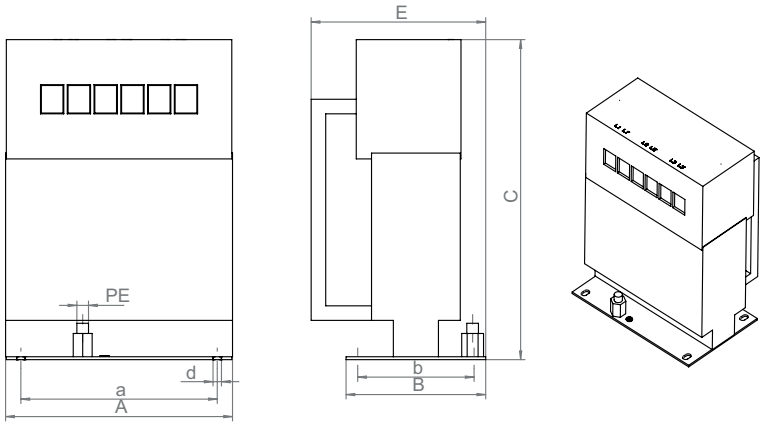
Line choke	Main dimensions in mm				Mounting dimensions in mm			
	A	B	C	E	a	b	d	PE
ND0300-503	121	86	145	86	105	70	4.8	M5
ND0420-503	121	86	150	90	105	70	4.8	M5



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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

24748536/EN – 11/2017

9 Functional safety

9.1 General information

9.1.1 Underlying standards

The safety assessment of the application inverter is based on the following standards and safety classes:

Underlying standards	
Safety class/underlying standard	• Performance level (PL) according to EN ISO 13849-1:2008 • Safety Integrity Level (SIL) according to EN 61800-5-2:2007 • Safety Integrity Level Claim Limit (SIL_{CL}) according to EN 62061:2005/A1:2013

9.2 Integrated Safety Technology

The safety technology of the application inverter described below has been developed and tested in accordance with the following safety requirements:

- Safety Integrity Level 3 according to EN 61800-5-2:2007, EN 61508:2010.
- PL e according to EN ISO 13849-1: 2008.

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 application inverter, 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

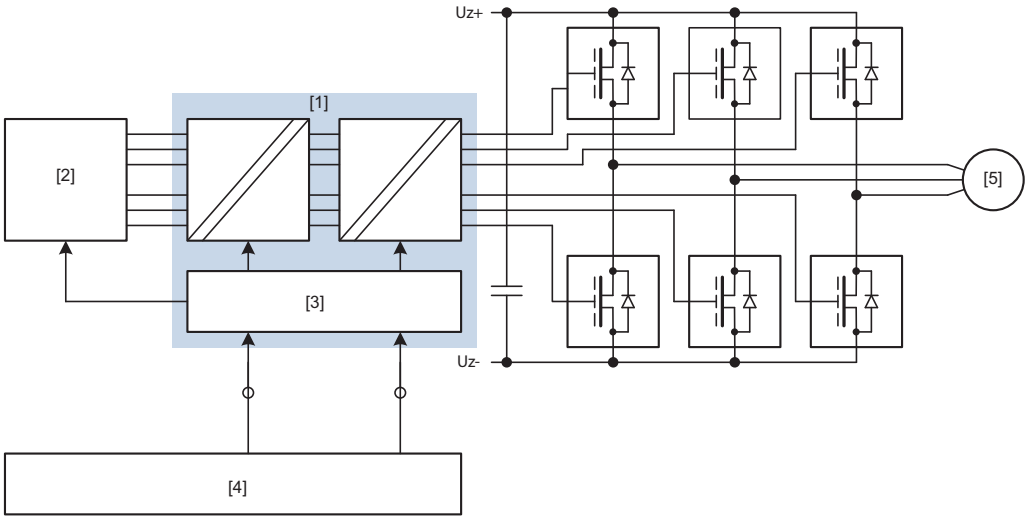
The application inverter is supposed to be able to perform the drive safety function "Safe Torque Off" according to EN 61800-5-2:

- The application inverter is characterized by the optional connection of a safety relay/external safety controller. 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 application inverter.
- An internal, dual-channel structure with diagnostics prevents the generation of pulse trains at the power output stage (IGBT).
- Instead of galvanic isolation of the drive from the supply system by means of contactors or switches, the disconnection of the STO input described here safely prevents the control of the power semiconductors in the output stage. The rotary-field generation for the respective motor is deactivated even though the line voltage is still present.
- When the STO drive safety function is activated, the PWM signals generated by the application inverter are interrupted and not transmitted to the IGBTs.

24748536/EN – 11/2017

- If the STO function detects a discrepancy between both channels, the PWM signals are inhibited. The inhibit can be revoked by a 24 V reset, or by a device reset if F_STO_P1 and F_STO_P2 are not controlled with 24 V.
- The STO drive safety function can be activated externally e.g. via an external safety device via the STO input.

9.2.3 Schematic representation of the safety concept



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[1] STO function
[2] Drive controller
[3] Diagnostics and inhibiting unit
[4] Safety-related connection
[5] Motor

24748536/EN – 11/2017

9.2.4 Drive safety functions

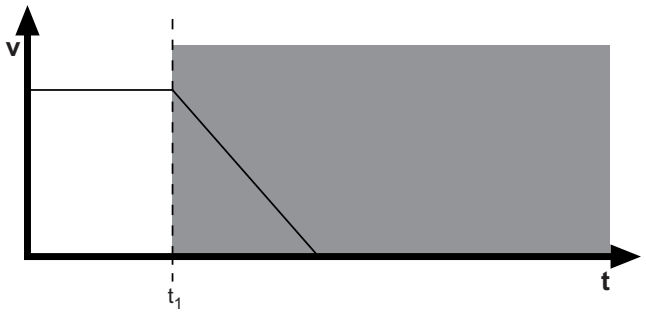
The following drive-related safety functions can be used:

- **STO** (Safe Torque Off according to EN 61800-5-2) by disconnecting the STO input.

  If the STO function is activated, the frequency inverter no longer supplies power to the motor for generating torque. This drive safety function corresponds to a non-controlled stop according to EN 60204-1, stop category 0.

  The STO input must be disabled by a suitable external safety controller/safety relay.

  The following figure shows the STO function:



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v	Speed
t	Time
t_1	Point of time when STO is triggered
	Disconnection range

- **SS1(c)** (safe stop 1, function variant c according to EN 61800-5-2) by means of suitable external control (e.g. safety relay with delayed disconnection).

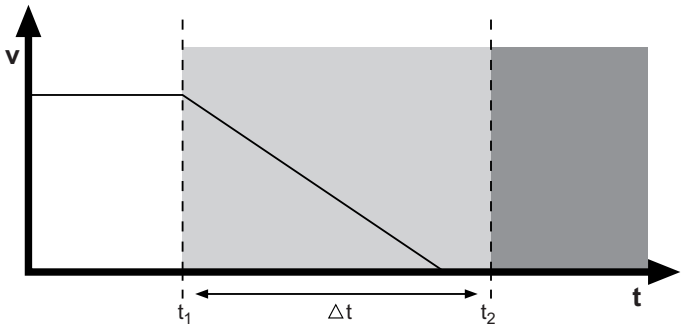
  The following sequence is mandatory:

  – Decelerate the drive using an appropriate 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 according to EN 60204-1, stop category 1.

  The following figure illustrates the SS1(c) 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

24748536/EN – 11/2017

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 case of regenerative loads, or with axes that are loaded with gravitational forces or driven externally, the drive can even accelerate. This must be taken into account in a risk assessment of the system/machine. Additional safety measures might have to be implemented (e.g. safety brake system).

  The application inverter cannot be used without an additional brake system for application-specific drive safety functions that require active deceleration (braking) of the dangerous movement.
- When using the SS1(c) function as described in chapter "Drive safety functions" (→ 🗎 251), the brake ramp of the drive is not monitored with respect to safety. In case of a fault, the drive might not be decelerated after the delay time, or it might be accelerated in the worst case. In this case, the STO function is only activated after the set time delay has passed, see chapter "Drive safety functions" (→ 🗎 251). 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 only suitable for performing mechanical work on driven system/machine components.

Result

When the STO signal is disconnected, the line voltage is still present at the DC link of the application inverter.

- Before working on the electric part of the drive system, disconnect it from the supply voltage using an appropriate external disconnecting device and secure it against unintentional reconnection to the voltage supply.

⚠ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

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

INFORMATION

In case of safety-related disconnection of the DC 24 V supply voltage at X6 (STO activated), the brake controller is switched off. The brake control in the application inverter is not safety-related.

24748536/EN – 11/2017

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 by the system/machine manufacturer and taken into account for the use of the drive system with the application inverter.

The system/machine manufacturer and the operator are responsible for compliance of the system/machine with applicable safety regulations.

The following requirements are mandatory when installing and operating the application inverter in safety-related applications:

- Approved devices.
- Installation requirements.
- Requirements on external safety controllers and safety relays.
- Startup requirements.
- Operation requirements.

9.3.1 Approved devices

The following unit variants of MOVIDRIVE® modular are permitted for safety-related applications:

Application inverter	Module	Nominal output current
MOVIDRIVE® modular	Single-axis module	2 – 180 A
	Double-axis module	2 – 8 A

24748536/EN – 11/2017

9.3.2 Requirements on the installation

- The components must be protected against conductive dirt, e.g. by installing them in a control cabinet with degree of protection IP54 according to IEC 60529.

  If conductive dirt can be excluded at the installation site, a control cabinet with lower degree of protection is permitted under observance of the applicable standards, e.g. EN 60204-1.

  The same applies to temporary condensation, e.g. due to rapid changes of the ambient temperature.
- 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: Individual cores can be routed.
  - Adhere to the regulations in force for the application.
  - The sinking and sourcing cables from the external safety device to the axis must be routed right next to each other with a cable length of ≤ 30 m.
  - The sinking and sourcing cables from the external safety device to the axis must have the same cable length. A difference in length ≤ 3% of the two cables is permitted.
  - The STO control cable must be routed separately to the power lines of the drive.
- The STO function does not detect short circuits or interference voltage in the supply line. This is why you must make sure that:
  - No parasitic voltages can occur in the STO control cables.

    or
  - The external safety controller can detect a crossfault from an external potential to the STO control lines.
- Observe the values specified for safety components when designing the safety circuits.
- The STO signal (F_STO_P1, F_STO_P2, and F_STO_M) may not be used for feedback.
- For safety controller/safety relays, you must only use grounded voltage sources with protective electrical separation (PELV) according to 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 application inverter.
- Do not use the 24-V-STO_Out of the application inverter for safety-related applications. Voltage is only permitted to supply the connection for safe disconnection X6 with plugged jumper plug.
- For safety-related applications with the application inverter, the jumper plug at the STO input X6 must be removed.

24748536/EN – 11/2017

9.3.3 Requirements on the external safety controller

A safety relay can be used as an alternative to a safety controller. The following requirements apply analogously.

- The safety controller and all other safety-related subsystems must be approved for at least 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 according to EN ISO 13849-1, SIL 2 according to EN 62062	Performance Level d according to EN ISO 13849-1, SIL 2 according to EN 61508
Performance level e according to EN ISO 13849-1, SIL 3 according to EN 62061	Performance level e according to EN ISO 13849-1, SIL 3 according to EN 61508

- The wiring of the safety controller must be suitable for the required safety class, (see manufacturer documentation). The STO input of the application inverter can be switched with 2 poles (sourcing output, sourcing/sinking, or serial sourcing) or with 1 pole (sourcing).
- The values specified for the safety controller must be strictly adhered to when designing the circuit.
- Electro-sensitive protective equipment (such as light grid or scanner) according to EN 61496-1 and emergency stop buttons must not be directly connected to the STO input. The connection must be realized using safety relays, safety controllers etc.
- To ensure protection against unintended restart in accordance with EN 1037, the safe control system must be designed and connected in such a way that resetting the command device alone does not lead to a restart. A restart may only be carried out after a manual reset of the safety circuit.
- If no fault exclusion is used for the STO wiring according to EN ISO 13849-2 or DIN EN 61800-5-2, the external safety device must detect the following faults in the STO wiring within 20 s depending on the connection type:
  - 2-pole sourcing:

    Short circuit of 24 V at F_STO_P1 or F_STO_P2 (Stuck-at 1)

    Crossfault between F_STO_P1 and F_STO_P2
  - 2-pole sourcing/sinking:

    Short circuit of 24 V at F_STO_P1 (Stuck-at 1)

    Short circuit of 0 V at F_STO_M (Stuck-at 0)
  - 2-pole serial sourcing:

    Fault exclusion is mandatory
  - 1-pole sourcing:

    Short circuit of 24 V at F_STO_P (Stuck-at 1)

2-pole sourcing:

- In disconnected state, no switch-on test pulses must occur in the sourcing cables.
- In connected state:

24748536/EN – 11/2017

  - The switch-off test pulses on both sourcing channels must be switched with a time delay. However, additional switch-off test pulses may occur simultaneously.
  - The switch-off test pulses in both sourcing channels must not exceed 1 ms.
  - The next switch-off test pulse in one sourcing channel must only occur after a 2 ms time period.
  - The signal levels must be played back by the safety controller and compared to the expected value.

2-pole sourcing/sinking:

- In disconnected state, no switch-on test pulses must occur in the sourcing cable.
- In connected state:
  - The switch-off test pulses in the sourcing and sinking channel must not exceed 1 ms.
  - The next switch-off test pulse in the sourcing or sinking channel must only occur after a 2 ms time period.
  - The signal levels must be played back by the safety controller and compared to the expected value.

2-pole serial sourcing:

- Fault exclusion in the connection lead is mandatory if no external test pulses are possible.

1-pole sourcing:

- In disconnected state, no switch-on test pulses must occur in the sourcing cable.
- In connected 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.
  - The signal levels must be played back by the safety controller and compared to the expected value.

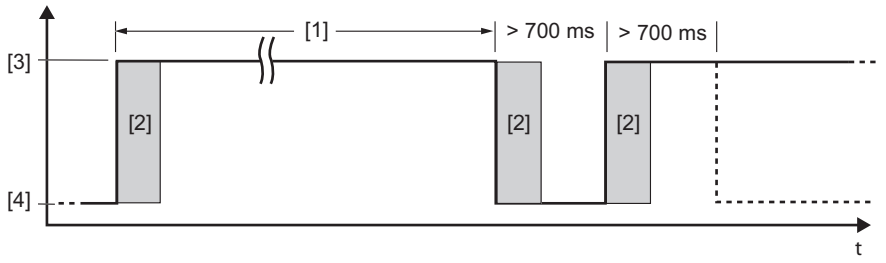
24748536/EN – 11/2017

9.3.4 Requirements on startup

- To validate the implemented drive safety functions, they must be documented and checked after successful startup (validation).
- Observe the restrictions for drive safety functions in chapter "Restrictions" for the validation of the safety functions. Non-safety-related parts and components that affect the result of the verification test (e.g. motor brake) must be deactivated, if necessary.
- For using the application inverter in safety-relevant applications, it is essential that you perform and record startup checks for the disconnecting device and correct wiring.

9.3.5 Requirements on operation

- Operation is only allowed within the limits specified in the data sheets. This principle applies to the external safety controller as well as the application inverter and approved options.
- The built-in diagnostic function is limited in case of a permanently enabled or permanently disabled STO input. Only with a level change of the STO signal, extended diagnostic functions are performed. This is why the drive safety function via STO input must be triggered with connected line voltage at least once every 12 months for PL d according to EN ISO 13849-1 and SIL 2 EN 61800-5-2 and at least once every 3 months for PL e according to EN ISO 13849-1 and SIL 3 EN 61800-5-2 to achieve a complete test coverage. Adhere to the following test procedure.



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[1] Maximum 12 months with PL d/SIL 2
Maximum 3 months with PL e/SIL 3

[2] Internal diagnostics

[3] High: No STO

[4] Low: STO active

- To achieve complete test coverage after a device reset (e.g. after connecting the line voltage), the test transition (STO active → not active) can only be started > 700 ms later. The device signals "ready for operation" or "STO – Safe Torque Off" if it is not in fault state.
- A detected hardware fault in the internal switch-off channels for STO will lead to a locking fault state of the application inverter. If the fault is reset (e.g. by switching the line voltage on/off or by a low level at the STO input for at least 30 ms), a complete test with internal diagnostics according to the above mentions test procedure must be performed. If the fault occurs again, replace the device or contact the SEW-EURODRIVE Service.

24748536/EN – 11/2017

9.4 Connection variants

9.4.1 General information

Generally, all the connection variants listed in this documentation are permitted for safety-relevant applications as long as the basic safety concept is met. This means you have to make sure that the DC 24 V safety inputs are operated by an external safety relay or a safety controller, thus preventing an automatic restart.

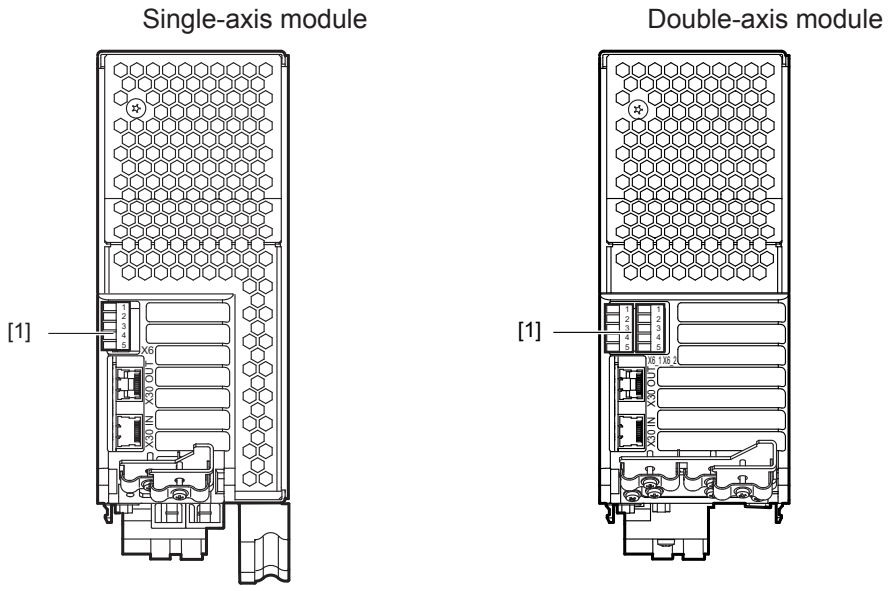
All safety conditions mentioned in chapter "Integrated Safety Technology" (→ 🗎 249), "Safety Conditions" (→ 🗎 254) and "Connection variants" must be met for the basic selection, installation, and application of the safety components, such as safety relay, emergency stop switch, etc., and the approved 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 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.

Connection X6 at the application inverter

The following figure shows the X6 terminal at the top of the axis modules.



[1] X6: Connection for safe disconnection (STO)

24748536/EN – 11/2017

9.4.2 Requirements

Use of safety relays

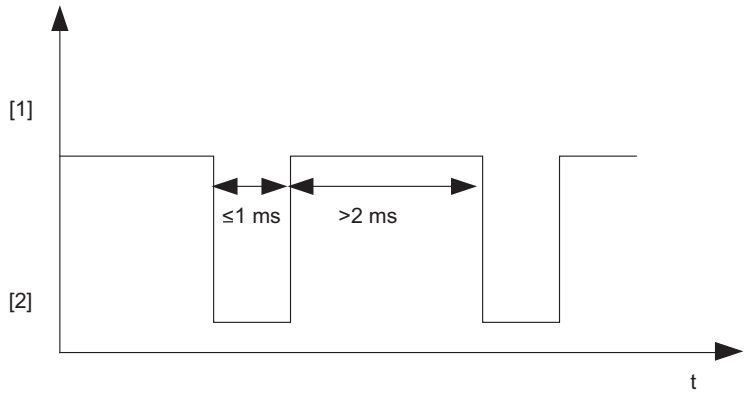
The requirements of the manufacturers of safety relays (such as protecting the output contacts against welding) or other safety components must be strictly observed. For cable routing, the basic requirements apply as described in this documentation.

For connecting the application inverter with the safety relays, observe the installation requirements in chapter "Requirements on the installation" (→ 🗎 255).

All instructions by the manufacturer on the use of safety relays for specific applications must also be observed.

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.



15214338827

[1] High

[2] Low

INFORMATION

If the safety-related control voltage at X6 is switched off (STO activated), the specifications in chapter "Requirements on the external safety controller" (→ 🗎 256) must be adhered to in regard to the test pulses.

INFORMATION

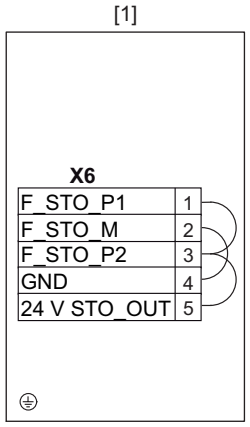
If F_STO_P1 (X6:1), F_STO_P2 (X6:3) is connected to DC 24 V, and F_STO_M is connected to GND, STO is deactivated.

24748536/EN – 11/2017

Wiring diagrams

Delivery state

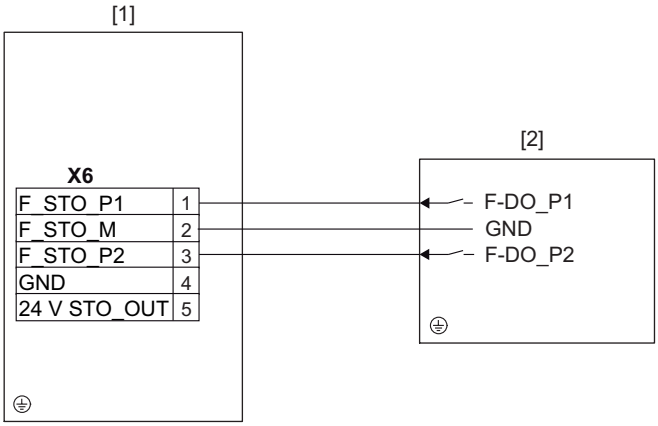
In delivery state, the terminals at the connection for safe disconnection X6 are jumpered.



9007214807030283

[1] Axis module

2-pole sourcing

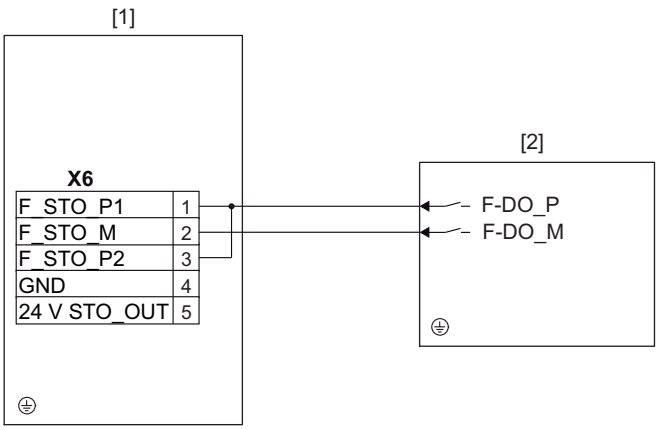


9007214803886091

[1] Axis module

[2] External safety device

2-pole sourcing/sinking

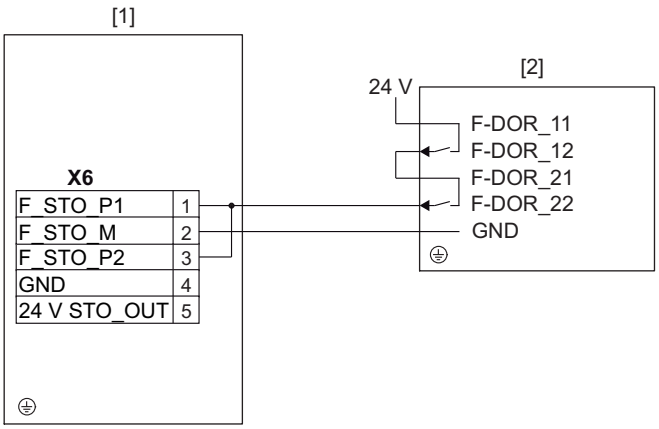


9007214805120139

[1] Axis module

[2] External safety device

2-pole serial sourcing



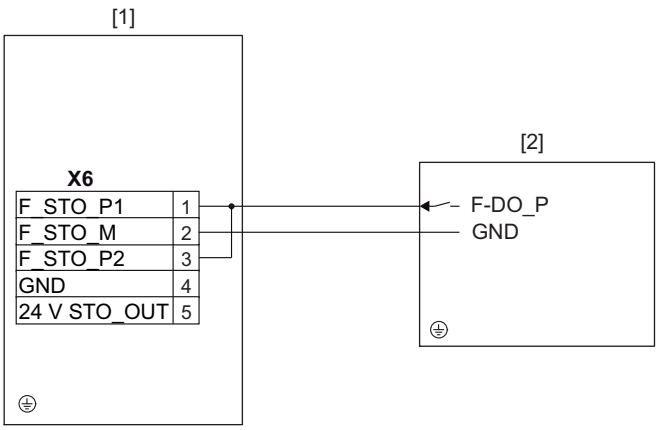
15991307275

[1] Axis module

[2] External safety device

24748536/EN – 11/2017

1-pole sourcing



9007214805125643

[1] Axis module

[2] External safety device

24748536/EN – 11/2017

9.4.3 STO signal for group disconnection

For group drives, the STO signal for several application inverters can be provided by a single safety relay. The following requirements must be met:

- The cable length is limited to 30 m. Other instructions published by the manufacturer on the use of the safety device (for the respective application) must also be observed.
- The maximum output current and the maximally permitted contact load of the safety device must be observed.
- You must comply with the permitted signal levels at the STO input and all other technical data of the application inverter. The routing of the STO control cables and the voltage drop must be considered.
- Other requirements of the safety manufacturer (such as protecting the output contacts against welding) must be strictly observed. The basic cable routing requirements apply.
- A calculation based on the technical data of the application inverter must be performed separately for each case of group drive disconnection.
- A maximum of 20 axes of the application inverter must be used in a group disconnection.

24748536/EN – 11/2017

9.5 Safety characteristics

	Characteristic values according to	
	EN 61800-5-2	**EN ISO 13849-1**
Tested safety class/underlying standards	Safety integrity level 3	Performance level e
Probability of a dangerous failure per hour (PFH value)	2.5×10^{-9} 1/h	
Service life	20 years, after which the component must be replaced with a new one.	
Proof test interval	> 20 years	-
Safe state	Safe Torque Off (STO)	
Drive safety function	STO, SS1[1] according to EN 61800-5-2	

1) With suitable external control

INFORMATION

With 1-pole wiring, the realizable performance level according to EN ISO 13849 is reduced to PL d. For the wiring between safety relay and STO input, an fault exclusion is necessary.

24748536/EN – 11/2017

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	Additional 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_F		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	Rated 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_{BR}		Ω	Value of the braking resistor
R_{BRmin}		Ω	Minimum value of the braking resistor
S_N	S	kVA	Apparent output power
SM			Synchronous motor
V_O	rev	V	Output voltage motor
V_{BR}		V	Brake supply voltage
V_N		V	Nominal line voltage (filter, choke)
V_{line}	rev	V	Connection voltage
V_{NDCL}	rev	V	Nominal DC link voltage

24748536/EN – 11/2017

Abbreviation	Information on the nameplate	Unit	Meaning
V_{OUT}		V	DC 24 V to supply STO_P1 and STO_P2
V_S		V	Supply voltage of encoder
V_{S12VG}		V	DC 12 V supply voltage of encoder
V_{S24VG}		V	DC 24 V supply voltage of encoder
V_{I24}		V	Voltage supply for electronics and brake
ϑ_A	T	°C	Ambient temperature
(+ES)			... with output stage inhibit

24748536/EN – 11/2017

10.2 Declarations of conformity

EU Declaration of Conformity

SEW EURODRIVE

Translation of the original text **900980216/EN**

SEW-EURODRIVE GmbH & Co. KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal
declares under sole responsibility that the following products

MOVIDRIVE® modular	**MDP power supply module** **MDP90A-0100-503-4-000** **MDP90A-0100-503-4-C00** **MDP90A-0250-503-4-000** **MDP90A-0500-503-4-000** **MDP90A-0750-503-4-000**	
in accordance with		
Low Voltage Directive	**2014/35/EU** **(L 96, March 29, 2014, 357-374)**	
EMC Directive	**2014/30/EU** **(L 96, March 29, 2014, 79-106)**	**4)**
RoHS Directive	**2011/65/EU** **(L 174, July 1, 2011, 88-110)**	
Applied harmonized standards:	**EN 61800-5-1:2007** **EN 61800-3:2004/A1:2012** **EN 50581:2012**	

4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. For the assessment, the product was installed in a typical plant configuration.

Bruchsal	**17.11.2017**		
Place	Date	Johann Soder Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

24748536/EN – 11/2017

EU Declaration of Conformity

SEW EURODRIVE

Translation of the original text **900990216/EN**

SEW-EURODRIVE GmbH & Co. KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal
declares under sole responsibility that the following products

MOVIDRIVE® modular	**MDA single-axis module** **MDA90A-0020-503-X-S00** **MDA90A-0040-503-X-S00** **MDA90A-0080-503-X-S00** **MDA90A-0120-503-X-S00** **MDA90A-0160-503-X-S00** **MDA90A-0240-503-X-S00** **MDA90A-0320-503-X-S00** **MDA90A-0480-503-X-S00** **MDA90A-0640-503-X-S00/01** **MDA90A-1000-503-X-S00** **MDD double-axis module** **MDD90A-0020-503-X-S00/X** **MDD90A-0040-503-X-S00/X** **MDD90A-0020-503-X-S00** **MDD90A-0040-503-X-S00** **MDD90A-0080-503-X-S00**

in accordance with

Machinery Directive	**2006/42/EC** **(L 157, 09.06.2006, 24-86)**	
EMC Directive	**2014/30/EU** **(L 96, March 29, 2014, 79-106)**	**4)**
RoHS Directive	**2011/65/EU** **(L 174, July 1, 2011, 88-110)**	
Applied harmonized standards:	**EN ISO 13849-1:2008/AC:2009** **EN 60204-1:2006+A1:2009+AC:2010** **EN 61800-5-1:2007** **EN 61800-5-2:2007** **EN 61800-3:2004/A1:2012** **EN 50581:2012**	

This includes the fulfillment of the protection targets for "electrical power supply" in accordance with annex I No. 1.5.1 according to the Low Voltage Directive 73/23/EEC -- Note: 2006/95/EC (until 19 Apr 2016) and 2014/35/EU (as of 20 Apr 2016) are currently valid.

4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. For the assessment, the product was installed in a typical plant configuration.

Bruchsal	**10.11.2017**	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

Index

Numerical

A

B

C

D

E

24748536/EN – 11/17

F

G

H

I

24748536/EN – 11/17

24748536/EN – 11/17

R

S

T

24748536/EN – 11/17

U

V

W

24748536/EN – 11/17

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24748536/EN – 11/2017

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24748536/EN – 11/2017

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24748536/EN – 11/2017

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24748536/EN – 11/2017

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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
	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911
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 http://www.varmaverk.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
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
	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

24748536/EN – 11/2017

Indonesia			
	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 di R. Blickle & Co.s.a.s. Via Bernini,14 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 hamamatsu@sew-eurodrive.co.jp
Kazakhstan			
Sales	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 Narny zam street 62 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Fax +976-77109997 imt@imt.mn
Kenya			
Sales	Nairobi	SEW-EURODRIVE Pty Ltd Transnational Plaza, 5th Floor Mama Ngina Street P.O. Box 8998-00100 Nairobi	Tel. +254 791 398840 http://www.sew-eurodrive.co.tz info@sew.co.tz
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

24748536/EN – 11/2017

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
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
Mexiko			
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 Narny zam street 62 Union building, Suite A-403-1 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Tel. +976-99070395 Fax +976-77109997 http://imt.mn/ imt@imt.mn
Morocco			
Sales Service	Bouskoura	SEW-EURODRIVE Morocco Parc Industriel CFCIM, Lot 55 and 59 Bouskoura	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 Services 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

24748536/EN – 11/2017

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 sialco@sialco.ro
Russia			
Assembly Sales Service	St. Petersburg	ЗАО «СЕВ-ЕВРОДРАЙФ» а. я. 36 195220 Санкт-Петербург	Tel. +7 812 3332522 / +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

24748536/EN – 11/2017

Sambia

representation: South Africa

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	Bratislava	SEW-Eurodrive SK s.r.o. Rybničná 40 831 06 Bratislava	Tel.+421 2 33595 202, 217, 201 Fax +421 2 33595 200 http://www.sew-eurodrive.sk sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 Mobile +421 907 671 976 sew@sew-eurodrive.sk

Slovenia

Sales Service	Celje	Pakman - Pogonska Tehnika d.o.o. UI. 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

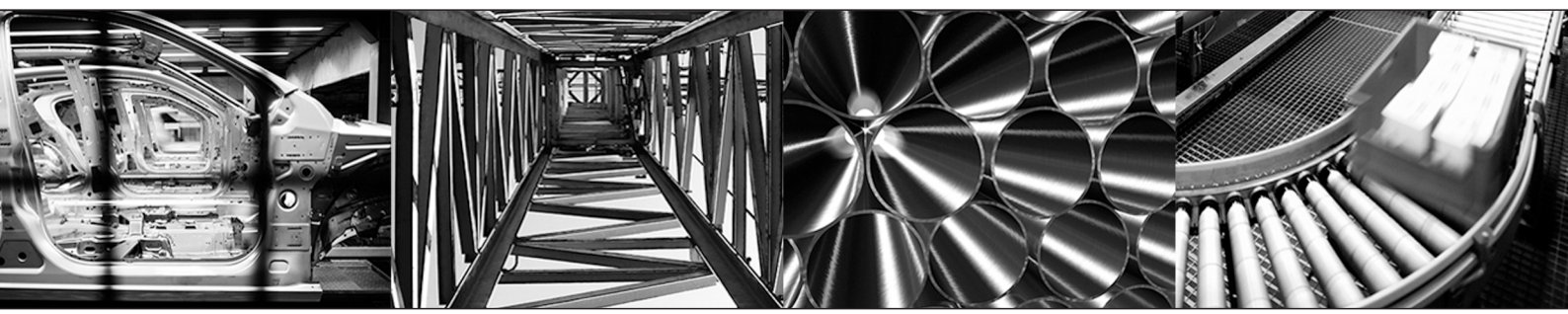
24748536/EN – 11/2017

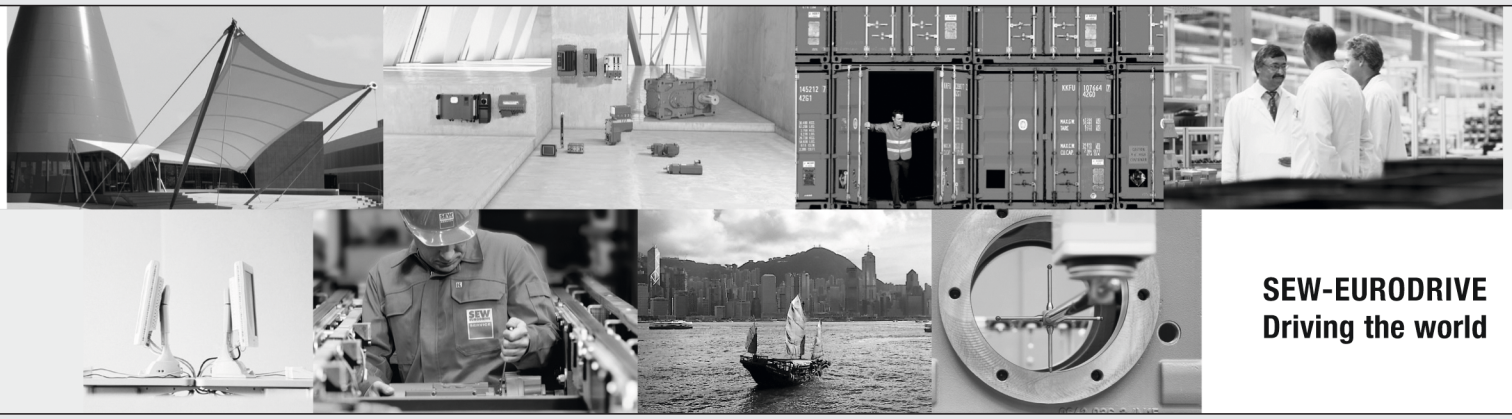
South Korea			
	Busan	SEW-EURODRIVE KOREA CO., LTD. 28, Noksansandan 262-ro 50beon-gil, Gangseo-gu, Busan, Zip 618-820	Tel. +82 51 832-0204 Fax +82 51 832-0230
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 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 PO Box 2960 Manzini M200	Tel. +268 2 518 6343 Fax +268 2 518 5033 engineering@cgtrading.co.sz
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-EURODRİVE Hareket Sistemleri San. Ve TIC. Ltd. Sti 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

24748536/EN – 11/2017

Ukraine			
Assembly Sales Service	Dnipropetrovsk	ООО «СЕВ-Евродрайв» ул. Рабочая, 23-В, офис 409 49008 Днепр	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
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!		
Uzbekistan			
Technical Office	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
Vietnam			
Sales	Ho Chi Minh City	Nam Trung Co., Ltd Huế - South Vietnam / Construction Materials 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 khanh-nguyen@namtrung.com.vn http://www.namtrung.com.vn
	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

24748536/EN – 11/2017





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Driving the world

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