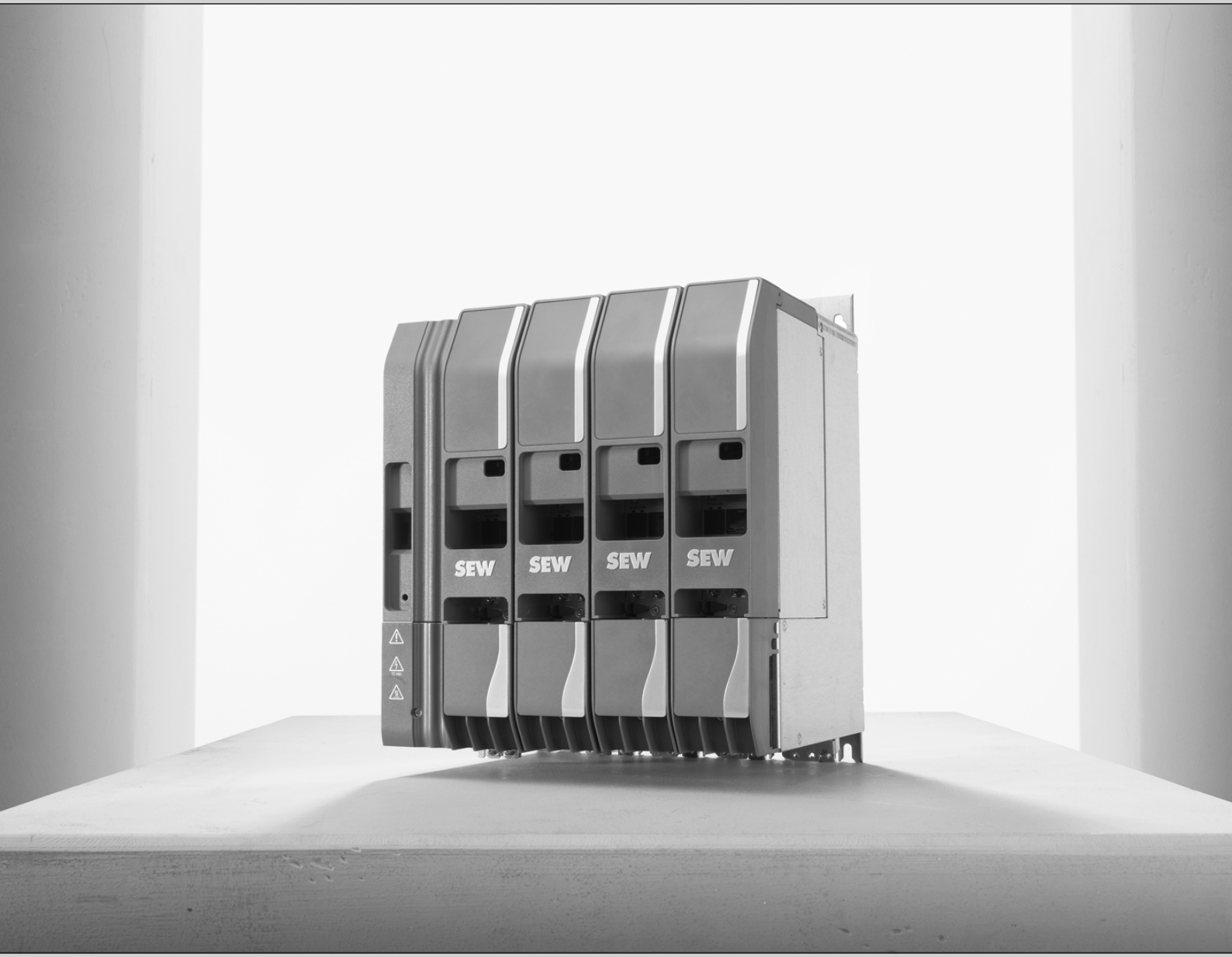
SEW EURODRIVE

Compact Operating Instructions



Application Inverter

MOVIDRIVE® modular

Edition 01/2020

25953486/EN

Table of contents

25953486/EN – 01/2020

1 General information

1.1 Scope of this documentation

This documentation comprises the general safety notes and selected information regarding the MOVIDRIVE® modular application inverter.

- Please note that this documentation does not replace the detailed operating instructions.
- Read the detailed operating instructions before you start working with the application inverter.
- Observe the information, instructions and notes in the detailed operating instructions. This is essential for fault-free operation of the unit and fulfillment of any rights to claim under guarantee.
- The enclosed DVD contains PDF files of the detailed operating instructions as well as other MOVIDRIVE® modular documentation.

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.	

25953486/EN – 01/2020

1.2.2 Structure of section-related safety notes

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

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

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of 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.

25953486/EN – 01/2020

2 Safety notes

2.1 Preliminary information

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

2.2 Duties of the user

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

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

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

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

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

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

25953486/EN – 01/2020

2.3 Target group

Specialist for mechanical work

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

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

Specialist for electrotechnical work

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

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

Additional qualifications

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

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

Instructed persons

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

2.4 Designated use

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

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

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

The systems can be mobile or stationary.

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

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

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

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

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

25953486/EN – 01/2020

2.4.1 Hoist applications

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

- Use mechanical protection devices.

Application in ELSM® control mode

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

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

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

25953486/EN – 01/2020

2.5 Functional safety technology

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

2.6 Transport

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

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.

If necessary, use suitable, sufficiently dimensioned handling equipment.

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

2.7 Installation/assembly

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

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

Observe the notes in chapter Mechanical installation in the documentation.

2.7.1 Restrictions of use

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

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

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

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

25953486/EN – 01/2020

2.8 Electrical installation

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

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

2.8.1 Required preventive measure

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

2.8.2 Stationary application

Necessary preventive measure for the product is:

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

2.8.3 Regenerative operation

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

2.9 Protective separation

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

25953486/EN – 01/2020

2.10 Startup/operation

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

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

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

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

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

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

10 minutes.

Observe the corresponding information signs on the product.

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

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

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

2.10.1 Energy storage unit

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

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

25953486/EN – 01/2020

3 MOVIDRIVE® modular type code

The following type code applies to MOVIDRIVE® modular.

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

25953486/EN – 01/2020

4 Installation

4.1 Mechanical installation

⚠ CAUTION

Risk of injury to persons and damage to property.

Never install defective or damaged application inverters.

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

NOTICE

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

Damage to the application inverter.

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

4.1.1 Hole pattern

Preparing the control cabinet

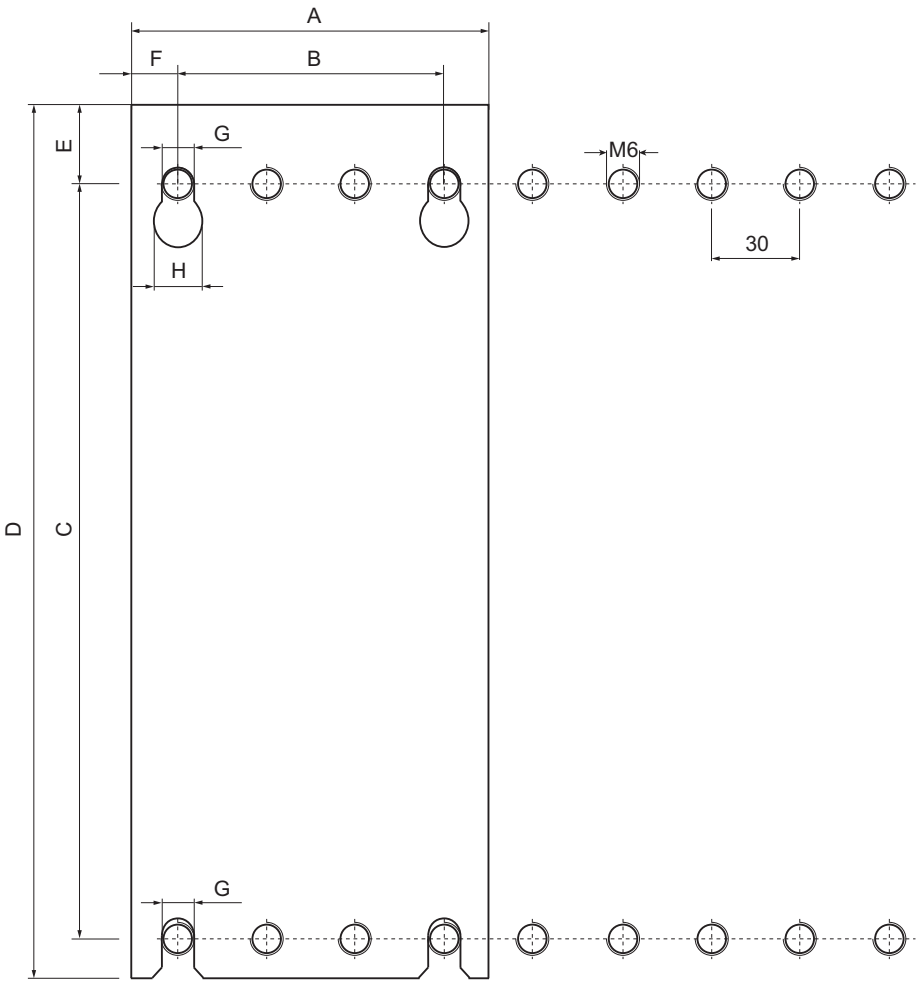
You can prepare the control cabinet for the installation of differently assembled axis systems by drilling tapped holes every 30 mm for mounting the modules. The modules can be attached to this grid irrespective of their width, see figure below.

Dimensions
Device base plate

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

25953486/EN – 01/2020

Mounting grid



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

25953486/EN – 01/2020

4.1.2 Minimum clearance and mounting position

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

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

INFORMATION

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

25953486/EN – 01/2020

4.2 Electrical installation

⚠ DANGER

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

Severe or fatal injuries from electric shock.

To prevent electric shocks:

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

⚠ DANGER

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

Severe or fatal injuries from electric shock.

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

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

NOTICE

Interchanging the poles when connecting a DC source/sink.

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

25953486/EN – 01/2020

INFORMATION

Installation with protective separation.

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

25953486/EN – 01/2020

4.2.1 General information

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

4.2.2 Permitted voltage systems

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

25953486/EN – 01/2020

4.2.3 Line connection

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

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

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

NOTICE

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

Adhere to the specified times and intervals.

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

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

25953486/EN – 01/2020

4.2.4 24 V supply voltage

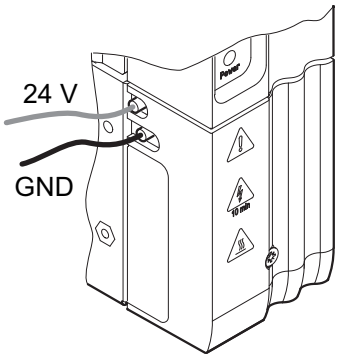
24 V supply voltage without master module

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

- M4 fork-type or ring lugs with insulating collar and a cable cross-section of maximum 4 mm²,

  or

- M4 tubular cable lugs with insulating heat shrink tubing and a cable cross-section of maximum 6 mm².



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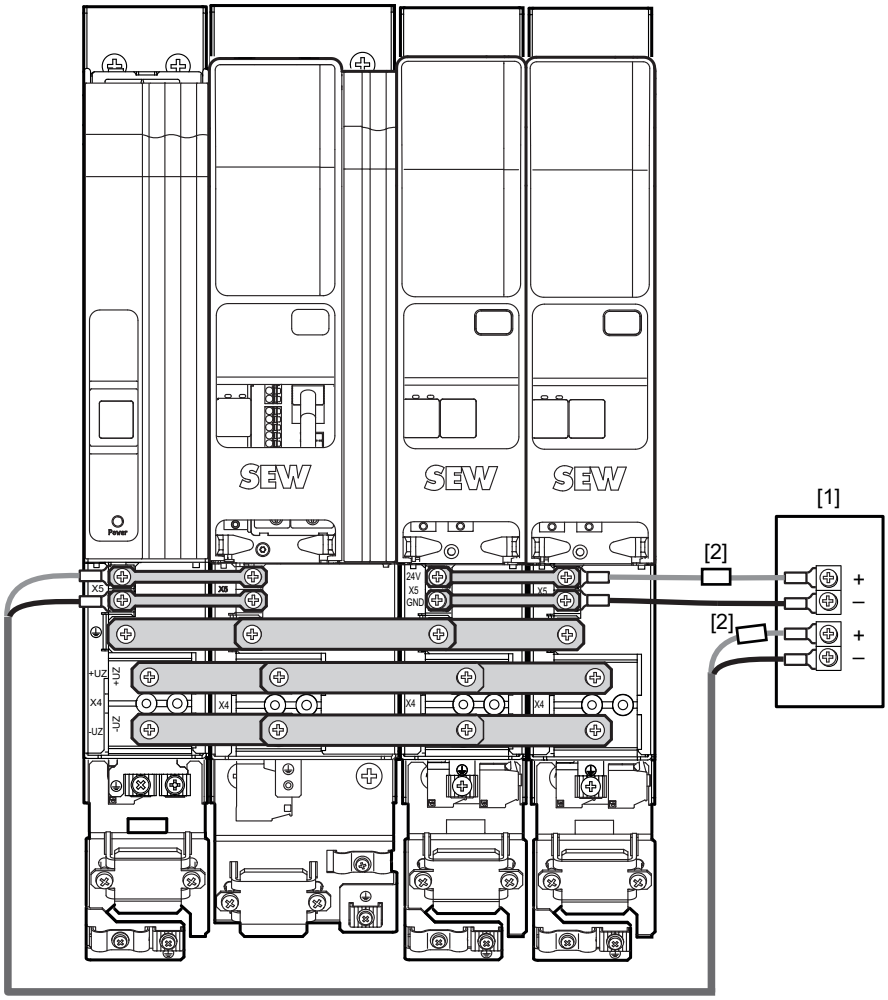
Select the cross-section of the supply cable according to the power demand of the device to be supplied. Note the additionally required power of the directly supplied 24 V brakes for CMP motors with BK or BP brake without brake control.

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

25953486/EN – 01/2020

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



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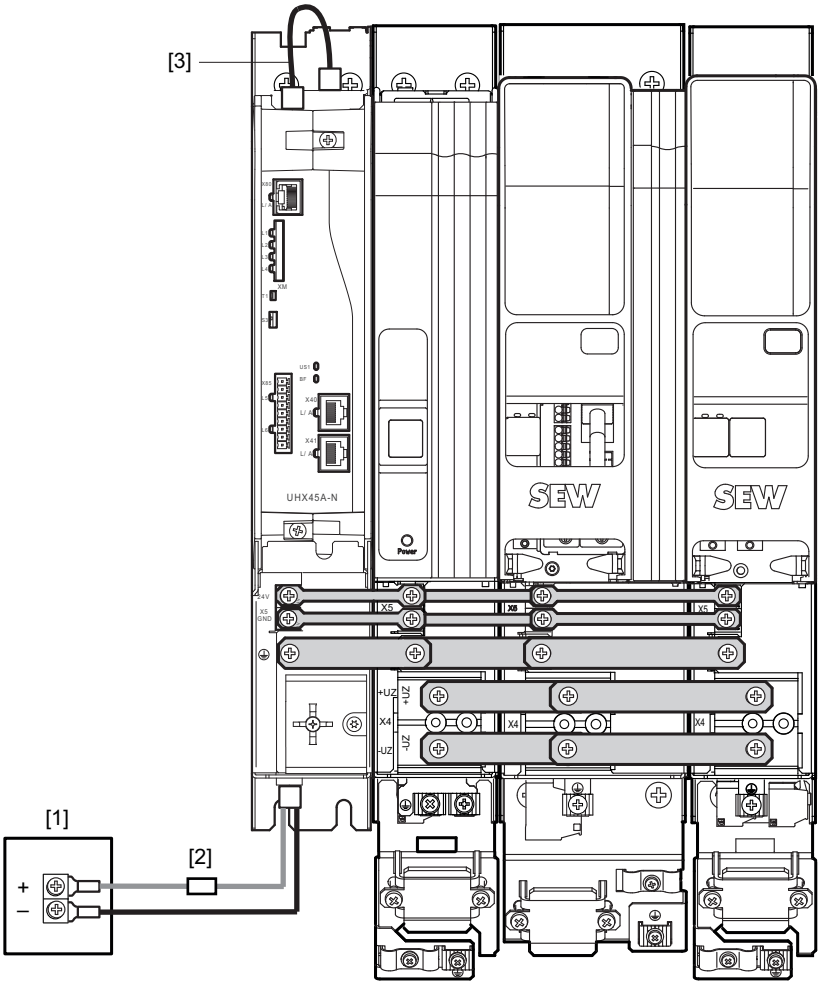
[1] External DC 24 V voltage supply

[2] DC 24 V fuse

25953486/EN – 01/2020

24 V supply voltage with master module UHX45A/MDM90A



[1] External DC 24 V supply at X5_A

[2] DC 24 V fuse

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

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

25953486/EN – 01/2020

4.2.5 System bus EtherCAT®/SBus^{PLUS}

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

NOTICE

Use of wrong cables

Damage to the application inverter

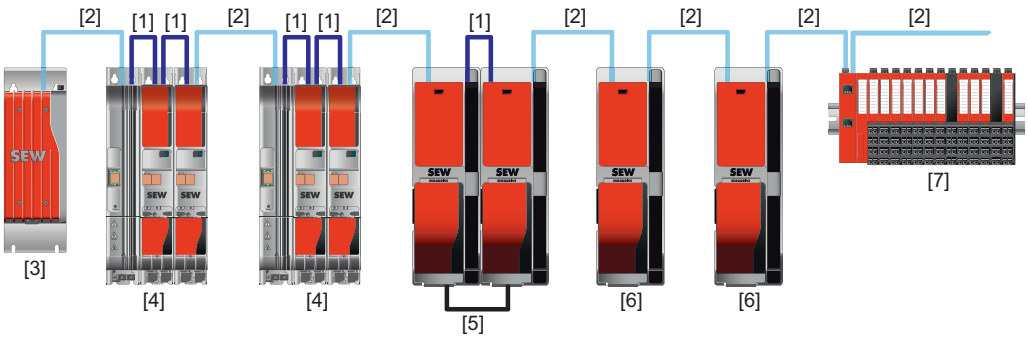
Only 4-pole cables are permitted to be used as system bus cables [2]. If an 8-pole cable is used, malfunctions or failures may occur at the connected devices.

INFORMATION

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

System bus and module bus cabling

Example of a system bus and module bus cabling



9007217271733643

[1] Module bus cable: EtherCAT®/SBus^{PLUS} and internal signals, 8-pole, color: anthracite

[2] System bus cable: EtherCAT®/SBus^{PLUS}, 4-pole, color: light gray

[3] MOVI-C® CONTROLLER power UHX85A

[4] MOVIDRIVE® modular

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

[6] MOVIDRIVE® system/technology

[7] Other EtherCAT® stations at the EtherCAT®/SBus^{PLUS}

Correct cabling

Module bus cable

In the case of MOVIDRIVE® modular, the 8-core module bus cable connects the power supply module to the first axis module and the axis modules to one another; see figure (→ 🗎 23).

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

25953486/EN – 01/2020

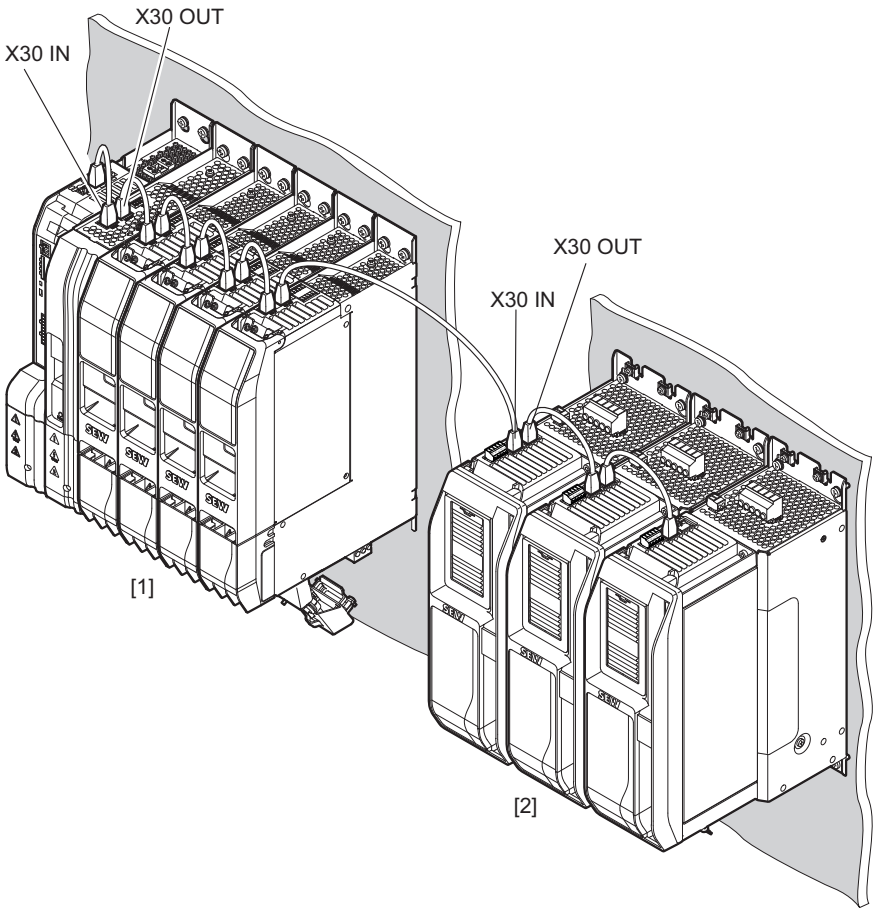
The connectors of the module bus cables are red and black to simplify correct attachment of the cables; see the following figure.

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

System bus cable

The 4-pole system bus cable is used between automation components; see figure (→ 🗎 23). Some of these components are listed here as examples:

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



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[1] MOVIDRIVE® modular

[2] MOVIDRIVE® system

25953486/EN – 01/2020

4.2.6 Two-row design

Design variants in a control cabinet

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

INFORMATION

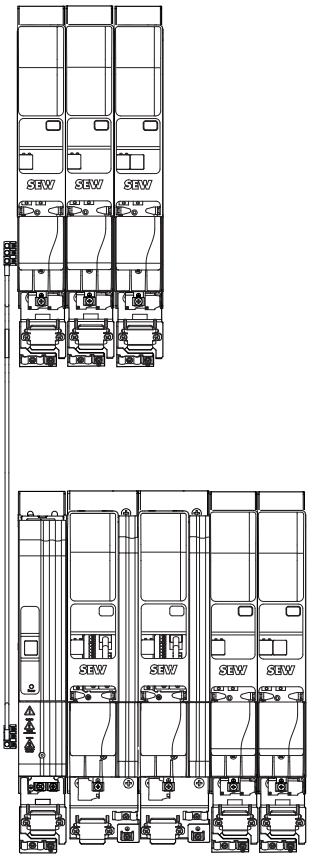
Change of the degree of protection

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

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

For the two-row design in a control cabinet, cable sets from SEW-EURODRIVE must be used, see chapter "Cable sets and accessories" (→ 🗎 34).

Variant 1



Auxiliary row

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

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

Connection of main row and auxiliary row

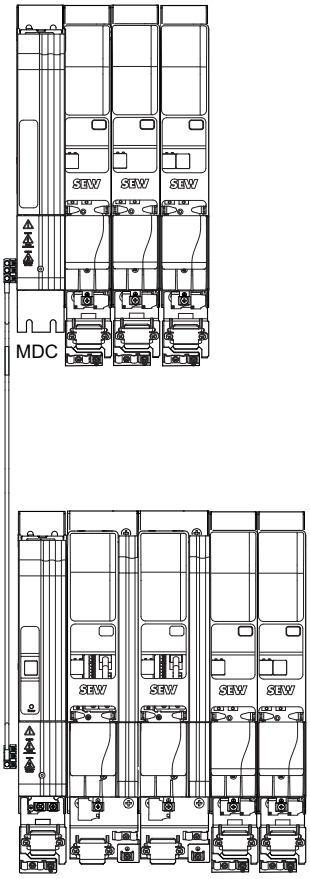
- Connection via cable lug
- Cable set DCP34A
- Degree of protection IP10

Main row

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

25953486/EN – 01/2020

Variant 2



Auxiliary row

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

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

Connection of main row and auxiliary row

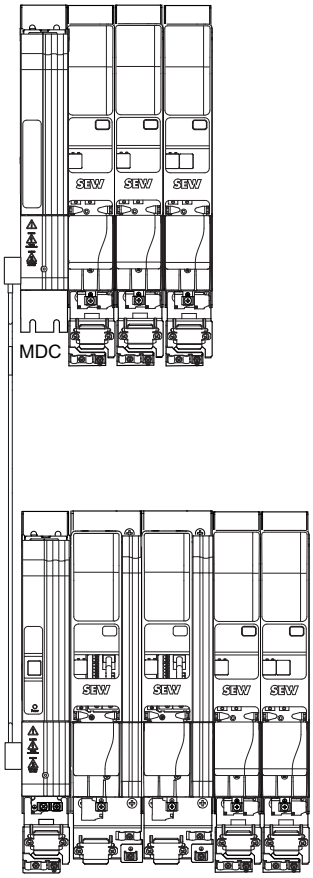
- Connection via cable lug
- Cable set DCP34A
- Degree of protection IP10

Main row

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

25953486/EN – 01/2020

Variant 3



Auxiliary row

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

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

Connection of main row and auxiliary row

- Connection via connection units
- DCP35A cable set
- With MDP90A in main row: MDP connection unit set, 28261666
- With MDR91A in the main row: MDR connection unit set, 28261674
- Degree of protection IP20

Main row

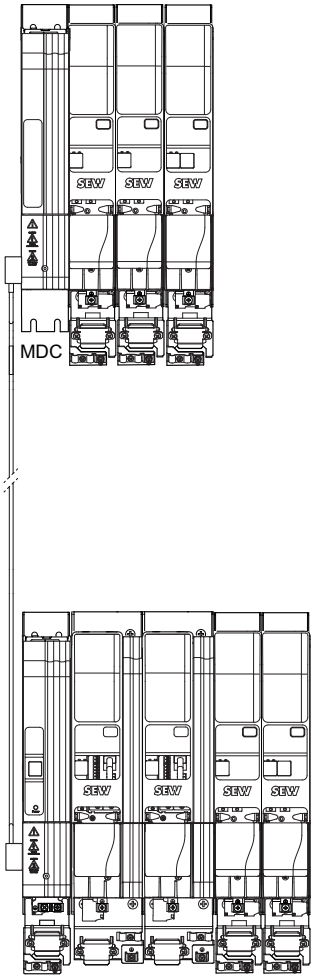
- MDP90A-0250 – 1100-..
- MDR91A-0500 – 0750-..
- MDA90A-0020 – 0180-..
- MDD9.A-0020 – 0080-..

25953486/EN – 01/2020

Design variant with large distance between main row and auxiliary row

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

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



Auxiliary row

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

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

Connection of main row and auxiliary row

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

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

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

Main row

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

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

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

25953486/EN – 01/2020

Installation

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

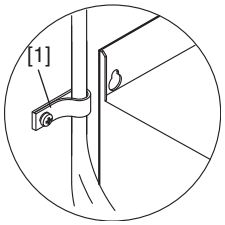
If the width of the axis system is wider than the available control cabinet width, it is possible to install some of the modules in a second row (auxiliary row).

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

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

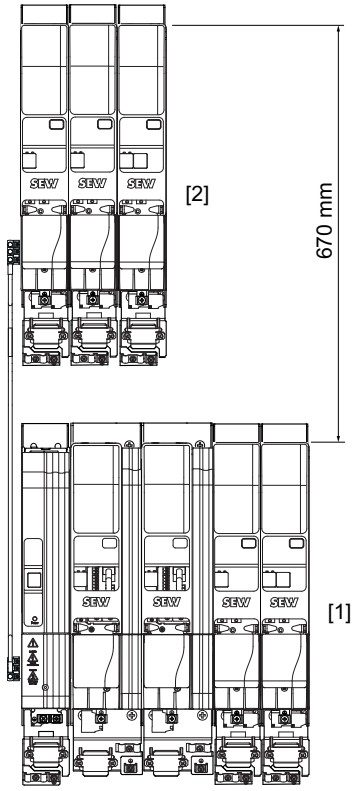
The following requirements must be met for installation in a control cabinet:

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



25953486/EN – 01/2020

Connection to the DC link connection



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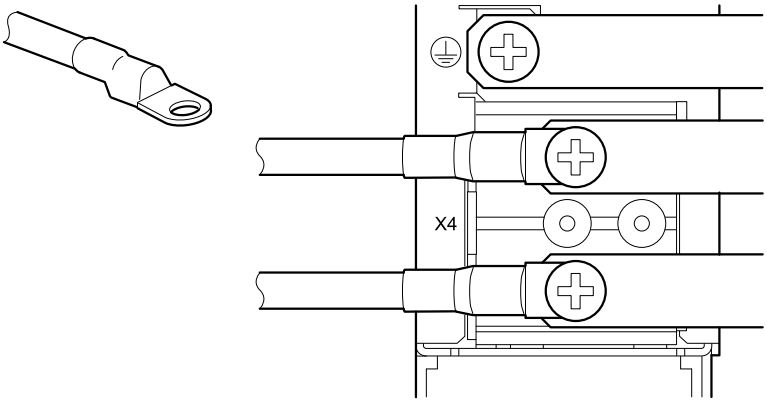
[1] Main row
[2] Auxiliary row

Connection main row and auxiliary row with DPC34A cable set

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

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



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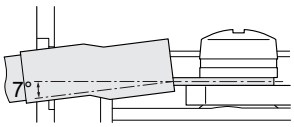
- The cable lugs must be bent down approx. 7°.



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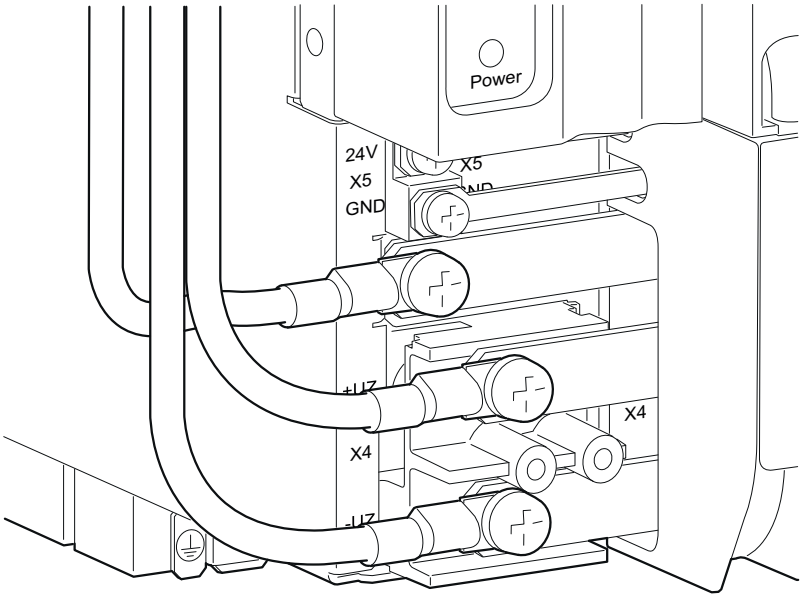
25953486/EN – 01/2020



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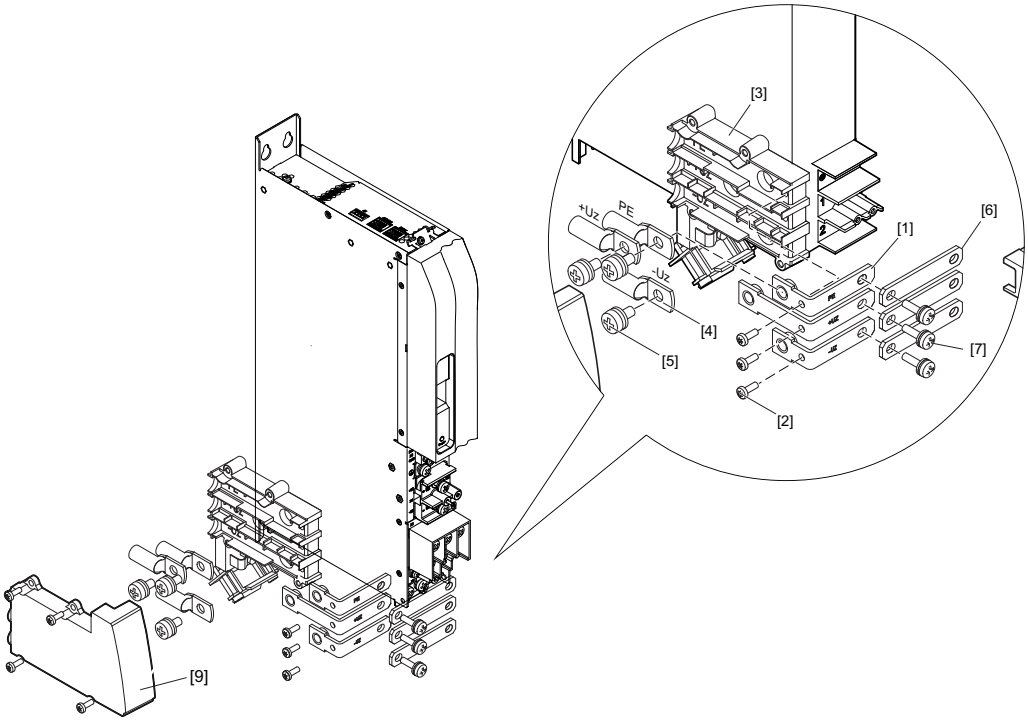
25953486/EN – 01/2020

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



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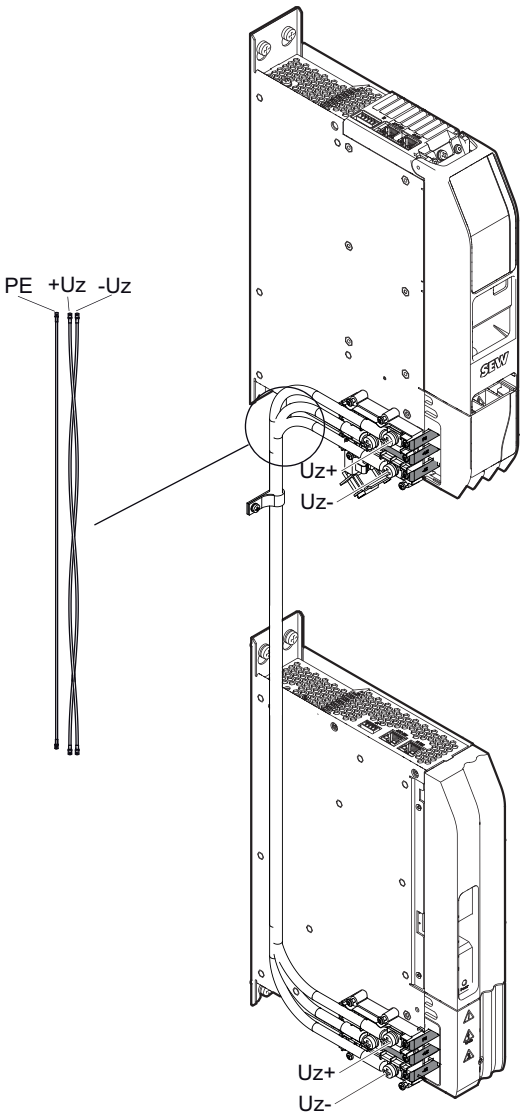
- Use the screws [2] to screw the 3 conductor rails [1] to the insulator [3]. The tightening torque is 2.5 – 3 Nm.

25953486/EN – 01/2020

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



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

The steps described above must be performed at both insulators.

Mount the preinstalled insulators to the axis module as follows:

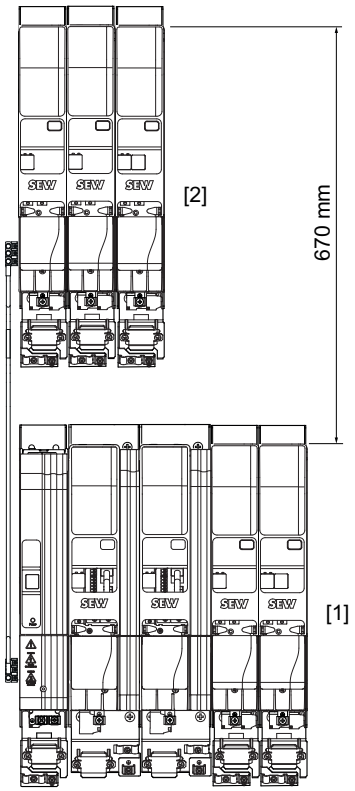
- Push the conductor rails [1] **under** the DC link bars [6] of the module and use the screws [7] to connect them.
- Re-install all covers.

25953486/EN – 01/2020

Cable sets and accessories

DCP34A cable set, part number: 28261631	
Cables	1× PVC conductor H07V-K, color: black, identification: Uz-
	1× PVC conductor H07V-K, color: black, identification: Uz+
	1× PVC conductor H07V-K, color: green/yellow, identification: PE
Cross section	16 mm^2
Connection	Crimping cable lug M6
Length	Approx. 1150 mm
DCP35A cable set, part number: 28261658	
Cables	1× PVC conductor H07V-K, color: black, identification: Uz-
	1× PVC conductor H07V-K, color: black, identification: Uz+
	1× PVC conductor H07V-K, color: green/yellow, identification: PE
Cross section	35 mm^2
Connection	Crimping cable lug M8
Length	Approx. 1000 mm
Connection units for:	
MDP90A-...	28261666
MDR92A-..	28261674

Maximum permitted distance of the module rows



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1 Main row
2 Auxiliary row

25953486/EN – 01/2020

4.3 Braking resistors

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

⚠ DANGER

Dangerous pulsed DC voltage of up to 970 V.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

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

Braking resistors become very hot during operation.

⚠ WARNING

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

Severe burns.

To prevent burns:

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

25953486/EN – 01/2020

4.3.1 Protection against thermal overload of the braking resistor

INFORMATION

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

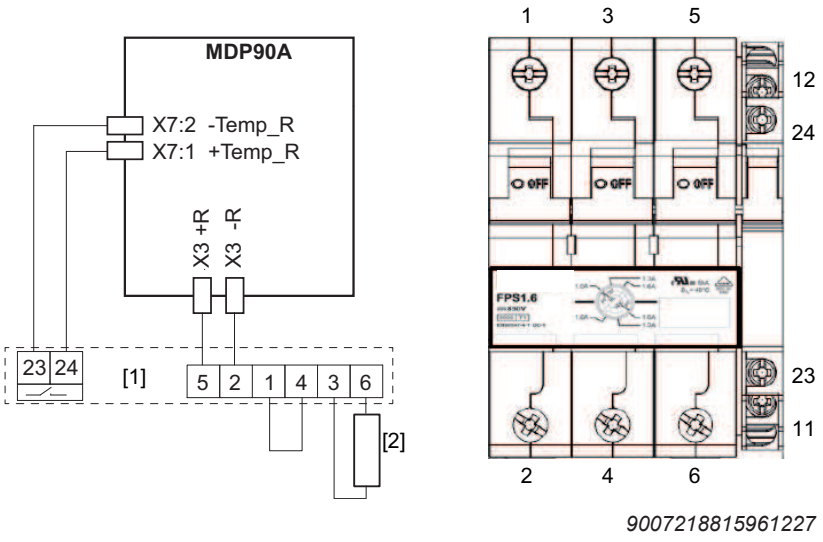
It is not permitted to separate the connection between power supply module and braking resistor. Guards, such as fuses or miniature circuit breakers are not permitted.

External thermal circuit breaker TCB

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

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

Connection



[1] TCB thermal circuit breaker

[2] Braking resistor

INFORMATION

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

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

25953486/EN – 01/2020

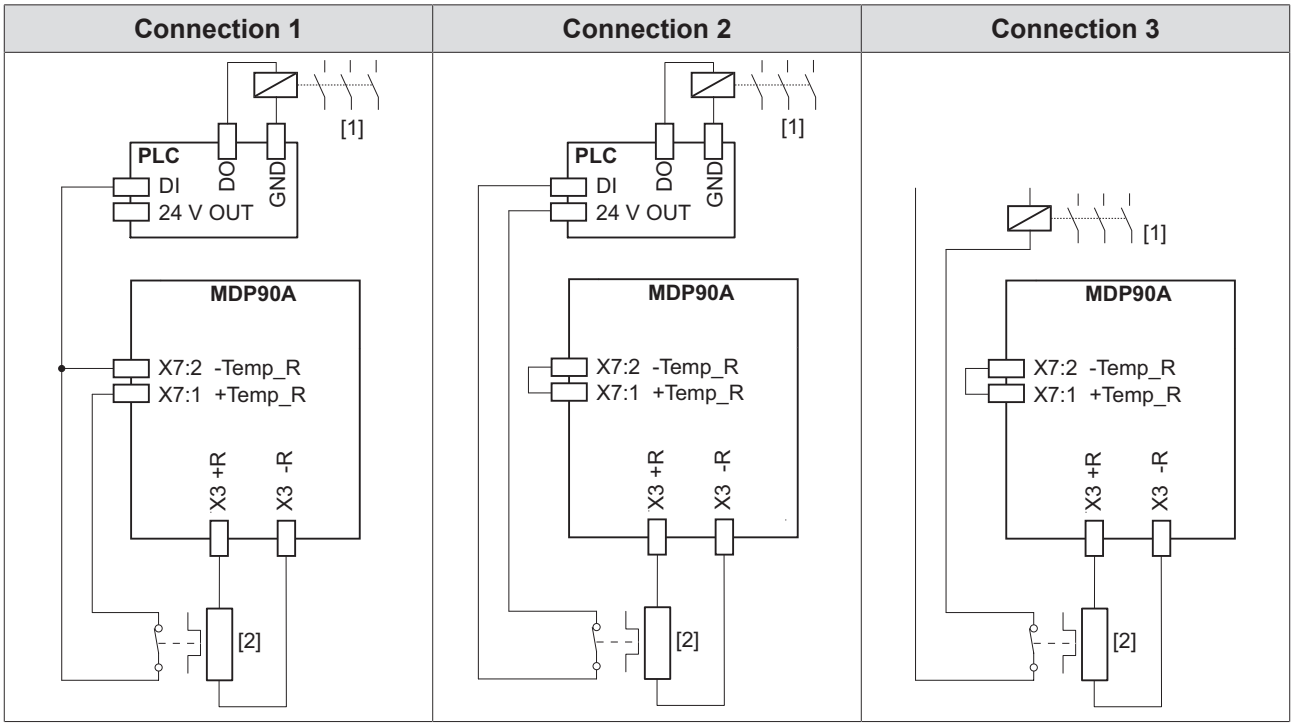
- Set the control knob of the thermal circuit breaker TCB to the tripping current I_F of the connected braking resistor. Set the scaling 40 °C.
- After all cables are connected, the 3 upper screw holes must be covered with 3 touch guard caps. The touch guard caps are included in the delivery.

25953486/EN – 01/2020

Internal temperature switch -T

MDP90A-0100-.. power supply module

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



[1] Line contactor

[2] Braking resistor

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

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

25953486/EN – 01/2020

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

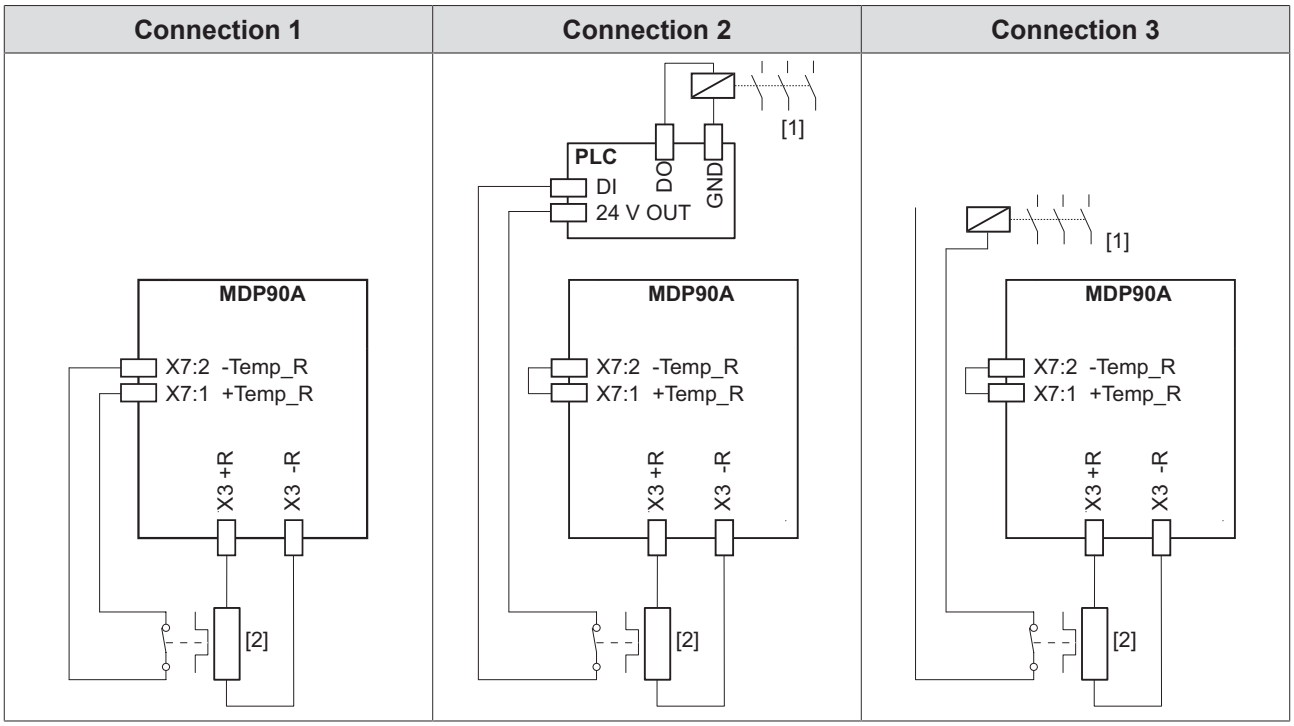
INFORMATION

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

25953486/EN – 01/2020

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

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



[1] Line contactor

[2] Braking resistor

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

25953486/EN – 01/2020

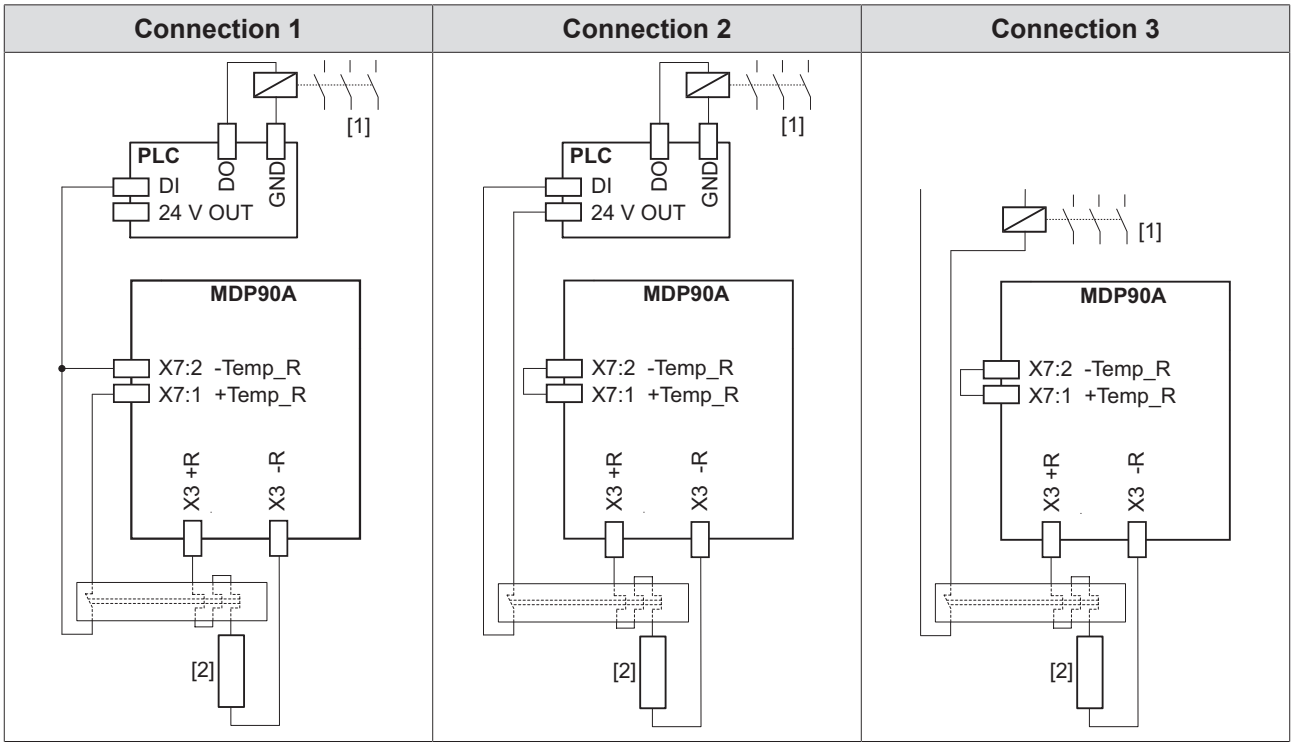
– If the thermal circuit breaker trips, there is no direct response in the application inverter.

25953486/EN – 01/2020

External bimetallic relay

MDP90A-0100-.. power supply module

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



[1] Line contactor

[2] Braking resistor

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

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

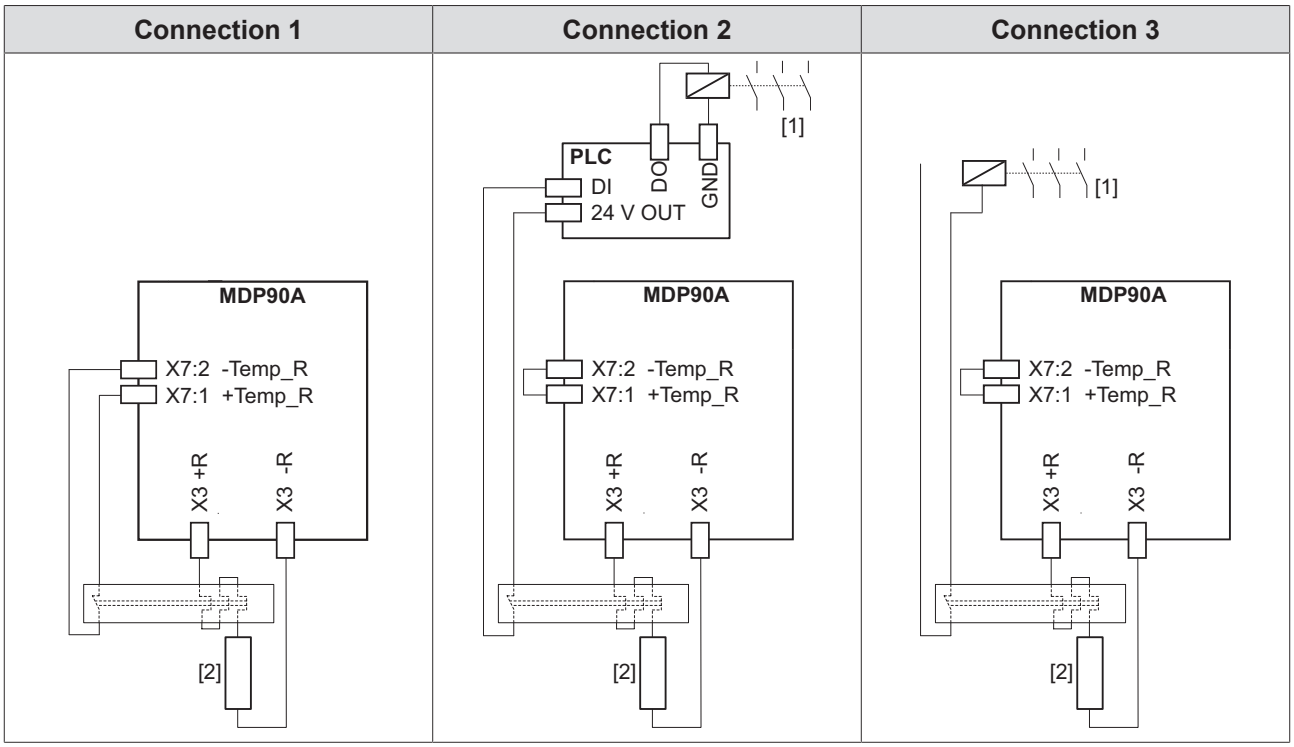
25953486/EN – 01/2020

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

25953486/EN – 01/2020

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

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



[1] Line contactor

[2] Braking resistor

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

25953486/EN – 01/2020

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

4.4 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

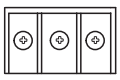
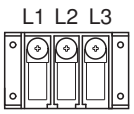
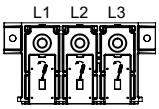
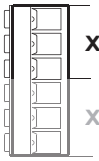
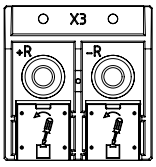
The assignment "reserved" means that no cable must be connected to this connection.

INFORMATION

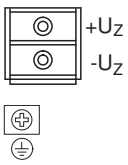
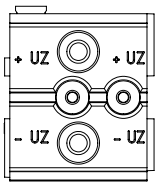
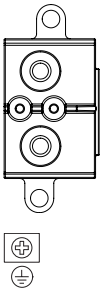
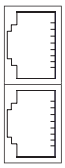
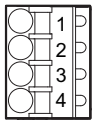
The technical data for the connection of power electronics and control electronics are listed in chapter Technical Data.

25953486/EN – 01/2020

4.4.1 Terminal assignment at MDP power supply module

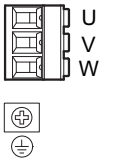
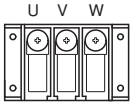
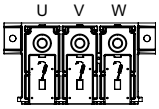
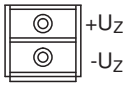
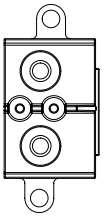
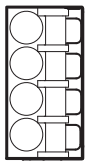
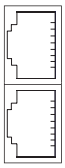
Representation	Terminal	Connection	Brief description
	X1:L1	L1	Line connection MDP90A-0100-.. (size 1)
	X1:L2	L2	
	X1:L3	L3	
	⏚	PE	PE connection
	X1:L1	L1	Line connection MDP90A-0250-.. (size 2)
	X1:L2	L2	
	X1:L3	L3	
	⏚	PE	PE connection
	X1:1	L1	Line connection MDP90A-0500 – 0750-.. (size 3)
	X1:2	L2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

25953486/EN – 01/2020

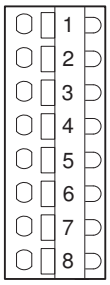
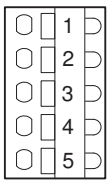
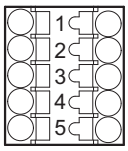
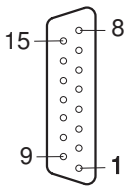
Representation	Terminal	Connection	Brief description
	X4:+U_Z	+U_Z	DC link connection
	X4:-U_Z	-U_Z	
	⏚	PE	PE connection
	X4:+U_Z	+U_Z	DC link connection left side MDP90A-1100-.. (size 4)
	X4:-U_Z	-U_Z	
	⏚	PE	PE connection
	X4:+U_Z	+U_Z	DC link connection right side MDP90A-1100-.. (size 4)
	X4:-U_Z	-U_Z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

25953486/EN – 01/2020

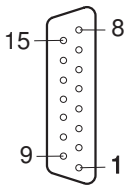
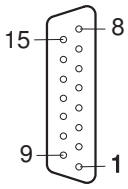
4.4.2 Terminal assignment at MDA single-axis module

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

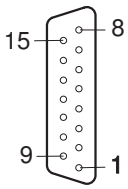
25953486/EN – 01/2020

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

25953486/EN – 01/2020

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

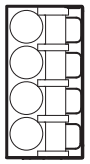
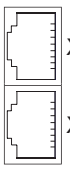
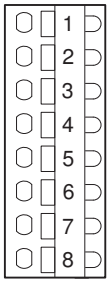
25953486/EN – 01/2020

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

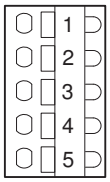
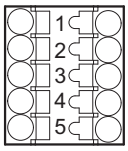
1) The assignment of DI01 – DI05 specified here is the factory setting. The inputs are parameterizable.
2) The assignment of DOI00 – DO02 specified here is the factory setting. The outputs are parameterizable.
3) For encoders from SEW-EURODRIVE with electronic nameplate of type E.7S

25953486/EN – 01/2020

4.4.3 Terminal assignment at MDD double-axis module

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

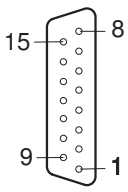
25953486/EN – 01/2020

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

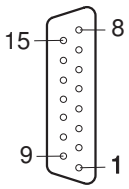
1) The assignment of DI01 – DI05 specified here is the factory setting. The inputs are parameterizable.

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

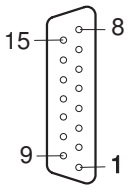
The X15_.. terminals are available for the MDD90A double-axis module.

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

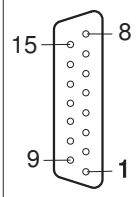
25953486/EN – 01/2020

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

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

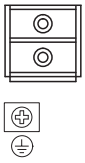
Representation	Terminals		Connection	Brief description motor encoder HTL encoder
	X15_1:1	X15_2:1	A (K1)	Signal track A (K1)
	X15_1:2	X15_2:2	B (K2)	Signal track B (K2)
	X15_1:3	X15_2:3	C (K0)	Signal track C (K0)
	X15_1:4	X15_2:4	Reserved	–
	X15_1:5	X15_2:5	Reserved	–
	X15_1:6	X15_2:6	-TEMP_M	Motor temperature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

25953486/EN – 01/2020

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

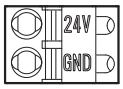
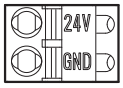
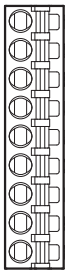
25953486/EN – 01/2020

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

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

25953486/EN – 01/2020

4.4.5 Terminal assignment at master module UHX45A/MDM90A

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

4.5 Wiring diagrams

4.5.1 General information on the wiring diagrams

- For technical data of the power electronics and the control electronics, refer to chapter Technical data.
- For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 45).

4.5.2 Power connection

NOTICE

Incorrectly placed components.

Destruction of the power supply module.

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

NOTICE

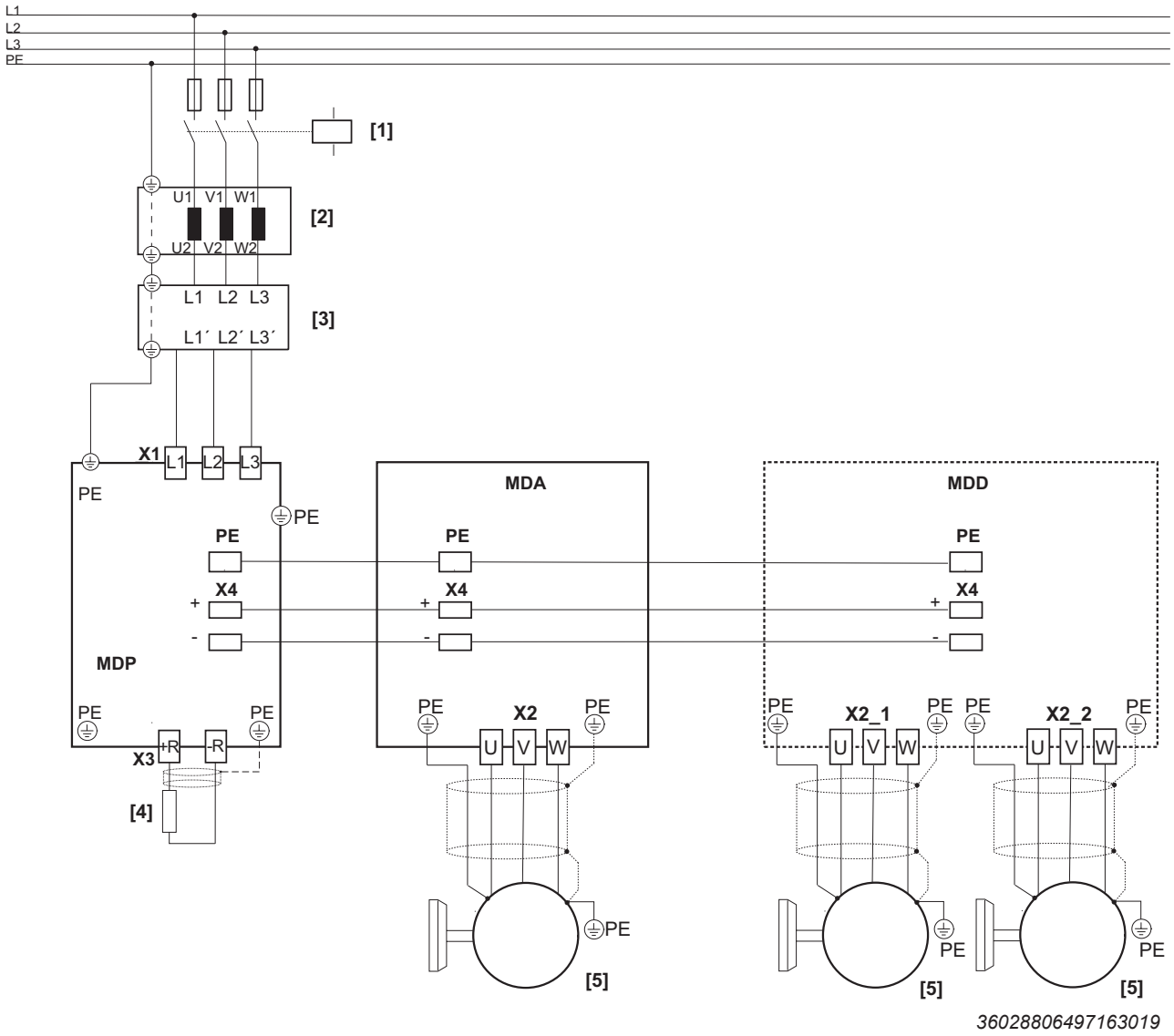
Overtemperature of line filter and line choke.

Destruction of line filter and line choke.

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

25953486/EN – 01/2020

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



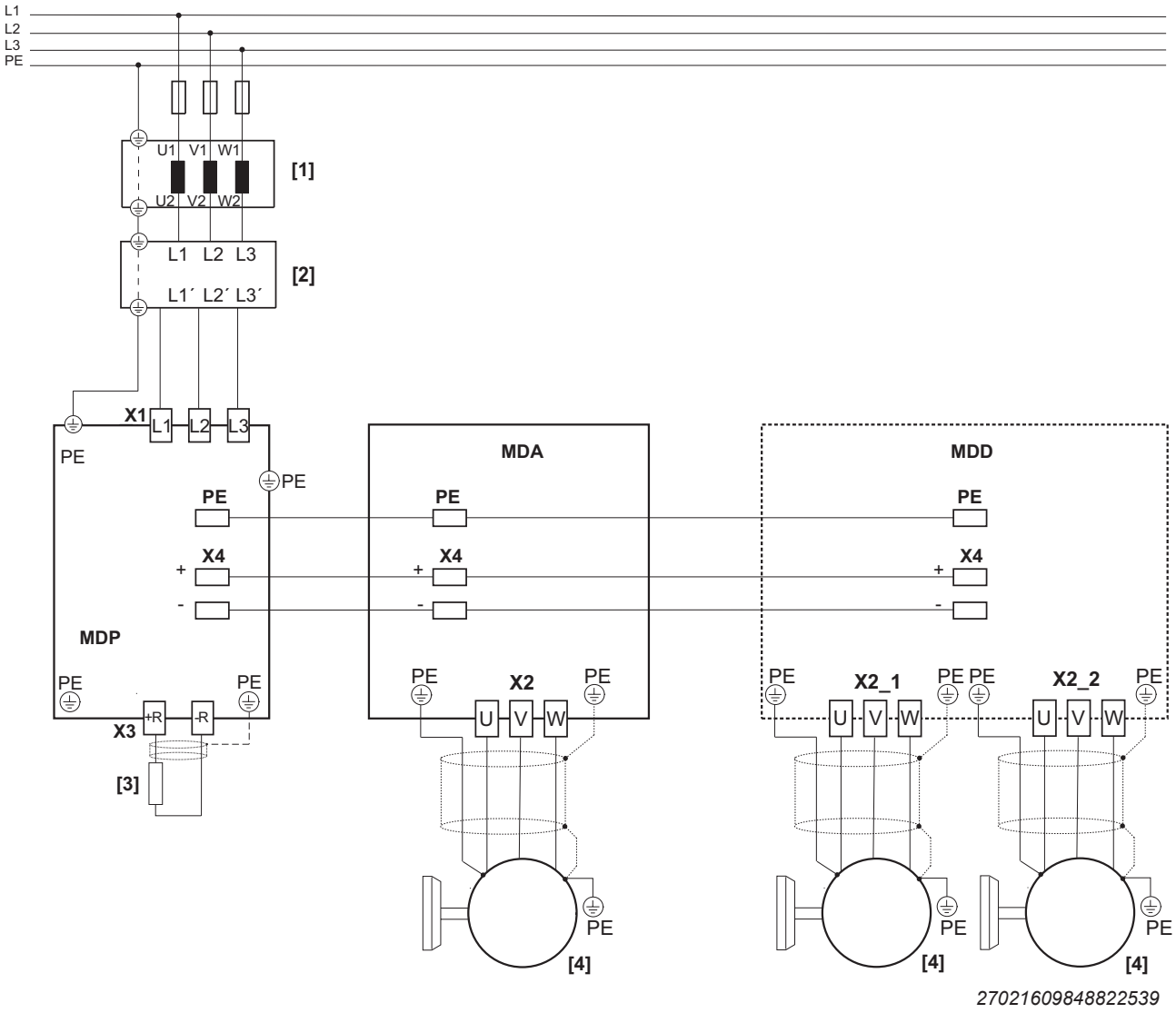
36028806497163019

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

25953486/EN – 01/2020

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

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

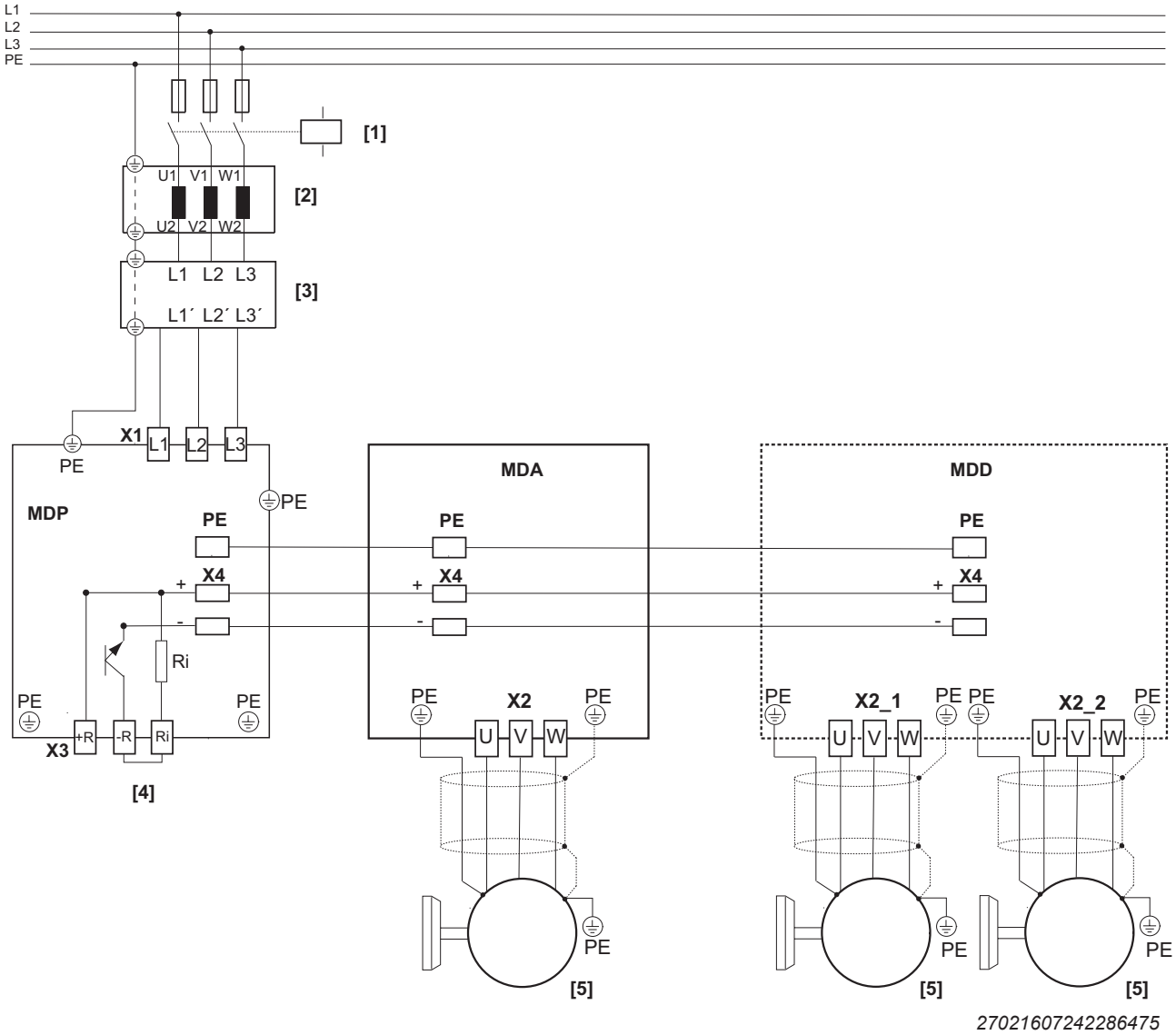


[1] Line choke (optional)
[2] Line filter
[3] Connection of the braking resistor
[4] Motor
MDP Power supply module
MDA Single-axis module
MDD Double-axis module

INFORMATION

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

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

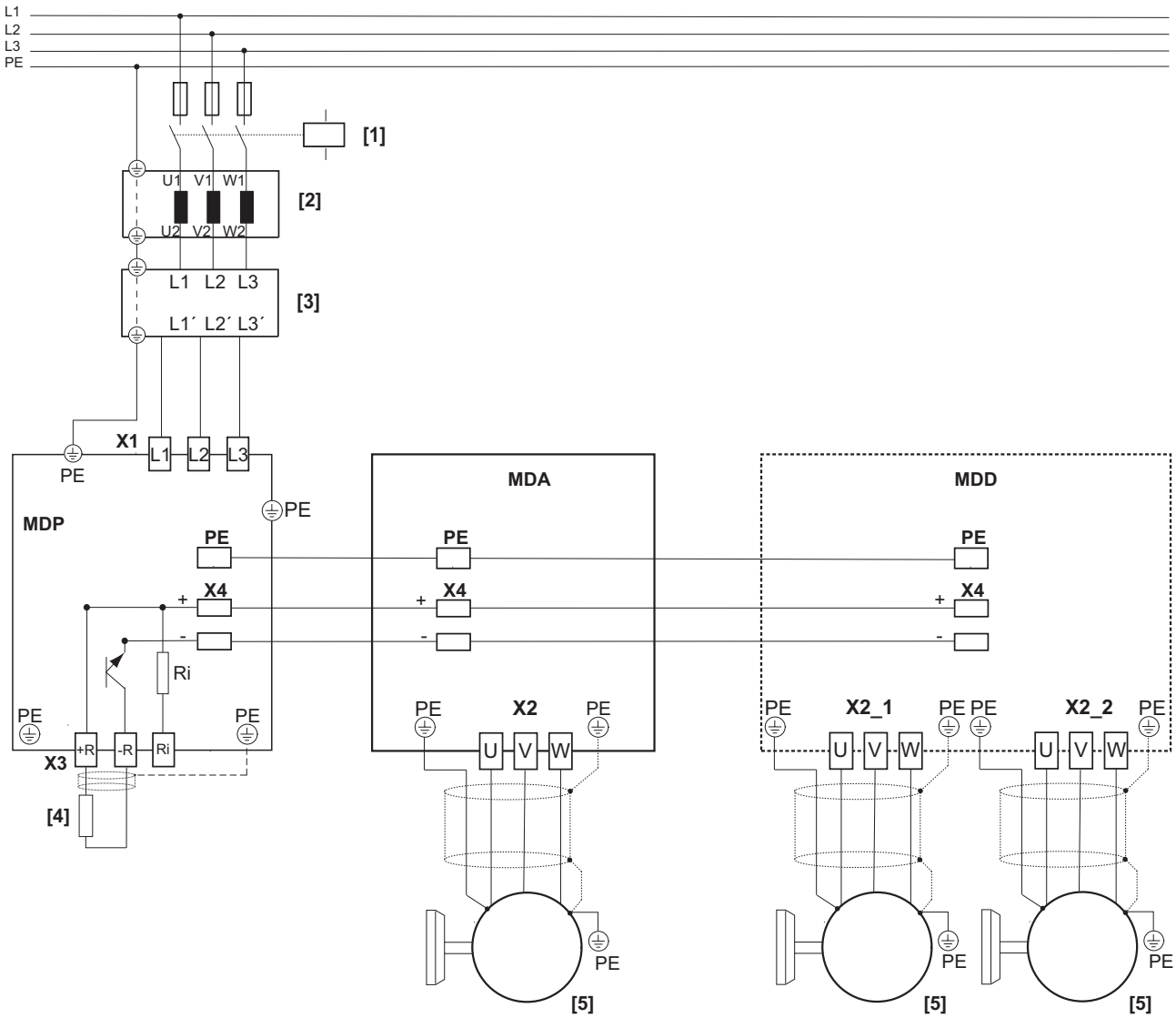


27021607242286475

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

25953486/EN – 01/2020

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

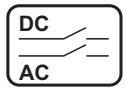


36028806505258635

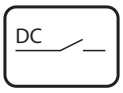
[1]	Line contactor
[2]	Line choke (optional)
[3]	Line filter
[4]	Connection of the braking resistor
[5]	Motor
MDP	Power supply module
MDA	Single-axis module
MDD	Double-axis module

4.5.3 Brake control

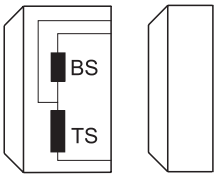
Legend:



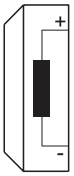
Cut-off in the DC and AC circuits
(rapid brake application)



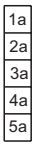
Cut-off in the DC circuit



Brake
BS = accelerator coil
TS = coil section



DC brake with one brake coil



Auxiliary terminal strip in terminal box

Control cabinet limit

WH	White
RD	Red
BU	Blue

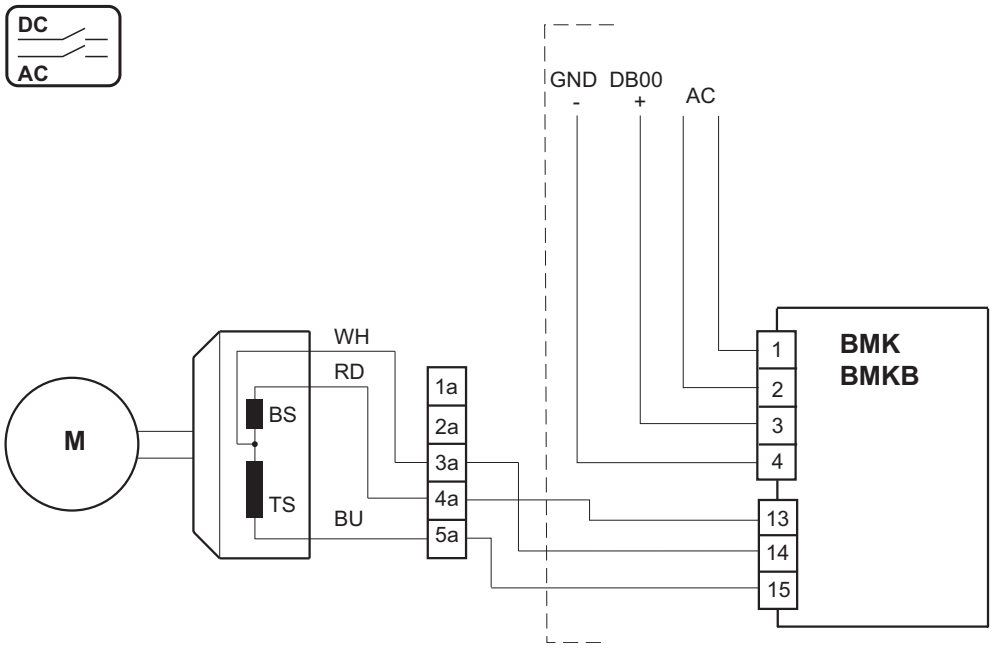
INFORMATION

Type and source of the hazard

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

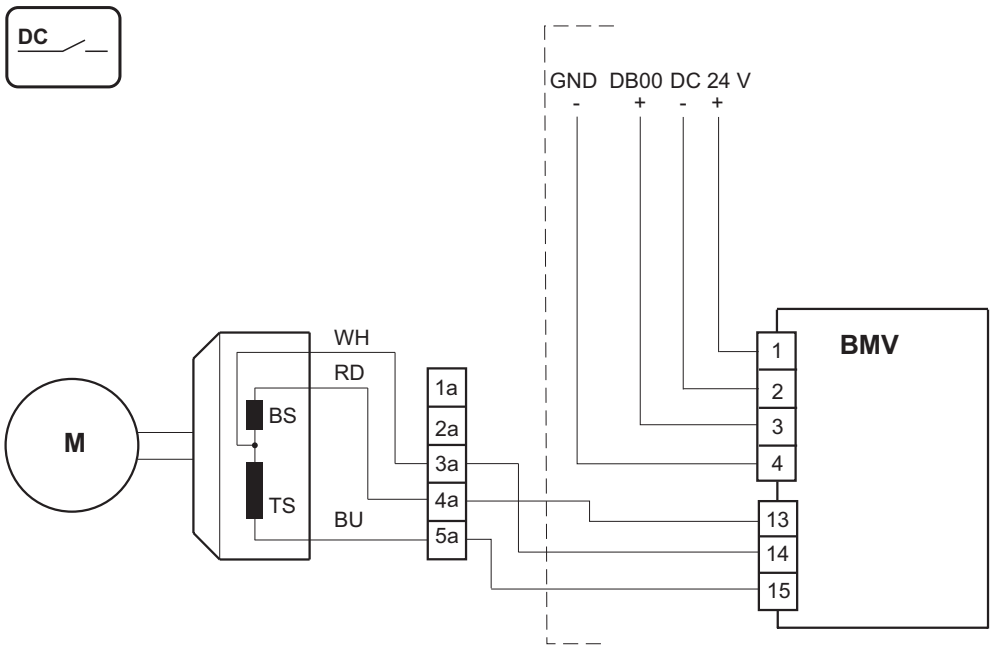
25953486/EN – 01/2020

BMK. brake control



14324495755

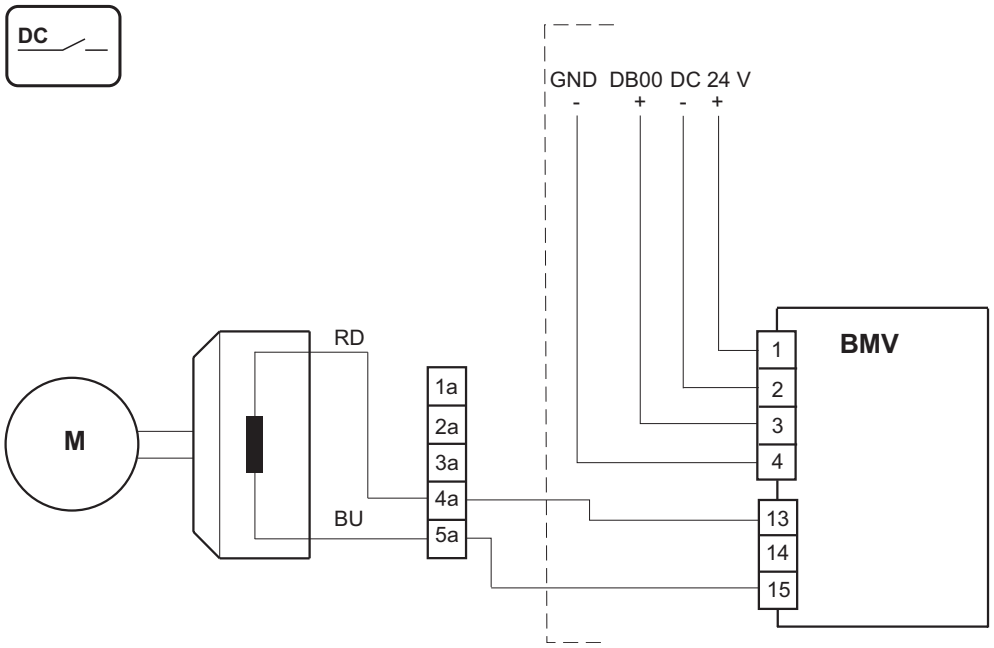
BMV brake control – 2 coils



14373482507

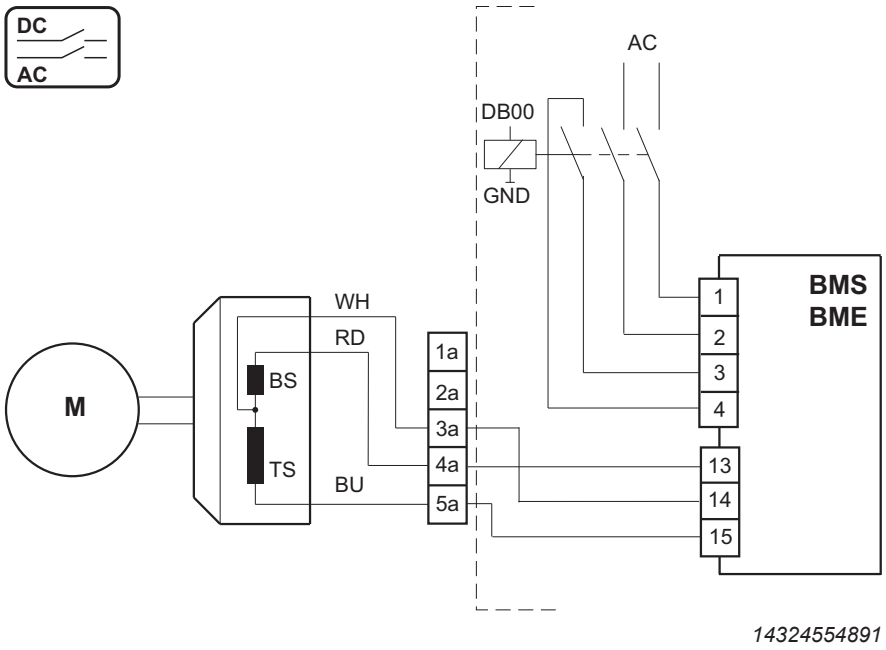
25953486/EN – 01/2020

BMV brake control – 1 coil



14373494923

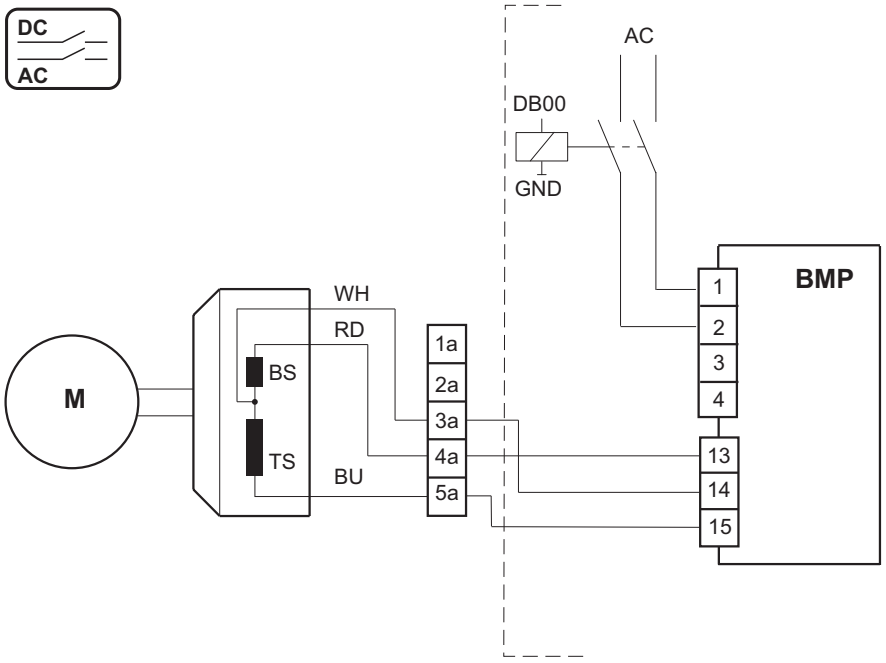
BMS, BME brake control



14324554891

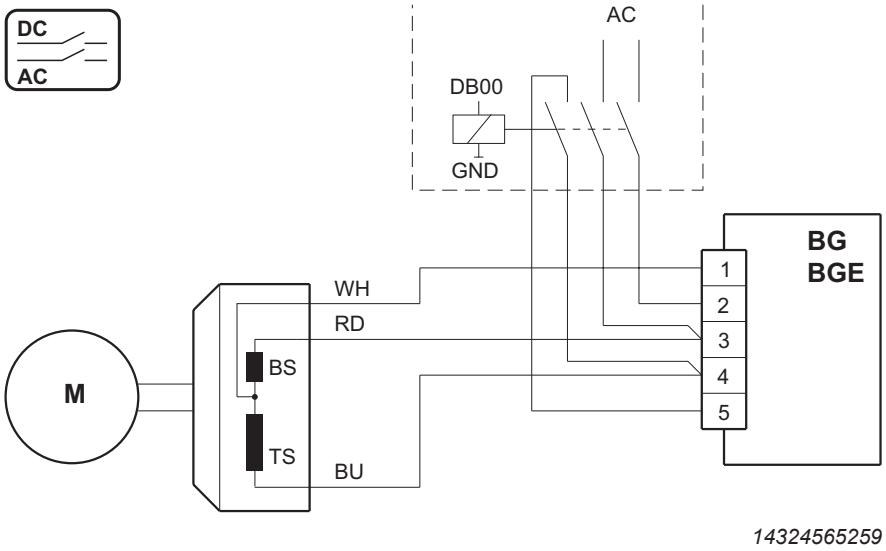
25953486/EN – 01/2020

BMP brake control



14324544523

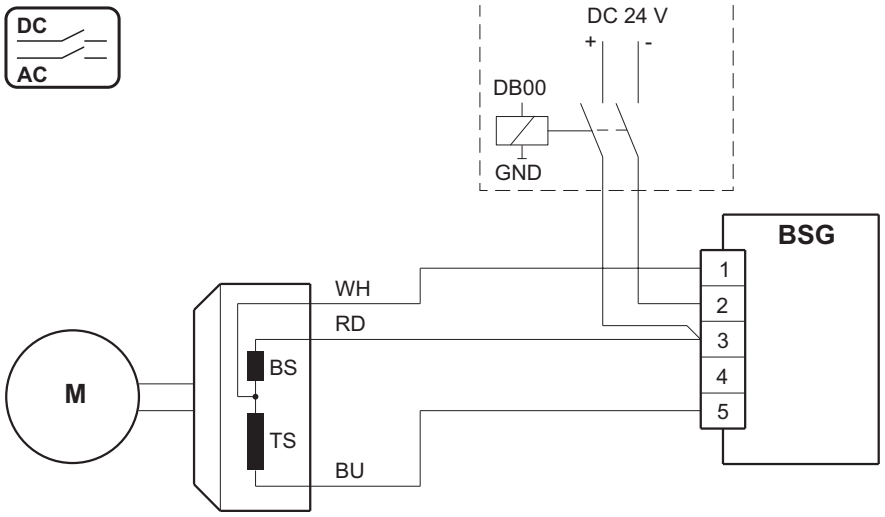
BG, BGE brake control



14324565259

25953486/EN – 01/2020

BSG brake control



14324597131

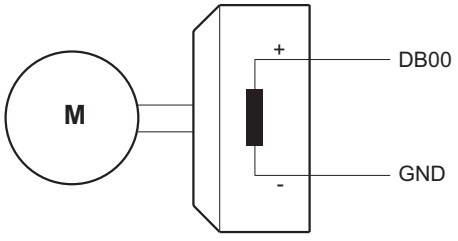
Direct control DC 24 V brake

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

Specifications for direct brake control:

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

Observe additional information in the "Synchronous Servomotors" catalog.



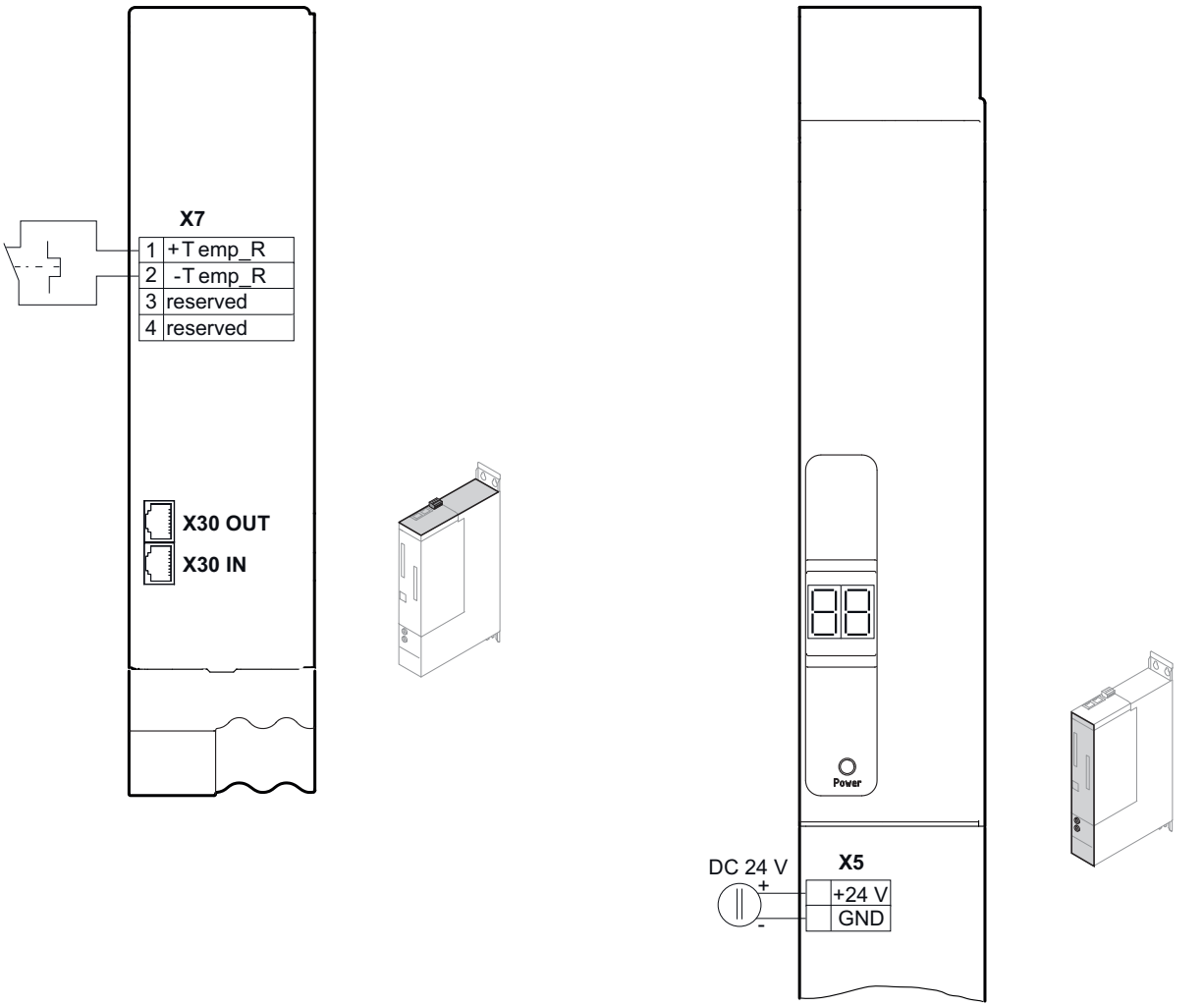
14333605771

25953486/EN – 01/2020

4.5.4 Electronics connection MDP90A.. power supply module

Wiring the control electronics

For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 45).



54043209842314507

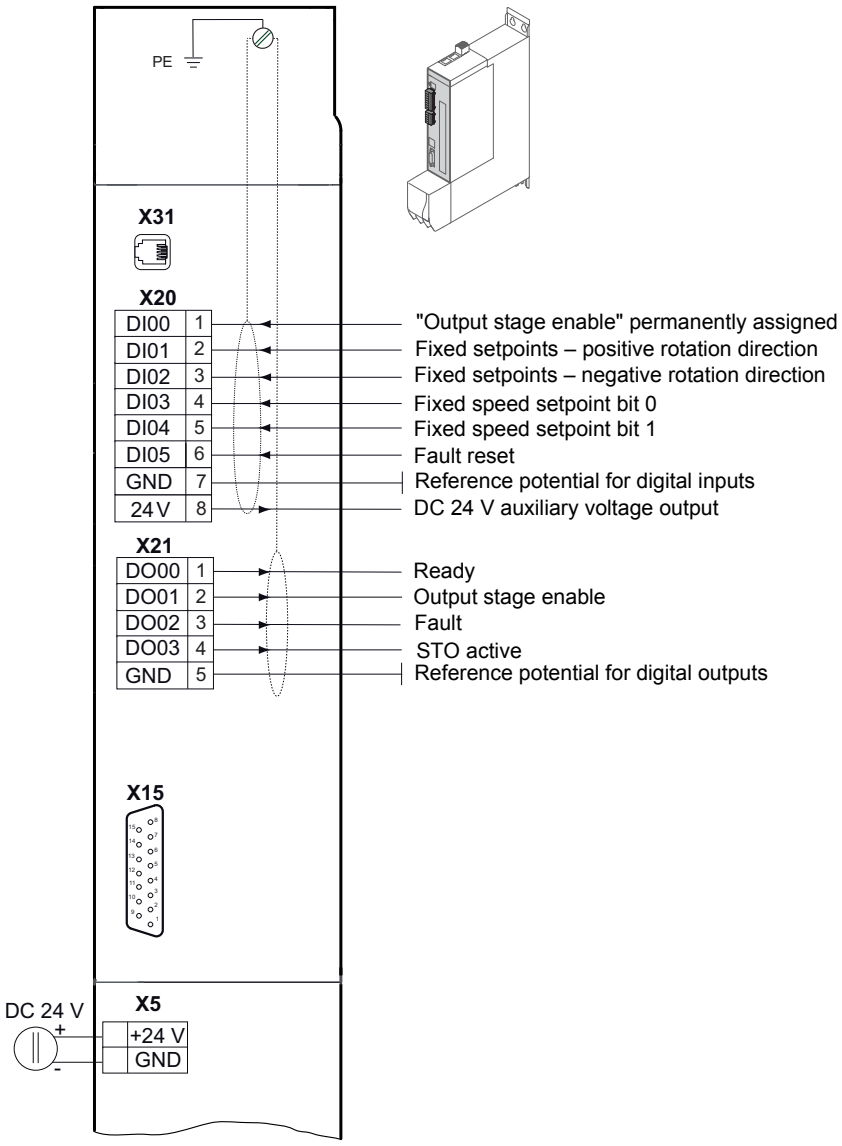
X5 Connection +24 V supply voltage
X7 Braking resistor temperature monitoring
X30 System bus

25953486/EN – 01/2020

4.5.5 Electronics connection MDA90A.. single-axis module

Wiring the control electronics

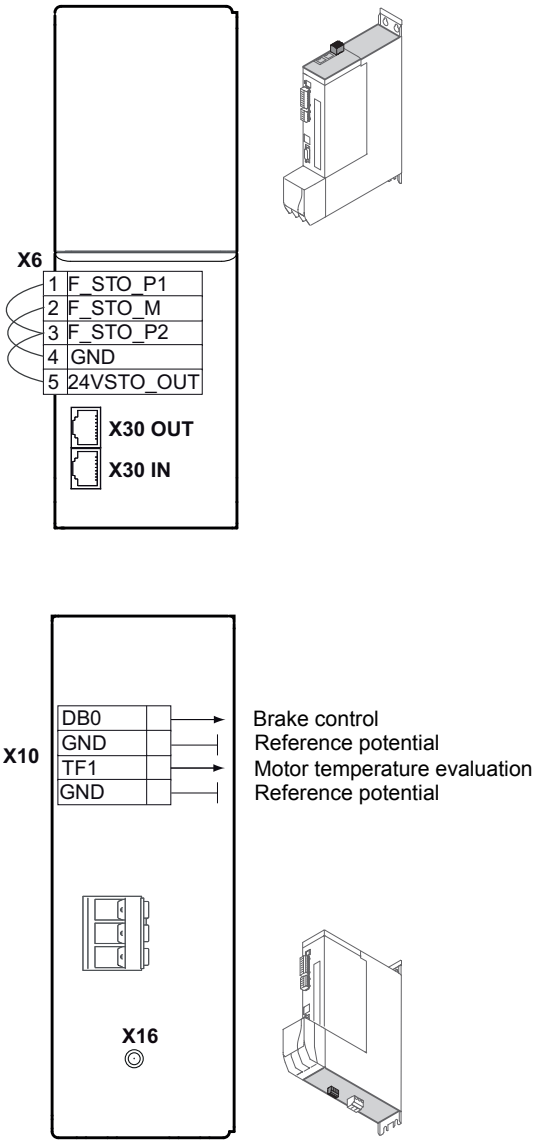
For the terminal assignment and connections, refer to the chapter "Terminal assignment" (→ 🗎 45).



9007224862225163

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

25953486/EN – 01/2020



9007224862221067

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

X10 Brake control and motor temperature monitoring

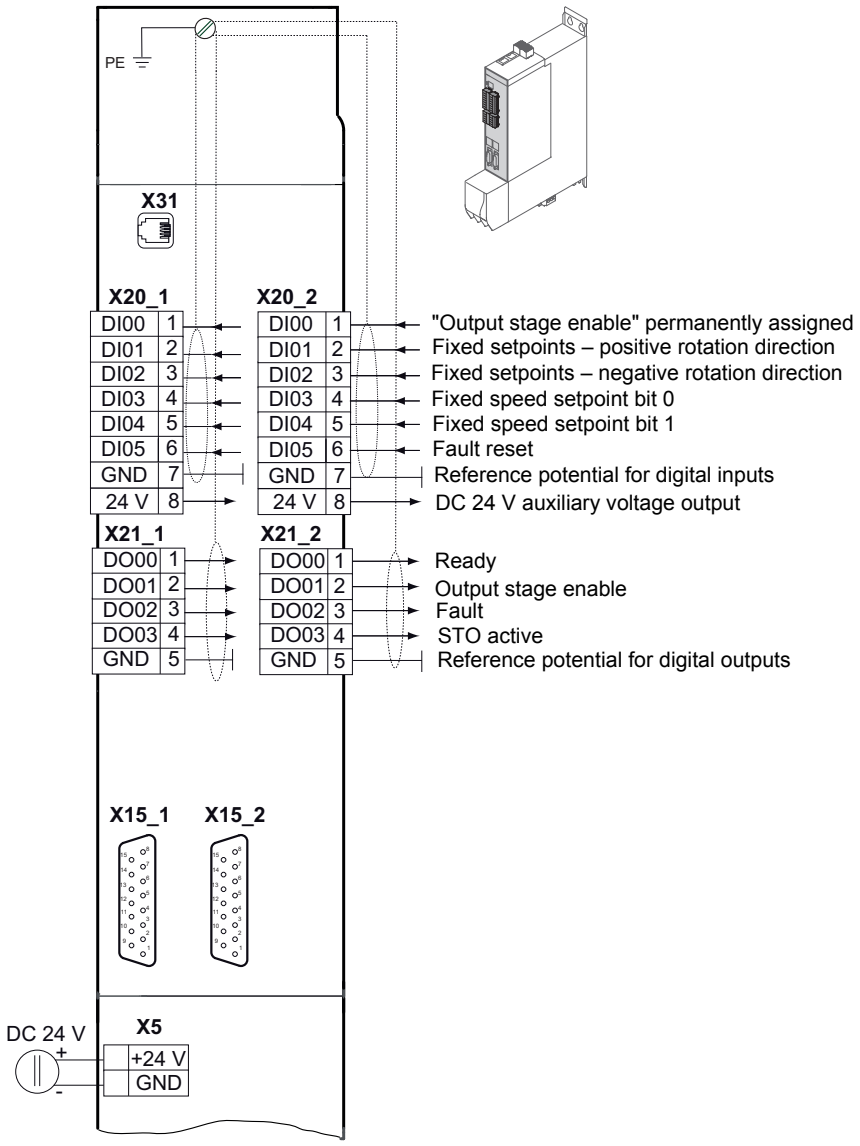
X16 MOVILINK® DDI connection

X30 System bus

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

Wiring the control electronics

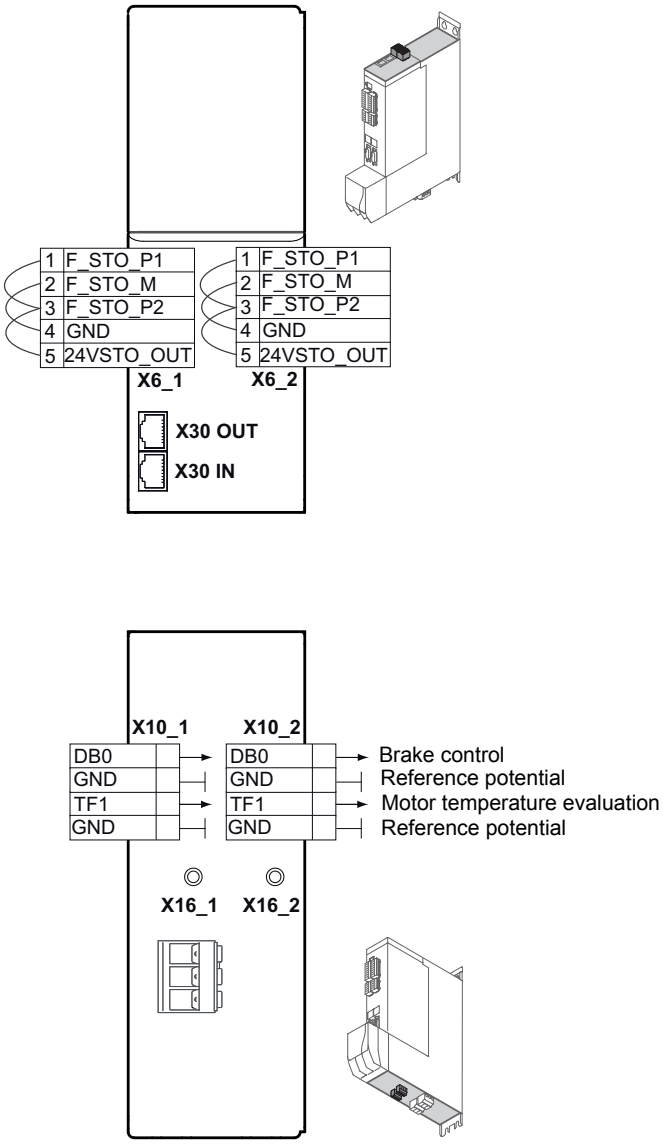
For the terminal assignment and connections, refer to the chapter "Terminal assignment" (→ 🗎 45).



9007224862457611

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

25953486/EN – 01/2020



25607711883

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

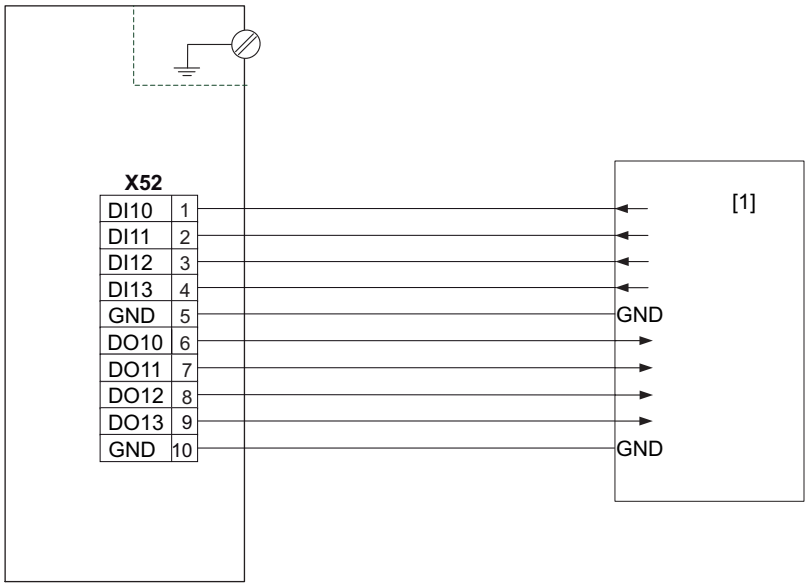
X10 Brake control and motor temperature monitoring

X16 MOVILINK® DDI connection with MDD91A-..

X30 System bus

4.5.7 Connection diagram CIO21A and CID21A input/output card

Digital inputs and outputs

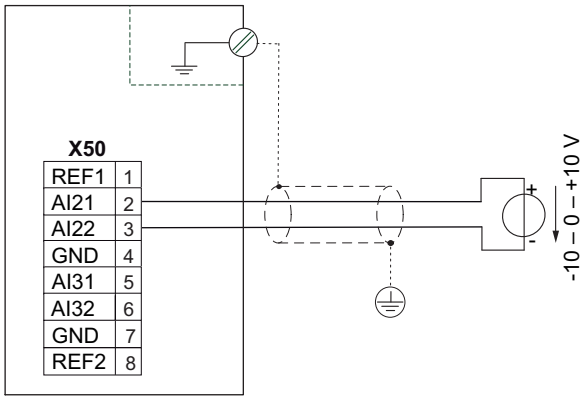


18014412829087243

[1] Higher-level controller

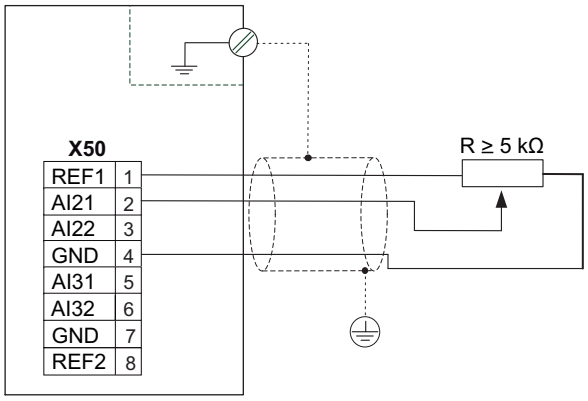
25953486/EN – 01/2020

Voltage input



9007213575393675

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

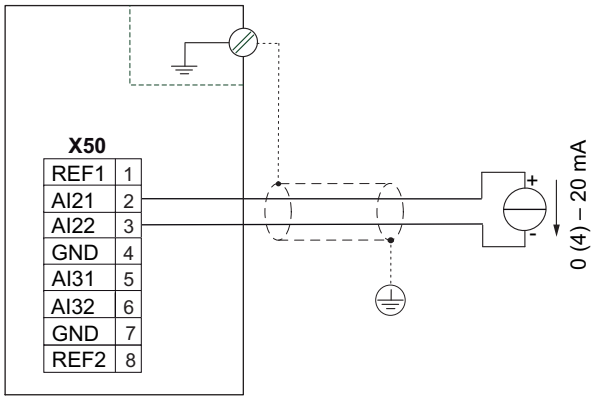


18014412830137099

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

25953486/EN – 01/2020

Current input

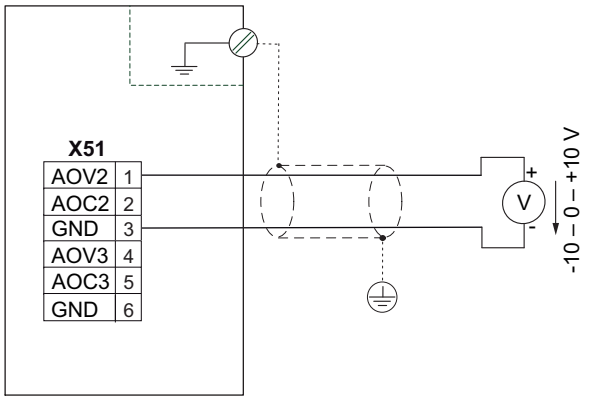


9007213575398539

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

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

Voltage output

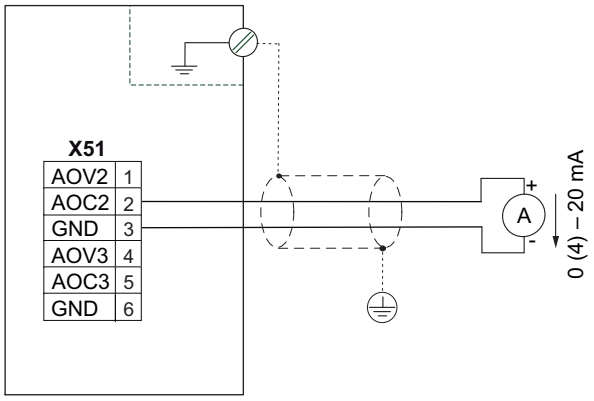


18014412830141963

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

25953486/EN – 01/2020

Current output



18014412830272395

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

5 Startup

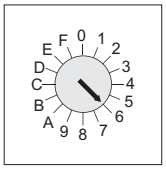
5.1 Assigning the EtherCAT®/SBusPLUS address at the axis module

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

The following table lists example settings for the address switches.

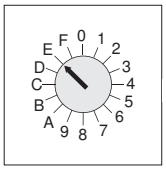
Required address, decimal	Address, hexa-decimal	Setting S1 (× 16)	Setting S2 (× 1)
3	03	0	3
18	12	1	2
25	19	1	9
100	64	6	4
110	6E	6	E
255	FF	F	F

S1 address switch



6

S2 address switch



E

The EtherCAT®/SBusPLUS address "110" is set as an example in the illustration above.

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

5.2 Startup requirements

The following requirements apply to startup:

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

Required hardware components:

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

25953486/EN – 01/2020

Required software:

- MOVISUITE® standard engineering software from SEW-EURODRIVE.

25953486/EN – 01/2020

6 Operation

6.1 General information

⚠ DANGER

Dangerous voltages present at cables and motor terminals.

Severe or fatal injuries from electric shock.

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

⚠ DANGER

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

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

NOTICE

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

Damage to the application inverter.

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

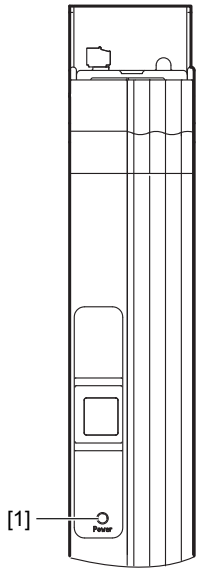
25953486/EN – 01/2020

6.2 Operating displays

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

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

6.2.2 Operating displays of the power supply module – LED displays



25761468299

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

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

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

25953486/EN – 01/2020

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

25953486/EN – 01/2020

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

25953486/EN – 01/2020

7 Service

7.1 Extended storage

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

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

1) Power supply module with integrated braking resistor and capacitor

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

⚠ DANGER

Uncovered power connections.

Severe or fatal injuries from electric shock.

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

7.1.1 Procedure in case maintenance has been neglected

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

The following graduations are recommended:

AC 400/500 V devices:

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

25953486/EN – 01/2020

7.2 Shutdown

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

⚠ WARNING

Electric shock due to incompletely discharged capacitors.

Severe or fatal injuries.

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

7.2.1 Using energy storage units

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

⚠ WARNING

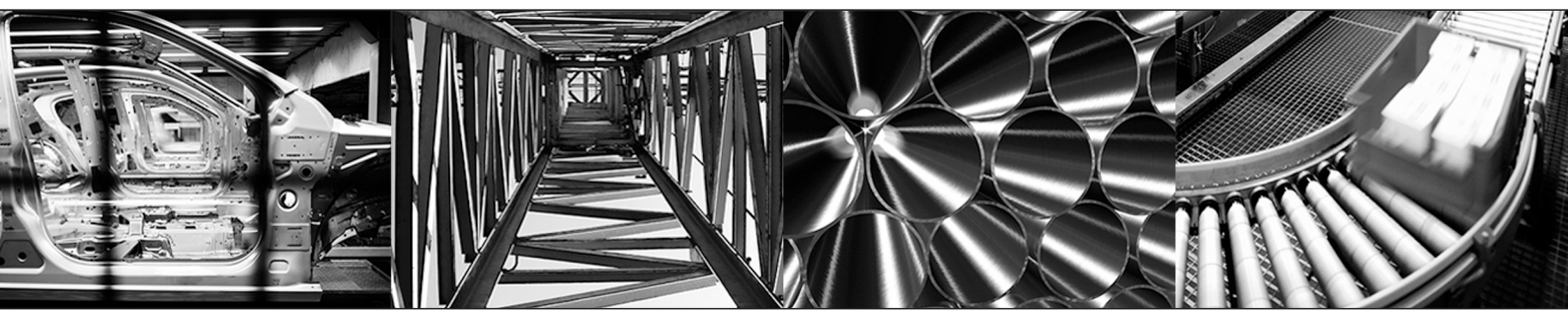
The energy storage units are still charged after the device has been switched off.

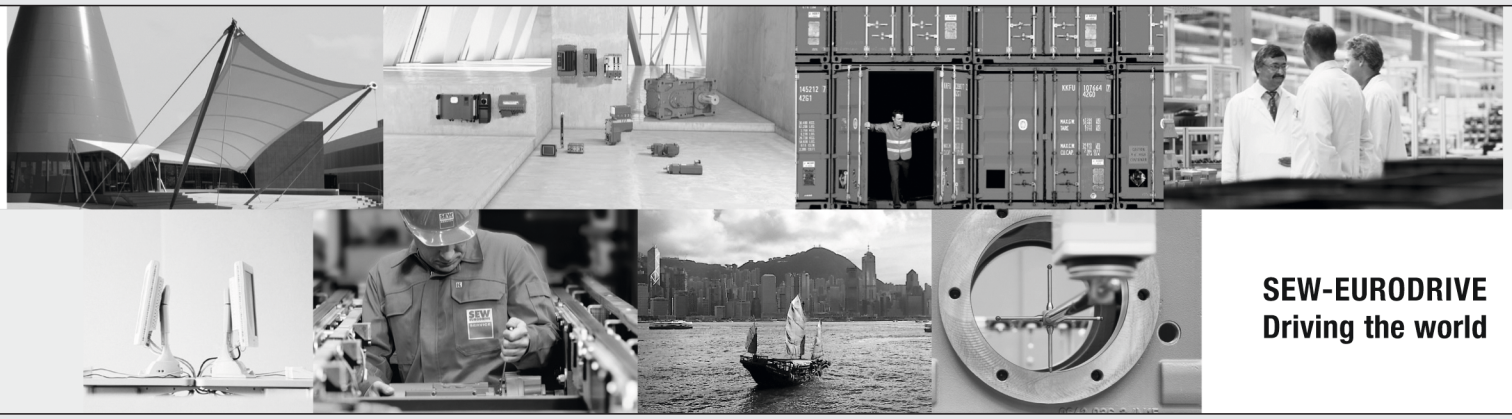
Severe or fatal injuries from electric shock.

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

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

25953486/EN – 01/2020





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