SEW EURODRIVE

Operating Instructions

Application Inverter
MOVIDRIVE® system

Edition 03/2017

23031719/EN

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1 General information

1.1 About this documentation

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.	

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.

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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.

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.

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1.4 Content of the documentation

The current version of the documentation is the original.

This document contains additional safety-relevant information and conditions for use 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

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 application inverters. Accessories required for the inverter operation such as braking resistors, chokes, and filters are available.

Type designation
MDX90A-0020-5E3-4-S00
MDX90A-0025-5E3-4-S00
MDX90A-0032-5E3-4-S00
MDX90A-0040-5E3-4-S00
MDX90A-0055-5E3-4-S00
MDX90A-0070-5E3-4-S00
MDX90A-0950-5E3-4-S00
MDX90A-0125-5E3-4-S00
MDX90A-0160-5E3-4-S00
MDX90A-0240-503-4-S00

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Type designation
MDX90A-0320-503-4-S00
MDX90A-0070-2E3-4-S00
MDX90A-0093-2E3-4-S00
MDX90A-0140-2E3-4-S00
MDX90A-0213-2E3-4-S00
MDX90A-0290-2E3-4-S00

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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 Operator's duties

Make sure that the basic safety notes are read and observed. 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. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

The operator must ensure that the following works are only performed by qualified personnel:

- Transport
- Storage
- Setup and assembly
- Installation and connection
- Startup
- Maintenance and repair
- Shutdown
- Disassembly
- Waste disposal

Make sure persons working on the product adhere to the following regulations, requirements, documents 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, wiring diagrams and schematics
- Do not assemble, install or operate damaged products
- All specific specifications and requirements for the system

Make sure that systems with the product installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical equipment and accident prevention regulations.

2.3 Target group

Specialist for mechanical work

Any mechanical work may only be performed by adequately qualified personnel. Qualified personnel 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 field of mechanics according to applicable national regulation.
- They are familiar with this documentation

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Specialist for electrotechnical work

Any electronic work may only be performed by adequately skilled persons (electrically). Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and servicing of the product who possess the following qualifications:

- Qualification in the field of electrical engineering according to applicable national regulation.
- They are familiar with this documentation

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 above mentioned persons must have the authorization expressly issued by the company to operate, program, configure, label and ground devices, systems and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the instruction is that the persons are capable of performing the required tasks and work steps in a safe and correct manner.

2.4 Designated use

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

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

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

The systems can be mobile or stationary. 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.

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 during transportation.
- 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.

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2.7 Installation/assembly

Ensure that the product is installed and cooled according to the regulations in this documentation.

Protect the product from excessive mechanical strain. Ensure that elements are not deformed or insulation spaces are maintained, particularly during transportation. Electric components must not be mechanically damaged or destroyed.

Observe the notes in the chapter "Mechanical installation".

2.7.1 Restrictions of use

The following applications are prohibited unless explicitly permitted:

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 61800-5-1
- 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)

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2.8 Electrical connection

Make yourself familiar with the applicable national accident prevention guidelines before you work on the product.

Perform electrical installation according to the pertinent regulations (e.g. cable cross sections, fusing, protective conductor connection). The documentation at hand contains additional information.

Make sure that all required covers are installed correctly after 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.

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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".

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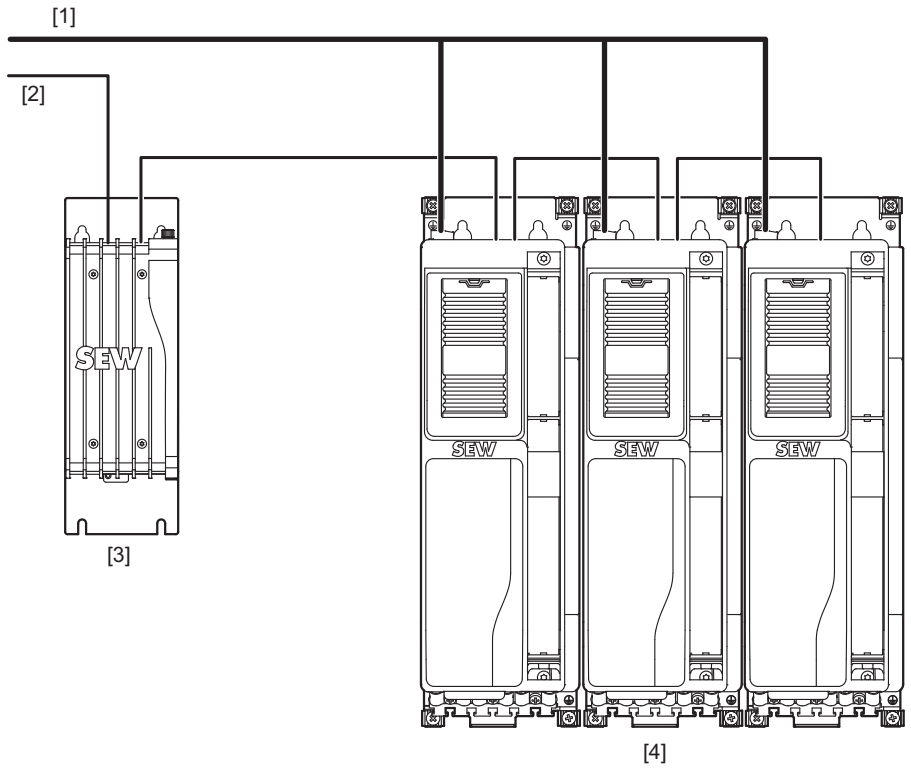
3 Device structure

3.1 Connection variants

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

- As application inverter in connection with a MOVI-C® CONTROLLER



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[1] Line voltage
[2] Industrial communication
[3] MOVI-C® CONTROLLER
[4] MOVIDRIVE® system

and/or

- as extension of a MOVIDRIVE® modular axis system

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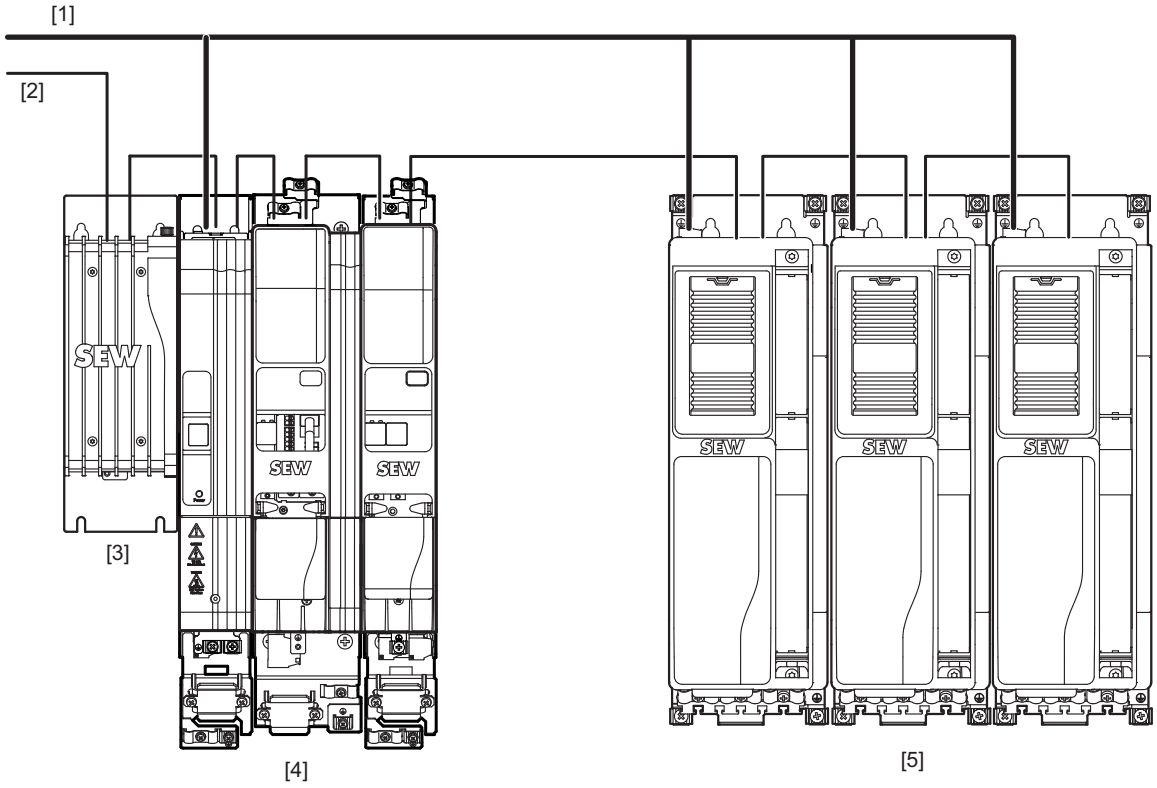

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[1] Line voltage
[2] Industrial communication
[3] MOVI-C® CONTROLLER
[4] MOVIDRIVE® modular axis system
[5] MOVIDRIVE® system

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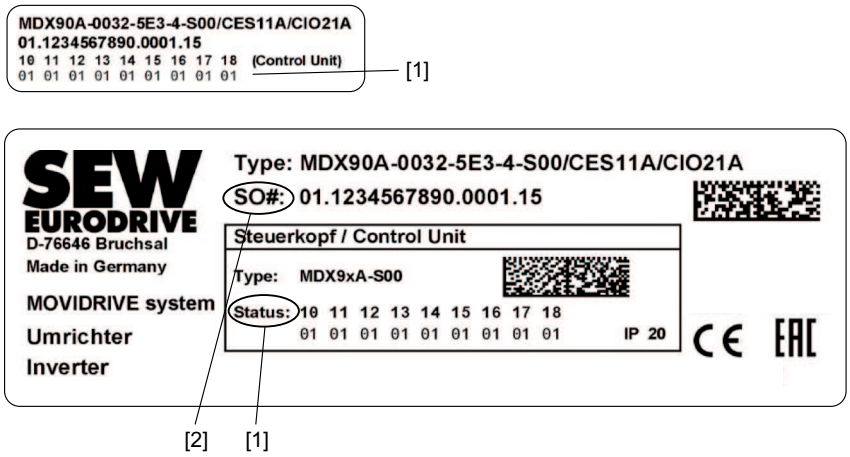
3.2 Nameplates

3.2.1 System nameplate



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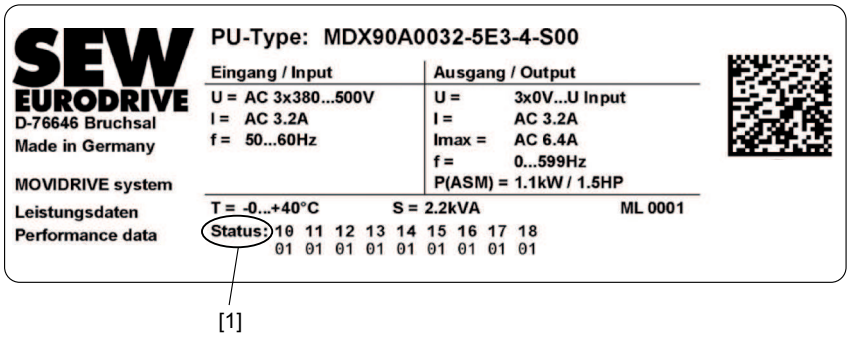
[1] Device status

[2] Serial number

3.2.2 Performance data nameplate



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[1] Device status

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3.3 Type code

The following type code applies to MOVIDRIVE® system.

Example: MDX90A-0125-5E3-X-S00		
Product name	MD	MOVIDRIVE®
Device type	X	• X = Single-axis inverter
Series	90	• 90 = Without DC 24 V switched-mode power supply • 91 = With DC 24 V switched-mode power supply
Version	A	• A = Version status of the device series
Performance class	0125	• MDX = Nominal output current – e.g. 0125 = 12.5 A
Connection voltage	5	• 2 = AC 200 – 230 V • 5 = AC 380 – 500 V
EMC variant of power section	E	• 0 = Interference suppression integrated • E = EMC filter limit value category C2 acc. to EN 61800-3
Number of phases	3	• 3 = 3-phase connection type
Operating mode	X	• 4 = 4-quadrant operation • X = Not relevant
Variants	S	• 0 = not relevant • S = Control MOVI-C® CONTROLLER
Designs	00	• 00 = Standard design
Options		The following list serves as an example: • /CES11A = Multi-encoder card • /CID21A, /CIO21A = I/O expansion card

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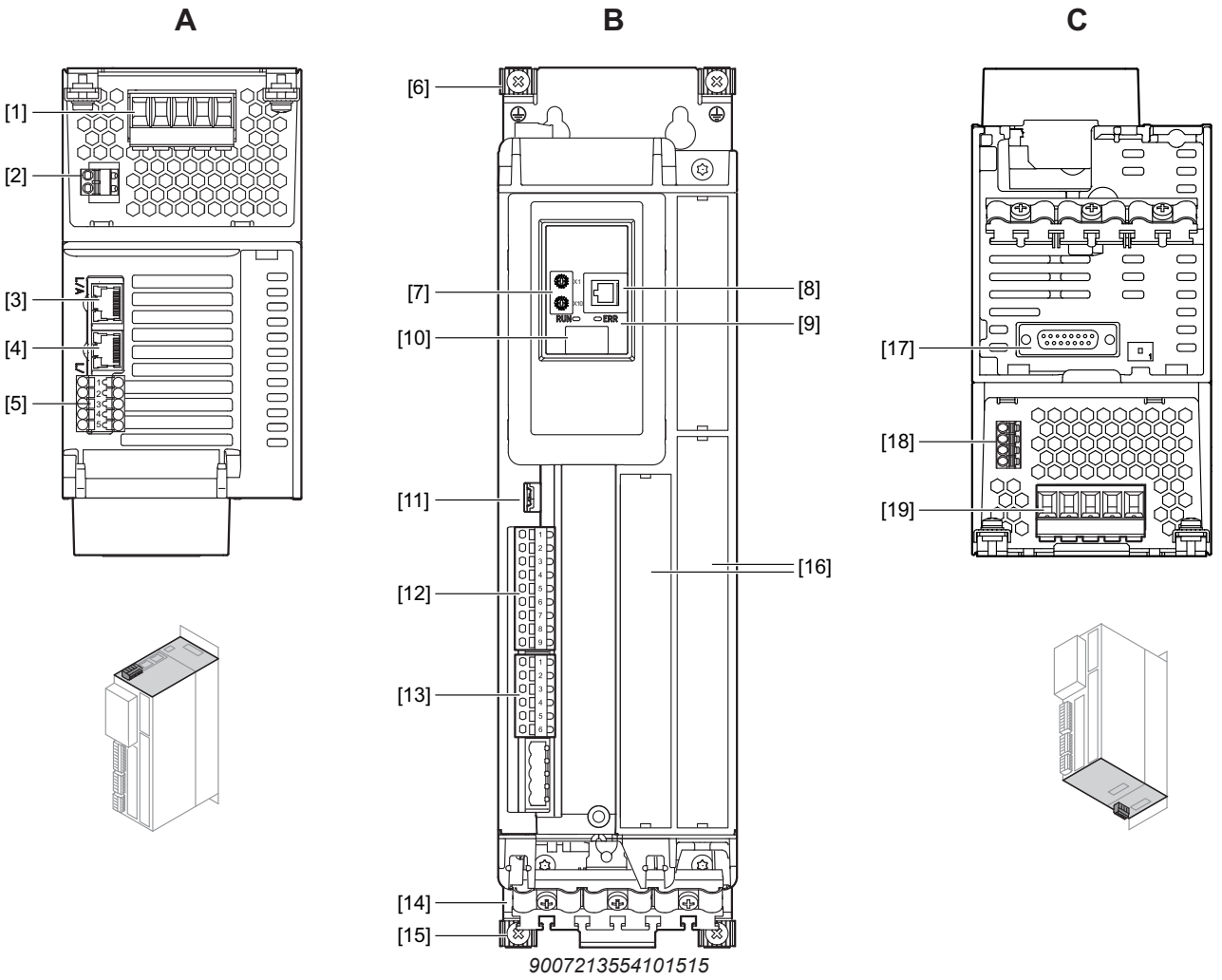
3.4 Device structure of the application inverter

3.4.1 MDX90A-0020 – 0040-5_3-..



A: View from top

[1] X1: Line connection

[2] X5: 24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

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

B: View from front

[6] PE connection housing

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE service interface

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

[10] 7-segment display

[11] S3: Operating mode module bus

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] PE connection housing

[16] Option card slot

C: View from bottom

[17] X15: Motor encoder connection

[18] X10: Brake control and temperature monitoring motor

[19] X2: Motor and braking resistor connection

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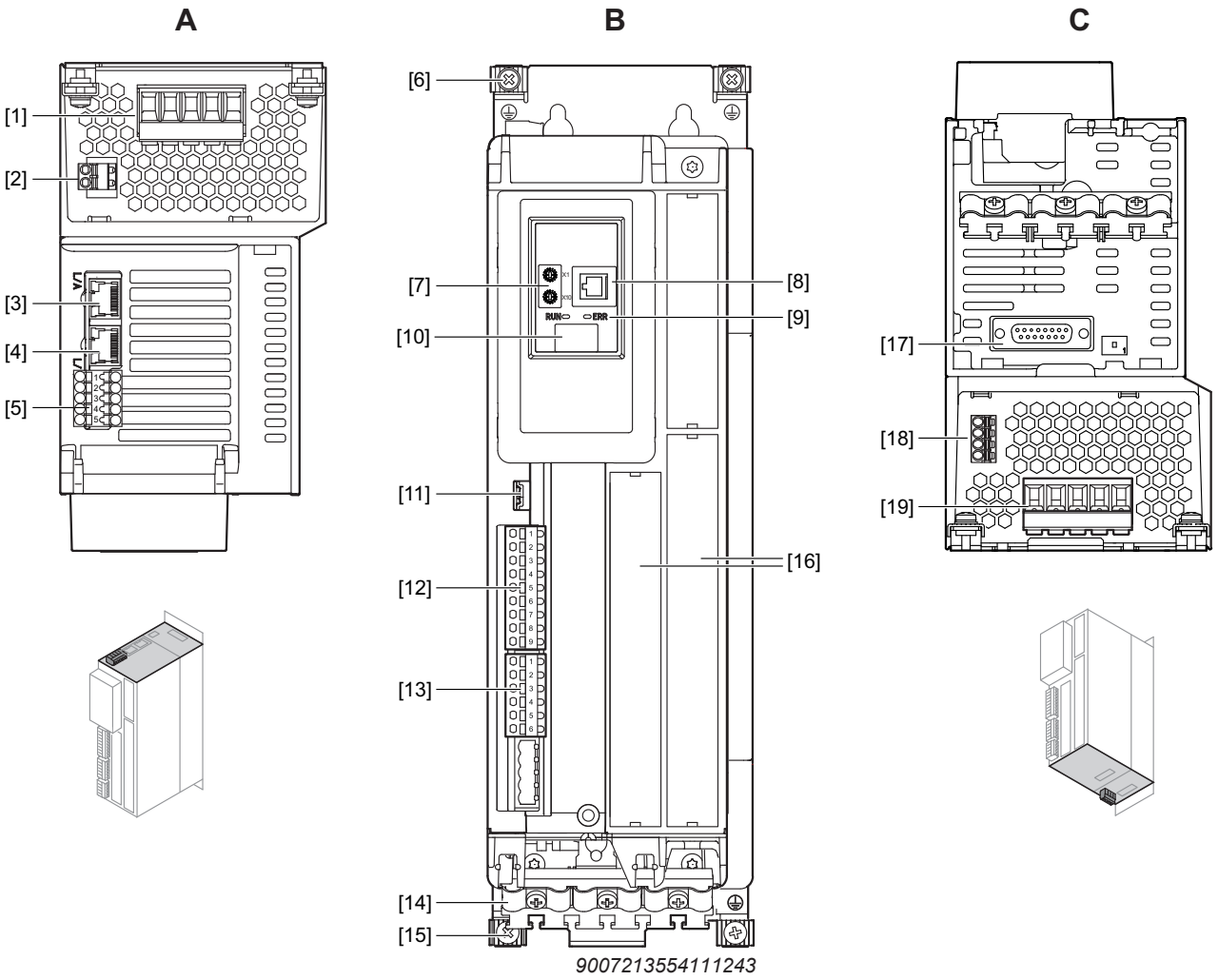
3.4.2 MDX90A-0055 – 0095-5_3-.. , MDX90A-0070 – 0093-2_3-..



A: View from top

[1] X1: Line connection

[2] X5: 24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

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

B: View from front

[6] PE connection housing

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE service interface

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

[10] 7-segment display

[11] S3: Operating mode module bus

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] PE connection housing

[16] Option card slot

C: View from bottom

[17] X15: Motor encoder connection

[18] X10: Brake control and temperature monitoring motor

[19] X2: Motor and braking resistor connection

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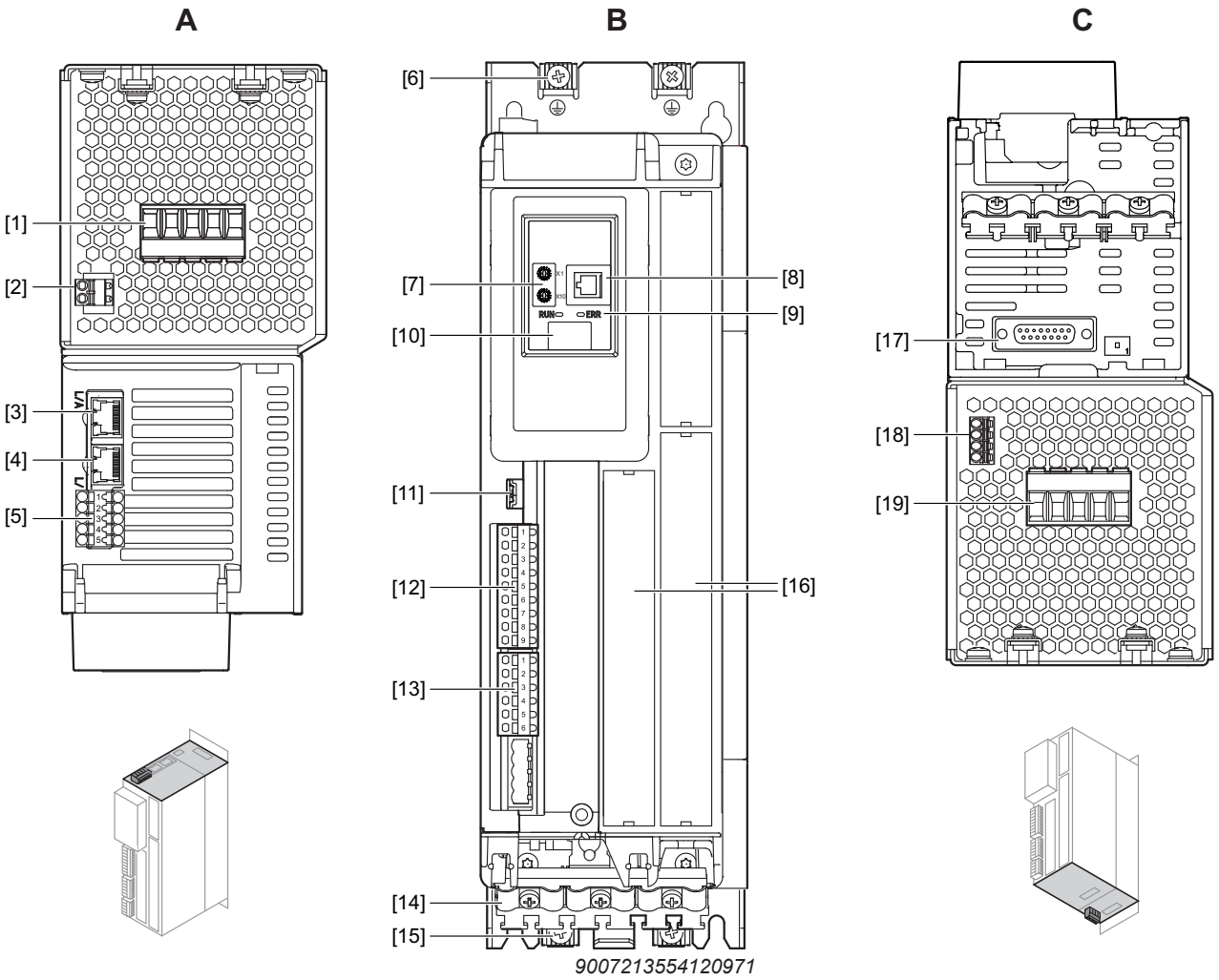
3.4.3 MDX90A-0125 – 0160-5_3-.. , MDX90A-0140-2_3-..



A: View from top

[1] X1: Line connection

[2] X5: 24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

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

B: View from front

[6] PE connection housing

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE service interface

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

[10] 7-segment display

[11] S3: Operating mode module bus

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] PE connection housing

[16] Option card slot

C: View from bottom

[17] X15: Motor encoder connection

[18] X10: Brake control and temperature monitoring motor

[19] X2: Motor and braking resistor connection

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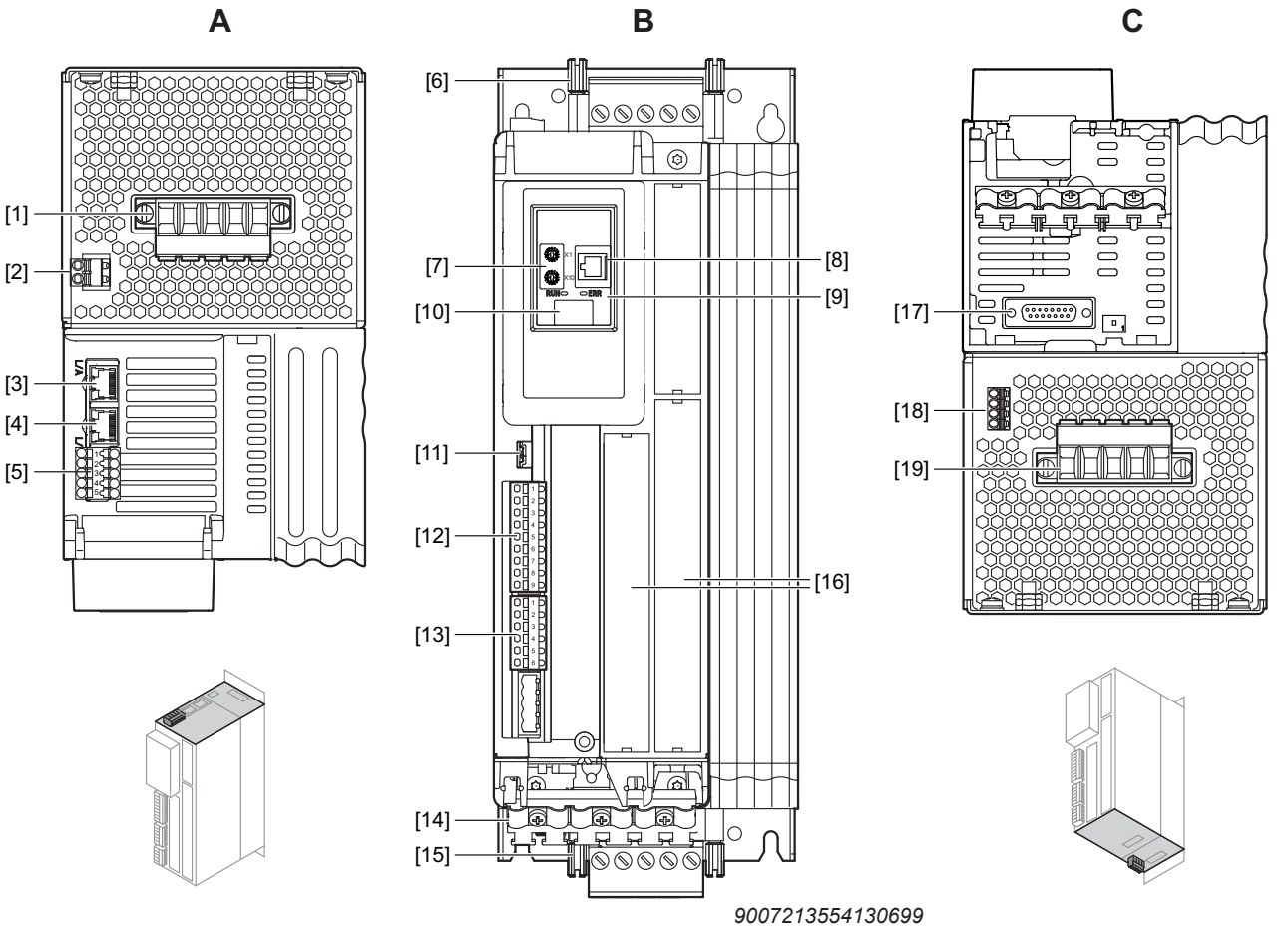
3.4.4 MDX90A-0240 – 0320-5_3-.. , MDX90A-0210 – 0290-2_3-..



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A: View from top

[1] X1: Line connection

[2] X5: 24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

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

B: View from front

[6] PE connection housing

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE service interface

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

[10] 7-segment display

[11] S3: Operating mode module bus

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] PE connection housing

[16] Option card slot

C: View from bottom

[17] X15: Motor encoder connection

[18] X10: Brake control and temperature monitoring motor

[19] X2: Motor and braking resistor connection

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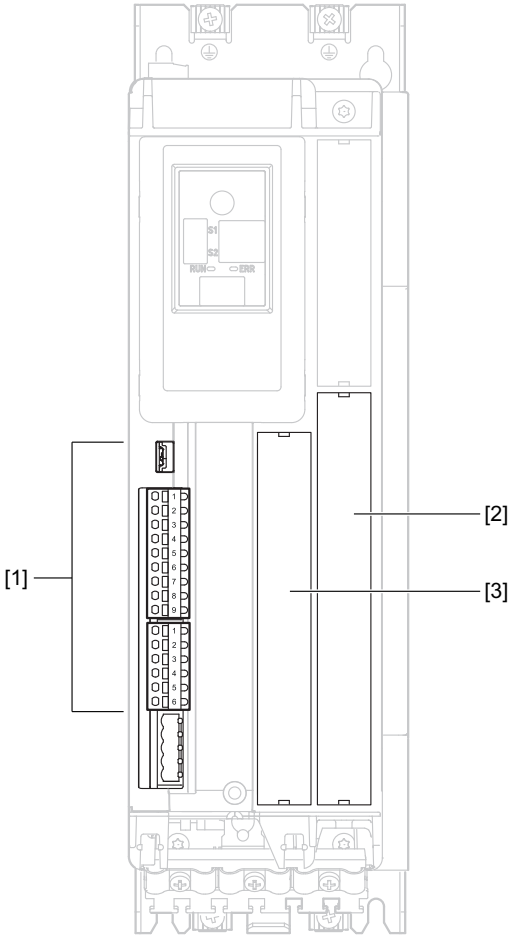
3.5 Use of option cards

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

Type designation	Description	Slot
CES11A	Multi-encoder card	[2]
CID21A, CIO21A	I/O expansion	[3]



[1] Connector panel of basic device

[2] Safety module/additional encoder slot

[3] I/O expansion slot

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4 Installation

MOVIDRIVE® system 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

Inverter									
MDX90A-....-5_3-..	**0020 – 0040**	**0055 – 0095**	**0125 – 0160**	**0240 – 0320**	**0460 – 0750**	**0910 – 1490**	**1770 – 2200**	**2500 – 3000**	**3800 – 47009**
MDX90A-....-2_3-..	**-**	**0070 – 0093**	**0140**	**0213 – 0290**	**0420 – 0570**	**0840 – 0950**	**-**	**-**	**-**
Electronics shield clamp									
	3×								

Inverter									
MDX90A-....-5_3-..	**0020 – 0040**	**0055 – 0095**	**0125 – 0160**	**0240 – 0320**	**0460 – 0750**	**0910 – 1490**	**1770 – 2200**	**2500 – 3000**	**3800 – 47009**
MDX90A-....-2_3-..	**-**	**0070 – 0093**	**0140**	**0213 – 0290**	**0420 – 0570**	**0840 – 0950**	**-**	**-**	**-**
Power shield clamp									
	2×		1×						

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4.2 Permitted tightening torques

MDX90A-....-5_3-..		0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320	0460 – 0750	0910 – 1490	1770 – 2200	2500 – 3000	3800 – 47009
MDX90A-....-2_3-..		-	0070 – 0093	0140	0213 – 0290	0420 – 0570	0840 – 0950	-	-	-
Screw connection		**Tightening torque in Nm**								
Line connection	X1	0.5 – 0.8			1.7 – 1.8	8.5 – 9.5	18 – 22			
Motor and braking resistor connection	X2	0.5 – 0.8			1.7 – 1.8	8.5 – 9.5	18 – 22			
Terminal screw for TN/IT systems	EMC	1 – 1.2								
PE connections - M4 - M6		1 – 1.2 3 – 4								
Installing option cards		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.
- Exceeding the tightening torques may result in a rupture of the screw.

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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.

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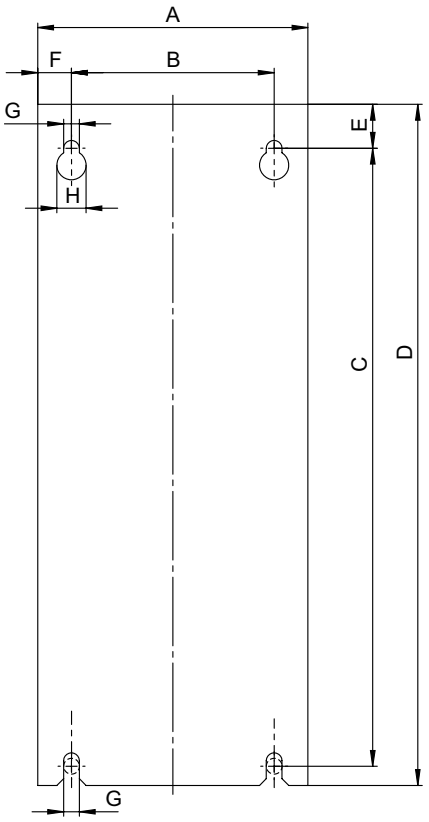
4.3.1 Bore patterns

Dimensions
Device base plate

Inverter	Dimensions of the device base plate in mm								
	A	B	C	D	E	F	G	H	T
MDX90A-0020 – 0040-5_3-..	95	50	325	350	17.5	22.5	6	12	215
MDX90A-0055 – 0095-5_3-.. MDX90A-0070 – 0093-2_3-..	105	50	325	350	17.5	27.5	6	12	215
MDX90A-0125 – 0160-5_3-.. MDX90A-0140-2_3-..	105	80	325	350	17.5	12.5	6	12	260
MDX90A-0240 – 0320-5_3-.. MDX90A-0213 – 0290-2_3-..	135	80	325	350	17.5	27.5	6	12	260



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4.3.2 Minimum clearance and mounting position

When installing the application inverters in the control cabinet, observe the following:

- To ensure unobstructed cooling, leave a minimum clearance of 100 mm above and below the application inverter housings. Make sure air circulation in the clearance is not impaired by cables or other installation equipment.
- Make sure that the application inverters are not subjected to heated exhaust air from nearby components.
- Install the application inverters 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.

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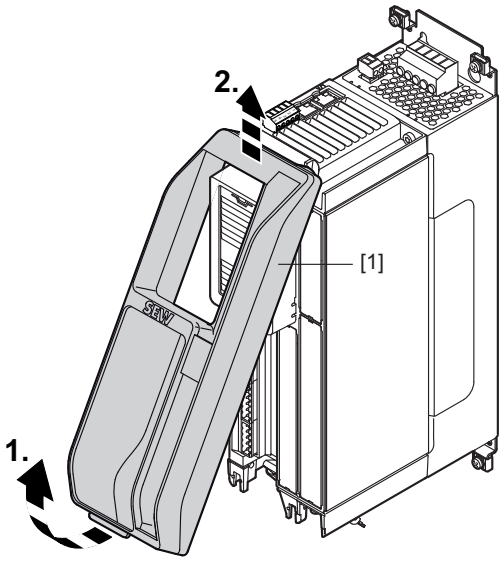
4.4 Covers

The application inverters are equipped with a safety cover [1], see following figures.

Removing the safety cover



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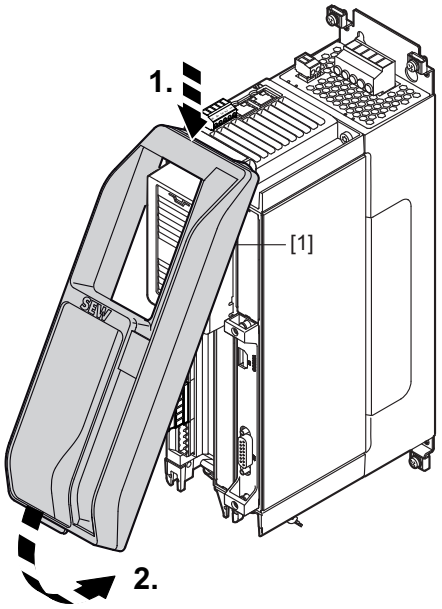
- The safety cover [1] has a latching mechanism at the bottom. Pull the lower part of the safety cover away from the application inverter to unlatch it.
- Pivot the safety cover forward and lift it to remove it from the application inverter.

Installing the safety cover



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- Place the safety cover [1] into the upper recess and move it towards the application inverter until it clicks into place.
- Always install the safety cover [1] after having worked on the application inverter.

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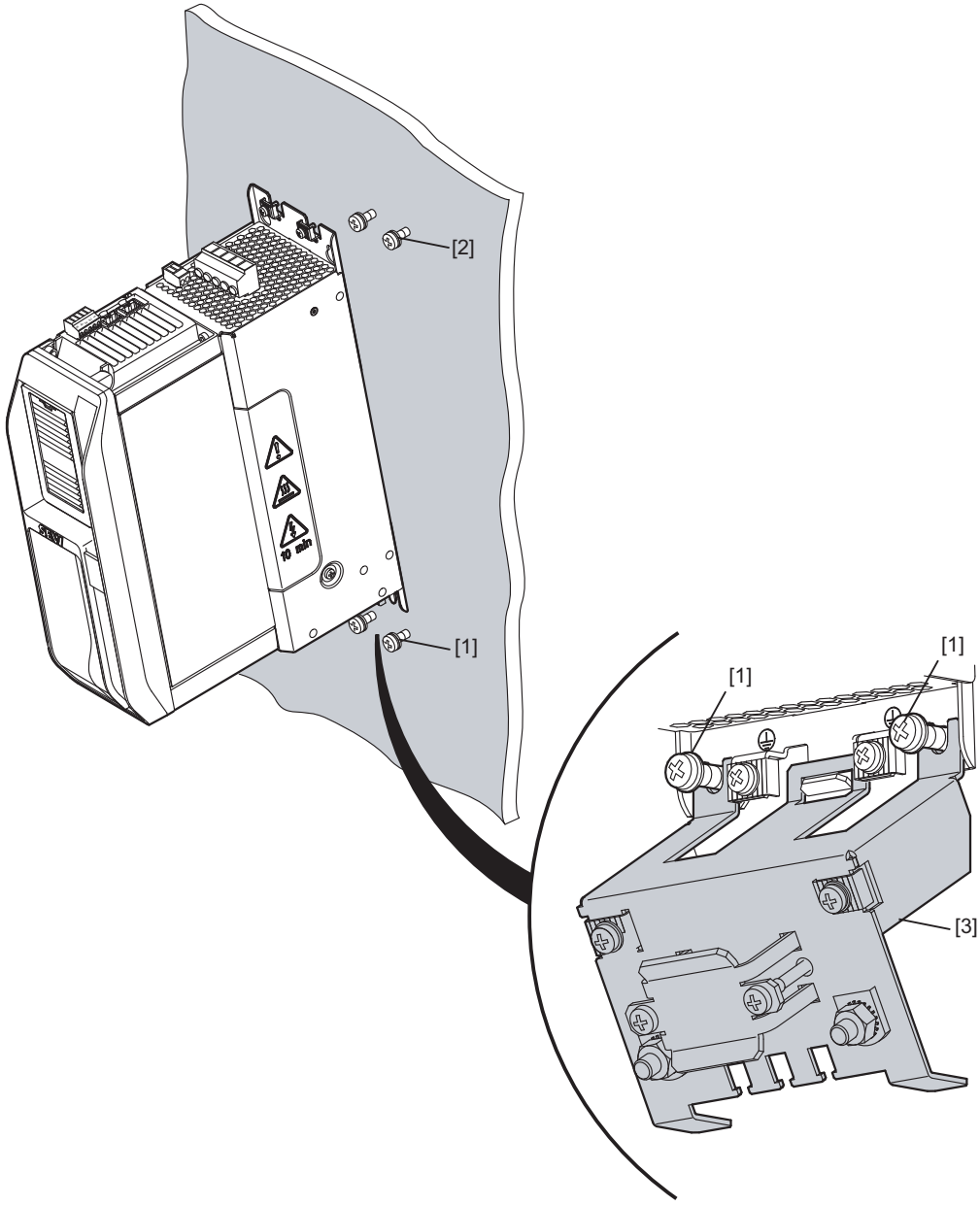
4.5 Control cabinet installation

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

1. Place the application inverter with the slotted holes in the device base plate onto the retaining screws [1] from the top.



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2. Push the application inverter backwards to insert the retaining screws [2] into the upper holes in the device base plate.
3. Lower the application inverter.
4. Install the shield plate [3] as shown above.
5. Tighten the retaining screws [1] and [2].

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4.6 Electrical installation

⚠ DANGER

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

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the application inverter from the supply system and wait 10 minutes before removing the protective covers.

⚠ DANGER

A leakage current > 3.5 mA can occur during operation of the 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 cable 10 mm^2 – 16 mm^2:
  - Route a copper protective earth conductor with the cable cross section of the supply system lead.
- Supply system cable 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.

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4.6.1 General information

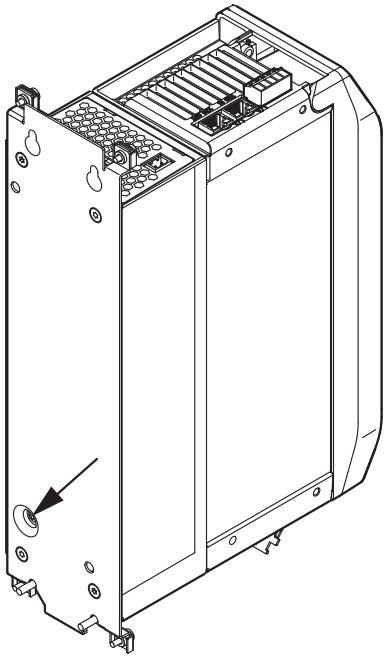
- Take suitable measures to prevent the motor starting up inadvertently, for example by removing the electronics terminal block X20. Take additional safety measures depending on the application to prevent possible injuries to people and damage to machinery.
- Only use closed cable lugs for connection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

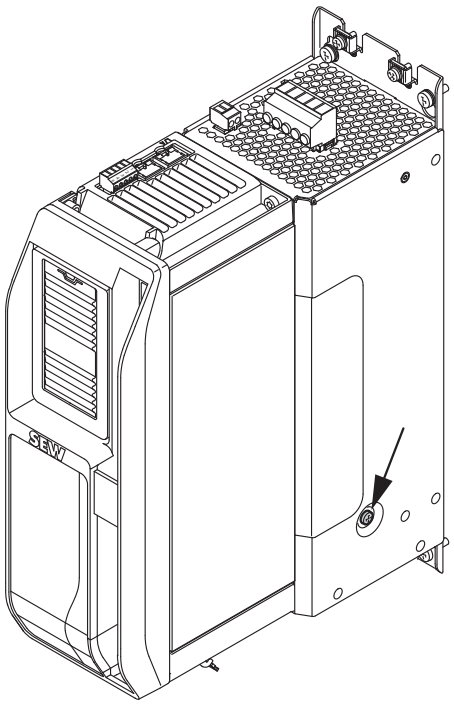
4.6.2 Permitted voltage systems

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" (→ 🗎 35):
Voltage systems with grounded outer conductor.	Use only for line voltages up to max. 240 V.

4.6.3 Use in IT systems

To ensure IT system-capability, the terminal screw shown in the following figure must be removed from the application inverter.

Application inverter	Position of the terminal screw
MDX90A-0020 – 0095-5_3-.. MDX90A-0070 – 0093-2_3-..	On the back of the application inverter.  15144351755

Application inverter	Position of the terminal screw
MDX90A-0125 – 0320-5_3-.. MDX90A-0140 – 0290-2_3-..	On the right side of the application inverter.  15026230411

INFORMATION

Use of regenerative power supply unit

When using a regenerative power supply unit, the terminal screw must always be removed.

INFORMATION

EMC limit values

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

SEW-EURODRIVE recommends the use of an pulse-code-modulated insulation monitor for operation in IT systems.

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4.6.4 Line fuses, fuse types

Type class	Requirement
Fuses in utilization categories gL, gG	Fusing voltage ≥ rated line voltage
Miniature circuit breaker of characteristics D	Nominal miniature circuit breaker voltage ≥ nominal line voltage
	Nominal currents of the miniature circuit breaker must be 10% higher than the nominal line current of the application inverter

4.6.5 Line connection

The operation of the application inverter with connected braking resistor is possible with and without line contactor.

NOTICE

Frequent switch-on may destroy the application inverter or lead to unexpected 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.

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4.6.6 Line contactor

The following table provides an overview of when a line contactor is required and what kind of preventive measures must be taken for the used braking resistor, see also chapter "Protection against thermal overload of the braking resistor" (→ 🗎 58).

Inverter type	Braking resistor type	Protective element/preventive measure	Line contactor required?
MDX90A-0020 – 0160-5_3-..	No BR	-	No
	BR... flat design	-	No
	BR... as PTC	-	No
MDX90A-0070 – 0140-2_3-..	BW...	External bimetallic relay	Yes
		TBC circuit breaker	No
	BR...-T	External bimetallic relay	Yes
		TBC circuit breaker	No
MDX90A-0240-5_3-.. and higher MDX90A-0213-2_3-.. and higher	No BR	-	No
	BR... flat design	-	No
	BR... as PTC	-	No
	BW...	External bimetallic relay	No
		TBC circuit breaker	No
	BR...-T	Temperature contact evaluation	No
		External bimetallic relay	No
		TBC circuit breaker	No

INFORMATION

When connecting a braking resistor without using a line contactor or a TCB circuit breaker, it is mandatory to connect an external DC 24 V voltage supply to the application inverter.

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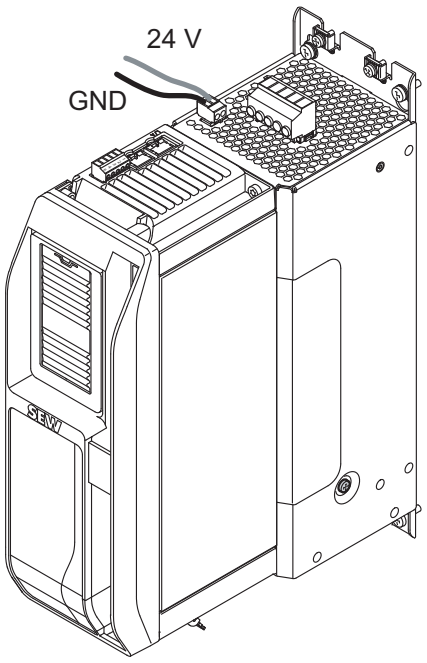
4.6.7 24 V supply voltage

MOVIDRIVE® system **MDX90A**... must be connected to an external 24 V supply voltage.

MOVIDRIVE® system **MDX91A**... has an integrated 24 V power supply unit with a power rating of 80 W. An external power supply unit can be connected as well.

The maximum cable cross section is 2.5 mm^2.

Whether an external 24 V supply is required for MDX91A depends on the load e.g. the encoder supply and the outputs.



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Select the cross section of the supply cable according to the power demand of the device to be supplied.

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

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4.6.8 Motor output

NOTICE

Connecting capacitive loads to the application inverter.

Destruction of the application inverter.

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

4.6.9 Output brake chopper

NOTICE

Connecting capacitive loads to the application inverter.

Connecting inductive loads to the application inverter.

Destruction of the application inverter.

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

4.6.10 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 separately.

⚠ 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 error.

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4.6.11 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.

4.6.12 Digital inputs, digital outputs

NOTICE

Destruction of 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.

If you route the cables outside the control cabinet, you have to shield them irrespective of the length.

When connecting the shielding, ensure equipotential bonding.

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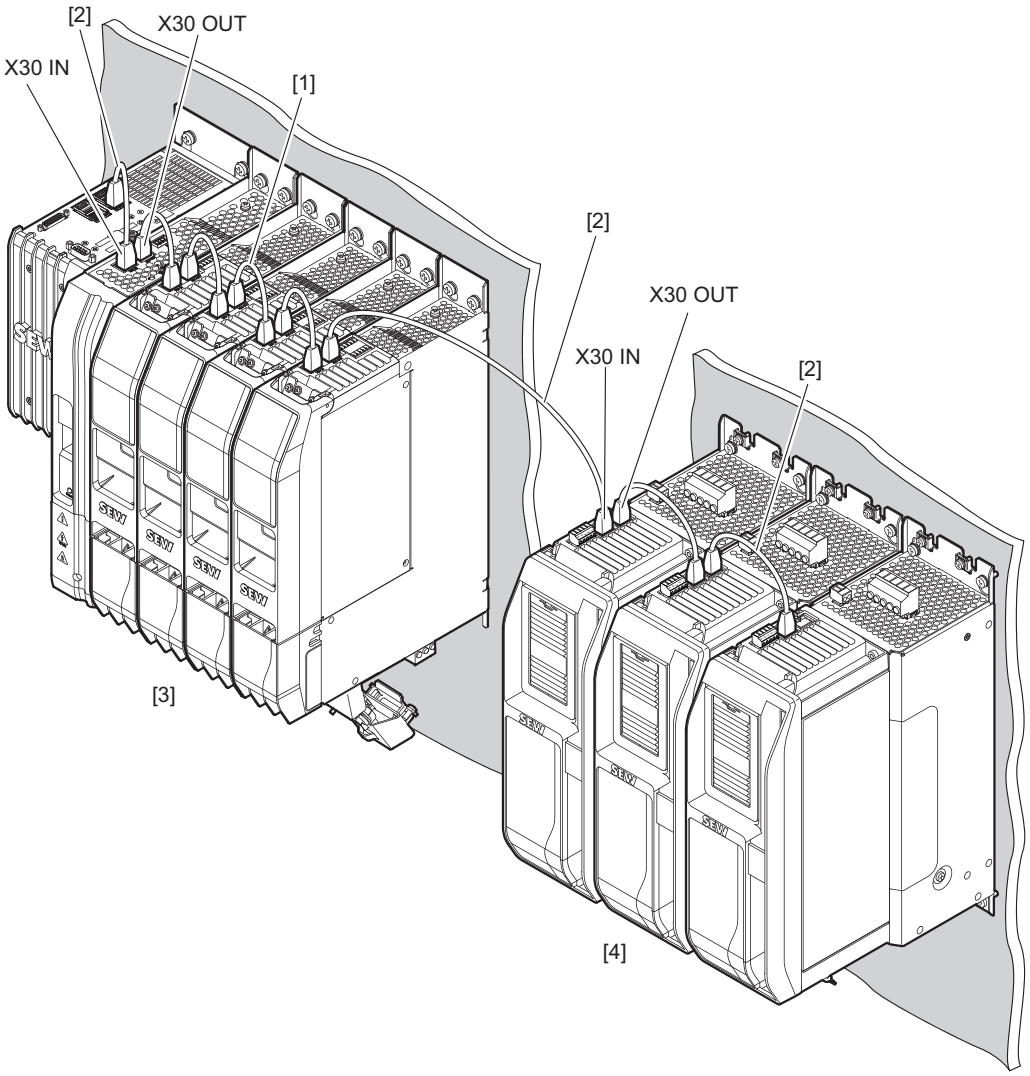
4.6.13 System bus EtherCAT®/SBus^{PLUS}

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



[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.

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4.6.14 Encoders

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

For information on the pin assignment, refer to chapter "Terminal assignment" (→ 🗎 73).

⚠ WARNING

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

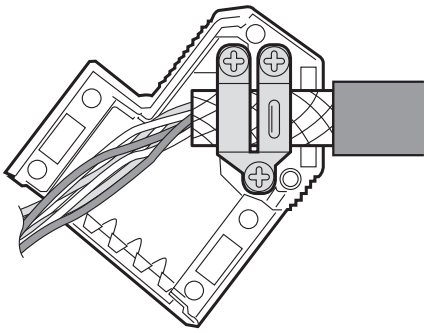
Severe or fatal injuries from electric shock.

- 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 error.

Installation notes for encoder connection

Encoder cables

- 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,
  - To the application inverter in the housing of the D-sub connector.



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

On the encoder/resolver

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

Prefabricated cables

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

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Encoder connection/cable lengths

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

INFORMATION

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

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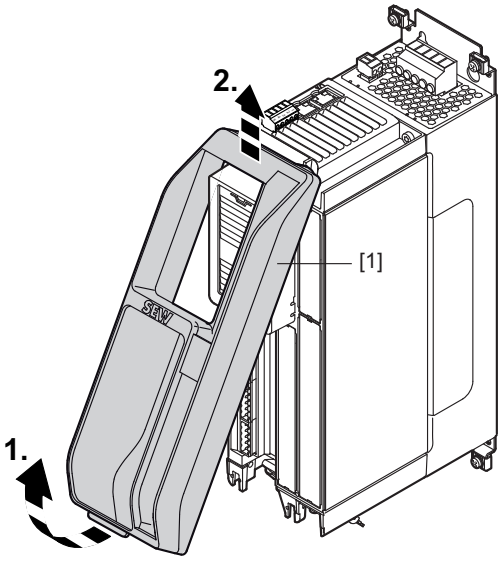
4.7 Installing options and accessories

4.7.1 Installing an option card

Observe the safety notes in chapter "Electrical installation" (→ 🗎 34).

For information on which option card can be installed in which slot, refer to chapter "Use of option cards" (→ 🗎 26).

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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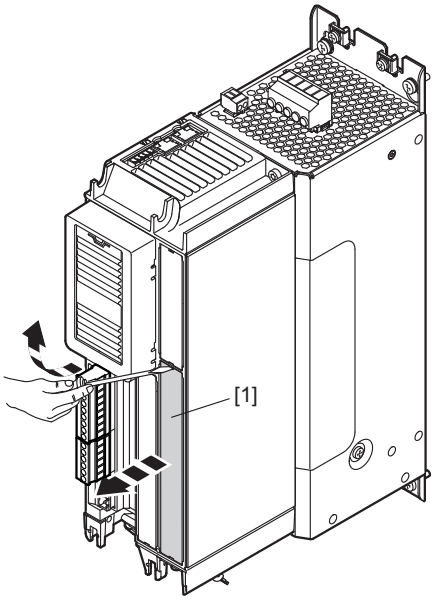
4. Remove the plastic cover [1] of the card slot using a screwdriver.



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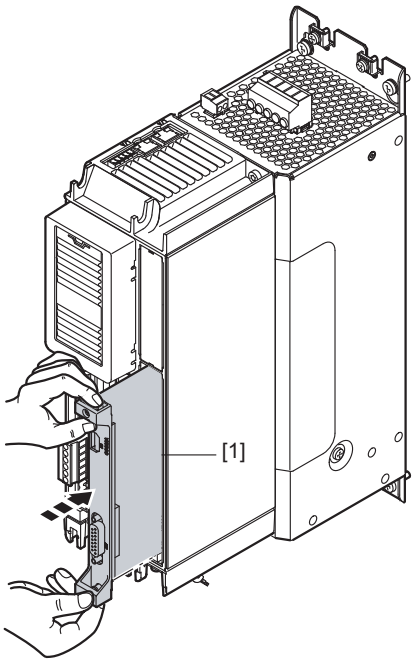
INFORMATION

Hold the option card by its edges only.

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



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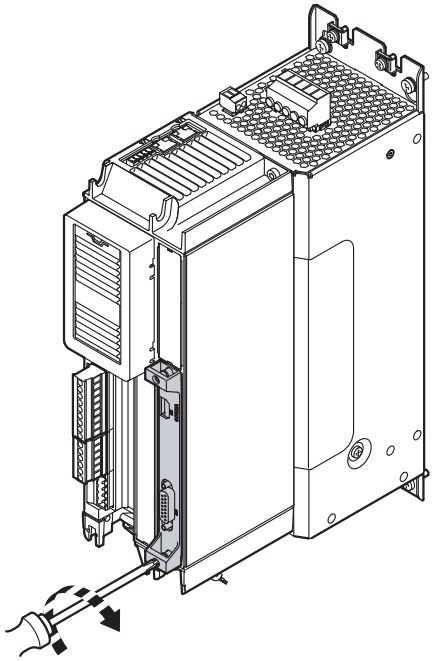
6. Screw in the card with the specified tightening torque (→ 🗎 28).



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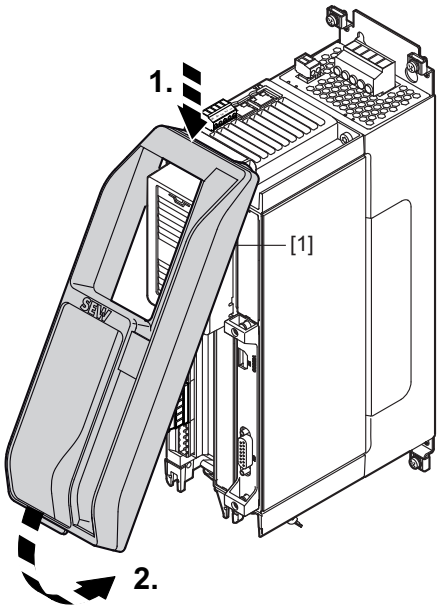
7. Install the safety cover [1] at the front of the application inverter.



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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

For inductive loads an external protective element (e.g. freewheeling diode) is required.

Connecting 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 and shielding

Cable length	The maximum cable length of connections on the inputs and outputs is 30 m.
Shielding of signal lines	Cables outside the control cabinet must be shielded.

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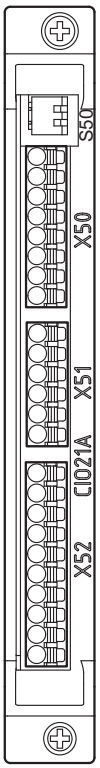
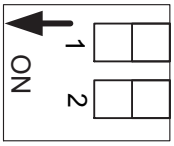
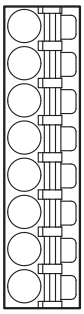
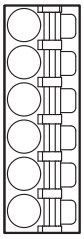
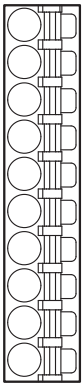
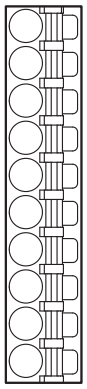
CIO21A terminal assignment

	Terminal		Connection	Brief 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
		X50:4	GND	Reference potential
		X50:5	AI31	Analog current and voltage input
		X50:6	AI32	Analog current and voltage input
		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	Brief 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

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4.7.3 CES11A multi-encoder 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".

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/RS422 (differential)
SIN/COS 1 V_{SS} (differential)
HIPERFACE® with SIN/COS signals 1 V_{SS}
SEW encoder (RS485) with SIN/COS signals 1 V_{SS}, e.g. AS7W, AG7W
EnDat 2.1 with SIN/COS signals 1 V_{SS}
SSI encoder with/without SIN/COS signals 1 V_{SS}
CANopen encoder

Encoder connection/cable lengths

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

INFORMATION

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

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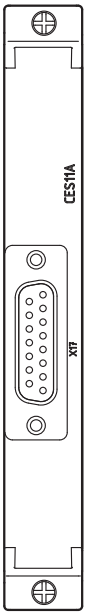
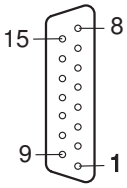
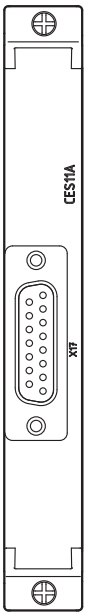
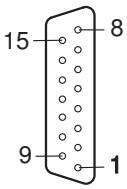
Terminal assignment of TTL, HTL, SIN/COS encoder

Card	Terminal		Connection	Brief description
		X17:1	A (COS+) (K1)	Signal track A (COS+) (K1)
		X17:2	B (SIN+) (K2)	Signal track B (SIN+) (K2)
		X17:3	C	Signal track C (K0)
		X17:4	Reserved	–
		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	Reserved	–
		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 HIPERFACE® and SEW encoder (RS485)

Card	Terminal		Connection	Brief description
		X17:1	A (COS+) (K1)	Signal track A (COS+) (K1)
		X17:2	B (SIN+) (K2)	Signal track B (SIN+) (K2)
		X17:3	Reserved	–
		X17:4	DATA+	Data line RS485
		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

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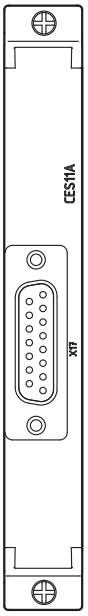
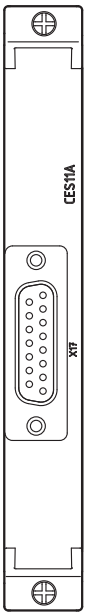
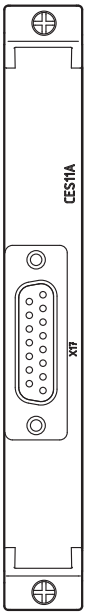
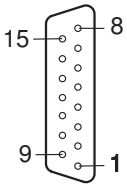
Terminal assignment EnDat encoder

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

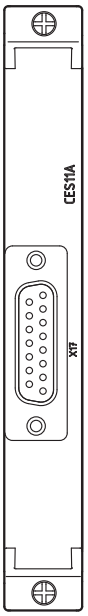
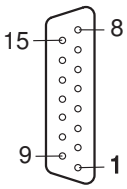
Terminal assignment SSI encoder

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

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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 nominal operation.

⚠ DANGER

Dangerous clocked 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.

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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.

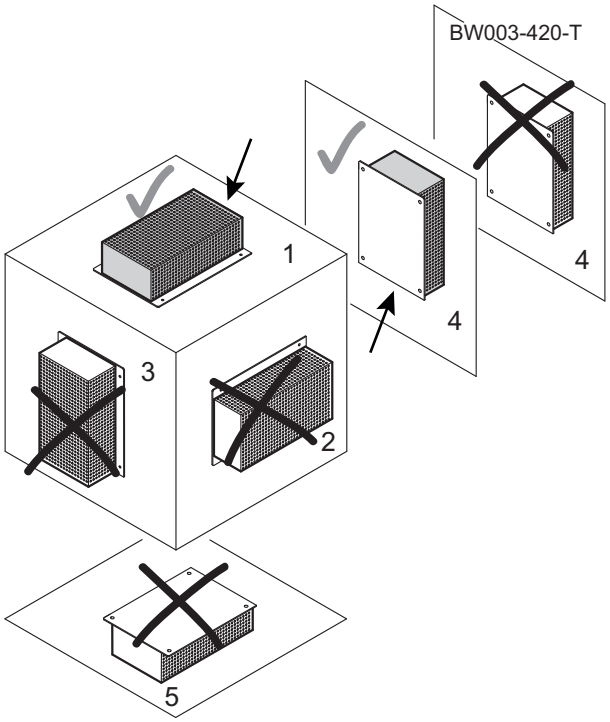
Non-permissible installation might lead to an accumulation of heat in the braking resistor due to reduced convection. A tripping temperature contact or an overheated braking resistor can lead to a system standstill.

✓ 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.

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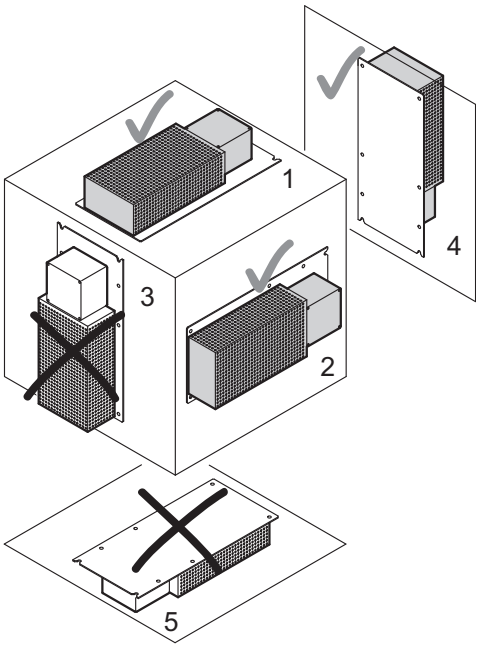
- Wire resistor



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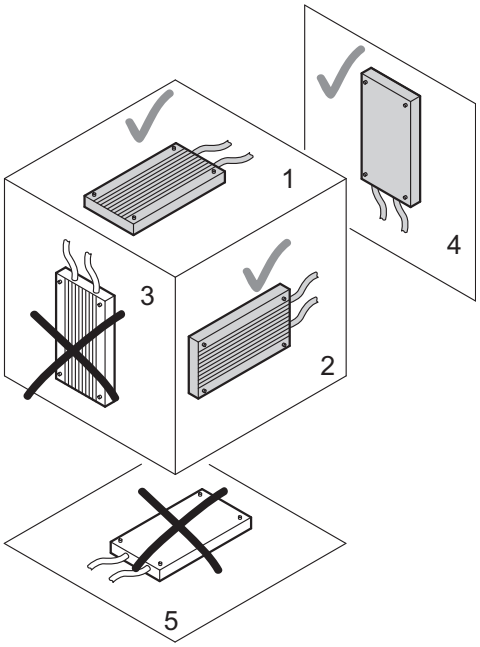
- Flat type resistor



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4.8.2 Protection against thermal overload of the braking resistor

INFORMATION

PTC braking resistor

A PTC braking resistor goes to high resistance in case of overload.

INFORMATION

Flat-type resistor

Flat-design resistors have an internal thermal protection (non-replaceable fuse) that interrupts the current circuit in the event of overload. The project planning guidelines and the documented assignments of drive inverter and braking resistor must be adhered to.

Parallel connection of braking resistors

It is permitted to connect several identical braking resistors in parallel. The following applies:

- The power connections of the braking resistors must be connected to +R and –R in parallel.
- Each braking resistor requires a separate protection against thermal overload.
- The signal contacts (NC contacts) of the protection devices must be connected in series.

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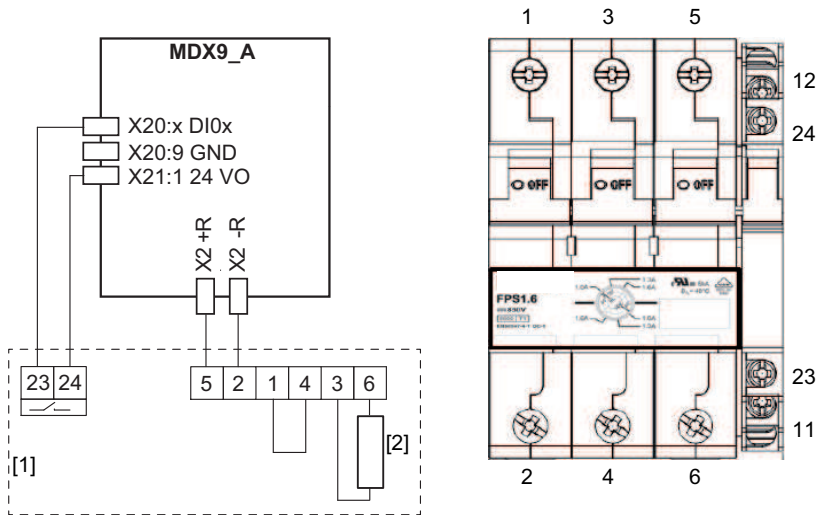
External thermal circuit breaker TCB

If an external TCB thermal circuit breaker is used for this application inverter, the following connection applies.

Connection



[1] TCB thermal circuit breaker

[2] Braking resistor

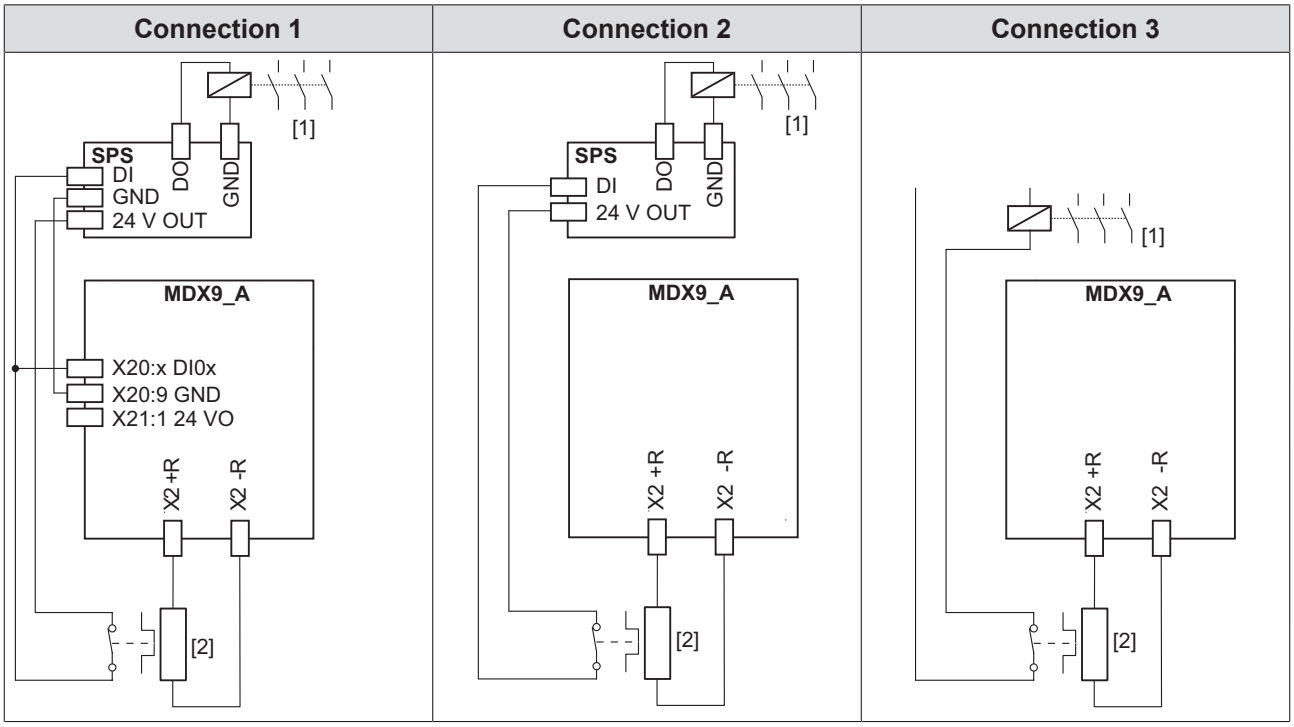
The digital input of the application inverter connected to the signal contact of the TCB thermal circuit breaker must be parameterized to the function "External braking resistor error".

- If the thermal circuit breaker trips, the signal contact is set (connection 23-24 is opened) and evaluated in the application inverter.
- The connection between application inverter 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.
- The following applies to application inverters MDX90A-**0240**-5_3 and higher and MDX90A-**0213**-2_3 and higher: If the thermal circuit breaker trips, the application inverter disconnects the power supply by inhibiting the rectifier.
- If the thermal circuit breaker trips, the application inverter switches to "Output stage inhibit".
- Set the thermal circuit breaker TCB to the tripping current I_F of the connected braking resistor.
- After all cables are connected, the 3 upper screw holes must be covered with 3 touch guard caps. The touch guard lids are included in the delivery.

Internal temperature switch -T

Application inverter: MDX90A-0020 – 0160-5_3-.., MDX90A-0070 – 0140-2_3-..

If an BW...-T braking resistor with internal temperature switch is used with the application inverter, 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

  The digital input of the application inverter connected to the signal contact of the internal temperature switch must be parameterized to the function "External braking resistor error".

  – If the thermal circuit breaker trips, the signal is evaluated in the application inverter and the PLC is evaluated.

  – If the thermal circuit breaker trips, the PLC must interrupt the power supply.

  – If the thermal circuit breaker trips, the application inverter switches 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 direct response in the application inverter.

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  - 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.

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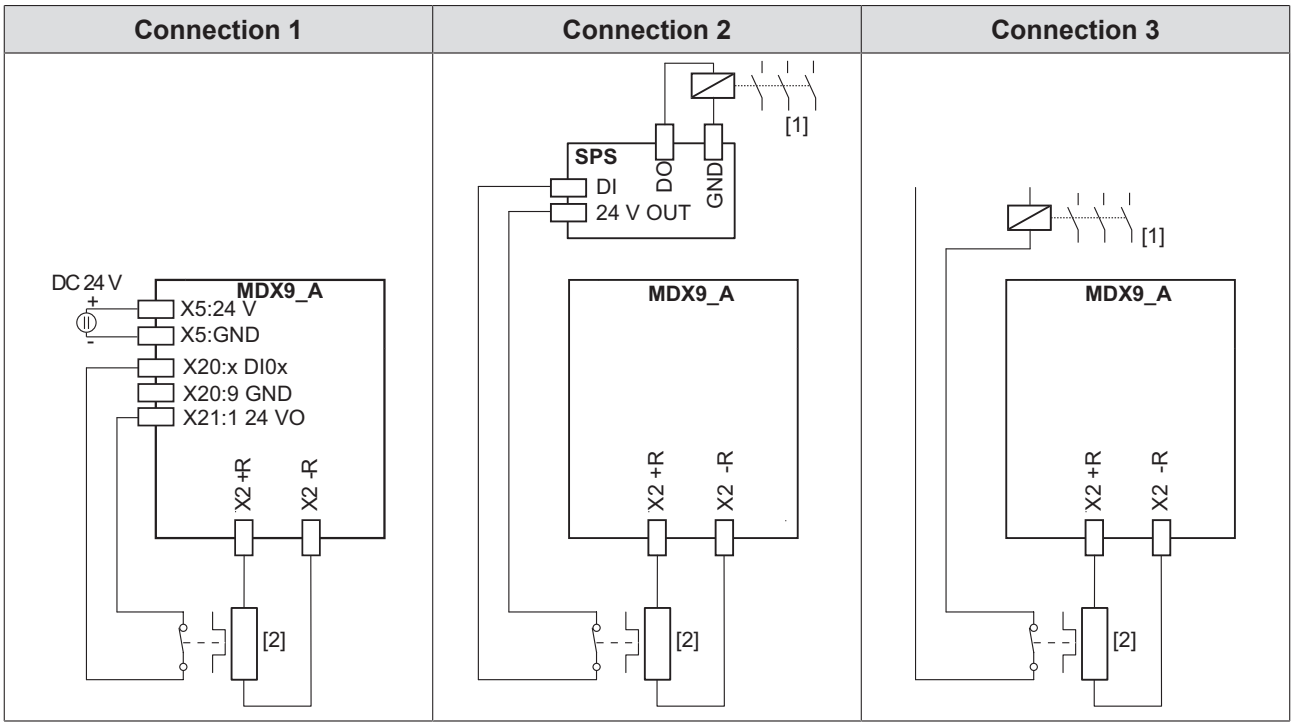
Application inverter: MDX90A-0240-5_3-.. and higher, MDX90A-0213-2_3-.. and higher

If an BW...-T braking resistor with internal temperature switch is used with the application inverter, there are 3 possible connections.



[1] Line contactor

[2] Braking resistor

- Connection 1

  The digital input of the application inverter connected to the signal contact of the internal temperature switch must be parameterized to the function "External braking resistor error".

  – If the thermal circuit breaker trips, the signal is evaluated in the application inverter.

  – 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 application inverter interrupts the power supply by inhibiting the rectifier.

  – If the thermal circuit breaker trips, the application inverter switches all axis modules to "Output stage inhibit".

INFORMATION

When using connection variant 1 (connection of braking resistor without line contactor), the application inverter must be supplied with external DC 24 V.

- 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.

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

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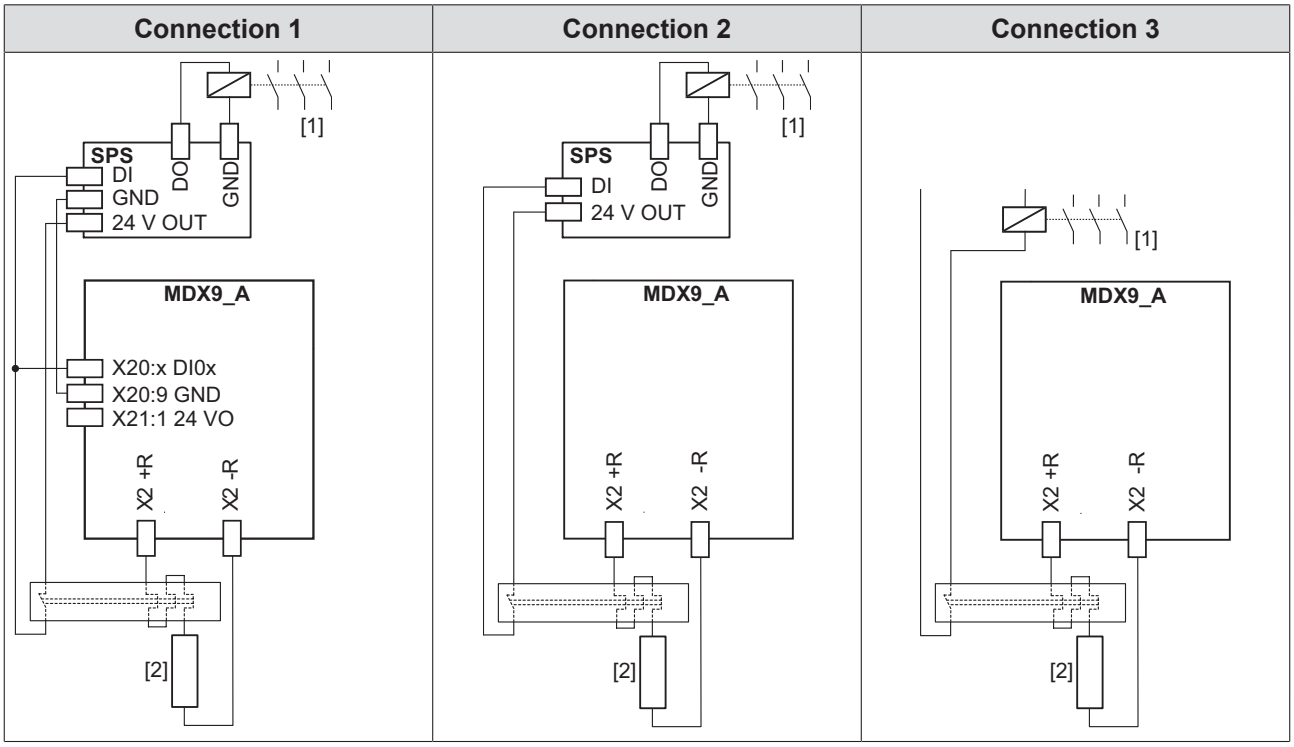
External bimetallic relay

Application inverter: MDX90A-0020 – 0160-5_3-.., MDX90A-0070 – 0140-2_3-..

If an external bimetallic relay is used with the application inverter, 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

  The digital input of the application inverter connected to the signal contact of the external bimetallic relay must be parameterized to the function "External braking resistor error".

  – If the thermal circuit breaker trips, the signal is evaluated in the application inverter and the PLC is evaluated.
  – If the thermal circuit breaker trips, the PLC must interrupt the power supply.
  – If the thermal circuit breaker trips, the application inverter switches 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 direct response in the application inverter.

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  - 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.

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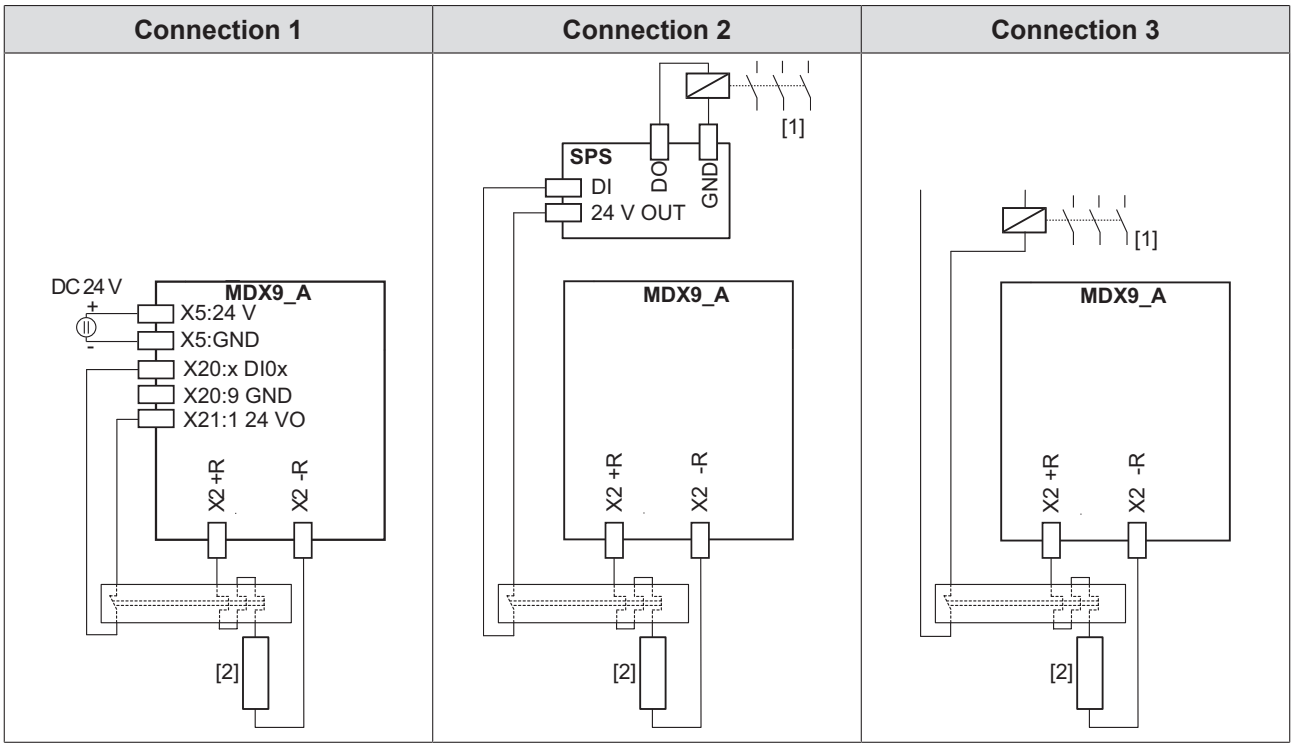
Application inverter: MDX90A-0240-5_3-.. and higher, MDX90A-0213-2_3-.. and higher

If an external bimetallic relay is used with the application inverter, there are 3 possible connections.



[1] Line contactor

[2] Braking resistor

- Connection 1

  The digital input of the application inverter connected to the signal contact of the external bimetallic relay must be parameterized to the function "External braking resistor error".

  – If the thermal circuit breaker trips, the signal is evaluated in the application inverter.

  – 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 application inverter interrupts the power supply by inhibiting the rectifier.

  – If the thermal circuit breaker trips, the application inverter switches to "Output stage inhibit".

INFORMATION

When using connection variant 1 (connection of braking resistor without line contactor), the application inverter must be supplied with external DC 24 V.

- 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.

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

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4.9 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.

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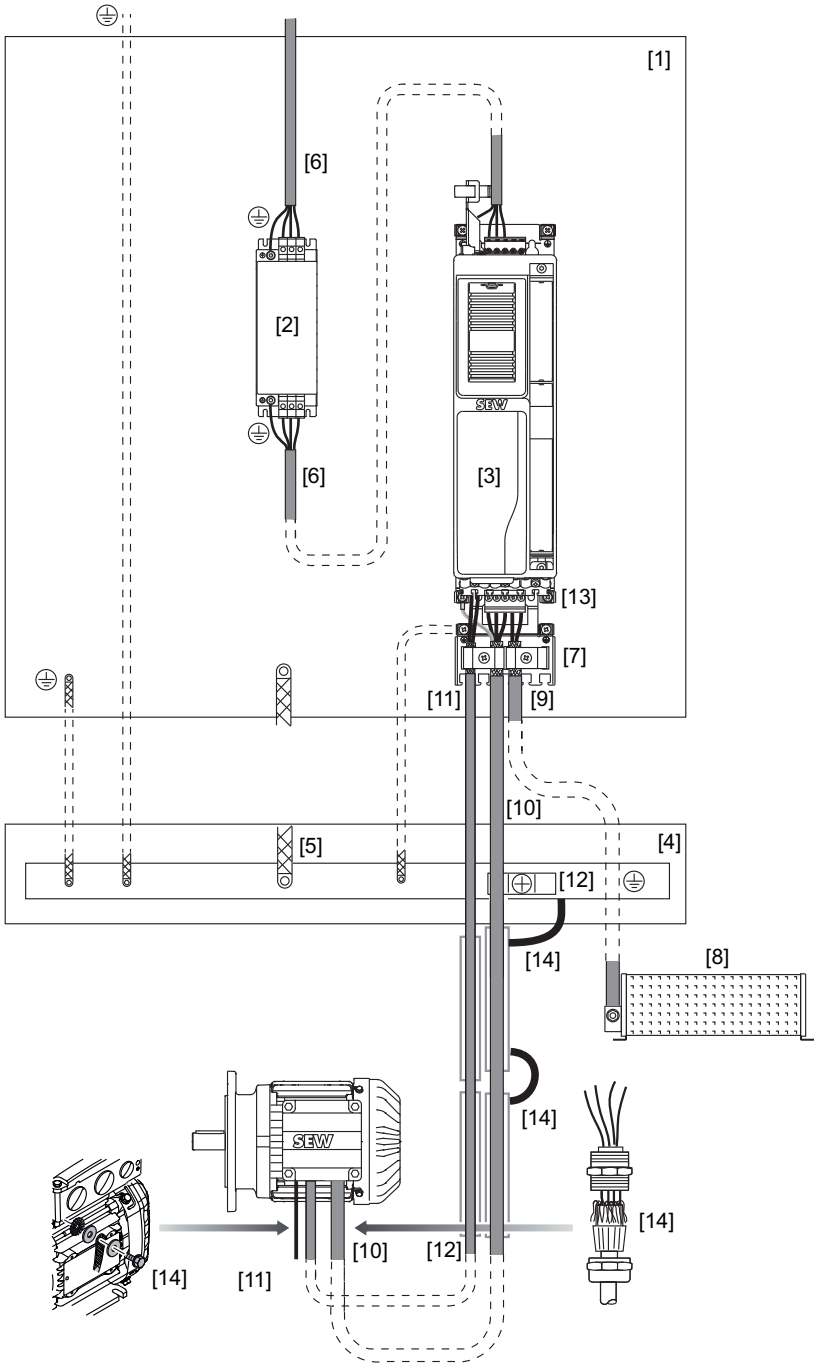
4.10 EMC-compliant installation



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[1] Zinc-coated mounting plate
[2] Line filter
[3] Inverter
[4] PE busbar
[5] HF connection of PE busbar/mounting plate
[6] Supply system cable
[7] Power shield plate
[8] Braking resistor
[9] Braking resistor performance
[10] Motor cable
[11] Brake cable
[12] Grounding clamp
[13] Electronics shield plate
[14] HF connection

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

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

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

4.10.1 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.

4.10.2 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.

4.10.3 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.

4.10.4 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.

4.10.5 Line filter connection

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

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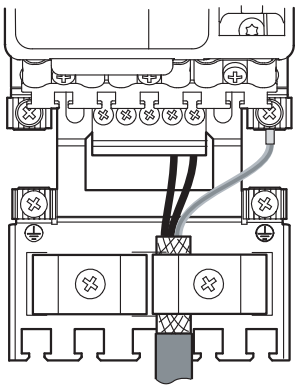
In general, filtered and unfiltered cables must not be routed together. For this reason, route incoming and outgoing line filter cables separately.

4.10.6 Braking resistor connection

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



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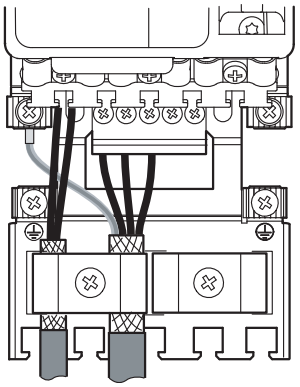
4.10.7 Motor and brake connection

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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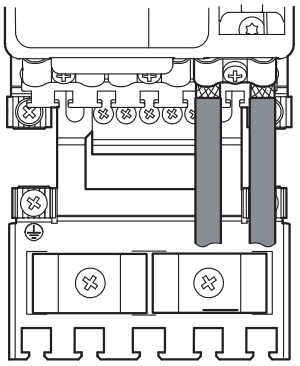
SEW-EURODRIVE recommends to use prefabricated cables.

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).

4.10.8 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.



19508526603

4.10.9 Encoder connection

SEW-EURODRIVE recommends to use prefabricated encoder cables.

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

4.10.10 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.

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4.11 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" (→ 🗎 144).

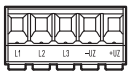
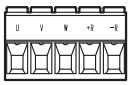
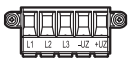
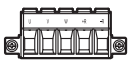
Figure	Terminal	Connection	Brief description
	X1:L1	L1	Line connection - MDX90A-0020 – 0160-5_3-.. - MDX90A-0070 – 0140-2_3-..
	X1:L2	L2	
	X1:L3	L3	
	X1:-V_{DCL}	-V_{DCL}	DC link connection
	X1:+V_{DCL}	+V_{DCL}	
	⏚	PE	PE connection at housing
	X2:U	U	Motor connection - MDX90A-0020 – 0160-5_3-.. - MDX90A-0070 – 0140-2_3-..
	X2:V	V	
	X2:W	W	
	X2:+R	+R	Braking resistor connection
	X2:-R	-R	
	⏚	PE	PE connection at housing
	X1:L1	L1	Line connection - MDX90A-0240 – 0320-5_3-.. - MDX90A-0213 – 0290-2_3-..
	X1:L2	L2	
	X1:L3	L3	
	X1:-V_{DCL}	-V_{DCL}	DC link connection
	X1:+V_{DCL}	+V_{DCL}	
	⏚	PE	PE connection at housing
	X2:U	U	Motor connection - MDX90A-0240 – 0320-5_3-.. - MDX90A-0213 – 0290-2_3-..
	X2:V	V	
	X2:W	W	
	X2:+R	+R	Braking resistor connection
	X2:-R	-R	
	⏚	PE	PE connection at housing

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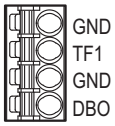
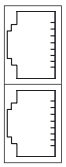
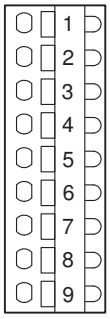
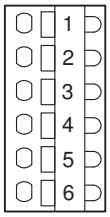
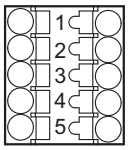
Figure	Terminal	Connection	Brief description
	X5:24 V	V_I24 V	DC 24 V supply voltage
	X5:GND	GND	Reference potential
	X10:DB0	DB00	Brake control
	X10:GND	GND	Reference potential
	X10:TF1	TF1	Sensor input for temperature evaluation of the motor
	X10:GND	GND	Reference potential
	X30 OUT		System bus
	X30 IN		
	X31		SEW 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	Reserved	–
	X20:8	Reserved	–
	X20:9	GND	Reference potential
	X21:1	+24 V	DC 24 V voltage output
	X21:2	DO00	Digital output 1, freely programmable
	X21:3	DO01	Digital output 2, freely programmable
	X21:4	DO02	Digital output 3, freely programmable
	X21:5	DO03	Digital output 4, freely programmable
	X21:6	GND	Reference potential
	X6:1	STO_P1	DC +24 V input STO_P1
	X6:2	STO_M	Reference potential for STO_P1 and STO_P2
	X6:3	STO_P2	DC +24 V input STO_P2
	X6:4	GND	Reference potential
	X6:5	24 V STO_OUT	V_{out} = DC 24 V to supply STO_P1 and STO_P2

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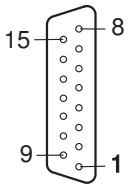
Figure	Terminal	Connection	Brief description motor encoder resolver
	X15:1	S2 (SIN +)	Signal track
	X15:2	S1 (COS +)	Signal track
	X15:3	Reserved	-
	X15:4	Reserved	-
	X15:5	R1 (REF +)	Supply voltage resolver
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	-
	X15:8	Reserved	-
	X15:9	S4 (SIN -)	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	-

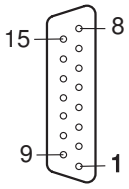
Figure	Terminal	Connection	Brief description motor encoder Sin/Cos encoder, TTL encoder
	X15:1	A (COS +) (K1)	Signal track A (COS+) (K1)
	X15:2	B (SIN +) (K2)	Signal track B (SIN+) (K2)
	X15:3	C (K0)	Signal track C (K0)
	X15:4	Reserved	–
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature evaluation
	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	Reserved	–
	X15:13	V_{S24VG}	24 V encoder supply
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	V_{S12VG}	12 V encoder supply

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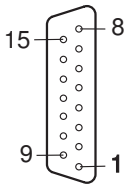
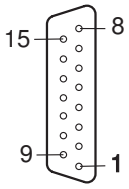
Figure	Terminal	Connection	Brief description motor encoder HTL encoder
	X15:1	A (K1)	Signal track A (K1)
	X15:2	B (K2)	Signal track B (K2)
	X15:3	C (K0)	Signal track C (K0)
	X15:4	Reserved	–
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	GND	Reference potential
	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	V_{S24VG}	24 V encoder supply
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	V_{S12VG}	12 V encoder supply

Figure	Terminal	Connection	Brief description motor encoder HIPERFACE® and SEW 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	V_{S24VG}	24 V encoder supply
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	V_{S12VG}	12 V encoder supply

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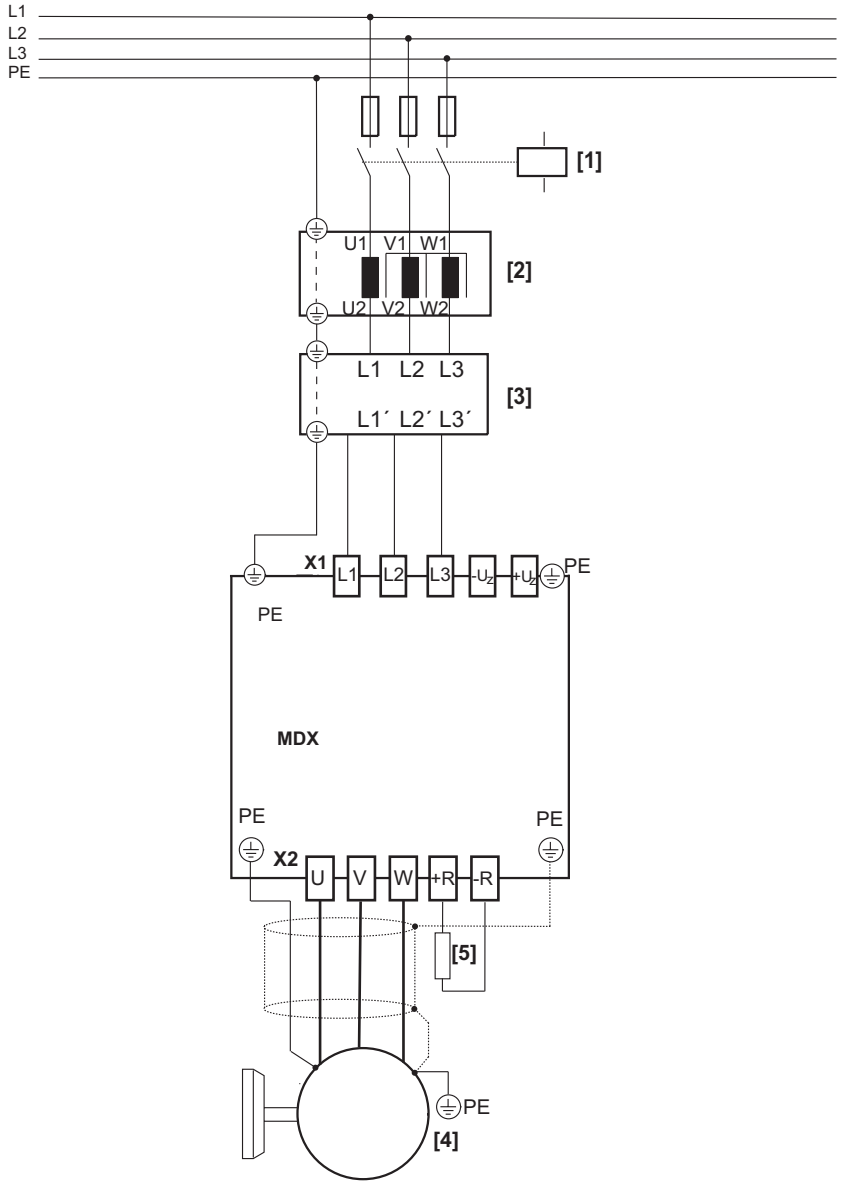
4.12 Wiring diagrams

4.12.1 General information on the wiring diagrams

- For technical data of the power electronics and the control electronics, refer to chapter "Technical data" (→ 🗎 144).
- For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 73).

4.12.2 Power connection

Wiring of the power connections with line contactor, line choke, line filter



18014412388387467

[1] Line contactor
[2] Line choke (optional)
[3] Line filter (optional)
[4] Motor
[5] Braking resistor (optional)

Wiring of the power connections with line choke, line filter without line contactor

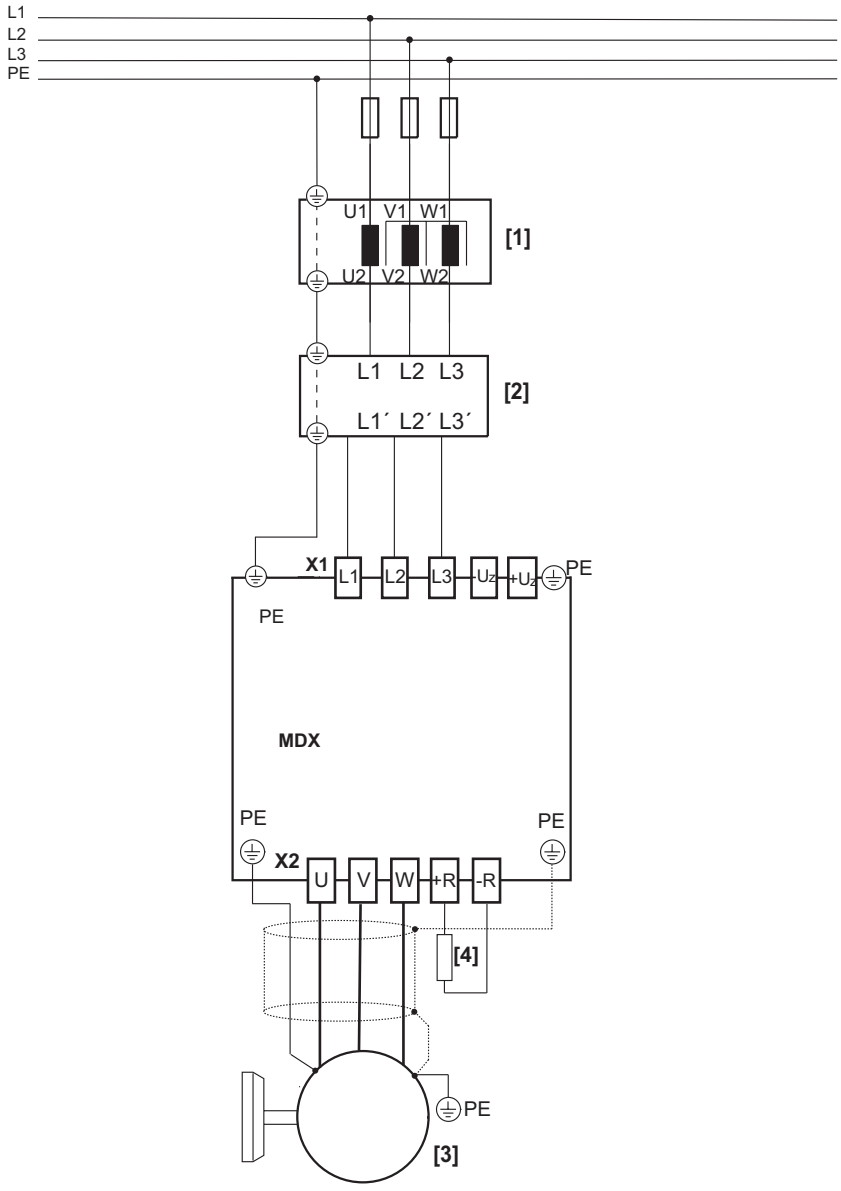
Refer to the table in chapter "Line contactor" (→ 🗎 38) to find out which application inverters can be operated without line contactor.

NOTICE

Operation without line contactor

Operation of an application inverter with connected braking resistor without line contactor may result in heavy damage with the following application inverter:

- MDX90A-0020 – 0240-5_3-..
- MDX90A-0070 – 0420-2_3-..



18014412388732299

[1] Line choke (optional)
[2] Line filter (optional)
[3] Motor
[4] Braking resistor (optional)

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INFORMATION

In case of a line connection without line contactor, the temperature evaluation of the braking resistor via a digital input of the application inverter must be ensured. The connected digital input must be parameterized for monitoring the braking resistor temperature evaluation.

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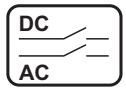
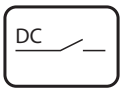
4.12.3 Brake control

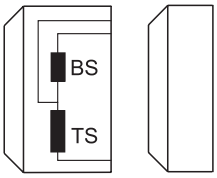
Key:



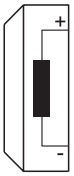
Cut-off in the DC and AC circuits
(Rapid brake application)



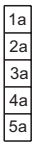
Cut-off in the DC circuit



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

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

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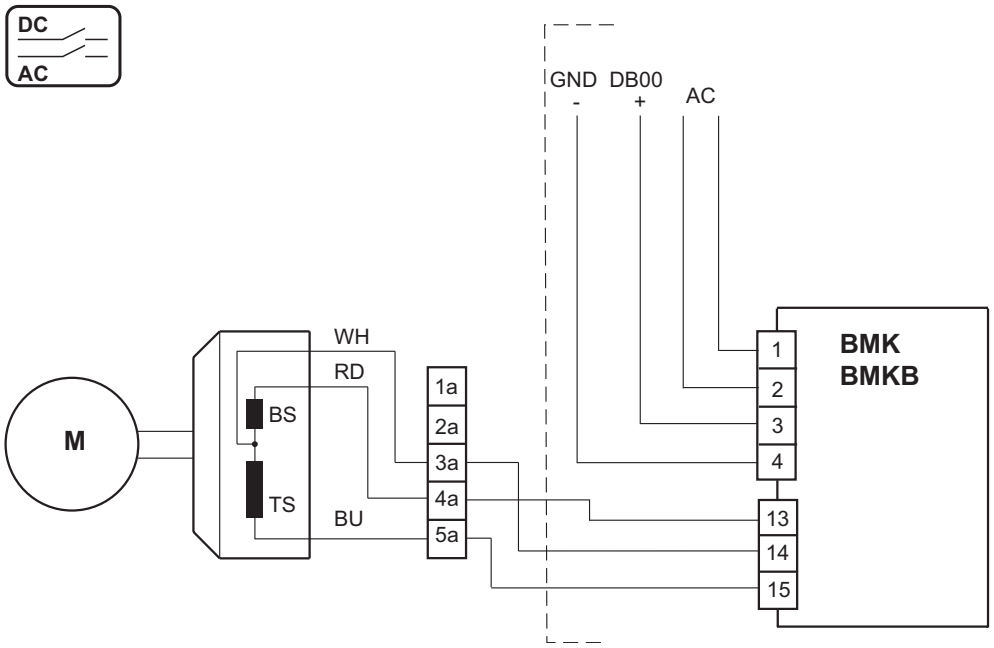
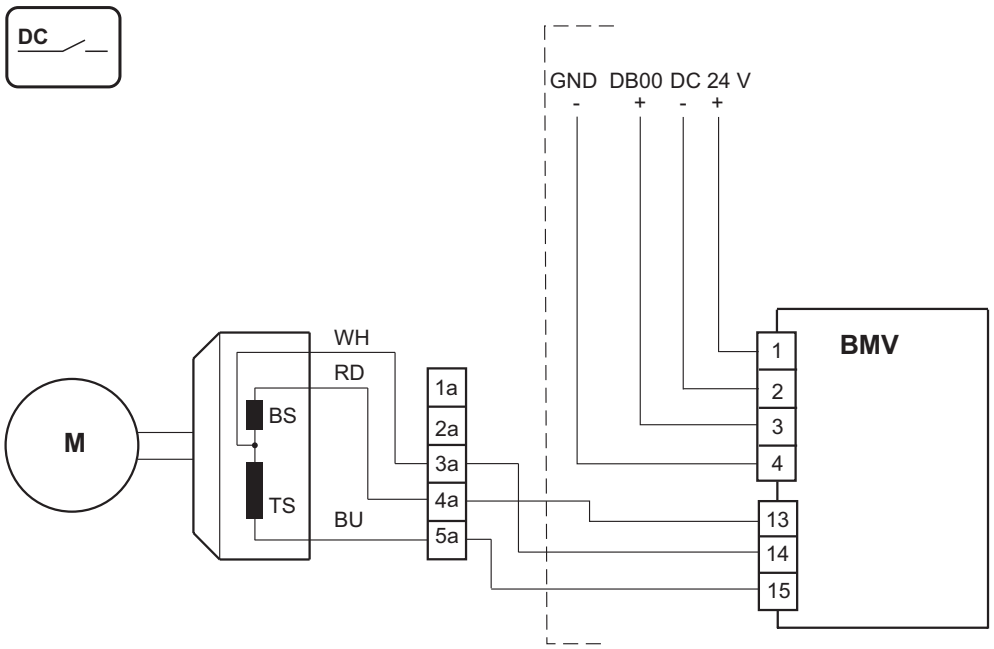
BMK. brake control



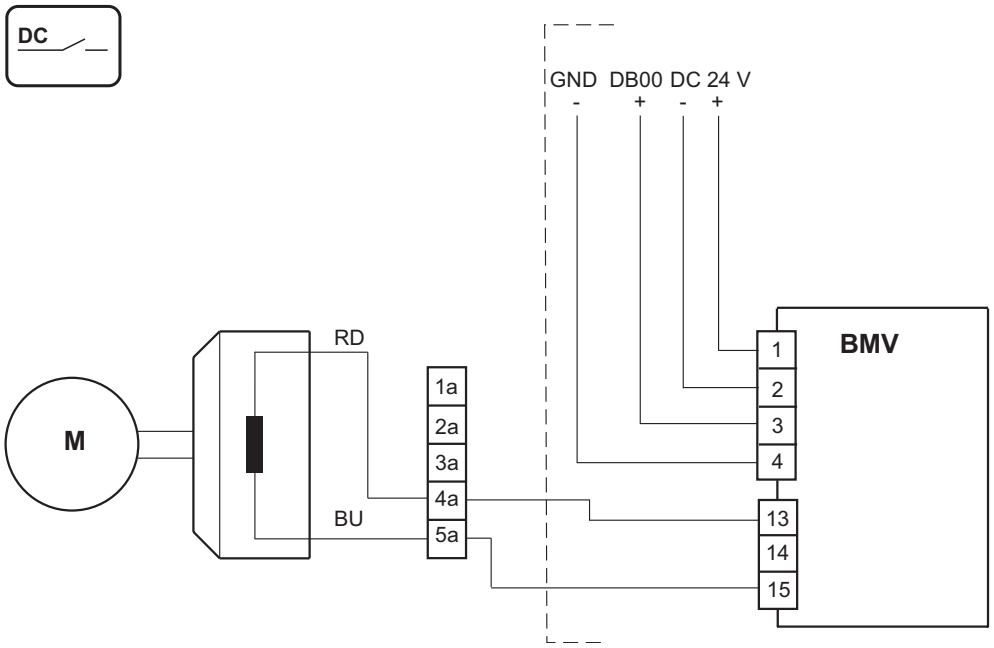
14324495755

BMV brake control – 2 coils



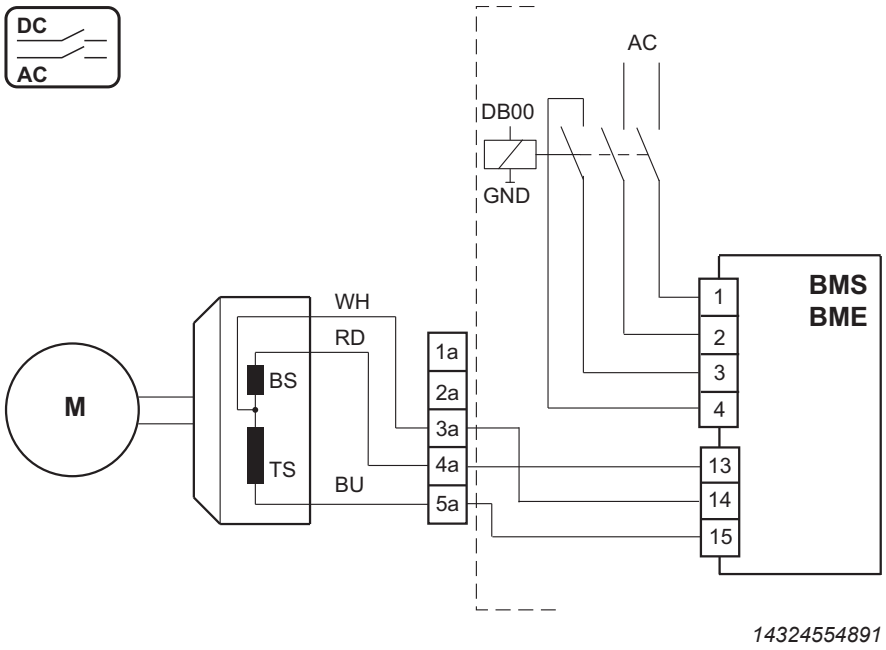
14373482507

BMV brake control – 1 coil



14373494923

BMS, BME brake control



14324554891

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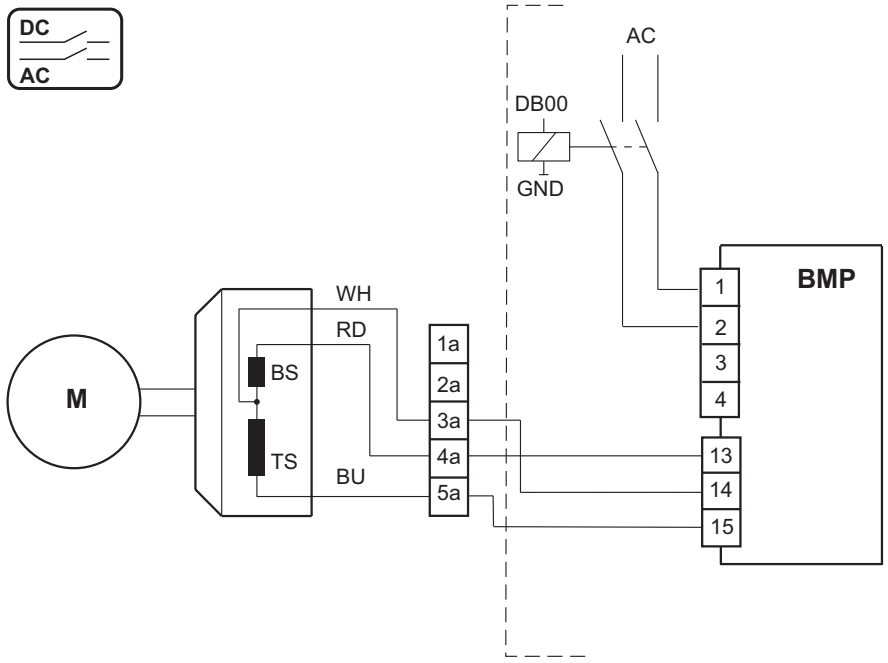
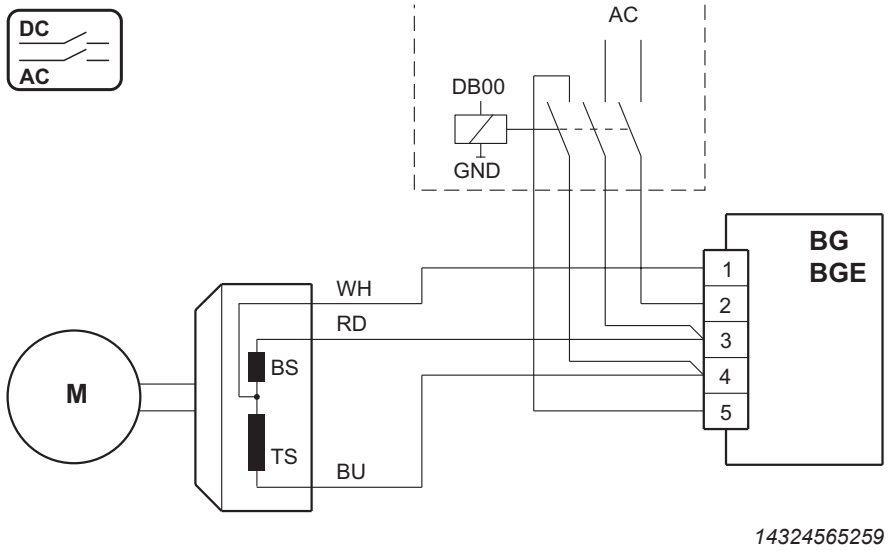
BMP brake control



14324544523

BG, BGE brake control



14324565259

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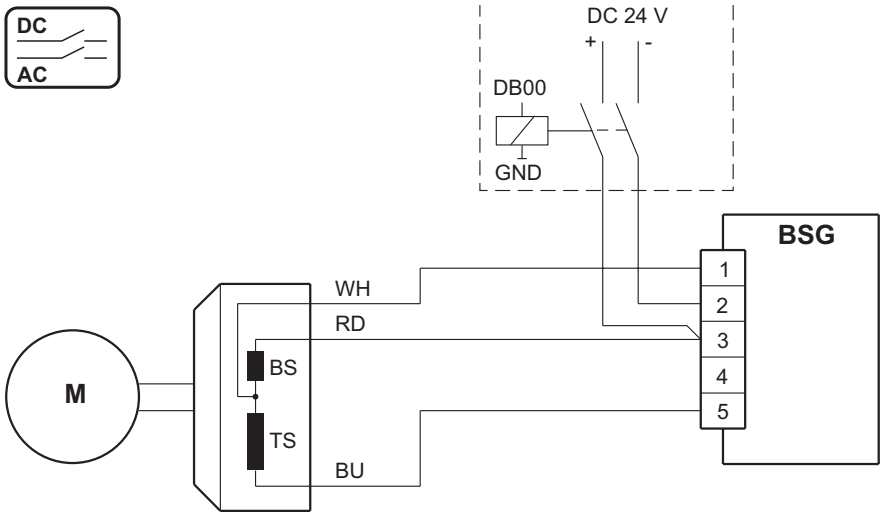
BSG brake control



14324597131

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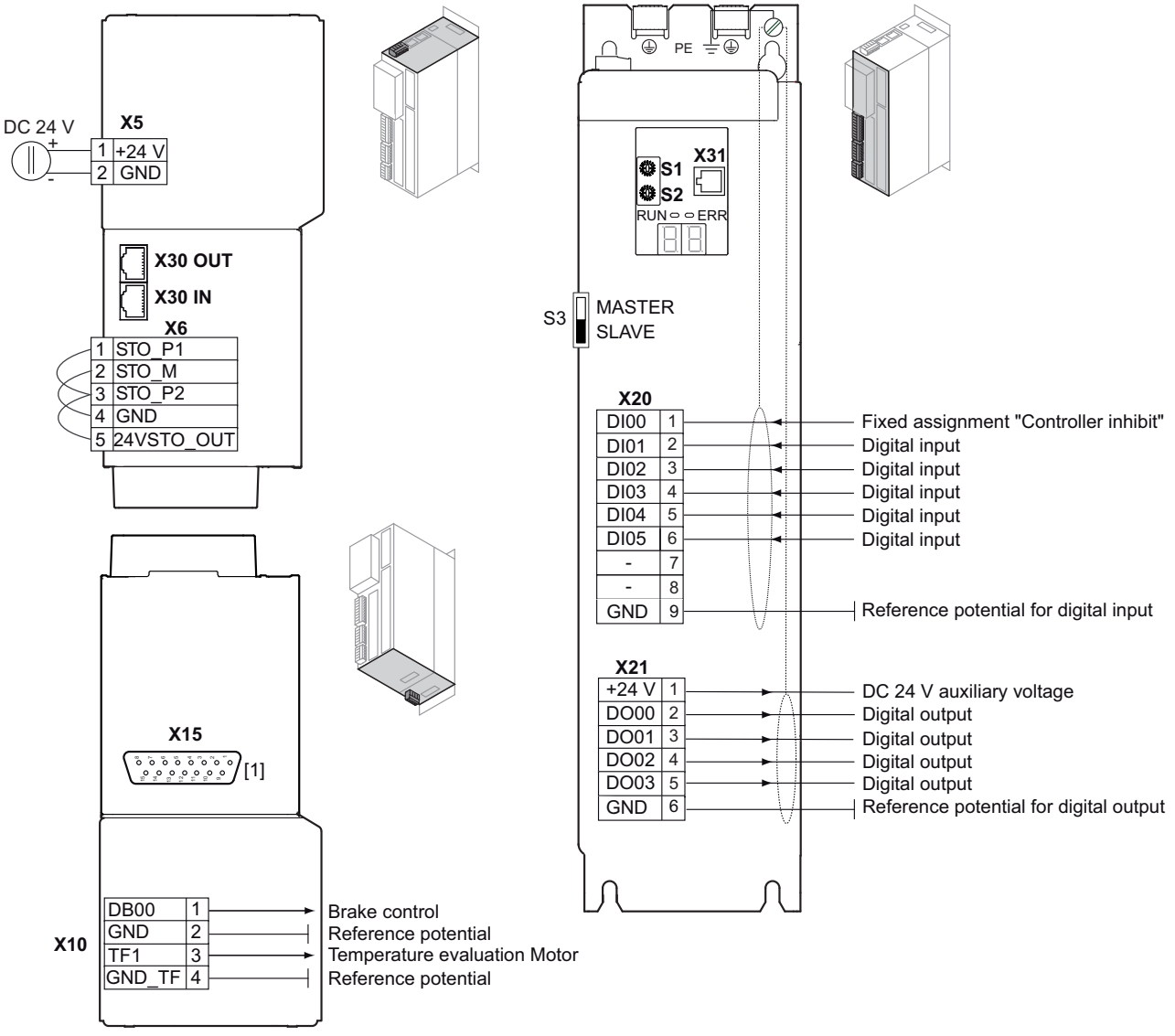
4.12.4 Electronics connection

Wiring the control electronics

For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 73).



9007214594818315

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

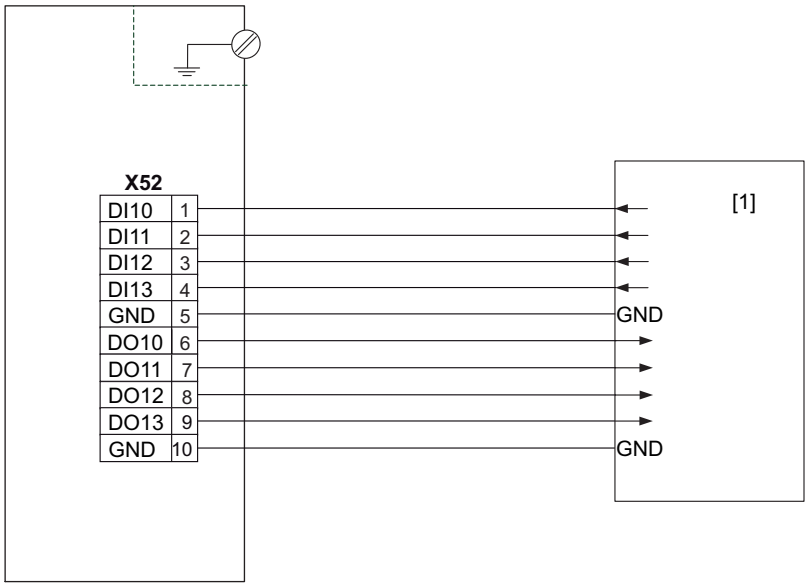
X30 System bus

S1 Operating mode module bus

[1] Motor encoder connection

4.12.5 Connection diagram CIO21A and CID21A input/output card

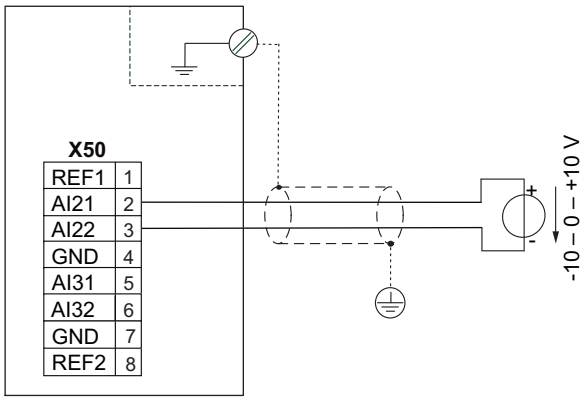
Digital inputs and outputs



18014412829087243

[1] Higher-level controller

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.

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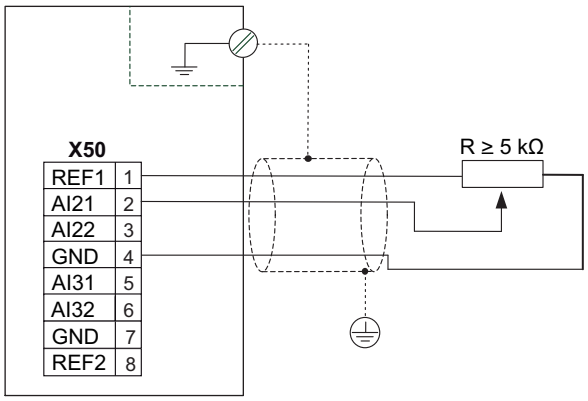
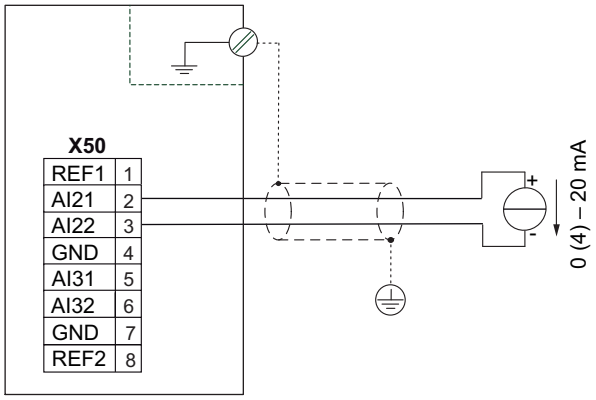


18014412830137099

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

Observe the switch position of "DIP switch S50" (→ 🗎 49) when activating the current input.

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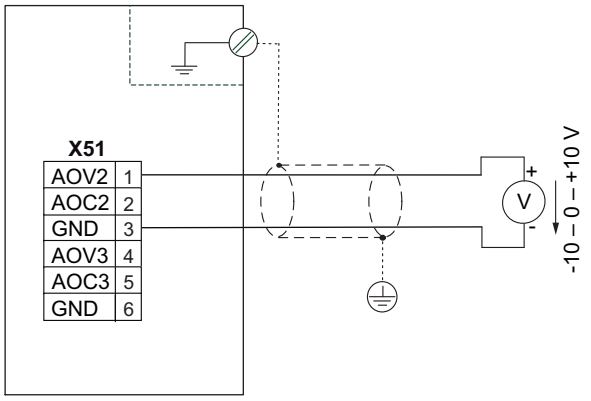
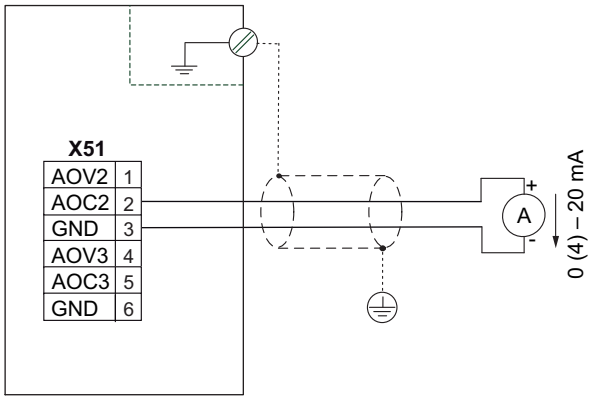
Voltage output



18014412830141963

Connection to the terminals AOV2 and GND is carried out analogously to the connection to the terminals AOV1 and GND shown in the wiring diagram.

Current output



18014412830272395

Connection to the terminals AOC2 and GND is carried out analogously to the connection to the terminals AOC1 and GND shown in the wiring diagram.

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4.13 UL-compliant installation

UL approval of the application inverter is in preparation.

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5 Startup

5.1 General

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 plugged in a de-energized state.

Irreparable damage to the application inverter or unforeseeable malfunctions.

- De-energize the application inverter.

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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 components:

- 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.

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5.4 Startup procedure

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

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The startup is functionally divided into segments. The following steps illustrate an example of the startup procedure for an application inverter.

Drive train segment	Drive train		Configuring drive trains.
Interfaces segment	Built-in interfaces		Basic settings of the installed interfaces • EtherCAT® • Standard I/O • Encoder 1
	Options		Basic settings of the options • Fieldbus • I/O card • Encoder 2 • DriveSafety®
Functions segment	I/O configuration		• Standard I/O • I/O card DI/DO • I/O card AI/AO
	PO configuration	10010	• Basic settings • PO data • Setpoint buffer • Fixed setpoints • Control word 1 – 3

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PI configuration		• PI data • Status word 1 – 3
Drive functions		• FCB05 Speed control • FCB06 Interpolated speed control • FCB08 Interpolated torque control • FCB09 Positioning • FCB10 Interpolated position control • FCB12 Reference travel
Advanced drive functions		• FCB01 Output stage inhibit • FCB20 Jog mode • FCB21 Brake test • FCB26 Stop at user limit
Event-driven functions		• Touchprobe 1 • Touchprobe 2 • Cam switch
Monitoring functions		• Reference signals • Limit values 1 • Limit values 2 • Monitoring functions 1 • Control functions 2 • Energy-saving function
User units		Converting system units into user units.

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		• Parameter set selection • Access rights • Resetting device parameters.

5.4.1 Check list for startup

The following checklist lists the necessary steps for complete startup.

Step	Startup step	Done
1	Motor installation	

Step	Startup step	Done
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	

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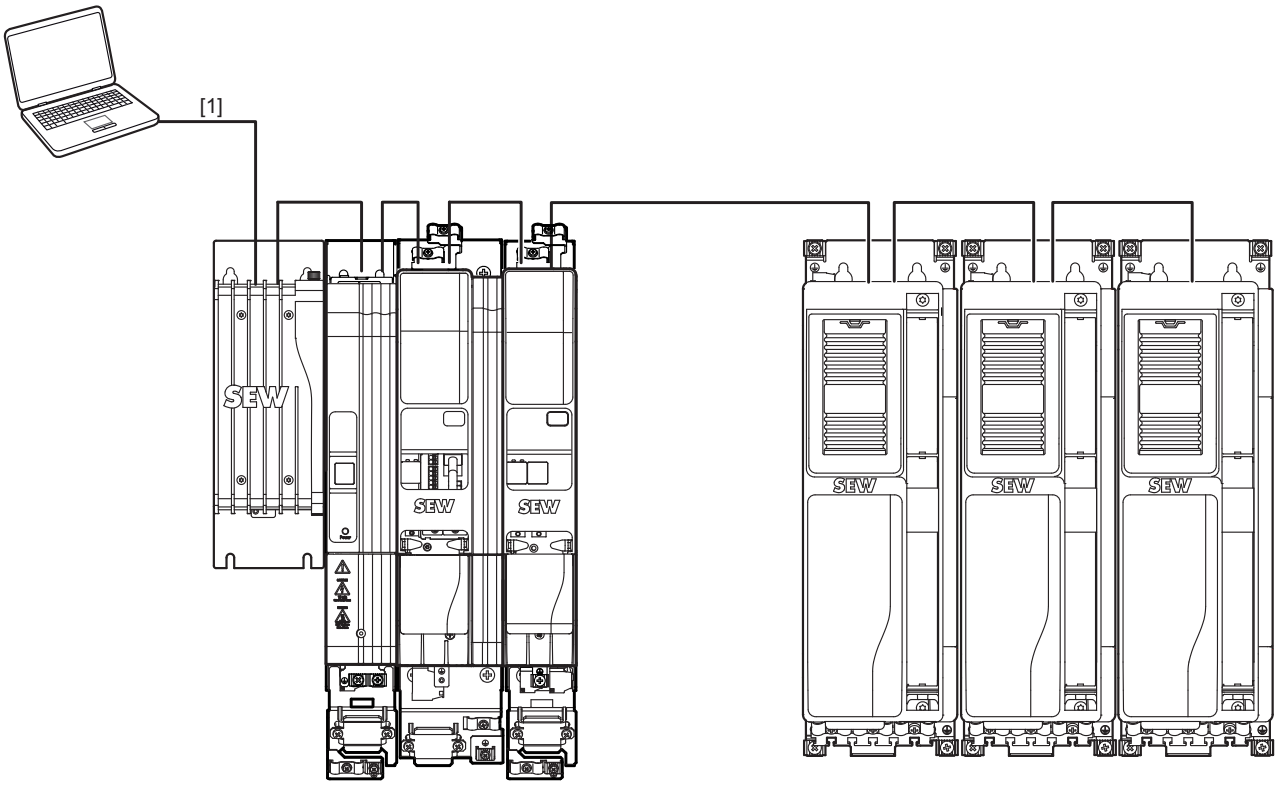
5.5 Connection to the engineering software

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



9007214576496523

[1] Ethernet

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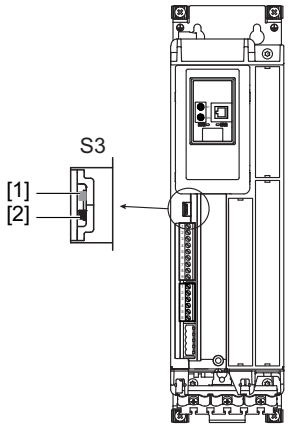
5.6 Setting the module bus operating mode

If 2 MOVIDRIVE® system application inverters are connected via a DC link connection, the require the information whether they are module bus master or module bus slave in the network. This is set with switch S3 "Module bus operating mode".

In the following chapter "Connection types" and the table "Setting options" (→ 🗎 97), the setting of the S3 switch for the respective modules is specified.



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[1] Switch setting "Master"

[2] Switch setting "Slave"

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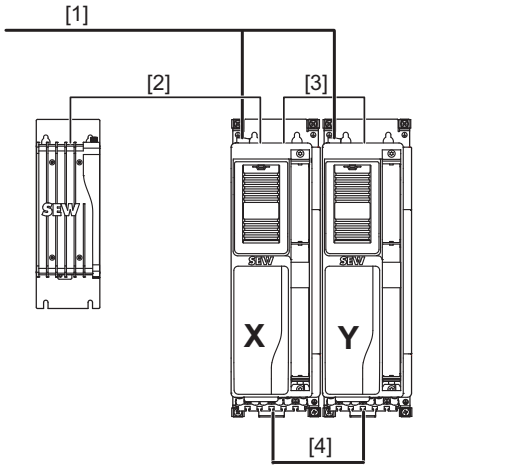
5.6.1 Connection types

When connecting several devices without DC link connection, the S3 switch must always be set to "Master".

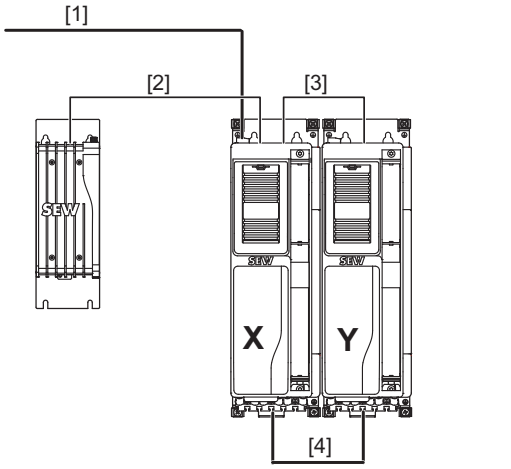
When connecting several MOVIDRIVE® system application inverters with DC link connection, the switch must be set as follows:

Connection type A



16081023627

Connection type B



16081026059

[1] Line cable

[2] System bus cable

[3] Module bus cable

[4] DC link connection

5.6.2 Setting options

The following settings are possible:

	Operating mode module bus	
	Module X	**Module Y**
Connection type A	Master	Master
Connection type B	Master	Slave

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6 Operation

6.1 General information

⚠ DANGER

Dangerous voltages present at cables and motor terminals.

Severe or fatal injuries from electric shock.

- Dangerous voltages are present at the output terminals and the cables and motor terminals connected to them when the device is switched on. This also applies even when the device is inhibited and the motor is at standstill.
- The fact that the operation LED is no longer illuminated does not indicate that the application inverter has been disconnected from the power supply and no longer carries any voltage.
- Before you touch the power terminals, check to see that the application inverter has been disconnected from the supply system.
- Observe the general safety notes in chapter "Safety notes" (→ 🗎 12) and the notes in chapter "Electrical installation" (→ 🗎 34).

⚠ 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**.

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6.2 7-segment display

6.2.1 Operating displays

- The two 7-segment displays indicate the operating state of the application inverter.

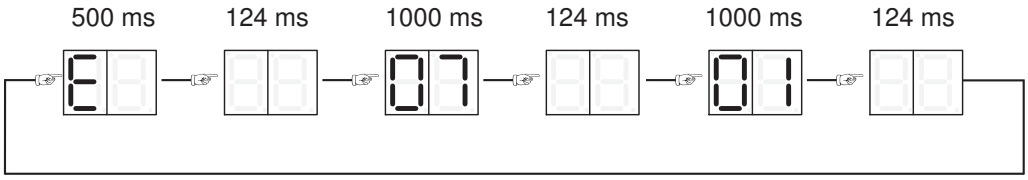
6.2.2 Fault display

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 displayed as flashing numeric values in the application inverter.

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, fault 07.01 in this example.

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6.3 Operating displays

Display	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: Device defective.

Display	Description	State	Comment/action
Displays of different device statuses			
.	Energy-saving mode		Energy-saving mode active
00	DC link voltage missing.	• Status: Not ready. • Output stage is inhibited. • Communication is possible.	Check supply system.
C2 Flashing	STO active.	• Status: Not ready. • Output stage is inhibited. • Communication is possible.	The function Safe Torque Off is active.
C3 Flashing	Incorrect synchronization with bus. 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	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.		
C6 Flashing	Internal device supply incomplete.		
C7 Flashing	Power section not ready.		
C8 Flashing	External device not ready.		
C9 Flashing	Data flexibility level is not ready.		
Cd Flashing	Parameter download running.		

Display	Description	State	Comment/action
Displays during initialization processes (parameters will be reset to default values)			
d0 Flashing	Basic initialization.	• Status: Not ready. • Output stage is inhibited. • Communication is possible.	Waiting for initialization to finish.
d1 Flashing	Initialization of delivery state.		

Display	Description	State	Comment/action
Displays during normal operation			
01	Output stage inhibit	• Output stage is inhibited.	The drive is not actuated by the output stage. The brake is closed, motor coasts without brake. FCB 01 is permanently selected with terminal DI00. However, it can be selected by additional sources.

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Display	Description	State	Comment/action
02	Default stop	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. FCB 13 is active if no other FCB is selected with the default FCB 02.
14	Emergency stop		Deceleration at the 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 a torque in close state of the brake.
25	Motor parameter measurement		Motor parameter measurement active
26	Stop at user limits		Serves to stop at user limits.

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6.4 Fault description

6.4.1 Fault 1 Output stage monitoring

Subfault: 1.1 Description: Short circuit in motor output terminals	
Response: Inhibit output stage	
Cause	Measure
Overcurrent in output stage or faulty output stage control detected, and output stage inhibited by the 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: Inhibit output stage	
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.

6.4.2 Fault 3 Ground fault

Subfault: 3.1 Description: Ground fault	
Response: Inhibit output stage	
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.

6.4.3 Fault 4 Brake chopper

Subfault: 4.1 Description: Brake chopper overcurrent	
Response: Inhibit output stage	
Cause	Measure
Too much regenerative power.	Extend deceleration ramps.
Short circuit in the 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: Inhibit output stage	
Cause	Measure
Output stage of brake chopper defective.	Replace defective brake chopper.

6.4.4 Fault 6 Line fault

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

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6.4.5 Fault 7 DC link fault

Subfault: 7.1 Description: DC link overvoltage	
Response: Inhibit output stage	
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 braking resistor.

6.4.6 Fault 8 Speed monitoring fault

Subfault: 8.1 Description: Speed monitoring – motor mode	
Response: Inhibit output stage	
Cause	Measure
The speed controller operates at setting limit (mechanical overload or phase failure in the supply system or the motor).	Increase set delay time of speed monitoring or reduce load.
The encoder is 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. If necessary, reduce acceleration values. – Check motor lead and motor, check line phases.

Subfault: 8.2 Description: Speed monitoring – generator mode	
Response: Inhibit output stage	
Cause	Measure
The speed controller operates at setting limit (mechanical overload or phase failure in the supply system or the motor).	Increase set delay time of speed monitoring or reduce regenerative load.
The encoder is 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. If necessary, reduce deceleration values. – Check motor lead and motor, check line phases.

Subfault: 8.3 Description: Motor limit speed exceeded	
Response: Inhibit output stage	
Cause	Measure
The maximum permitted motor speed was exceeded.	Reduce the maximum speed.

6.4.7 Fault 9 control mode

Subfault: 9.1 Description: Magnetization of motor not possible	
Response: Inhibit output stage	
Cause	Measure
The user current limit or output stage monitoring has reduced the possible maximum current to such a degree that the 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: The requested operating mode is not possible with the active control mode	
Response: Inhibit output stage	
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.

Subfault: 9.3 Description: Absolute rotor position not available		
	Response: Inhibit output stage	
	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 absolute encoder, or identify the rotor position using FCB 18.

Subfault: 9.4 Description: Correct current supply of motor not possible		
	Response: Inhibit output stage	
	Cause	Measure
	Failure to set the required current during premagnetization.	Check the cabling, or disable the function "current monitoring during premagnetization".

Subfault: 9.5 Description: Maximum output frequency exceeded		
	Response: Inhibit output stage	
	Cause	Measure
	Maximum output frequency exceeded.	Reduce maximum speed.

Subfault: 9.6 Description: Maximum model speed exceeded		
	Response: Inhibit output stage	
	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: Inhibit output stage	
	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 machines: Idle state or too low speed. – Contact SEW-EURODRIVE Service.

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

6.4.8 Fault 10 Data flexibilization layer

Subfault: 10.1 Description: initialization		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	Error during init task.	Contact SEW-EURODRIVE Service.

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

Subfault: 10.3 Description: Memory access		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	Memory area violated while accessing array.	Contact SEW-EURODRIVE Service.

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Subfault: 10.4 Description: Stack	
Response: Application stop (with output stage inhibit)	
Cause	Measure
Data flexibilization layer stack overflow.	Contact SEW-EURODRIVE Service.

Subfault: 10.5 Description: Division by 0	
Response: Application stop (with output stage inhibit)	
Cause	Measure
Division by 0.	Contact SEW-EURODRIVE Service.

Subfault: 10.6 Description: Runtime	
Response: Application stop (with output stage inhibit)	
Cause	Measure
Runtime error/watchdog.	Contact SEW-EURODRIVE Service.
PDI or PDO tasks.	Contact SEW-EURODRIVE Service.

Subfault: 10.7 Description: Calculation result of multiplication/division command too large	
Response: Application stop (with output stage inhibit)	
Cause	Measure
The calculation result of a multiplication/division command in the data flexibilization layer program exceeds 32 bits.	Contact SEW-EURODRIVE Service.
The result cannot be written into the result variable.	Contact SEW-EURODRIVE Service.

Subfault: 10.8 Description: Illegal connection	
Response: Application stop (with output stage inhibit)	
Cause	Measure
The index used in connect is not allowed.	Contact SEW-EURODRIVE Service.

Subfault: 10.9 Description: CRC code	
Response: Application stop (with output stage inhibit)	
Cause	Measure
The CRC checksum of the code is wrong.	Contact SEW-EURODRIVE Service.

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

Subfault: 10.11 Description: No application program loaded	
Response: Inhibit output stage	
Cause	Measure
No data flexibilization layer application program loaded.	Contact SEW-EURODRIVE Service.

Subfault: 10.99 Description: Unknown error	
Response: Application stop (with output stage inhibit)	
Cause	Measure
Unknown data flexibilization layer error.	Contact SEW-EURODRIVE Service.

6.4.9 Fault 11 Temperature monitoring

Subfault: 11.1
Description: Heat sink overtemperature

Response: Inhibit output stage

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

Subfault: 11.2
Description: Heat sink utilization – prewarning

Response: Heat sink utilization – prewarning

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

Subfault: 11.3
Description: Device utilization

Response: Inhibit output stage

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: Inhibit output stage

Cause	Measure
The electromechanical components of the device are 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 the electromechanical components of the device due to the high continuous current. Prewarning threshold reached.	– Reduce load. – Reduce PWM frequency. – Reduce rms value of current. – Reduce ambient temperature.

Subfault: 11.7
Description: Wire break of the temperature sensor of the heat sink

Response: Inhibit output stage

Cause	Measure
Wire break on the temperature sensor of the heat sink.	Contact SEW-EURODRIVE Service.

Subfault: 11.8
Description: Short circuit on the temperature sensor of the heat sink.

Response: Inhibit output stage

Cause	Measure
Short circuit on the temperature sensor of the heat sink.	Contact SEW-EURODRIVE Service.

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6.4.10 Fault 12 Brake

Subfault: 12.1 Description: Brake output		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	No brake connected.	Check brake connection.
	Brake cable disconnected in "ON" status.	Check brake connection.
	Overload due to overcurrent > 2 A.	Check sequential profile of brake control.
	Overload due to excessive connection (approx. > 0.5 Hz).	Check sequential profile of brake control.
	Monitoring is only active with parameter settings "Brake installed" and "Brake applied".	Check whether the connected brake is permitted.

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

6.4.11 Error 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 the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

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

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 the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 13.4 Description: Track measurement		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Faulty track measurement.	– Switch off the device and on again. – Check wiring. – Check interference source (e.g. from EMC). – Check/replace encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 13.5 Description: Internal warning		
	Response: Encoder – warning	
	Cause	Measure
	Encoder signals warning status.	– 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
	Error while monitoring signal level. Vector below permitted limit.	– Check wiring. – Check interference source (e.g. from EMC). – Check encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 13.7 Description: Signal level too high		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error while monitoring signal level. Vector exceeds permitted limit.	Check the gear ratio of the resolver in use. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 13.8 Description: Signal level monitoring		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error while monitoring signal level. Vector exceeds permitted limit.	Check the encoder mounting position. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 13.9 Description: Quadrant check		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error while checking quadrants (sine encoder).	– Switch off the device and on again. – Check wiring. – Check interference source (e.g. from EMC). – Check/replace encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 13.10 Description: Position tolerance band monitoring		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Position outside tolerance band.	– Check startup parameters. – 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: 13.11 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 the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

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Subfault: 13.12 Description: Emergency		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder sends emergency error message.	– Check interference source (e.g. from EMC). – Check startup parameters. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 13.13 Description: Initialization		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Communication error during initialization.	– Check parameterization. – Check baud rate. – CANopen interface at encoder (node ID) not set correctly. – Check wiring. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

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

Subfault: 13.15 Description: System error		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder evaluation signals a system error.	– Multi-turn encoder is outside the configured track are. – Check limits. – Check correct settings of encoder numerator/denominator factors. – Check interference source (e.g. from EMC). – Check startup parameters. – Switch off the device and on again. – Contact SEW-EURODRIVE service if the error is still present. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

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

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

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

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

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 settings at 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 settings at 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 signals internal fault status.	– 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: 13.23 Description: Internal fault	
Response: Encoder 1 – latest fault	
Cause	Measure
Encoder signals internal fault status.	– 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.

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Subfault: 13.24 Description: Travel range exceeded		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	The current position mode (8381.10) does not allow for a larger travel range.	Check travel range. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 13.25 Description: Encoder startup		
	Response: Inhibit output stage	
	Cause	Measure
	Fatal error during startup	Switch the device off/on. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

6.4.12 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 the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.2 Description: Unknown encoder type		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder type is not known and not supported by the inverter.	– Check encoder type. – Contact SEW-EURODRIVE Service. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

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 the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.4 Description: Track measurement		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Faulty track measurement.	– Switch off the device and on again. – Check wiring. – Check interference source (e.g. from EMC). – Check/replace encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.5 Description: Internal warning		
	Response: Encoder – warning	
	Cause	Measure
	Encoder signals warning status.	– 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
	Error while monitoring signal level. Vector below permitted limit.	– Check wiring. – Check interference source (e.g. from EMC). – Check encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.7 Description: Signal level too high		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error while monitoring signal level.Vector exceeds permitted limit.	Check the gear ratio of the resolver in use. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.8 Description: Signal level monitoring		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error while monitoring signal level.Vector exceeds permitted limit.	Check the encoder mounting position. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.9 Description: Quadrant check		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error while checking quadrants (sine encoder).	– Switch off the device and on again. – Check wiring. – Check interference source (e.g. from EMC). – Check/replace encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.10 Description: Position tolerance band monitoring		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Position outside tolerance band.	– Check startup parameters. – 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: 14.11 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 the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.12 Description: Emergency		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder sends emergency error message.	– Check interference source (e.g. from EMC). – Check startup parameters. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

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Subfault: 14.13 Description: initialization		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Communication error during initialization.	– Check parameterization. – Check baud rate. – CANopen interface at encoder (node ID) not set correctly. – Check wiring. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.14 Description: Communication		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Faulty communication with the encoder.	– Check voltage supply. – Check interference source (e.g. from EMC). – Check wiring. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.15 Description: System error		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder evaluation signals a system error.	– Multi-turn encoder is outside the configured track are. – Check limits. – Check correct settings of encoder numerator/denominator factors. – Check interference source (e.g. from EMC). – Check startup parameters. – Switch off the device and on again. – Contact SEW-EURODRIVE service if the error is still present. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.16 Description: Permanent high level in data line – critical		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Permanent high level of data signal.	– Check wiring. – Check encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.17 Description: Permanent high level in data line		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Permanent high level of data signal.	– Check wiring. – Check encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.18 Description: Permanent low level in data line – critical		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Permanent low level of data signal.	– Check wiring. – Check encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

Subfault: 14.19 Description: Permanent low level in data line	
Response: Encoder 2 – latest fault	
Cause	Measure
Permanent low level of data signal.	– Check wiring. – Check encoder. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

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 settings at 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 settings at 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 signals internal fault status.	– 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: 14.23 Description: Internal fault	
Response: Encoder 2 – latest fault	
Cause	Measure
Encoder signals internal fault status.	– 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: 14.24 Description: Travel range exceeded	
Response: Encoder 2 – latest fault	
Cause	Measure
The current position mode (8382.10) does not allow for a larger travel range.	Check travel range. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

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Subfault: 14.25 Description: Encoder startup		
	Response: Inhibit output stage	
	Cause	Measure
	Fatal error during startup.	Switch the device off/on. Note: In the "emergency mode" manual mode, you can move the drive even with a fault in the external position encoder.

6.4.13 Error 16 Startup

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

Subfault: 16.2 Description: Cannot calculate controller parameters		
	Response: Inhibit output stage	
	Cause	Measure
	The delay of the encoder in use is too long to calculate the required filter coefficients.	Use an encoder with shorter delay, or contact the SEW-EURODRIVE Service.

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

Subfault: 16.4 Description: Current limit too high		
	Response: Inhibit output stage	
	Cause	Measure
	The current limit value is greater than the maximum current of the inverter.	Set the current limit to a smaller value than the maximum current of the inverter.

Subfault: 16.5 Description: Current limit smaller than magnetizing current of motor		
	Response: Inhibit output stage	
	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: Inhibit output stage	
	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: Inhibit output stage	
	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: Inhibit output stage	
	Cause	Measure
	Faulty startup of temperature sensor of motor 1.	Perform startup again.

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

Subfault: 16.10 Description: Actual position source not assigned		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	The active control mode requires an encoder for position mode.	Assign actual position source in encoder assignment of the active parameter set: 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: Inhibit output stage	
	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 SEW-EURODRIVE Service.

Subfault: 16.12 Description: Motor data write sequence		
	Response: Inhibit output stage	
	Cause	Measure
	Subindex 1 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: Inhibit output stage	
	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: Inhibit output stage	
	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: Inhibit output stage	
	Cause	Measure
	During startup using nameplate data: It is not possible to calculate the number of pole pairs accurately from nominal frequency and nominal speed.	Enter the number of pole pairs.

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

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Subfault: 16.24 Description: Speed controller sampling cycle not possible with current PWM frequency or current control mode	
Response: Application stop (with 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: Inhibit output stage	
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	
Response: Inhibit output stage	
Cause	Measure
During startup using nameplate data: Nominal voltage, nominal current, nominal speed, or nominal torque not entered.	Enter nominal voltage, nominal current, nominal speed, and nominal torque.

Subfault: 16.27 Description: Maximum current or maximum torque not plausible	
Response: Inhibit output stage	
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®/SBusPLUS EEPROM configuration status. EEPROM not loaded, binary file not loaded.	Contact SEW-EURODRIVE Service.
Faulty EEPROM loading procedure.	Contact SEW-EURODRIVE Service.
Faulty EEPROM checksum.	Contact SEW-EURODRIVE Service.

6.4.14 Error 17 Internal processor error

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

6.4.15 Error 18 Software error

Subfault: 18.1 Description: Motor management	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
An error was detected at the motor management interface.	Switch the device off/on. Contact SEW-EURODRIVE service if the error is still present.

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Subfault: 18.4 Description: Task system		
	Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	An error was detected during processing the internal task system. This can for example be a timeout for cyclic tasks.	Switch the device off/on. Contact SEW-EURODRIVE service if the error is still present.

Subfault: 18.7 Description: Fatal error		
	Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	A fatal software error occurred.	Switch the device off/on. Contact SEW-EURODRIVE service if the error is still present.

Subfault: 18.8 Description: Invalid error code		
	Response: Inhibit output stage	
	Cause	Measure
	Invalid error code requested.	Switch the device off/on. Contact SEW-EURODRIVE service if the error is still present.

Subfault: 18.9 Description: Internal software error		
	Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	A group software error occurred.	Switch the device off/on. Contact SEW-EURODRIVE service if the error is still present.

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

Subfault: 18.12 Description: Configuration data		
	Response: Inhibit output stage 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.

6.4.16 Error 19 Process data

Subfault: 19.1 Description: Torque violation		
	Response: Application stop (with 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 (with output stage inhibit)	
	Cause	Measure
	The position setpoint is outside the software limit switches.	Check position setpoint.
	The position setpoint is outside the modulo range.	Check position setpoint.
	Position in user unit generates number overflow in system units	Check position in user unit.

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Subfault: 19.3 Description: Speed setpoint violation		
	Response: Application stop (with 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 (with output stage inhibit)	
	Cause	Measure
	The specified acceleration setpoints are not plausible.	Adjust acceleration setpoints.

Subfault: 19.5 Description: Drive function does not exist		
	Response: Application stop (with 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 (with output stage inhibit)	
	Cause	Measure
	The activated function is only permitted with referenced encoder.	Reference the encoder first, then activate the function.

Subfault: 19.8 Description: Data set changeover not allowed		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	You have requested data set changeover while the output stage is enabled.	Before changing to another data set, inhibit the output stage.

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

6.4.17 Fault 20 Device monitoring

Subfault: 20.1 Description: Supply voltage – fault		
	Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	The internal electronics supply voltage or the externally connected 24 V standby supply voltage are outside the permitted voltage range.	Check the voltage level of the external 24 V standby supply voltage and check for correct connection. If required, correct. – Acknowledge the error. If this does not help and the error message is displayed again, the device must be replaced.

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Subfault: 20.2 Description: Supply voltage – overload fault		
	Response: Inhibit output stage	
	Cause	Measure
	For MOVIDRIVE® system, the current load of the current paths of the 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.	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. – Acknowledge error. – If the fault is no longer displayed, reconnect the removed consumers one after the other until the fault message is displayed again. The consumer connected last is the one that caused the internal supply voltage overload. – To eliminate the fault, use a consumer with a lower current consumption or eliminate possible short circuit.

Subfault: 20.7 Description: Internal hardware fault		
	Response: Inhibit output stage	
	Cause	Measure
	An error occurred in the device hardware.	Acknowledge fault. If this does not help and the error message is displayed again, the device must be replaced.

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

Subfault: 20.9 Description: Fan function – fault		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	Fan defective.	Replace the fan.

Subfault: 20.10 Description: Fan supply voltage – fault		
	Response: Emergency stop (with 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: Inhibit output stage	
	Cause	Measure
	A switching delay occurred between the two STO channels.	Check STO channels.

6.4.18 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 (with output stage inhibit)	
	Cause	Measure
	Power section fault with fault response of the type "standard".	See also "power section subcomponent" fault status.

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Subfault: 23.3 Description: Critical fault		
	Response: Inhibit output stage	
	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: Inhibit output stage	
	Cause	Measure
	A fault occurred in a hardware component of the power section, e.g.: – Overcurrent hardware comparator.	– Check current supply. – Check current transformer. – Increase ramp time. – Check phase modules. – Check for correct motor size (the motor current is too high). – Perform power section update.
	SMPS fault, hardware fault.	– Check current supply. – Check 24 V supply voltage.
	Fault at the gate driver of an IGBT.	Defect in the power output stage. Contact SEW-EURODRIVE Service.
	Invalid process data configuration. Status of control section and power section are not compatible.	Perform power section update.

Subfault: 23.5 Description: Invalid process data configuration		
	Response: Inhibit output stage	
	Cause	Measure
	Invalid process data configuration.	Perform power section update.

6.4.19 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 windows limits and adjust.

Subfault: 24.2 Description: Cam window limit not within modulo range		
	Response: Warning	
	Cause	Measure
	Cam window limit not within modulo range.	Check cam windows limits and adjust.

6.4.20 Error 25 Parameter memory monitoring

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

Subfault: 25.3 Description: NV data import – error		
	Response: Inhibit output stage	
	Cause	Measure
	– Error while importing non-volatile memory data from non-volatile memory.	

Subfault: 25.4 Description: NV setup – error		
	Response: Inhibit output stage	
	Cause	Measure
	Error while performing delivery state or during basic initialization of the parameters.	– Reset device. If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.

Subfault: 25.5 Description: NV data error		
	Response: Inhibit output stage	
	Cause	Measure
	Faulty data detected in non-volatile memory system.	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: 25.6 Description: NV memory – incompatible data		
	Response: Inhibit output stage	
	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: Inhibit output stage System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	Error while initializing non-volatile memory system.	– Reset device. If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.

Subfault: 25.9 Description: NV memory hardware – error		
	Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	Faulty access to non-volatile memory hardware.	– Reset device. If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.

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

Subfault: 25.11 Description: Control electronics configuration data – version conflict		
	Response: Inhibit output stage	
	Cause	Measure
	Wrong version of configuration data of control electronics.	Contact SEW-EURODRIVE Service.

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

Subfault: 25.13 Description: Configuration data of control electronics – CRC error		
	Response: Inhibit output stage	
	Cause	Measure
	Faulty configuration data of the control electronics.	Contact SEW-EURODRIVE Service.

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Subfault: 25.20 Description: Initialization error – basic unit memory	
Response: Emergency stop (with output stage inhibit) System state: Fault acknowledgement with CPU reset	
Cause	Measure
Initialization error of the basic unit memory.	Contact SEW-EURODRIVE Service.

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

Subfault: 25.30 Description: Initialization error – replaceable memory module	
Response: Emergency stop (with output stage inhibit) System state: Fault acknowledgement with CPU reset	
Cause	Measure
Initialization error of the replaceable memory module.	Contact SEW-EURODRIVE Service.

Subfault: 25.31 Description: Runtime error – replaceable memory module	
Response: Emergency stop (with output stage inhibit) System state: Fault acknowledgement with CPU reset	
Cause	Measure
Runtime error of the replaceable memory module.	Contact SEW-EURODRIVE Service.

Subfault: 25.40 Description: Initialization error – safety device memory	
Response: Emergency stop (with output stage inhibit) System state: Fault acknowledgement with CPU reset	
Cause	Measure
Initialization error of the Safety unit memory.	Contact SEW-EURODRIVE Service.

Subfault: 25.41 Description: Runtime error – Safety device memory	
Response: Emergency stop (with output stage inhibit) System state: Fault acknowledgement with CPU reset	
Cause	Measure
Runtime error of the Safety unit memory.	Contact SEW-EURODRIVE Service.

Subfault: 25.50 Description: Runtime error – replaceable safety memory module	
Response: Emergency stop (with output stage inhibit) System state: Fault acknowledgement with CPU reset	
Cause	Measure
Runtime error of the replaceable safety memory module.	Contact SEW-EURODRIVE Service.

Subfault: 25.60 Description: Compatibility fault – replaceable memory module	
Response: Emergency stop (with output stage inhibit) System state: Fault acknowledgement with CPU reset	
Cause	Measure
Data on replaceable memory module does not match device.	Establish compatibility with the device, e.g. by installing missing options, etc.

Subfault: 25.61 Description: Error – restore point basic unit memory	
Response: Emergency stop (with output stage inhibit) System state: Fault acknowledgement with CPU reset	
Cause	Measure
The restore point could not be created.	Delete restore point.

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Subfault: 25.70 Description: NV memory – incompatible option card configuration		
	Response: Inhibit output stage	
	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/reset device parameter/reset delivery state.

6.4.21 Fault 26 External fault

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

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

Subfault: 26.3 Description: Power section emergency shutdown		
	Response: Inhibit output stage	
	Cause	Measure
	Power section has requested external emergency shutdown.	Power section has detected a critical fault.

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

6.4.22 Error 28 FCB drive functions

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

Subfault: 28.2 Description: FCB 12 – Hardware limit switch before reference cam		
	Response: Emergency stop (with 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.

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Subfault: 28.3 Description: FCB 12 – Hardware limit switch and reference cam not flush	
Response: Emergency stop (with output stage inhibit)	
Cause	Measure
Hardware limit switch and reference cam are 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 (with output stage inhibit)	
Cause	Measure
An error occurred while determining the 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: 28.6 Description: FCB 12 – limit switch/reference cam not flush/overlapping with fixed stop	
Response: Emergency stop (with 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: Inhibit output stage	
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: Inhibit output stage	
Cause	Measure
The required test torque for the brake test exceeds the valid limit values.	– Reduce the test torque. – Check limit values.

Subfault: 28.9 Description: FCB 18 – rotor position identification not possible	
Response: Inhibit output stage	
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: Inhibit output stage	
Cause	Measure
When measuring stator resistances, significantly different values were determined in the 3 phases.	– 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: Inhibit output stage	
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: Inhibit output stage	
Cause	Measure
Motor parameter measurement was activated while motor is rotating.	– Stop motor. – Start motor parameter measurement when the motor is at standstill.

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

6.4.23 Error 29 Hardware limit switch

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

Subfault: 29.2 Description: Negative limit switch hit	
Response: HW limit switches – current parameter set	
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 (with output stage inhibit)	
Cause	Measure
Both limit switches (positive and negative) were 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 (with output stage inhibit)	
Cause	Measure
The positive hardware limit switch was hit at negative speed, or the negative hardware limit switch was hit at positive speed.	Check whether hardware limit switch connections are swapped.

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6.4.24 Error 30 Software limit switch

Subfault: 30.1 Description: Positive limit switch hit		
	Response: SW limit switches – current parameter set	
	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 parameter set	
	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 (with output stage inhibit)	
	Cause	Measure
	The position value of the negative software limit switch is greater than the position value of the positive software limit switch.	Check software limit switch positions.

6.4.25 Error 31 Thermal motor protection

Subfault: 31.1 Description: Wire break temperature sensor – motor 1		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	The connection to the temperature sensor of motor 1 is interrupted.	Check temperature sensor wiring.

Subfault: 31.2 Description: Temperature sensor short circuit – motor 1		
	Response: Application stop (with 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: Inhibit output stage	
	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: Inhibit output stage	
	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: Motor temperature prewarning – current parameter set	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 1 exceeds prewarning threshold.	Check for motor overload.

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Subfault: 31.6 Description: Temperature model prewarning – motor 1		
	Response: Motor temperature prewarning – current parameter set	
	Cause	Measure
	The temperature signaled by the temperature sensor of motor 1 exceeds the prewarning threshold.	Check for motor overload.

Subfault: 31.7 Description: UL temperature monitoring		
	Response: Inhibit output stage	
	Cause	Measure
	Temperature model of the 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: Wire break temperature sensor – motor 2		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	The connection to the temperature sensor of motor 2 is interrupted.	Check temperature sensor wiring.

Subfault: 31.12 Description: Temperature sensor short circuit – motor 2		
	Response: Application stop (with 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: Inhibit output stage	
	Cause	Measure
	Temperature sensor of motor 2 signals overtemperature.	– Let motor cool down. – Check for motor overload.

Subfault: 31.14 Description: Temperature model overtemperature – motor 2		
	Response: Inhibit output stage	
	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: Motor temperature prewarning – current parameter set	
	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: Motor temperature prewarning – current parameter set	
	Cause	Measure
	The temperature signaled by the temperature sensor of motor 2 exceeds the prewarning threshold.	Check for motor overload.

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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.

6.4.26 Error 32 Communication

Subfault: 32.2 Description: EtherCAT®/SBusPLUS timeout		
	Response: Fieldbus – timeout	
	Cause	Measure
	Timeout during EtherCAT®/SBus^{PLUS} communication.	– Check the wiring of system bus and module bus. Check for correct setting of the EtherCAT®/SBusPLUS 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
	A timeout occurred while synchronizing to the 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: Inhibit output stage	
	Cause	Measure
	Fault while downloading the parameter set to the device.	– Check the wiring of system bus and module bus. – Restart download.

Subfault: 32.7 Description: Application heartbeat timeout		
	Response: Application heartbeat timeout	
	Cause	Measure
	Communication interrupted between IE program in MOVI-C® CONTROLLER and device.	– Check status of IEC program. – Restart IEC program.

Subfault: 32.12 Description: Manual mode timeout		
	Response: Manual mode – timeout response	
	Cause	Measure
	Communication connection to the device interrupted in manual mode.	– Check whether too many programs are open on the operator PC. Increase the timeout time in manual mode.

6.4.27 Error 33 System initialization

Subfault: 33.1 Description: Motor current measurement	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
Motor current measurement has detected an error.	Contact SEW-EURODRIVE Service.

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

Subfault: 33.3 Description: RAM error	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
Error detected while checking RAM.	Contact SEW-EURODRIVE Service.

Subfault: 33.4 Description: Bootloader CRC check	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
The bootloader check has detected a fault.	Contact SEW-EURODRIVE Service.

Subfault: 33.5 Description: RAM code CRC check	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
Error detected while checking RAM code.	Contact SEW-EURODRIVE Service.

Subfault: 33.6 Description: FPGA configuration	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
Error detected while checking the FPGA configuration.	Contact SEW-EURODRIVE Service.

Subfault: 33.7 Description: Function block compatibility error	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
The compatibility test of the function block has detected an error.	Contact SEW-EURODRIVE Service.

Subfault: 33.8 Description: SW function block configuration	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
Error detected while checking the configuration of the software function block.	Contact SEW-EURODRIVE Service.

Subfault: 33.10 Description: Boot timeout	
Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
Cause	Measure
Timeout during system boot.	Contact SEW-EURODRIVE Service.

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Subfault: 33.11 Description: Hardware compatibility error		
	Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	The firmware does not match the device.	Contact SEW-EURODRIVE Service.

Subfault: 33.12 Description: Memory module plugged		
	Response: Inhibit output stage	
	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: Inhibit output stage	
	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.
	The replaceable memory module was removed during ongoing operation.	Change parameter "Non-volatile memory source" to "Internal memory". Switch the device off and on again.

6.4.28 Error 34 Process data configuration

Subfault: 34.1 Description: Changed process data configuration		
	Response: Application stop (with output stage inhibit)	
	Cause	Measure
	The configuration of process data was 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.

6.4.29 Error 35 Function activation

Subfault: 35.1 Description: Invalid TAN		
	Response: Emergency stop (with output stage inhibit)	
	Cause	Measure
	Incorrect TAN was 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 sub address in the device.	Enter a TAN for the assigned sub address.

Subfault: 35.2 Description: Application requires a higher license		
	Response: Emergency stop (with output stage inhibit)	
	Cause	Measure
	The activated application module requires a higher license.	Enter a TAN for higher application activation.

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

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Subfault: 35.4 Description: Technology activation for wrong device variant		
	Response: Emergency stop (with 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.

6.4.30 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 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, line phases.
Acceleration ramps too short.	Extend acceleration ramps.
P component of positioning controller too small.	Set larger P component of positioning 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: Inhibit output stage	
Cause	Measure
A lag error occurred in jog mode (FCB 20). Incorrect encoder connection.	Check 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, line phases.
Acceleration ramps too short.	Extend acceleration ramps.
P component of positioning controller too small.	Set larger P component of positioning 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: 42.3 Description: Standard lag error	
Response: Inhibit output stage	
Cause	Measure
A lag error occurred outside a positioning process. Incorrect encoder connection.	Check 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, line phases.
Acceleration ramps too short.	Extend acceleration ramps.
P component of positioning controller too small.	Set larger P component of positioning controller.
Incorrectly set speed controller parameters.	Check controller parameters.
Value of lag error tolerance too small.	Increase lag error tolerance.

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6.4.31 Fault 45 Fieldbus option

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

6.4.32 Error 46 Safety option

Subfault: 46.1 Description: No response		
	Response: Inhibit output stage System state: Fault acknowledgement with CPU reset	
	Cause	Measure
	Failed to synchronize with subcomponent.	– Check device assignment of basic device and option. – Check card slot and installation and correct if necessary. – Perform device restart. – Contact SEW-EURODRIVE Service.

Subfault: 46.2 Description: Invalid variant		
	Response: Inhibit output stage	
	Cause	Measure
	The plugged safety option variant does not match the inverter type.	– Remove option. – Use the correct variant of the safety option.
	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: Inhibit output stage	
	Cause	Measure
	Communication interrupted between inverter and safety option.	Check card slot and installation and correct if necessary. – Contact SEW-EURODRIVE service if the error is still present.
	The safety option signals a subcomponent fault of the type "warning".	Check card slot and installation and correct if necessary. – Contact SEW-EURODRIVE service if the error is still present.

Subfault: 46.50 Description: Warning		
	Response: Warning with self-reset	
	Cause	Measure
	– The safety option signals a subcomponent fault of the type "warning".	

Subfault: 46.51 Description: Fault		
	Response: Emergency stop (with output stage inhibit) with self-reset	
	Cause	Measure
	– The safety option signals a subcomponent fault of the type "standard fault".	

Subfault: 46.52 Description: Critical fault		
	Response: Inhibit output stage with self-reset	
	Cause	Measure
	– The safety option signals a subcomponent fault of the type "critical fault".	

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6.4.33 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 (with 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: Inhibit output stage	
	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.	

6.4.34 Error 48 Module bus

Subfault: 48.1 Description: Incompatible		
	Response: Inhibit output stage	
	Cause	Measure
	– Module bus slave and module bus master are not compatible.	

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

6.4.35 Error 50 I/O option

Subfault: 50.1 Description: Boot synchronization timeout		
	Response: Inhibit output stage	
	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: Inhibit output stage	
	Cause	Measure
	Communication between FPGA and option card does not work, or is interrupted.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

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Subfault: 50.3 Description: CRC error of option card		
	Response: Inhibit output stage	
	Cause	Measure
	The option card signals a CRC error on the SPI bus.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

Subfault: 50.4 Description: Timeout error of the option card		
	Response: Inhibit output stage	
	Cause	Measure
	The option card signals a timeout error on the SPI bus.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

Subfault: 50.5 Description: Watchdog error of the option card		
	Response: Inhibit output stage	
	Cause	Measure
	Microcontroller of the option card signals a watchdog error.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

Subfault: 50.6 Description: Ready signal timeout		
	Response: Inhibit output stage	
	Cause	Measure
	The card has booted but cyclic communication is not possible.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

6.4.36 Error 51 Analog processing

Subfault: 51.1 Description: Analog current input 4 mA limit		
	Response: Warning with self-reset	
	Cause	Measure
	The input current of AI2/AI3 is below 4 mA.	Monitoring of input current of AI2/AI3.

6.4.37 Error 52 Explosion protection category 2 function

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

Subfault: 52.2 Description: Illegal system function		
	Response: Inhibit output stage	
	Cause	Measure
	– An illegal system function is active.	

Subfault: 52.3 Description: Inverter too large		
	Response: Inhibit output stage	
	Cause	Measure
	– Ratio of inverter current and nominal motor current too large.	

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Subfault: 52.4 Description: Parameterization of current limit characteristic		
	Response: Inhibit output stage	
	Cause	Measure
	– Error while setting the parameters for the current limit characteristic.	

Subfault: 52.5 Description: Timeout f < 5 Hz		
	Response: Emergency stop (with output stage inhibit)	
	Cause	Measure
	– Duration of 60 s for f < 5 Hz exceeded.	

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6.5 Responses to error acknowledgement

6.5.1 Error acknowledgement

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

Final fault status	Responses to error acknowledgement
System blocked	System restart
System waiting	Warm start: Delete error code
Only display error	Warm start: Delete error code

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 microcontroller.

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

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

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Warm start

A warm start only resets the fault code.

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

Fieldbus timeout

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

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6.6 Fault responses

6.6.1 Default – fault response

Fault response	Description
No response	The inverter ignores the event.
Warning with self reset	The inverter issues a warning message.
Warning	
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.

6.6.2 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
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

Parameterizable faults	Description	Index no.	Possible fault response
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
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

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Parameterizable faults	Description	Index no.	Possible fault response
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

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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

If the application inverters are stored in a temperature range of 5 °C to 40 °C, no measures are required.

The following table lists the application inverters, time intervals, and measures that are required if the application inverters are stored outside the above mentioned temperature range.

For all application inverters other than the ones listed, **no** measures are required.

Modules	Time interval	Measure
- MDX90A-0020 – 0160-5_3-.. - MDX90A-0070 – 0140-2_3-..	Every 2 years	Line connections: Connect the device to the line voltage for 5 minutes.
All application inverters		Connect the device to 24 V for 5 minutes

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7.2.1 Procedure in case maintenance has been neglected

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

The following 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 due to 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

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8 Technical data

8.1 Markings

The MOVIDRIVE® system application inverter complies with the following directives and guidelines:

Mark	Meaning
CE	CE mark to state compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • EMC Directive 2014/30/EU • Machinery Directive 2006/42/EC
EAC	The MOVIDRIVE® system device series fulfills the requirements of the technical regulations of the Customs Union of Russia, Kazakhstan, and Belarus. The EAC marking on the nameplate certifies the conformity with the safety requirements of the Custom Union.
c UL us LISTED	UL mark to confirm UL (Underwriters Laboratories) is in preparation. Also valid for CSA together with the registration number.
RCM	RCM logo (Regulatory Compliance Mark). Confirmation of compliance with technical regulations of the Australian Communications and Media Authority ACMA is in preparation.

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8.2 General technical data

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

- Type
- Design
- Size
- Power

MOVIDRIVE® system	
Interference immunity	Meets EN 61800-3; 2. Environment
Interference emission	Limit value category C2 to EN 61800-3
Ambient temperature ϑ_A	0 °C to +40 °C without derating 40 °C to +60 °C with 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 +60 °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 60721-3-3 class 1S1 • Transportation: EN 60721-3-3 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	
MDX90A-0020-... – MDX90A-0320-...	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.

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8.3 Technical data of basic device

8.3.1 Performance data 3 × AC 400 V

MOVIDRIVE® system	Unit	MDX90A-...-5_3-4-S00								
Type		**0020**	**0025**	**0032**	**0040**	**0055**	**0070**	**0095**	**0125**	**0160**
Size		1				2			3	
Nominal output current I_N PWM = 4 kHz	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16
Input										
Nominal line voltage (to EN 50160) AC V_{line}	V	3 × 380 – 500 V								
Nominal line current AC I_{line}	A	1.9	2.3	2.9	3.6	5.0	6.3	8.6	11.3	14.4
Line frequency f_{line}	Hz	50 – 60 Hz ± 10%								
Controlled rectifier		No								
X1 connection contacts		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[1)]								
Output										
Output voltage V_O	V	0 – max. V_{line}								
Motor power ASM P_{Mot}	kW	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5
Nominal output current I_N PWM = 4 kHz	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16
Overload capacity		200%: 3 s with PWM 4 kHz								
Maximum output current at f = 0 Hz	A	100% × I_N at PWM 4 kHz								
Apparent output power S_N	kVA	1.9	2.3	2.9	3.7	5	6.5	8.8	11.6	14.9
Nominal DC link voltage V_{NDCL}	V	DC 560								
PWM frequency f_{PWM}	kHz	4, 8, 16 (adjustable)								
Max. output frequency f_{max}	kHz	V/f: 599 Hz VFC^{PLUS}: 250 Hz CFC: 500 Hz ELSM®: 500 Hz								
X2 connection contacts		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[1)]								
General										
Nominal power loss 24 V	W	20								
Nominal power loss power section	W	16	20	27	34	45	58	83	112	147
Permitted number of times power may be switched on/off	1/min	< 1								
Minimum switch-off time for power off	s	10								
Weight	kg	4.1				4.4			5.7	
Brake chopper and braking resistor										
Minimum braking resistance R_{BRmin}	Ω	100				47			27	
Continuous power brake chopper	kW	1.9	2.3	2.9	3.7	5	6.5	8.8	11.6	14.9
Peak power brake chopper	kW	200% × apparent output power S_N × 0.9								
Connection contacts		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[1)]								
Dimensions										
Width	mm	95				105			105	
Height	mm	295				295			295	
Depth	mm	216				216			260	

1) AEH: Conductor end sleeve

MOVIDRIVE® system	Unit	MDX90A-...-5_3-4-S00									
Type		**0240**	**0320**	**0460**	**0620**	**0750**	**0910**	**1130**	**1490**	**1770**	**2200**
Size		4		5			6			7	
Nominal output current I_N PWM = 4 kHz	A	24	32	46	62	75	91	113	149	177	220

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MOVIDRIVE® system	Unit	MDX90A-...-5_3-4-S00									
Type		**0240**	**0320**	**0460**	**0620**	**0750**	**0910**	**1130**	**1490**	**1770**	**2200**
Input											
Nominal line voltage (to EN 50160) AC V_{line}	V	3 × 380 – 500 V									
Nominal line current AC I_{line}	A	22	29	42	56	68	82	102	135	160	198
Line frequency f_{line}	Hz	50 – 60 Hz ± 5%									
Controlled rectifier		Yes									
X1 connection contacts		Plug connector - 1 core: 0.5 – 16 mm² - 2 cores: 0.25 – 6 mm² (Twin-AEH)[1]		M8			M10			M12	
Output											
Output voltage V_O	V	0 – max. V_{line}									
Motor power ASM P_{Mot}	kW	11	15	22	30	37	45	55	75	90	110
Nominal output current I_N PWM = 4 kHz	A	24	32	46	62	75	91	113	149	177	220
Overload capacity		200%: 3 s with PWM 4 kHz									
Maximum output current at f = 0 Hz	A	100% × I_N at PWM 4 kHz									
Apparent output power S_N	kVA	15.3	19.8	28.8	38.7	46.8	56.7	70.2	92.7	110.7	136.8
Nominal DC link voltage V_{NDCL}	V	DC 560									
PWM frequency f_{PWM}	kHz	4, 8, 16 (adjustable)									
Max. output frequency f_{max}	kHz	V/f: 599 Hz VFC^{PLUS}: 250 Hz CFC: 500 Hz ELSM®: 500 Hz									
X2 connection contacts		Plug connector - 1 core: 0.5 – 16 mm² - 2 cores: 0.25 – 6 mm² (Twin-AEH)[1]		M8			M10				
General											
Nominal power loss 24 V	W	30									
Nominal power loss power section	W	202	282	419	600						
Permitted number of times power may be switched on/off	1/min	< 1									
Minimum switch-off time for power off	s	10									
Weight	kg	6.6		12.1			24.1				
Brake chopper and braking resistor											
Minimum braking resistance R_{BRmin}	Ω	15		10	6		4.7			2.3	
Continuous power brake chopper	kW	15.3	19.8	28.8	38.7	46.8	56.7	70.2	92.7	110.7	136.8
Peak power brake chopper	kW	200% × apparent output power S_N × 0.9									
Connection contacts		Plug connector - 1 core: 0.5 – 16 mm² - 2 cores: 0.25 – 6 mm² (Twin-AEH)[1]		M8			M10				
Dimensions											
Width	mm	135		195			240			280	
Height	mm	295		325			505			620	
Depth	mm	260		296			346			346	

1) AEH: Conductor end sleeve

MOVIDRIVE® system	Unit	MDX90A-...-5_3-4-S00				
Type		**2500**	**3000**	**3800**	**4700**	**5880**
Size		8		9		
Nominal output current I_N PWM = 4 kHz	A	250	300	380	470	588
Input						
Nominal line voltage (to EN 50160) AC V_{line}	V	3 × 380 – 500 V				
Nominal line current AC I_{line}	A	225	280	340	435	545
Line frequency f_{line}	Hz	50 – 60 Hz ± 5%				
Controlled rectifier		Yes				
X1 connection contacts						
Output						
Output voltage V_O	V	0 – max. V_{line}				
Motor power ASM P_{Mot}	kW	132	160	200	250	315
Nominal output current I_N PWM = 4 kHz	A	250	300	380	470	588
Overload capacity		200% with PWM 2.5 kHz		150% with PWM 2.5 kHz		
Maximum output current at f = 0 Hz	A	100% × I_N at PWM 4 kHz				
Apparent output power S_N	kVA	230	277	350	434	541
Nominal DC link voltage V_{NDCL}	V	DC 560				
PWM frequency f_{PWM}	kHz	4, 8, 16 (adjustable)				
Max. output frequency f_{max}	kHz	V/f: 599 Hz VFC^{PLUS}: 250 Hz CFC: 500 Hz ELSM®: 500 Hz				
X2 connection contacts	mm^2					
General						
Nominal power loss 24 V						
Nominal power loss power section						
Permitted number of times power may be switched on/off						
Minimum switch-off time for power off						
Weight						
Brake chopper and braking resistor						
Minimum braking resistance R_{BRmin}	Ω	2.3		1		
Continuous power brake chopper	kW	230	277	350	434	541
Peak power brake chopper	kW	200% × apparent output power S_N × 0.9				
Connection contacts						
Dimensions						
Width	mm	285		700		
Height	mm	950		1490		
Depth	mm	346		473		

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8.3.2 Performance data 3 × AC 230 V

MOVIDRIVE® system	Unit	MDX90A-...-2_3-4-S00		
Type		**0070**	**0093**	**0140**
Size		2		3
Nominal output current I_N PWM = 4 kHz	A	7	9.3	14
Input				
Nominal line voltage (to EN 50160) AC V_{line}	V	3 × 200 – 240 V		
Nominal line current AC I_{line}	A	6.4	8.4	12.4
Line frequency f_{line}	Hz	50 – 60 Hz ± 10%		
Controlled rectifier		No		
X1 connection contacts		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[1)]		
Output				
Output voltage V_O	V	0 – max. V_{line}		
Motor power ASM P_{Mot}	kW	1.5	2.2	3.7
Nominal output current I_N PWM = 4 kHz	A	7	9.3	14
Overload capacity		200%: 3 s with PWM 4 kHz		
Maximum output current at f = 0 Hz	A	100% × I_N at PWM 4 kHz		
Apparent output power S_N	kVA	3.7	4.9	7.5
Nominal DC link voltage V_{NDCL}	V	DC 325		
PWM frequency f_{PWM}	kHz	4, 8, 16 (adjustable)		
Max. output frequency f_{max}	kHz	V/f: 599 Hz VFC^{PLUS}: 250 Hz CFC: 500 Hz ELSM®: 500 Hz		
X2 connection contacts		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[1)]		
General				
Nominal power loss 24 V	W	20		
Nominal power loss power section	W	51	72	105
Permitted number of times power may be switched on/off	1/min	< 1		
Minimum switch-off time for power off	s	10		
Weight		4.4		5.7
Brake chopper and braking resistor				
Minimum braking resistance R_{BRmin}	Ω	27		15
Continuous power brake chopper	kW	3.7	4.9	7.5
Peak power brake chopper	kW	200% × apparent output power S_N × 0.9		
Connection contacts		Plug connector - 1 core: 0.25 – 4 mm² - 2 cores: 0.25 – 2.5 mm² (Twin-AEH)[1)]		
Dimensions				
Width	mm	105		105
Height	mm	295		295
Depth	mm	216		260

1) AEH: Conductor end sleeve

MOVIDRIVE® system	Unit	MDX90A-...-2_3-4-S00					
Type		**0213**	**0290**	**0420**	**0570**	**0840**	**1080**
Size		4		5		6	
Nominal output current I_N PWM = 4 kHz	A	21.3	29	42	57	84	108
Input							
Nominal line voltage (to EN 50160) AC V_{line}	V	3 × 200 – 240 V					
Nominal line current AC I_{line}	A	18.9	27.4	40.8	52	76	86

MOVIDRIVE® system	Unit	MDX90A-...-2_3-4-S00					
Type		**0213**	**0290**	**0420**	**0570**	**0840**	**1080**
Line frequency f_{line}	Hz	50 – 60 Hz ± 10%					
Controlled rectifier		Yes					
X1 connection contacts		Plug connector - 1 core: 0.5 – 16 mm² - 2 cores: 0.25 – 6 mm² (Twin-AEH)[1]		M8		M10	
Output							
Output voltage V_O	V	0 – max. V_{line}					
Motor power ASM P_{Mot}	kW	5.5	7.5	11	15	22	30
Nominal output current I_N PWM = 4 kHz	A	21.3	29	42	57	84	108
Overload capacity		200%: 3 s with PWM 4 kHz					
Maximum output current at f = 0 Hz	A	100% × I_N at PWM 4 kHz					
Apparent output power S_N	kVA	11.3	15.4	22.2	30.2	44.6	50.4
Nominal DC link voltage V_{NDCL}	V	DC 325					
PWM frequency f_{PWM}	kHz	4, 8, 16 (adjustable)					
Max. output frequency f_{max}	kHz	V/f: 599 Hz VFC^{PLUS}: 250 Hz CFC: 500 Hz ELSM®: 500 Hz					
X2 connection contacts	mm²	Plug connector - 1 core: 0.5 – 16 mm² - 2 cores: 0.25 – 6 mm² (Twin-AEH)[1]		M8		M10	
General							
Nominal power loss 24 V	W	30					
Nominal power loss power section	W	152	218	315	459		
Permitted number of times power may be switched on/off	1/min	< 1					
Minimum switch-off time for power off	s	10					
Weight		6.6		12.1		24.1	
Brake chopper and braking resistor							
Minimum braking resistance R_{BRmin}	Ω	7.5		4.7		2.3	
Continuous power brake chopper	kW	11.3	15.4	22.2	30.2	44.6	50.4
Peak power brake chopper	kW	200% × apparent output power S_N × 0.9					
Connection contacts		Plug connector - 1 core: 0.5 – 16 mm² - 2 cores: 0.25 – 6 mm² (Twin-AEH)[1]		M8		M10	
Dimensions							
Width	mm	135		195		240	
Height	mm	295		325		505	
Depth	mm	260		296		346	

1) AEH: Conductor end sleeve

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8.4 Electronics data – signal terminals

	Terminal designation	Specification
General		
Design		according to EN 61131-2
Supply voltage		
Connection	X5	External power supply 24 V -20% +25% according to EN 61131
Connection contacts		Plug connector - 1 core: 0.25 – 2.5 mm² - 2 cores: 0.5 – 1.5 mm² (Twin-AEH)[1)] Shield terminals for control cables available.

1) AEH: Conductor end sleeve

Digital inputs		
Cycle time input		1 ms / 500 µs
Number		• 6 for MOVIDRIVE® system • 8 for MOVIDRIVE® technology
Response time		100 µs plus cycle time
Assignment	X20: 1 – 6	DI00: "Output stage enable" fixedly assigned. DI01 – DI07: Selection option, see parameter menu. All inputs are suitable for touch probe function. Latency period < 100 µs, max. 2 simultaneously. DI04, DI05: HTL low-resolution encoder connection. DI05: Primary frequency input.
	X20: 7 – 8	Reserved
	X20: 9	GND
Connection contacts		Plug connector - 1 core: 0.25 – 2.5 mm² - 2 cores: 0.5 – 1.5 mm² (Twin-AEH)[1)] Shield terminals for control cables available.

1) AEH: Conductor end sleeve

Digital outputs		
Cycle time output		1 ms / 500 µs
Number		4
Response time		175 µs plus cycle time
Output current		I_{max} = 50 mA
Short-circuit protection		Yes
Assignment	X21: 1	24 V supply voltage Maximum output current = 50 mA
	X21: 2 – 5	DO00 – DO03: Selection option, see parameter menu.
	X21: 6	GND
Connection contacts		Plug connector - 1 core: 0.25 – 2.5 mm² - 2 cores: 0.5 – 1.5 mm² (Twin-AEH)[1)] Shield terminals for control cables available.

1) AEH: Conductor end sleeve

Brake control		
Assignment	X10:DB0	DB00: - Control SEW brake switchgear - Control braking contactor DC 24 V, max. 150 mA
	X10:GND	GND
Connection contacts		Plug connector MDX90A-0020 – 0320-5_3-.. and MDX90A-0070 – 0290-2_3-..: - One core: 0.25 – 2.5 mm² MDX90A-0460-5_3-.. and higher and MDX90A-0420-.. and higher: - One core: 0.25 – 2.5 mm² - Two cores: 0.5 – 1 mm² (Twin-AEH)[1)] Shield terminals for control cables available.

1) AEH: Conductor end sleeve

Encoder input		
	X15:13	X15:13 DC 24 V, I_{max} = 500 mA
	X15:15	X15:15 DC 12 V, I_{max} = 500 mA

8.5 Electronics data – 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 STO_P1 and STO_P2 is STO_M (contact at terminal X6:2).

	Terminal designation	General electronics data		
Safety contact STO	X6			
Electrical data inputs STO_P1, 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	2 ms
Time from connecting the safety voltage until the activation of the rotating field				110 ms
Connection contacts		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

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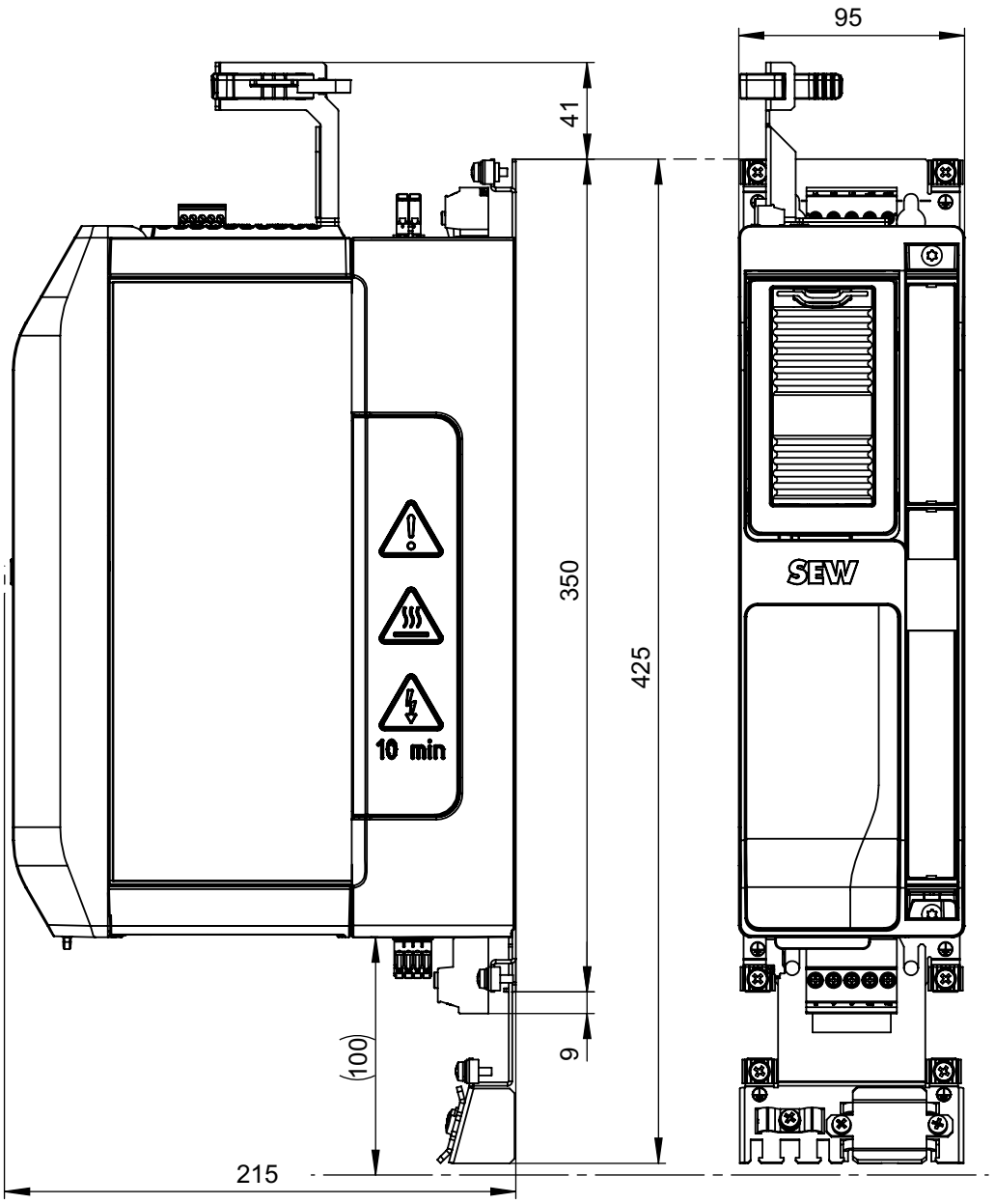
8.6 Dimension drawings

8.6.1 MDX90A-0020 – 0040-5_3-..



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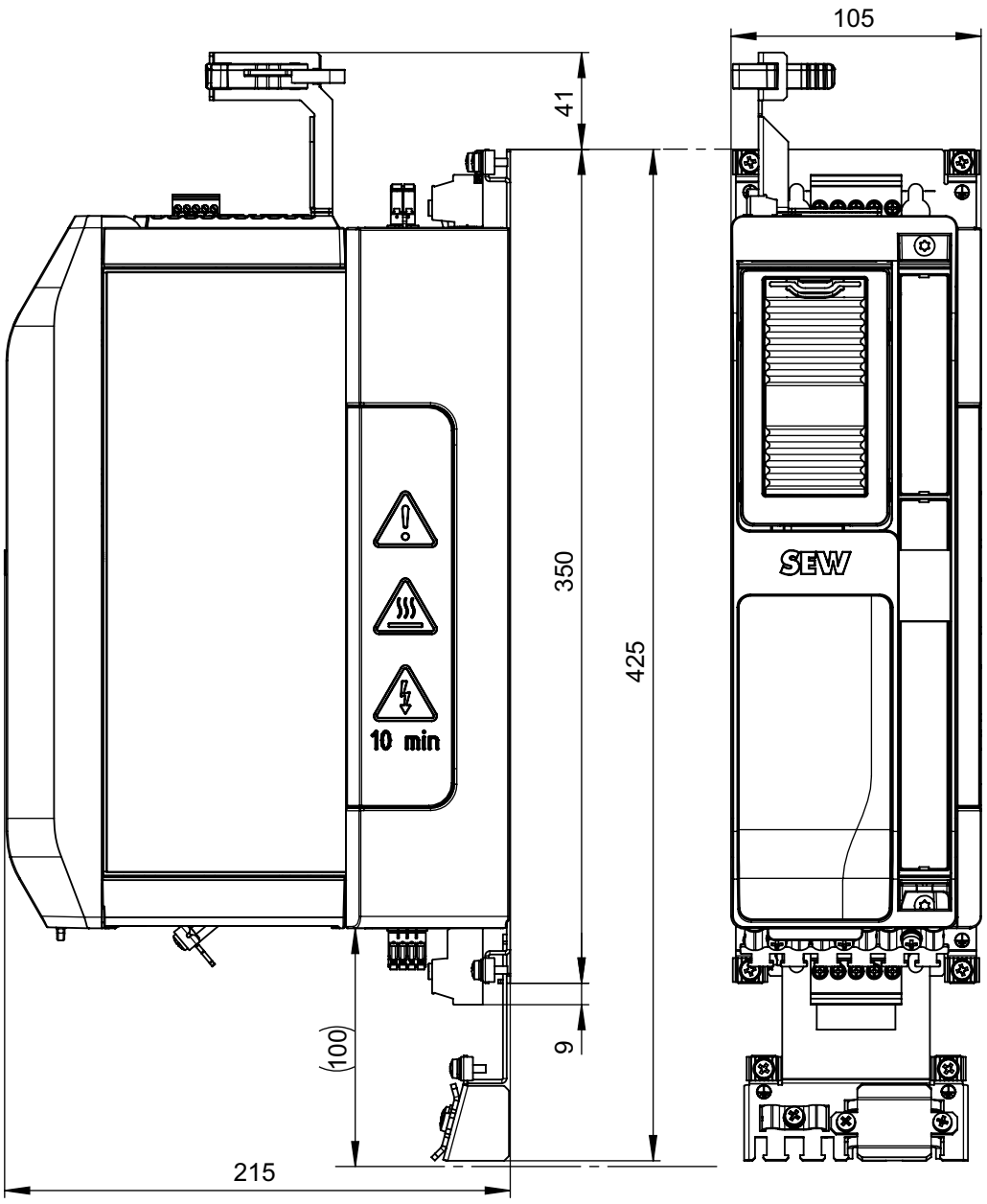
8.6.2 MDX90A-0055 – 0095-5_3-.. , MDX90A-0070 – 0093-2_3-..



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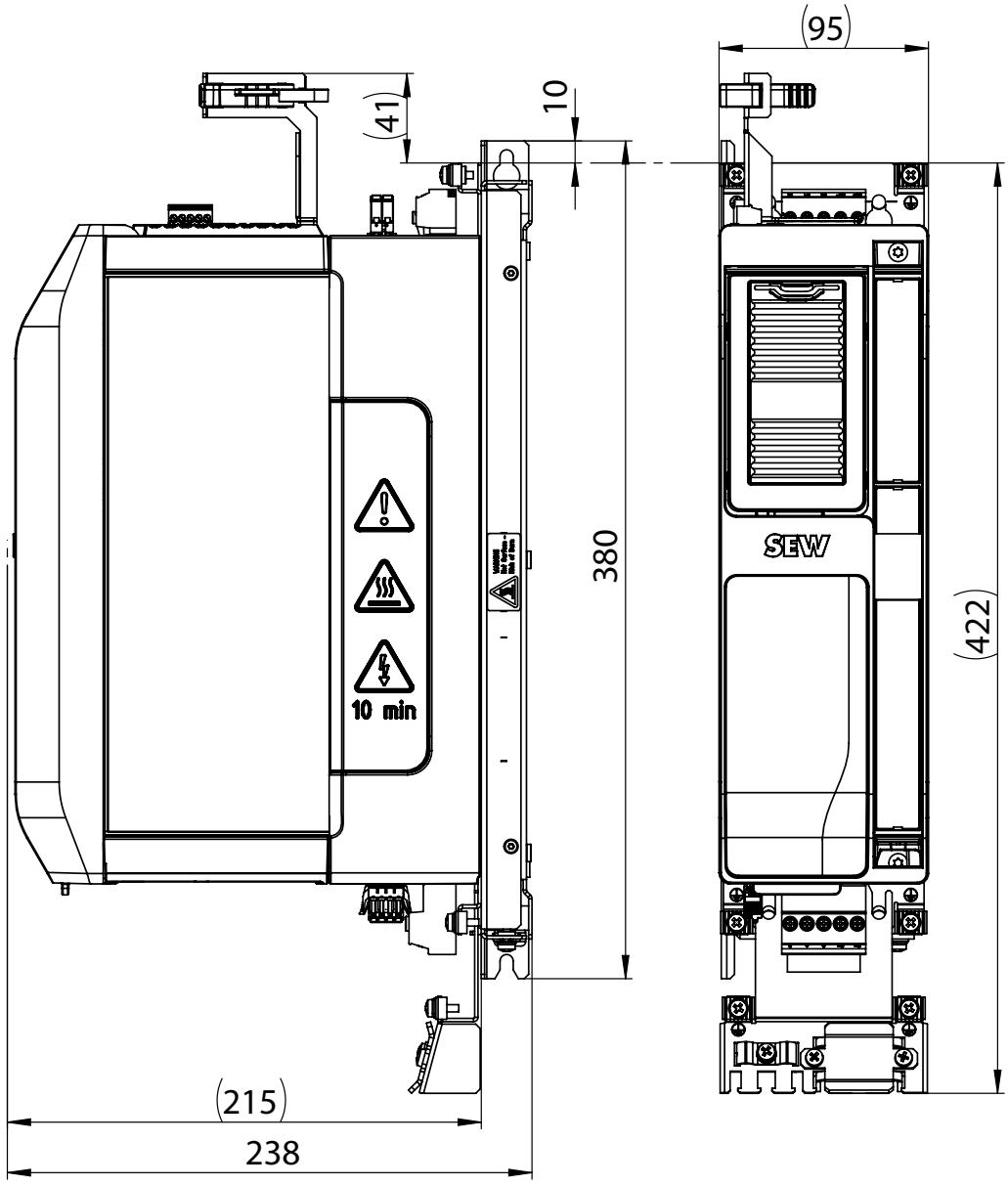
8.6.3 MDX90A-0020 – 0040-5_3-.. , MDX90A-0070 – 0093-2_3-.. with braking resistor



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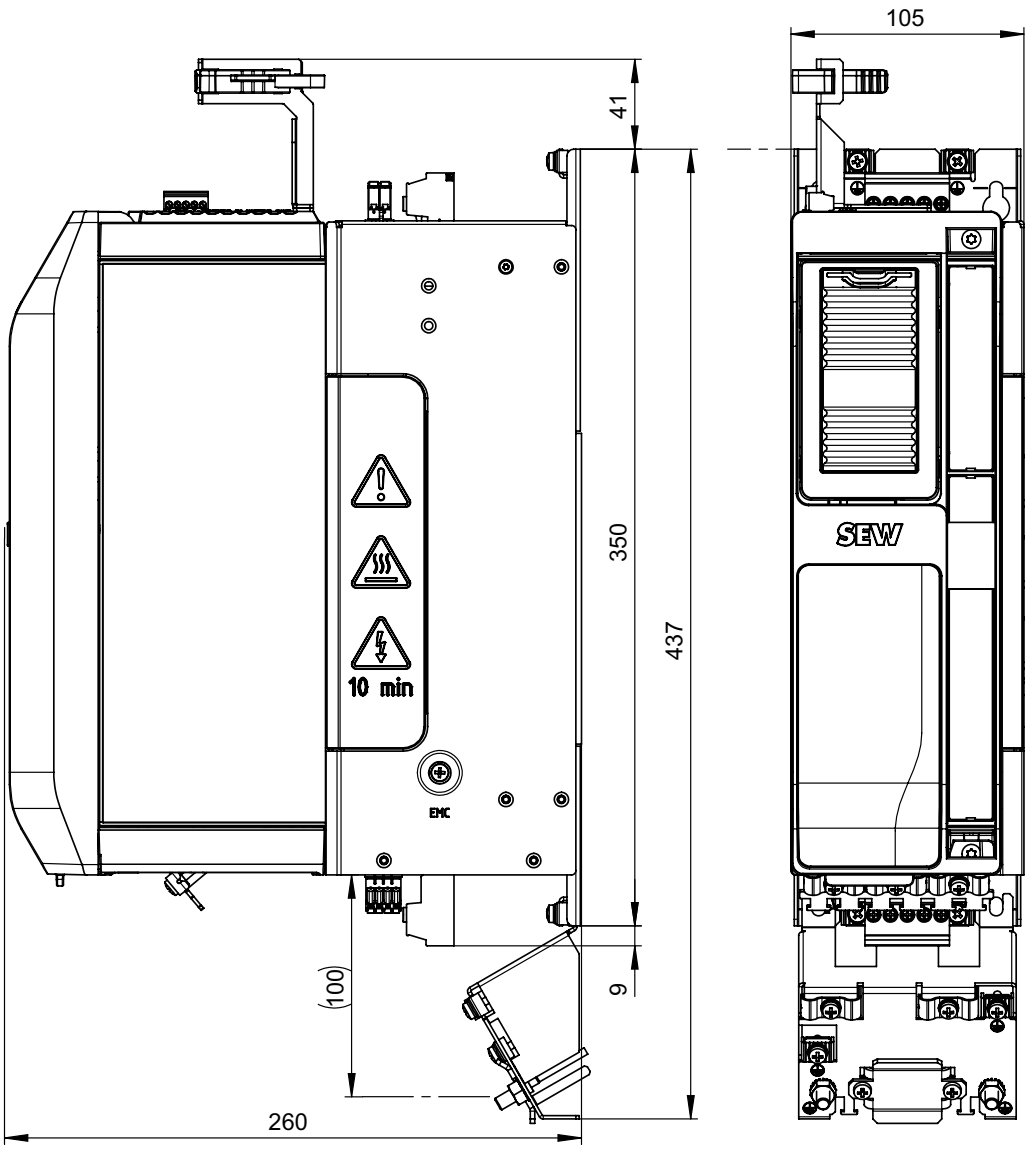
8.6.4 MDX90A-0125 – 0160-5_3-.. , MDX90A-0140-2_3-..



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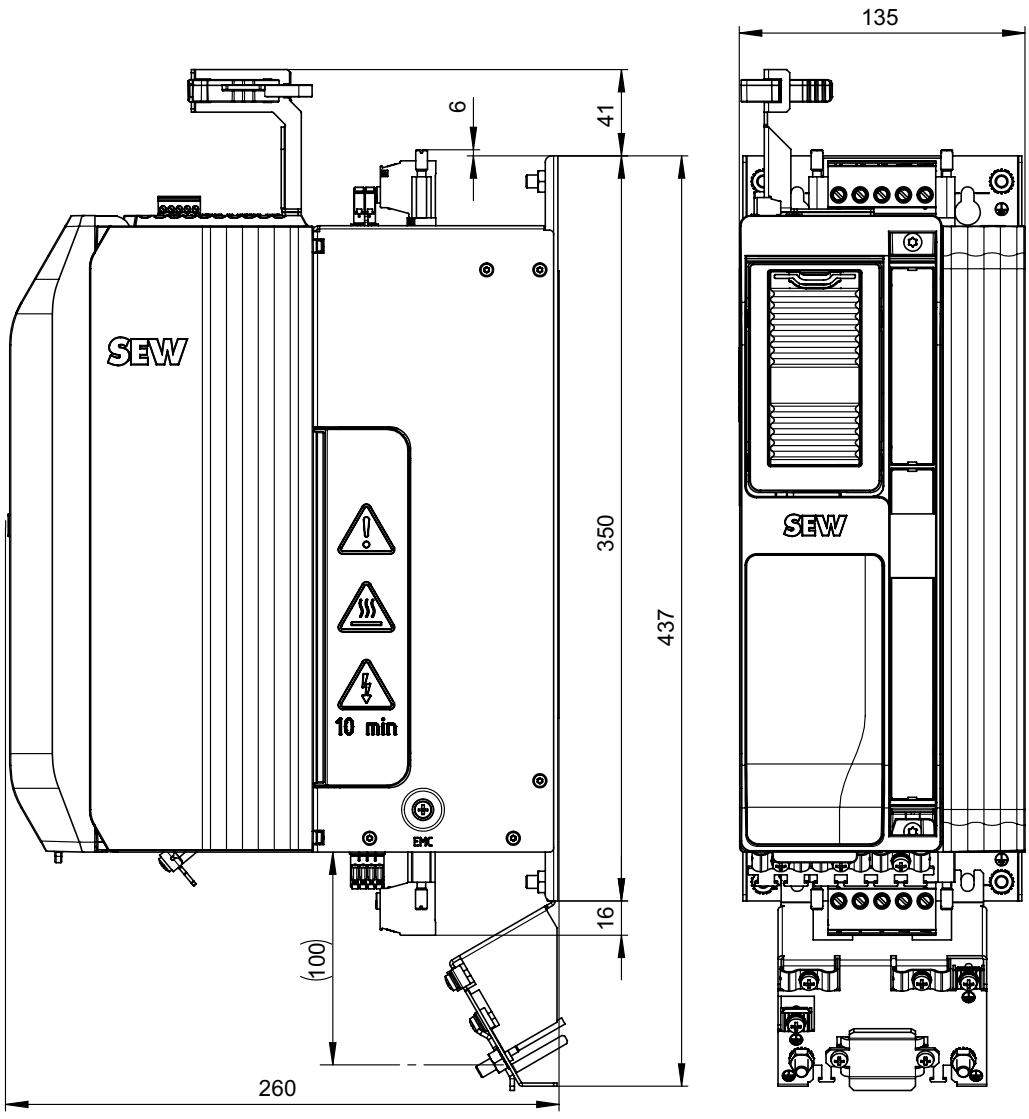
8.6.5 MDX90A-0240 – 0320-5_3-.. , MDX90A-0213 – 0290-2_3-..



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8.7 Technical data of the option 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 plus total load at outputs.
Connection contacts			Plug connector - 1 core: 0.25 – 0.5 mm^2 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
Output value			0 to +10 V, -10 V to +10 V 0(4) – 20 mA
Assignment	X50:2 X50:3		Analog input AI21/AI22
	X50:4 X50:7		GND
	X50:5 X50:6		Analog input AI31/AI32
Voltage input			
Resolution			0 to +10 V (11 Bits), -10 V to +10 V (12 Bits)
Tolerance			± 0.5%
Overvoltage immunity			DC -20 V to DC +20 V
Input resistance			≥ 10 kΩ
Current input			
Resolution			0(4) – 20 mA (11 Bit)
Tolerance			±2%
Load impedance			(internal) 250 Ω
Overvoltage immunity			DC -10 V to DC +10 V
Analog outputs			
Quantity			2
Short-circuit protection			Yes

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	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).

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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 (option card)		0.8 W
Maximum power consumption 24 V (option 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

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8.8 Technical data of encoder interfaces

8.8.1 Basic device

	Terminal designation	Specification
Encoder interface	X15:1 – 15	Supported encoders
		Resolver
		SIN/COS
		TTL/HTL
		HIPERFACE®
Connection 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 interface	X17:1 – 15	Supported encoders
		SIN/COS
		TTL/HTL
		HIPERFACE®
		EnDat2.1
		SSI
		CANopen
Connection 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

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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.

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 against power peaks over short periods.

A PTC resistor protects itself (reversible) against regenerative overload by changing abruptly to high resistance and no longer consuming any more energy. The inverter then switches off and signals a "brake chopper" fault.

In the documented assignments of drive inverters and flat-design resistors, flat-design resistors have an internal thermal protection (non-replaceable fuse) that interrupts the current circuit in the event of overload. The project planning guidelines and the documented assignments of drive inverter and braking resistor must be adhered to.

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.

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UL and cUL approval

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

Parallel connection of braking resistors

Identical braking resistors must be connected in parallel for some inverter/resistor combinations.

In this case, protect each braking resistor against overload and overtemperature using a thermal overload relay.

The temperature switches must be connected in series for braking resistors of the BW...-T series.

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Technical data and assignment to an inverter

Technical data

Braking resistor	Unit	BW120-001	BW100-001	BW100-002	BW100-006-T
Part number		18176011	08281718	08281653	18204198
Current-carrying capacity at 100% cdf	kW	0.1	0.1	0.2	0.6
Resistance value R_{BW}	Ω	117	100 ± 10%		
Tripping current I_F	A		1	1	2.4
Design		Submounting resistor	Flat-type resistor		Wire resistor
Power connections		Single conductors			Ceramic terminal 2.5 mm²
Tightening torque	Nm	-			0.5
PE connection					M4
Tightening torque PE	Nm				1.8
Degree of protection		IP20	IP65		IP20
Ambient temperature ϑ_A			-20 °C – +40 °C (Reduction 4% P_N/10 K up to +60 °C)		
Weight	kg	0.95	0.3	0.6	3

Assignment to an inverter

Braking resistor	BW120-001	BW100-003	BW100-005	BW100-006-T
MDX90A-...-5_3-..	0020 0025 0032 0040	0020 0025 0032 0040		

Technical data

Braking resistor	Unit	BW47-010-T	BW147-T	BW247-T
Part number		17983207	18201342	18200842
Current-carrying capacity at 100% cdf	kW	0.8	1.2	2
Resistance value R_{BW}	Ω	47 ± 10%		
Tripping current I_F	A	4.1	5.1	6.5
Design		Wire resistor		
Power connections		Ceramic terminal 2.5 mm²		
Tightening torque	Nm	0.5		
PE connection		M4		
Tightening torque PE	Nm	1.8		
Degree of protection		IP20		
Ambient temperature ϑ_A		-20 °C – +40 °C		
Weight	kg	4	4.9	6.7

Assignment to an inverter

Braking resistor	BW47-010-T	BW147-T	BW247-T
MDX90A-...-5_3-..	0055 0070 0095		

Technical data

Braking resistor	Unit	BW027-016-T	BW027-024-T	BW027-042-T
Part number		17983215	17983231	19155301
Current-carrying capacity at 100% cdf	kW	1.6	2.4	4.2
Resistance value R_{BW}	Ω	27 ± 10%		
Tripping current I_F	A	7.7	9.4	12.5
Design		Wire resistor		Frame resistor

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Braking resistor	Unit	BW027-016-T	BW027-024-T	BW027-042-T
Power connections		Ceramic terminal 2.5 mm²		
Tightening torque	Nm	0.5		
PE connection		M4		M5
Tightening torque PE	Nm	1.8		2.5
Degree of protection		IP20		
Ambient temperature ϑ_A		-20 °C – +40 °C		
Weight	kg	5.8	8	10

Assignment to an inverter

Braking resistor	BW027-016-T	BW027-024-T	BW027-042-T
MDX90A-...-5_3-..	0125 0160		
MDX90A-...-2_3-..	0070 0093		

Technical data

Braking resistor	Unit	BW015-016	BW015-042-T	BW015-075-T	BW915-T
Part number		17983258	19155328	19155271	18204139
Current-carrying capacity at 100% cdf	kW	1.6	4.2	7.5	16
Resistance value R_{BW}	Ω	15 ± 10%			
Tripping current I_F	A	10.3	16.7	22.4	32.7
Design		Wire resistor	Frame resistor	Grid resistor	
Power connections		Ceramic terminal 2.5 / 4 mm²		M8 stud	
Tightening torque	Nm	0.5	0.9	6	
PE connection		M4	M5	M6 stud	
Tightening torque PE	Nm	1.8	2.5	3	
Degree of protection		IP20			
Ambient temperature ϑ_A		-20 °C – +40 °C			
Weight	kg	5.8	10	12	32

Assignment to an inverter

Braking resistor	BW015-016	BW015-042-T	BW015-075-T	BW915-T
MDX90A-...-5_3-..	0240 0320 0620 (Parallel connection of 2 braking resistors) 0750 (Parallel connection of 2 braking resistors)			
MDX90A-...-2_3-..	0140 0213 (Parallel connection of 2 braking resistors) 0290 (Parallel connection of 2 braking resistors)			

Technical data

Braking resistor	Unit	BW010-024	BW010-050-T	BW010-108-T
Part number		17983266	17983274	19155298
Current-carrying capacity at 100% cdf	kW	2.4	5	10.8
Resistance value R_{BW}	Ω	10 ± 10%		
Tripping current I_F	A	15.5	22.4	32.9
Design		Wire resistor	Grid resistor	
Power connections		Ceramic terminal 2.5 mm²	M8 stud	
Tightening torque	Nm	0.5	6	
PE connection		M4 stud	M6 stud	
Tightening torque PE	Nm	1.8	3	
Degree of protection		IP20		
Ambient temperature ϑ_A		-20 °C – +40 °C		

Braking resistor	Unit	BW010-024	BW010-050-T	BW010-108-T
Weight	kg	8	11	17.5

Assignment to an inverter

Braking resistor	BW010-024	BW010-050-T	BW010-108-T
MDX90A-...-5_3-..	0460 0910 (Parallel connection of 2 braking resistors) 1130 (Parallel connection of 2 braking resistors)		
MDX90A-...-2_3-..	0213 0290 0420 (Parallel connection of 2 braking resistors)		

Technical data

Braking resistor	Unit	BW006-025-01	BW006-050-01	BW106-T	BW206-T
Part number		18200117	18200125	18200834	18204120
Current-carrying capacity at 100% cdf	kW	2.5	5	13.5	18
Resistance value R_{BW}	Ω	6 ± 10%			
Tripping current I_F	A	20.4	28.9	47.4	54.8
Design		Grid resistor			
Power connections		M8 stud			
Tightening torque	Nm	6			
PE connection					
Tightening torque PE	Nm				
Degree of protection		IP20			
Ambient temperature ϑ_A		-25 °C – +40 °C			
Weight	kg	7.5	12	30	40

Assignment to an inverter

Braking resistor	BW006-025-01	BW006-050-01	BW106-T	BW206-T
MDX90A-...-5_3-..	0620 0750 1490 (Parallel connection of 2 braking resistors)			
MDX90A-...-2_3-..	570 (Parallel connection of 2 braking resistors)			

Technical data

Braking resistor	Unit	BW004-050-01	BW004-070-01	BW005-070	BW005-170-T
Part number		18200133	17967678	17983282	17983290
Current-carrying capacity at 100% cdf	kW	5	7	7	17
Resistance value R_{BW}	Ω	3.6 ± 10%		4.7 ± 10%	
Tripping current I_F	A	32.6	38.6	38.6	60.1
Design		Grid resistor			
Power connections		M8 stud			
Tightening torque	Nm	6			
PE connection				M6 stud	
Tightening torque PE	Nm			3	
Degree of protection		IP20			
Ambient temperature ϑ_A		-20 °C – +40 °C			
Weight	kg			13	33

Assignment to an inverter

Braking resistor	BW004-050-01	BW004-070-01	BW005-070	BW005-170-T
MDX90A-...-5_3-..	1490		0910 1130 1770 (Parallel connection of 2 braking resistors) 2200 (Parallel connection of 2 braking resistors) 2500 (Parallel connection of 2 braking resistors)	

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Braking resistor	BW004-050-01	BW004-070-01	BW005-070	BW005-170-T
MDX90A-...-2_3-..	570		-	

Technical data

Braking resistor	Unit	BW002-070	BW003-420-T
Part number		17983304	13302345
Current-carrying capacity at 100% cdf	kW	7	42
Resistance value R_{BW}	Ω	2.3 ± 10%	2.5
Tripping current I_F	A	355.2	135.1
Design		Grid resistor	
Power connections		M8 stud	M12 stud
Tightening torque	Nm	6	15.5
PE connection		M6 stud	M10 stud
Tightening torque PE	Nm	3	10
Degree of protection		IP20	
Ambient temperature ϑ_A		-20 °C – +40 °C	
Weight	kg	33	93

Assignment to an inverter

Braking resistor	BW002-070	BW003-420-T
MDX90A-...-5_3-..	1770 2200 2500 3000 (Parallel connection of 2 braking resistors) 3800 (Parallel connection of 2 braking resistors) 4700 (Parallel connection of 2 braking resistors) 5880 (Parallel connection of 2 braking resistors)	

Technical data

Braking resistor	Unit	BW1.0-170
Part number		17985455
Current-carrying capacity at 100% cdf	kW	17
Resistance value R_{BW}	Ω	1 ± 10%
Tripping current I_F	A	130.4
Design		Grid resistor
Power connections		M12 stud
Tightening torque	Nm	15.5
PE connection		M10 stud
Tightening torque PE	Nm	10
Degree of protection		IP20
Ambient temperature ϑ_A		-25 °C – +40 °C
Weight	kg	45

Assignment to an inverter

Braking resistor	BW1.0-170
MDX90A-...-5_3-..	3000 3800 4700 5880

Technical data of BW..-T

Specifications for BW..-T	Design
Signal contact connection cross section	1 × 2.5 mm²
Tightening torque signal contact	1 Nm

Specifications for BW..-T	Design
Switching capacity signal contact	DC 2 A / DC 24 V (DC11) AC 2 A / AC 230 V (AC11)
Switch contact (NC contact)	According to EN 60730

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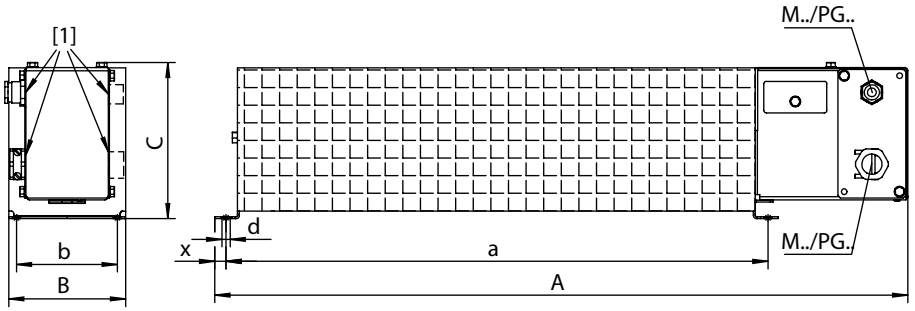
Dimension drawings and dimensions

Wire resistor



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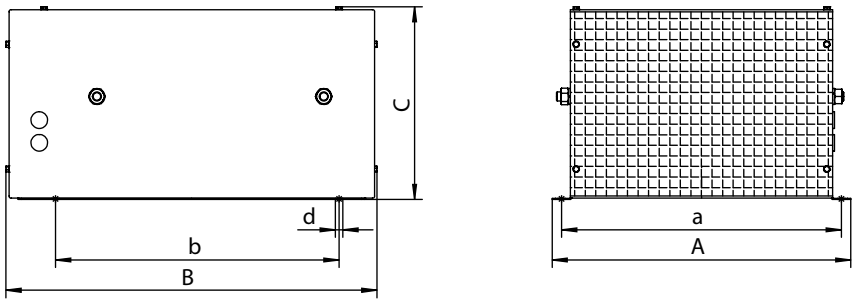
Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW100-006-T	549	92	125	430	80	6.5	8	M25 + M12
BW47-010-T	749	92	125	630	80	6.5	8	M25 + M12
BW147-T	549	185	125	430	150	6.5	8	PG16 + M12
BW247-T	749	185	125	630	150	6.5	8	PG16 + M12
BW027-016-T	649	185	125	530	150	6.5	8	M25 + M12
BW027-024-T	649	275	125	530	240	6.5	8	M25 + M12
BW015-016	649	185	125	530	150	6.5	8	M25
BW010-024	649	275	125	530	240	6.5	8	M25

Grid resistor



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Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW015-075-T	415	500	270	395	380	9	-	-
BW106-T	795	490	270	770	380	10.5	-	-
BW206-T	995	490	270	970	380	10.5	-	-
BW915-T	795	490	270	770	380	10.5	-	-
BW010-050-T	395	490	260	370	380	10.5	-	-
BW010-108-T	525	500	270	505	380	9	-	-
BW004-050-01	395	490	260	370	380	10.5	-	-
BW005-070	395	490	260	370	380	10.5	-	-
BW002-070	395	490	260	370	380	10.5	-	-

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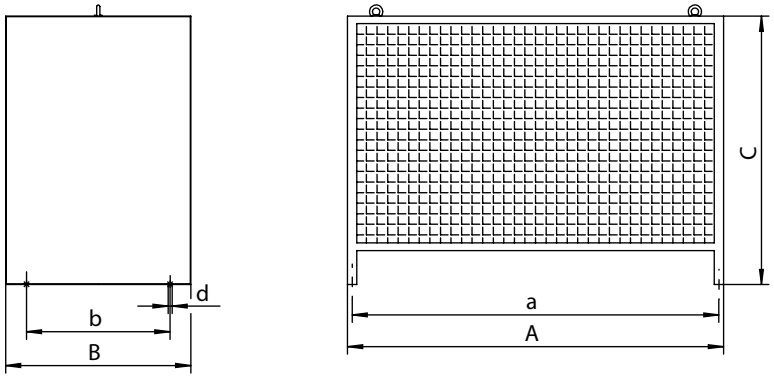
Grid resistor



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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	-	-

Grid resistor

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW005-170-T	490	795	270	380	770	10.5	-	-
BW1.0-170	490	795	490	380	770	10.5	-	-
BW006-025-01	295	490	260	270	380	10.5	-	-
BW006-050-01	395	490	260	370	380	10.5	-	-

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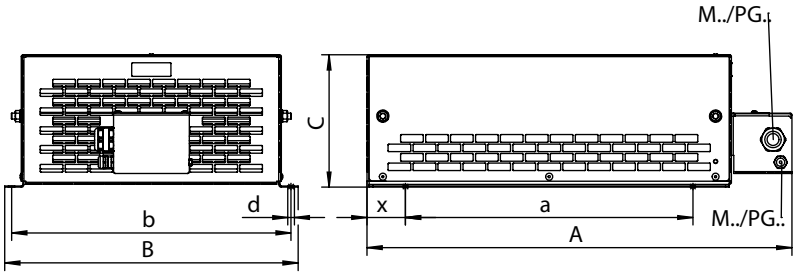
Frame resistor



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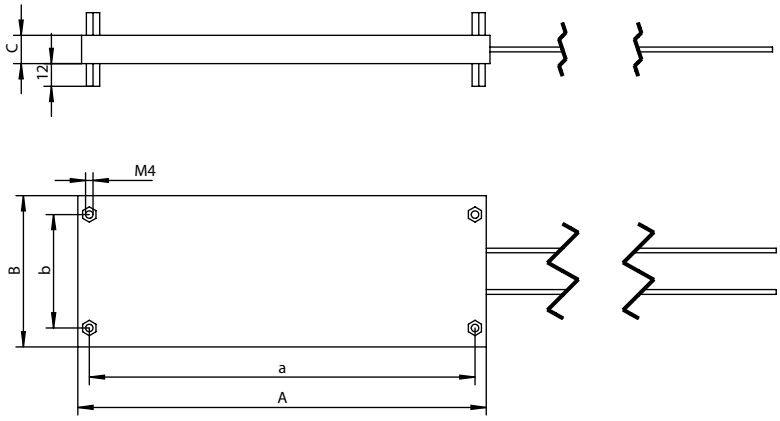
Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW027-042-T	570	390	180	380	370	6.5	55	M25 + M12
BW015-042-T	570	390	180	380	370	6.5	55	M25 + M12

Flat type resistor



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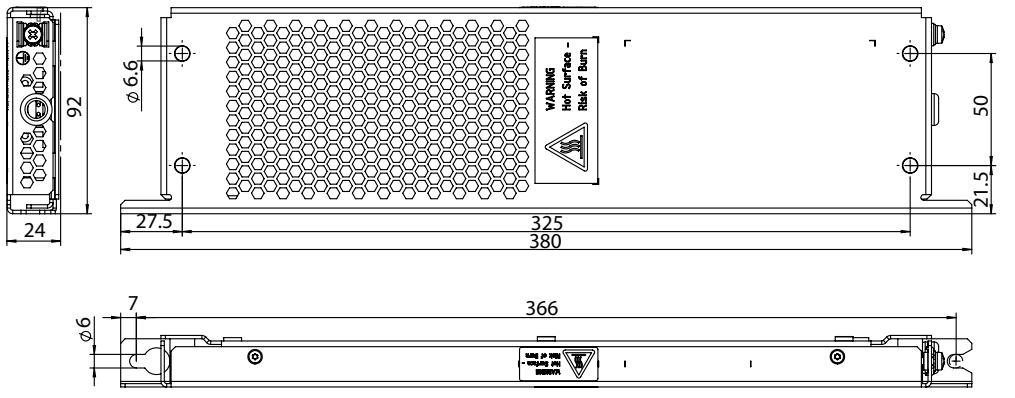
Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BW100-003	110	80	15	98	60			
BW100-005	216	80	15	204	60			

Submounting resistor BW120-001



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8.9.2 TCB thermal circuit breaker option

General

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

In the event of a fault, the thermal circuit breaker disconnects the braking resistor and signals this fault via isolated NO and NC contacts.

After fault elimination, the thermal circuit breaker can be reset manually. For this purpose, there is a lever at the front, similar to the design of a miniature circuit breaker.

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.
- Short circuit.
- Exceeded nominal current.

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.

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				

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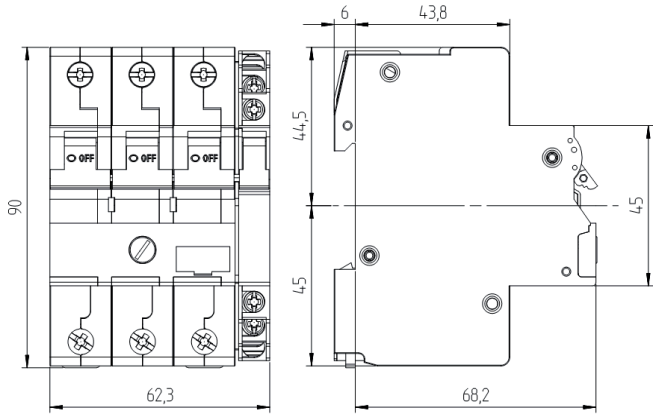
Dimension drawing



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8.9.3 Line filter

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

INFORMATION:

- Do not switch between the NF... line filter and inverter.

UL and cUL approval

The listed line filters have cRUus approvals independent of the application inverter.

Technical data

Line filter	NF0055-503	NF0120-503	NF0220-503	NF0420-513
Part number	17984319	17984270	17984300	17983789
Nominal line voltage V_N	3 × AC 230 V - 500 V, 50/60 Hz			
Nominal current I_N	5.5 A	12 A	22 A	42 A
Nominal power loss			9 W	30 W
Ambient temperature ϑ_A	0 to 45 °C (reduction: x% I_N up to max. 60 °C)			
Connection contacts L1/L2/L3 - L1'/L2'/L3'	Cage clamp terminals max. 6 mm²			2.5 – 16 mm²
Tightening torque L1/L2/L3 - L1'/L2'/L3'	-			2 - 4 Nm
PE terminal contacts			M5	M6
Tightening torque PE			3 Nm	6 Nm
Degree of protection	IP20 according to EN 60529			
Weight			1.4 kg	3 kg

Assignment to an inverter

Line filter	NF0055-503	NF0120-503	NF0220-503	NF0420-513
MDX90A-...-5_3-..	0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320
MDX90A-...-2_3-..	-	0070 – 0093	0140	0213 – 0290

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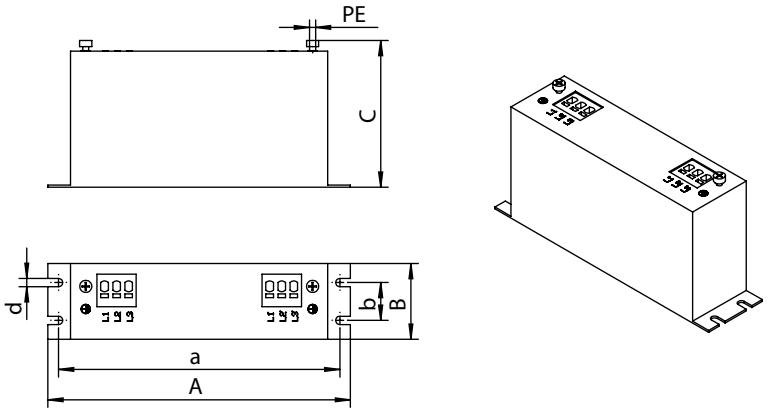
Dimension drawings and dimensions



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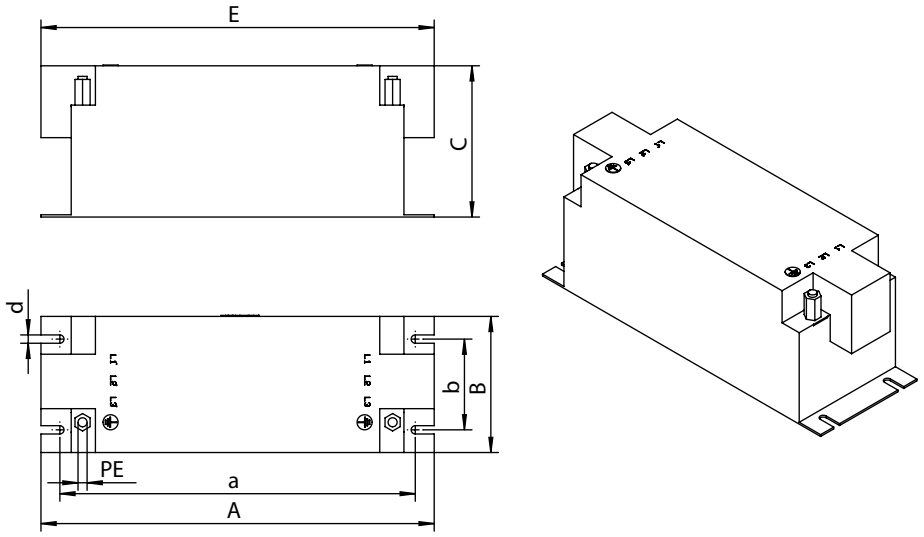
Line filter	Main dimensions in mm				Mounting dimensions in mm			
	A	B	C	E	a	b	d	PE
NF0055-503	200	50	97	-	186	25	5.5	M4
NF0120-503	200	50	97	-	186	25	5.5	M4
NF0220-503	230	55	102	-	216	30	5.5	M4



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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

8.9.4 Line choke

Using line chokes is optional:

- To support overvoltage protection
- To smoothen the line current, to reduce harmonics
- Protection in the event of distorted line voltage
- To limit the charging current when several inverters are connected together in parallel on the input end with shared line contactors (nominal current of line choke = total of inverter currents).

UL and cUL approval

The listed line chokes have cRUus approvals independent of the application inverter.

Technical data

Line choke	ND0070-503	ND0160-503	ND0300-503	ND0420-503
Part number	17984173	17984181	17983800	17983819
Nominal line voltage V_N	3 × AC 230 V - 500 V, 50/60 Hz			
Nominal current I_N	7 A	16 A	30 A	42 A
Nominal inductance	0.36 mH	0.2 mH	0.1 mH	0,045 mH
Nominal power loss	4 W	9 W	11 W	13 W
Ambient temperature ϑ_A	-10 °C to 45 °C (reduction: 3% I_N up to max. 60 °C)			
Terminal contacts L1/L2/L3 - L1'/L2'/L3'	0.2 – 4 mm²		0.2 – 10 mm²	2.5 – 16 mm²
Tightening torque L1/L2/L3 - L1'/L2'/L3'	0.5 – 1 Nm		1.2 – 2 Nm	2.5 Nm
PE terminal contact	M4		M5	
Tightening torque PE	1.5 Nm		3 Nm	
Degree of protection	IPXXB to EN 60529			
Weight	0.5 kg	1.3 kg	1.95 kg	1.82 kg

Assignment to an inverter

Line choke	ND0070-503	ND0160-503	ND0300-503	ND0420-503
MDX90A-...-5_3-..	0020 – 0055	0070 – 0125	0160 – 0240	0320
MDX90A-...-2_3-..	-	0070 – 0093	0140 – 0213	0290

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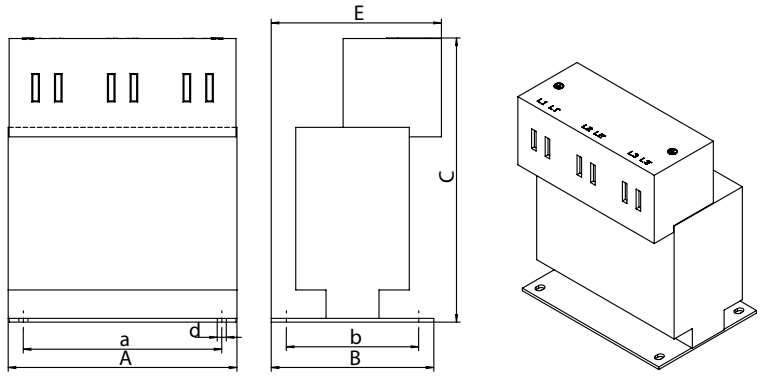
Dimension drawings and dimensions



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Line choke	Main dimensions in mm				Mounting dimensions in mm			
	A	B	C	E	a	b	d	PE
ND0070-503	78	57	105	56	65	40	4.8	M4
ND0160-503	96	70	120	65	71	54	4.8	M4
ND0300-503	121	86	145	86	105	70	4.8	M5
ND0420-503	121	86	150	90	105	70	4.8	M5

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8.9.5 Output filter

Description of the output filter

HF.. type output filters are sine filters used to smooth the output voltages of inverters.

- Discharge currents in the motor cables are suppressed.
- Motor winding insulations of third-party motors that are not suitable for inverters are protected.
- For long motor cables (> 100 m), overvoltage peaks are prevented.

UL and cUL approval

The listed output filters have cRUus approvals independent of the application inverter.

Technical data

Output filter	HF0055-503	HF0125-503	HF0240-503	HF0460-503
Part number	17985110	17985129	17985137	17985145
Nominal voltage U_N	3 × AC 230 V - 500 V, 50/60 Hz			
Nominal current I_N	5.5 A	12.5 A	24 A	46 A
Nominal power loss	80 W	120 W	200 W	400 W
Ambient temperature ϑ_A	0 °C to 45 °C (reduction: 3% I_N/K up to max. 60 °C)			
Terminal contacts L1/L2/L3 - L1'/L2'/L3'	0.2 – 10 mm²		2.5 – 16 mm²	
Tightening torque L1/L2/L3 - L1'/L2'/L3'	1.2 – 2 Nm		2 – 4 Nm	
PE terminal contacts	M6 stud			
Tightening torque PE	6 Nm			
Degree of protection	IP20			
Weight	8 kg	18 kg	25 kg	40 kg

Assignment to an inverter

Output filter	HF0055-503	HF0125-503	HF0240-503	HF0460-503
MDX90A-...-5_3-..	0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320
MDX90A-...-2_3-..	-	0070 – 0093	0140	0213 – 0290

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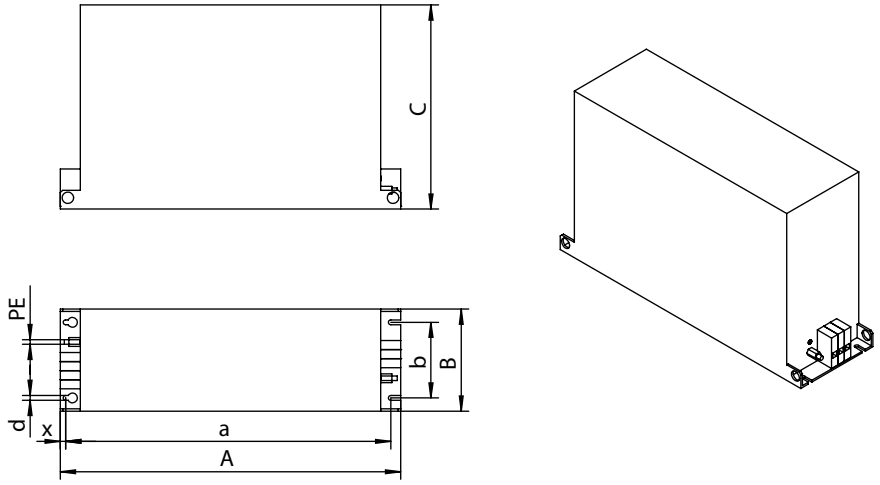
Dimension drawings and dimensions



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Output filter	Main dimensions in mm			Mounting dimensions in mm				
	A	B	C	a	b	d	x	PE
HF0055-503	310	105	160	290	75	6.5	7	M6
HF0125-503	390	120	215	370	90	6.5	7	M6
HF0240-503	450	135	270	430	100	6.5	7	M6
HF0460-503	450	160	310	430	120	6.5	7	M6

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8.9.6 Output choke

Description of output choke

HD.. type output chokes suppress interference emitted from unshielded motor cables.

UL and cUL approval

The listed output chokes have cRUus approvals independent of the application inverter.

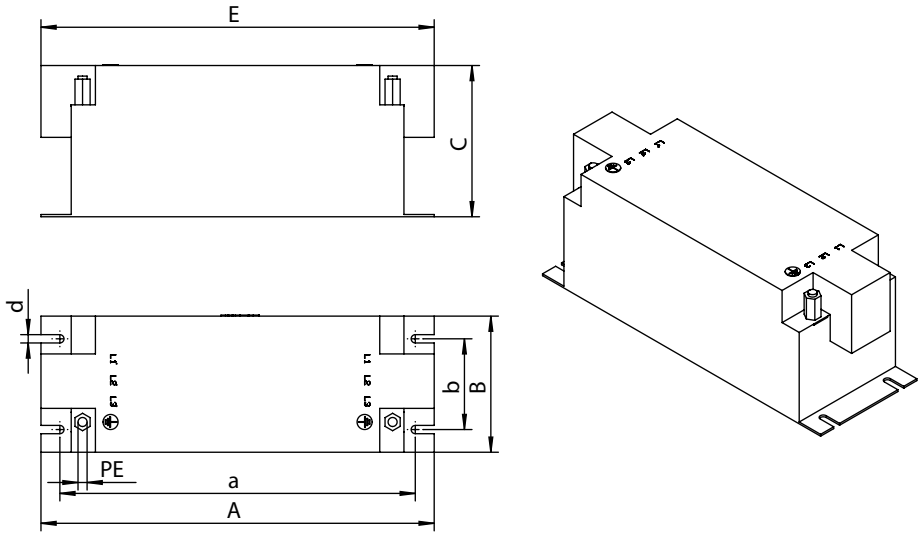
Technical data

Output choke	HD0125-503	HD0240-503	HD0460-503
Part number	17985153	17985188	17985161
Nominal voltage U_N	3 × AC 230 V - 500 V, 50/60 Hz		
Nominal current I_N	12.5 A	24 A	46 A
Nominal power loss	2.9 W	6 W	14 W
Ambient temperature ϑ_A	0 °C to 45 °C (reduction: 3% I_N/K up to max. 60 °C)		
Connection contacts U1/V1/W1 - U2/V2/W2	0.2 – 10 mm²	2.5 – 16 mm²	
Tightening torque L1/L2/L3 - L1'/L2'/L3'	1.2 – 2 Nm	2 – 4 Nm	
PE terminal contact	M6		
Tightening torque PE	6 Nm		
Degree of protection	IP20		
Weight	0.85 kg	1.46 kg	2.35 kg

Assignment to an inverter

Output choke	HD0125-503	HD0240-503	HD0460-503
MDX90A-...-5_3-..	0020 – 0095	0125 – 0160	0240 – 0320
MDX90A-...-2_3-..	0070 – 0093	0140	0213 – 0290

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
HD0125-503	153	62.5	72.5	151	138	40	5.5	M6
HD0240-503	178	92.5	82.5	178	158	65	5.5	M6
HD0460-503	190	122.5	112.5	189	170	90	5.5	M6

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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 condition (see STO safety function). The safety concept is based on this.

9.2.2 Safety concept

The application inverter is supposed to be able to perform the 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 control 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 separation 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 safety function is activated, the PWM signals generated by the application inverter are interrupted and not transmitted to the IGBTs.

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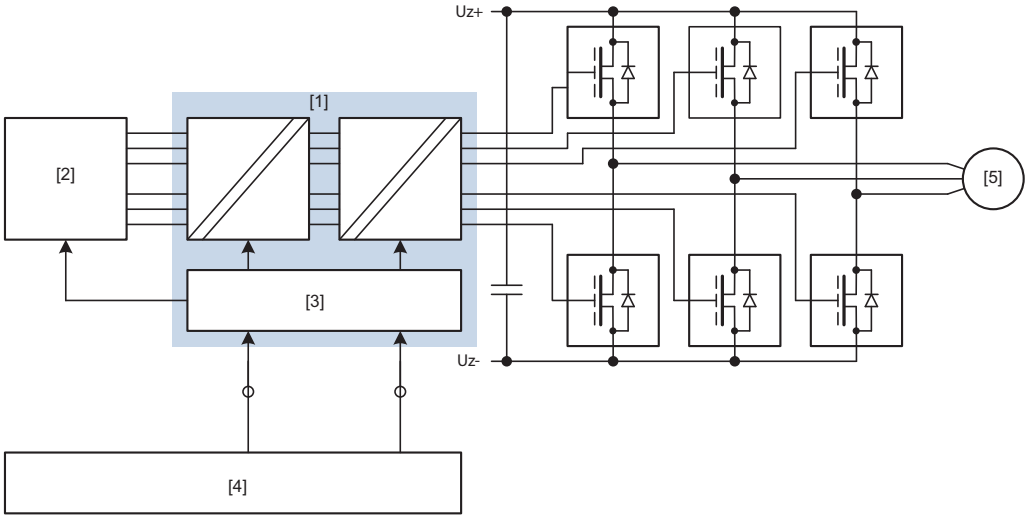
- If the STO function detects a discrepancy between both channels, the PWM signals are permanently inhibited.
- The STO safety function can be activated externally e.g. via an external safety device via the STO input.

9.2.3 Schematic representation of the safety concept



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

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9.2.4 Safety functions

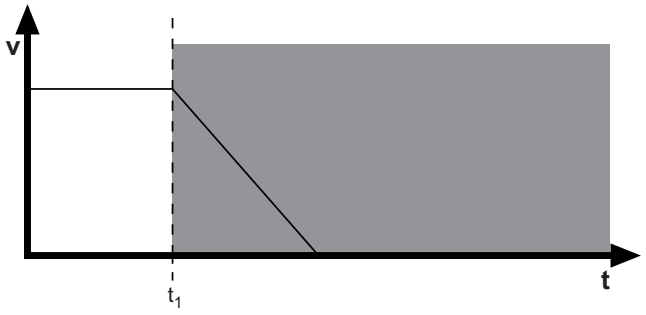
The following drive-related safety functions can be used:

- **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 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 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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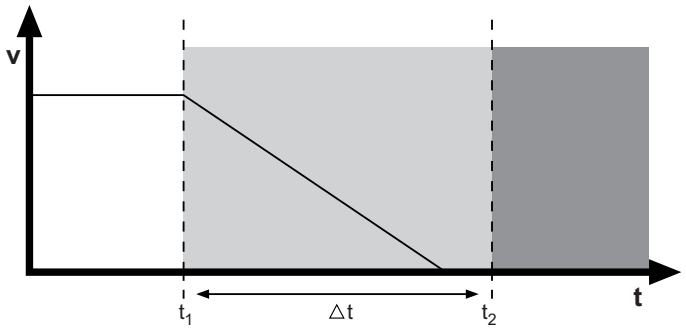

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v	Speed
t	Time
t_1	Point of time when the brake ramp is initiated
t_2	Point of time when STO is triggered
Δt	Delay time until STO is triggered
	Safe time delay range
	Disconnection range

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9.2.5 Restrictions

- Note that if the drive does not have a mechanical brake, or if the brake is defective, the drive may coast to a halt (depending on the friction and mass moment of inertia of the system). In 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 safety functions that require active deceleration (braking) of the dangerous movement.
- When using the SS1(c) function as described in chapter "Safety functions" (→ 🗎 183), 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 safety-related disconnection via the STO function is only activated after the set time delay has passed, see chapter "Safety functions" (→ 🗎 183). 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.

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 X16 (STO activated), the brake is **always** applied. The brake control in the application inverter is not safety-related.

9.3 Safety conditions

The requirement for safe operation is that the safety functions of the application inverter are properly integrated into an application-specific higher-level safety function. A system/machine-specific risk assessment must be carried out through 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 units.
- Installation requirements.
- Requirements on external safety controllers and safety relays.
- Startup requirements.
- Operation requirements.

9.3.1 Approved devices

The following device types of MOVIDRIVE® system are permitted for safety-related applications:

Application inverter	Nominal output current
MOVIDRIVE® system	2 – 588 A

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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 lines must be routed according to EMC guidelines and as follows:
  - Inside an electrical installation space: Individual conductors can be routed.
  - Adhere to the relevant 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 not 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 lines

    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 (STO_P1, STO_P2, and 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.

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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 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, 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 control 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 STO_P1 or STO_P2 (Stuck-at 1)

    Crossfault between STO_P1 and STO_P2
  - 2-pole sourcing/sinking:

    Short circuit of 24 V at STO_P1 (Stuck-at 1)

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

    Fault exclusion is mandatory
  - 1-pole sourcing:

    Short circuit of 24 V at 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:

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  - 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 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.

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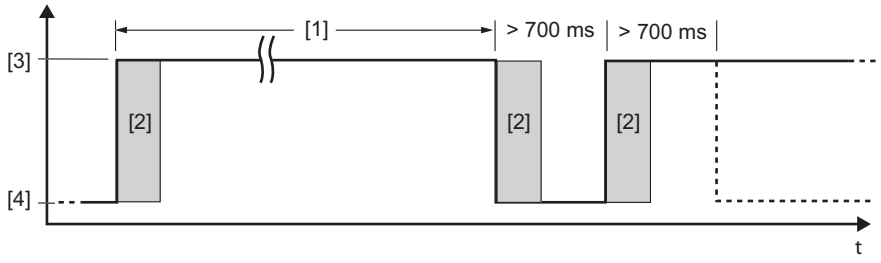
9.3.4 Requirements on startup

- To validate the implemented safety functions, they must be documented and checked after successful startup (validation).
- Observe the restrictions for 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 safety function via STO input must be triggered with connected line voltage at least once every 12 months for PL d according to EN 13849-1 and at least once every 3 months SIL 2 EN 61800-5-2 and for PL e according to EN 13849-1 and SIL 3 EN 61800-5-2 to achieve a complete test coverage. Adhere to the following test sequences.



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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 error state.
- A detected hardware fault in the internal switch-off channels for STO will lead to a locking error 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 error occurs again, replace the device or contact the SEW-EURODRIVE Service.

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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.

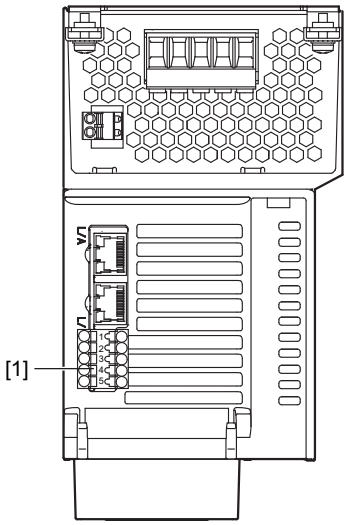
All safety conditions mentioned in chapter "Integrated safety technology" (→ 🗎 181), "Safety conditions" (→ 🗎 186) and "Connection variants" must be met for the basic selection, installation, and application of the safety components, such as safety relay, emergency stop switch, etc., and the approved connection variants.

The wiring diagrams are block diagrams whose only purpose is to show the 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 application inverter.



17915451659

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

9.4.2 Requirements

Use of safety relays

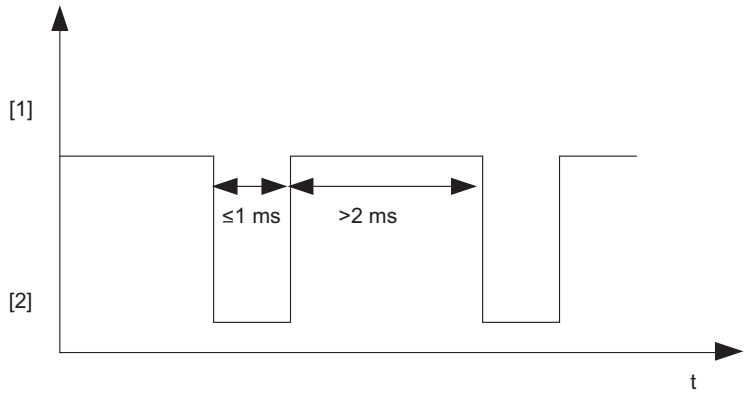
The requirements of the manufacturers of safety relays (such as protecting the output contacts against welding) or other safety components must be strictly observed. For cable routing, the basic requirements apply as described in this publication.

For connecting the application inverter with the safety relays, observe the installation requirements in chapter "Requirements on the installation" (→ 🗎 187).

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" (→ 🗎 188) must be adhered to in regard to the test pulses.

INFORMATION

If all safety inputs (X6) are connected, STO is deactivated.

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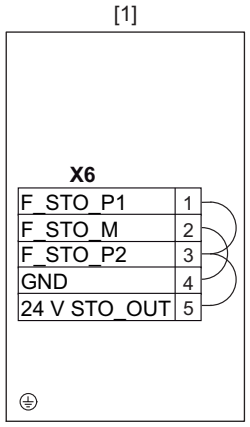
Wiring diagrams

Delivery state

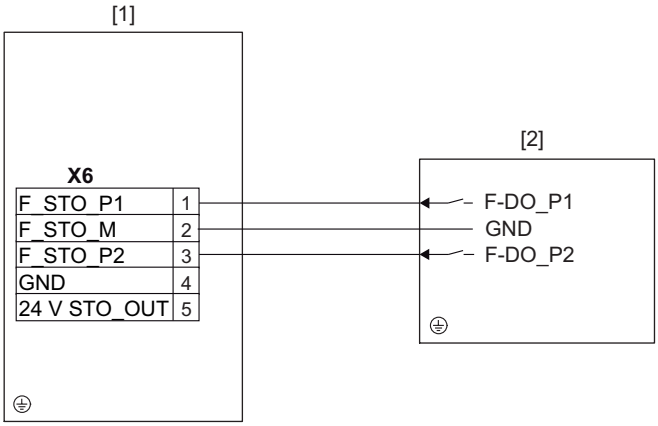
In delivery state, the terminals at the connection for safe disconnection X6 are jumpered.



9007214807030283

[1] MOVIDRIVE® system

2-pole sourcing

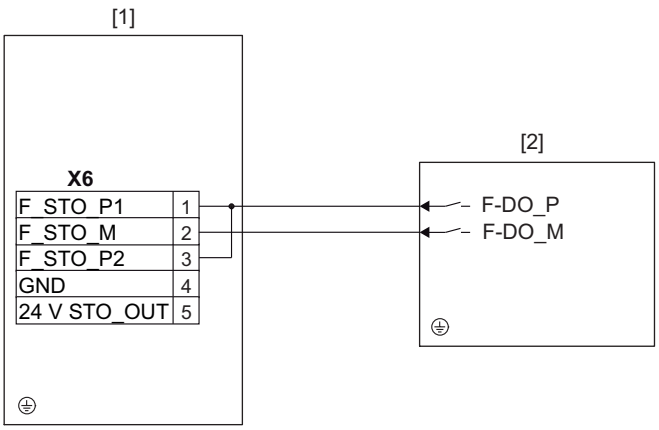


9007214803886091

[1] MOVIDRIVE® system

[2] External safety device

2-pole sourcing/sinking

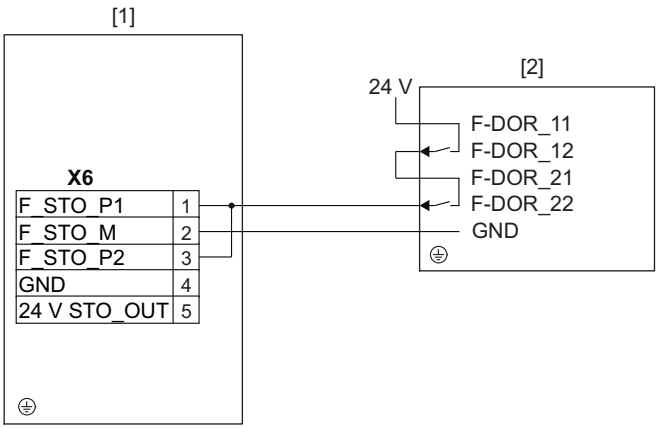


9007214805120139

[1] MOVIDRIVE® system

[2] External safety device

2-pole serial sourcing



15991307275

[1] MOVIDRIVE® system

[2] External safety device

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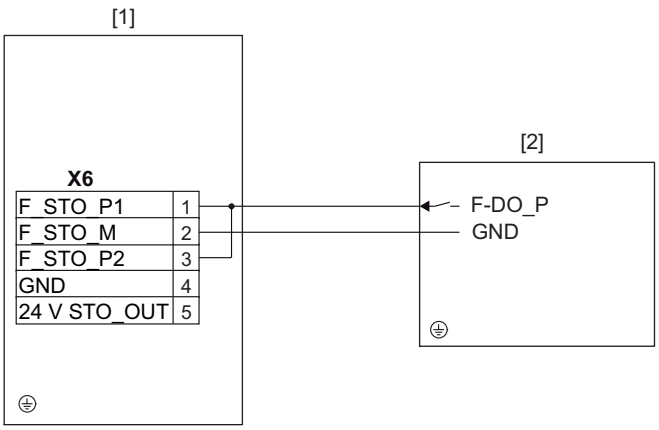
1-pole sourcing



9007214805125643

[1] MOVIDRIVE® system

[2] External safety device

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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.

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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 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)	
Safety function	STO, SS1[1)] according to EN 61800-5-2	

1) With suitable external control

INFORMATION

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

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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	Nominal DC link current
L_N		mH	Inductance
LSPM			Line start permanent magnet
P_{eff}		kW	Effective power (braking resistor)
P_{max}		kW	Maximum power (braking resistor)
P_{Mot}	P(ASM)	kW	Motor power of the asynchronous motor
P_N		kW	Nominal motor power (rated power)
P_V		W	Power loss
PWM			Pulse width modulation
R_{BW}		Ω	Value of the braking resistor
R_{BWmin}		Ω	Minimum value of the braking resistor
S_N	S	kVA	Apparent output power
SM			Synchronous motor
V_O	U	V	Output voltage motor
V_{BR}		V	Brake supply voltage
V_N		V	Nominal line voltage (filter, choke)
V_{line}	U	V	Connection voltage
V_{NDCL}	U	V	Nominal DC link voltage

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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

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10.2 Declaration of conformity

EU Declaration of Conformity

SEW EURODRIVE

Translation of the original text **901910016/EN**

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

Frequency inverters of the product family	**MOVIDRIVE® system** **MDX9.A-0020-5E3-4-S00** **MDX9.A-0025-5E3-4-S00** **MDX9.A-0032-5E3-4-S00** **MDX9.A-0040-5E3-4-S00** **MDX9.A-0055-5E3-4-S00** **MDX9.A-0070-5E3-4-S00** **MDX9.A-0095-5E3-4-S00** **MDX9.A-0125-5E3-4-S00** **MDX9.A-0160-5E3-4-S00** **MDX9.A-0240-503-4-S00** **MDX9.A-0320-503-4-S00** **MDX9.A-0070-2E3-4-S00** **MDX9.A-0093-2E3-4-S00** **MDX9.A-0140-2E3-4-S00** **MDX9.A-0213-203-4-S00** **MDX9.A-0290-203-4-S00**

are in conformity with

Machinery Directive	**2006/42/EC** **(L 157, 09.06.2006, 24-86)**	
EMC Directive	**2014/30/EU** **(L 96, 29.03.2014, 79-106)**	**4)**
Applied harmonized standards:	**EN ISO 13849-1:2015** **EN 60204-1:2006/A1:2009/AC:2010** **EN 61800-5-1:2007** **EN 61800-5-2:2007** **EN 61800-3:2004/A1:2012**	

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: 2014/35/EU is 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	**12.07.2016**	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

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	Ulm	SEW-EURODRIVE GmbH & Co KG Dieselstraße 18 89160 Dornstadt	Tel. +49 7348 9885-0 Fax +49 7348 9885-90 dc-ulm@sew-eurodrive.de

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Germany			
	Würzburg	SEW-EURODRIVE GmbH & Co KG Nürnbergerstraße 118 97076 Würzburg-Lengfeld	Tel. +49 931 27886-60 Fax +49 931 27886-66 dc-wuerzburg@sew-eurodrive.de
Drive Service Hotline / 24 Hour Service			0 800 SEWHELP 0 800 7394357
Great Britain			
Assembly Sales Service	Normanton	SEW-EURODRIVE Ltd. DeVilliers Way Trident Park Normanton West Yorkshire WF6 1GX	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	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

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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

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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

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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

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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

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South Korea			
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Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 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

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Ukraine			
Assembly Sales Service	Dnipropetrovsk	ООО «СЕВ-Евродрайв» ул. Рабочая, 23-В, офис 409 49008 Днепропетровск	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	IGLogistics@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

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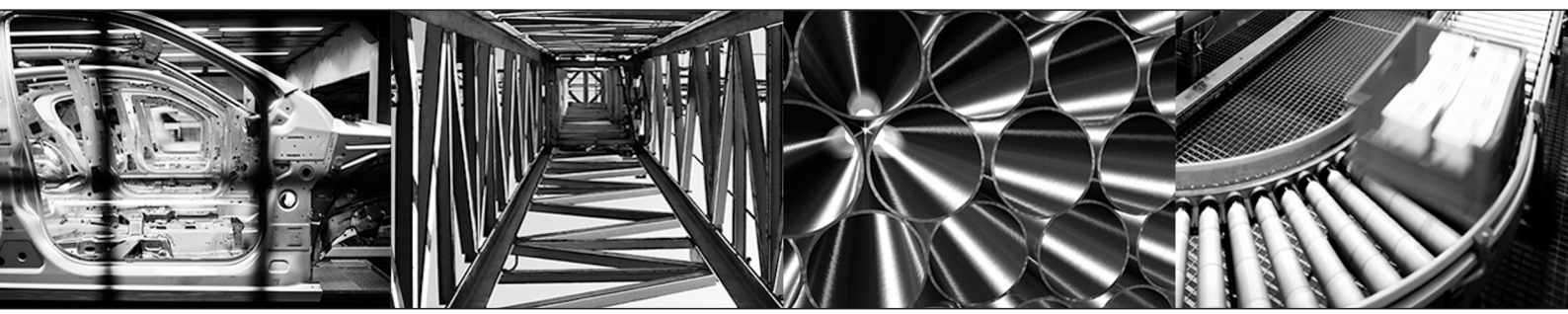

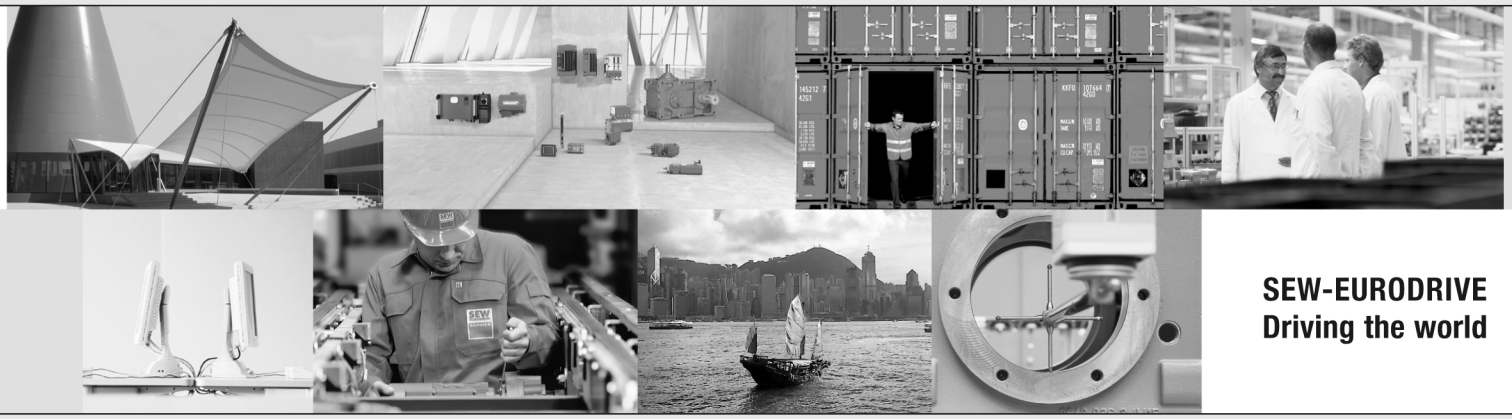

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