



Operating Instructions



Drive and Application Controller
MOVIPRO® PHE10A-...-3.X...A-00/...



Table of Contents

1	General information.....	6
1.1	About this documentation	6
1.2	Structure of the safety notes	6
1.3	Decimal separator in numerical values	7
1.4	Rights to claim under limited warranty	7
1.5	Other applicable documentation	7
1.6	Recycling, reprocessing, reuse	7
1.7	Product names and trademarks	7
1.8	Copyright notice	7
2	Safety notes	8
2.1	Preliminary information	8
2.2	Duties of the user	8
2.3	Target group	9
2.4	IT security	10
2.5	Designated use	10
2.6	Functional safety technology	11
2.7	Transport.....	12
2.8	Installation/assembly.....	12
2.9	Electrical installation	12
2.10	Protective separation	13
2.11	Startup/operation	14
3	Device structure	15
3.1	Type designation.....	15
3.2	Short designation	16
3.3	Scope of delivery	16
3.4	Labels on the device	17
3.5	Device overview.....	19
3.6	Accessories.....	20
3.7	Operating principle.....	21
3.8	Function units.....	25
4	Functional safety	29
4.1	Integrated safety technology.....	29
4.2	Safety requirements.....	32
4.3	Connection variants	34
5	Mechanical installation	36
5.1	Requirements.....	36
5.2	Mounting position.....	37
5.3	Minimum clearance	37
5.4	Cooling.....	39
5.5	Installation.....	39
6	Electrical installation.....	41
6.1	Three-phase current power supply	41
6.2	MOVITRANS® power supply	45

6.3	UL-compliant installation.....	47
6.4	Protective measures against electrical hazards.....	49
6.5	Motor types	54
6.6	Cable routing.....	54
6.7	Shielding	55
6.8	Using prefabricated cables	55
6.9	Terminal strips	56
6.10	Electrical connections	60
7	Startup	84
7.1	For your safety.....	84
7.2	Requirements.....	84
7.3	Device configuration	84
8	Operation.....	86
8.1	For your safety.....	86
8.2	Relative cyclic duration factor (cdf)	87
8.3	Duty cycles.....	87
8.4	Status and error messages.....	88
8.5	IT security	89
9	Service.....	90
9.1	Inspection/maintenance	90
9.2	Device replacement	90
9.3	Status display.....	91
9.4	Acknowledging fault messages.....	91
9.5	Electronics Service by SEW-EURODRIVE.....	91
9.6	Cleaning.....	91
9.7	Shutdown	92
9.8	Storage	92
9.9	Three-phase current power supply	93
9.10	MOVITRANS® power supply.....	93
9.11	IT security guidelines for secure disposal.....	94
9.12	Waste disposal.....	95
10	Technical data.....	96
10.1	Marks	96
10.2	General	97
10.3	Current reduction (derating).....	98
10.4	Input data	99
10.5	Output data	99
10.6	Axis data	100
10.7	Motor types	101
10.8	Information pursuant to EU Ecodesign Regulation 2019/1781	104
10.9	Auxiliary axes.....	105
10.10	Communication and control unit	106
10.11	Safety technology	107
10.12	Dimension drawings.....	108

10.13 Hybrid cable type "D" 110

10.14 Hybrid cable type "E" 112

Index 114

1 General information

1.1 About this documentation

The documentation at hand is the original.

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

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

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the graduation and meaning of the signal words in the safety notes:

Signal word	Meaning	Consequences if not observed
▲ DANGER	Imminent danger	Death or severe injuries
▲ WARNING	Possibly dangerous situation	Death or severe injuries
▲ CAUTION	Possibly dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

1.2.2 Structure of section-related safety notes

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

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



SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous step.

This is the formal structure of an embedded safety note:

▲ SIGNAL WORD! Type and source of danger. Possible consequence(s) if disregarded. Measure(s) to prevent danger.

1.3 Decimal separator in numerical values

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

Example: 30.5 kg

1.4 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

1.5 Other applicable documentation

Observe the corresponding documentation for all additional components.

1.6 Recycling, reprocessing, reuse

SEW-EURODRIVE GmbH & Co KG strives to use as few new natural resources as possible in the production of its products. An important aspect of this is the circular economy with the recycling of materials as well as the inspection and/or reprocessing of returned components and their reuse in new products. SEW-EURODRIVE GmbH & Co KG only uses these processes if the resulting materials and components are of the same quality as new parts.

1.7 Product names and trademarks

The product names mentioned in this documentation are trademarks or registered trademarks of the respective titleholders.

1.8 Copyright notice

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2 Safety notes

2.1 Preliminary information

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

2.2 Duties of the user

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

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

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

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

- The national and regional regulations governing safety and the prevention of accidents
- The warning and safety signs on the product
- All other associated project planning documents, installation and startup instructions, as well as wiring diagrams
- Do not assemble, install or operate damaged products
- All system-specific specifications and regulations

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

2.3 Target group

Specialist for mechanical work	Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product, and 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, and who possess the following qualifications: • Qualifications 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 transport, storage, installation, operation and waste disposal may only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.4 IT security

2.4.1 Contact



If you need support with the configuration, contact SEW-EURODRIVE Service. You can obtain information about current security-related issues by e-mail or on the [Product Security Management website](#). There you will find various contact options for reporting security-related problems.

2.4.2 IT security of the product



The product can be set to different access levels. Certain parameters are protected by these access levels. Authentication is implemented by using static access data. This data is not used to defend against attacks on IT security but to protect against unintentional modification.

2.4.3 IT security of the environment



For drive and control components that are integrated in a network (e.g. fieldbus or Ethernet network), settings can even be made from more remote locations. This entails the risk of a parameter change not being visible externally, resulting in unexpected – but not uncontrolled – system behavior, and this may impact negatively on operational safety and reliability, system availability or data security.

Ensure that unauthorized access is prevented, particularly with respect to Ethernet-based networked systems and engineering interfaces. Using IT-specific security standards, such as network segmentation, adds to the protection of access to the ports. For an overview of the ports and of the services provided by the communication interfaces, refer to [Online Support](#). The IT security of the product is only guaranteed when used in an environment secured by defense-in-depth strategies.

Ensure that clear responsibility for security is ensured during operation. SEW-EURODRIVE recommends an IT security management system in accordance with ISO/IEC 27001 and ISO/IEC 62443-2-4.

2.5 Designated use

The product is intended for installation in electrical systems or machines.

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

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

The systems can be mobile or stationary.

The motors must be suitable for operation with inverters.

Only connect ohmic/inductive loads.

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

- AC asynchronous motors with squirrel-cage rotor

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

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

Do not use the product as a climbing aid.

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

Options and accessories from SEW-EURODRIVE may only be used in combination with products from SEW-EURODRIVE.

2.5.2 Restrictions of use

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

- Use in potentially explosive areas.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation.
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 61800-5-1.
- Use at an elevation of more than 4000 m above sea level

The product can be used at altitudes above 1000 m above sea level up to 4000 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" (→ 96) in the documentation.
- Above 2000 m above sea level, the air and creepage distances are only sufficient for overvoltage class II according to EN 60664. At altitudes above 2000 m above sea level, limiting measures must therefore be taken that reduce the line side overvoltage from category III to category II for the entire system.
- If a protective electrical separation (in accordance with EN 61800-5-1 and EN 60204-1) is required, then implement this outside the product at altitudes of more than 2000 m above sea level.

2.6 Functional safety technology

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

2.7 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product or the packaging is damaged, do not assemble, install, connect, or start up the product. If the packaging is damaged, the product itself may also be damaged.

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.
- Before transportation, cover the connections with the supplied protection caps.
- Only place the product on the cooling fins or on the side without connectors during transportation.
- Always use all attachment points if available. The attachment points are designed to carry only the mass of the product. Do not apply any additional loads.

If necessary, use suitable, sufficiently dimensioned handling equipment.

Observe the information on climatic conditions in chapter "Technical data" (→ 96) of the documentation.

2.8 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" (→ 36) in the documentation.

2.9 Electrical installation

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

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

2.9.1 Stationary application

The necessary preventive measures for the product are:

Type of energy transfer	Preventive measure
Direct power supply	Ground connection
MOVITRANS® contactless energy transfer system	

2.9.2 Mobile application

The necessary preventive measures for the product are:

Type of energy transfer	Preventive measure
Direct power supply	Ground connection
MOVITRANS® contactless energy transfer system	Protection through protective separation Discharge measures against electrostatic discharge (ESD) and capacitive coupling

2.10 Protective separation

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

In order to avoid exceeding the permitted contact voltages in SELV or PELV power circuits in the event of a fault, continuous equipotential bonding is required in the vicinity of these power circuits. If this is not possible, other preventive measures must be taken. These preventive measures are described in IEC 61800-5-1.

2.11 Startup/operation

Observe the safety notes in chapters "Startup" (→ 84) and "Operation" (→ 86) in this documentation.

Make sure that any existing transport protection is removed.

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

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

Additional preventive measures may be required for applications with increased hazard potential. Be sure to check the effectiveness of the protection devices after every modification.

In the event of deviations from normal operation, switch the product off. Possible deviations are increased temperatures, noise, or vibration, for example. Determine the cause. Contact SEW-EURODRIVE if necessary.

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

Do not separate the connection to the product during operation. This may result in dangerous electric arcs damaging the product.

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

10 minutes.

Observe the corresponding information signs on the product.

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

Mechanical blocking or internal 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.

Cover unused connections with the supplied protection caps during operation.

3 Device structure

3.1 Type designation

The type designation contains the following data:

PHE10A	MOVIPRO® drive and application controller
-	
.	Power supply: A = Three-phase current T = MOVITRANS®
..	Maximum S1 device power: 11 = 1.1 kW 15 = 1.5 kW
-	
3	Brake control: Control for 3-wire brakes from SEW-EURODRIVE
.	Design: 0 = Standard 2 = With pressure compensating valve
X.	Auxiliary axis connection: X0 = Without connection for an auxiliary axis X1 = Connection for a MOVIMOT® auxiliary axis
..	Communication type: WLAN single client IEEE 802.11 a/b/g W1 = Radio approval Europe W2 = Radio approval China W3 = Radio approval USA/Canada W4 = Radio approval Brazil W5 = Radio approval Mexico W6 = Radio approval India W7 = Radio approval Thailand Ethernet interface E4 = Ethernet
A-00	Device generation: Generation A standard device
/	
...	Device option: 000 = Without input for safe disconnection 001 = With input for safe disconnection

3.2 Short designation

The following short designations are used in this documentation:

Component	Short designation
Drive and Application Controller MOVIPRO® PHE10A-...-3.X...A-00/...	Device

3.3 Scope of delivery

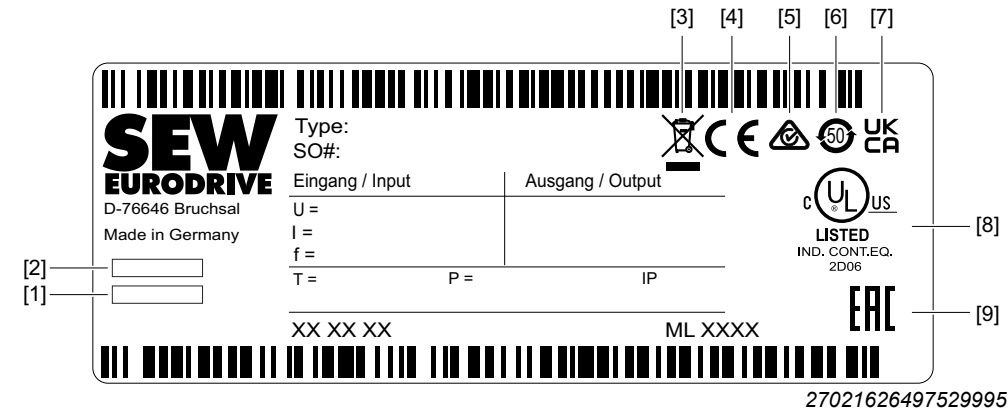
The following components are included in the delivery:

Component	Part number
Drive and Application Controller MOVIPRO® PHE10A-...-3.X...A-00/...	–
Protective covers for all plug connectors	–

3.4 Labels on the device

3.4.1 Nameplate

The nameplate lists information about the device type. The following figure shows an example of a nameplate:



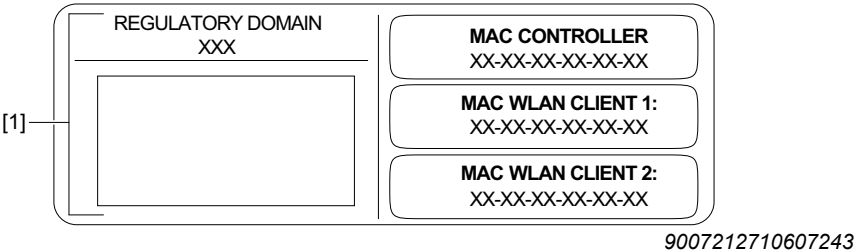
- [1] Product name
- [2] UKCA representative
- [3] Designation according to WEEE directive
- [4] CE marking
- [5] RCM approval
- [6] China RoHS-2 marking
- [7] UKCA marking
- [8] UL approval (depending on device certification)
- [9] EAC marking

Depending on the device design, the following information is listed on the nameplate:

Value	Specification
Type	Type designation
SO#	Production number
U	Voltage
I	Current
f	Frequency
T	Ambient temperature
P	Rated output power
IP	Degree of protection
XX XX XX	Status line
ML XXXX	Production plant

3.4.2 MAC address sticker

The MAC addresses for the controller (MAC CONTROLLER) and for the radio modem (MAC WLAN CLIENT) are given on the MAC address label. The following figure shows an example of a MAC address label:



[1] Country variant (REGULATORY DOMAIN)

For more information on the country variants, refer to the following documentation: "MOVIPRO® REC5 Radio Modem" addendum to the operating instructions.

3.4.3 Product label

Product label with QR code. The QR code can be scanned. You will be redirected to the digital services of SEW-EURODRIVE. There, you have access to product-specific data, documents, and further services.

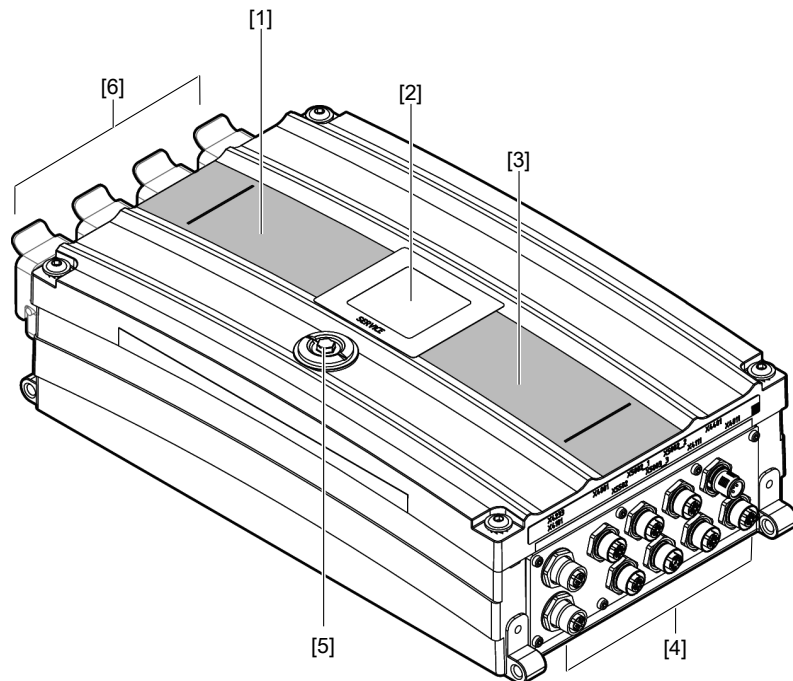
The following figure shows an example of a product label:



35021590539

3.5 Device overview

The following figure provides an example of an overview of the most important device components and the position of the labels on the device:



9007225931129227

- [1] Nameplate
- [2] Status display and infrared interface
- [3] MAC address label
- [4] Signal connections
- [5] Ethernet service interface
- [6] Power connections

3.6 Accessories

3.6.1 Available accessories

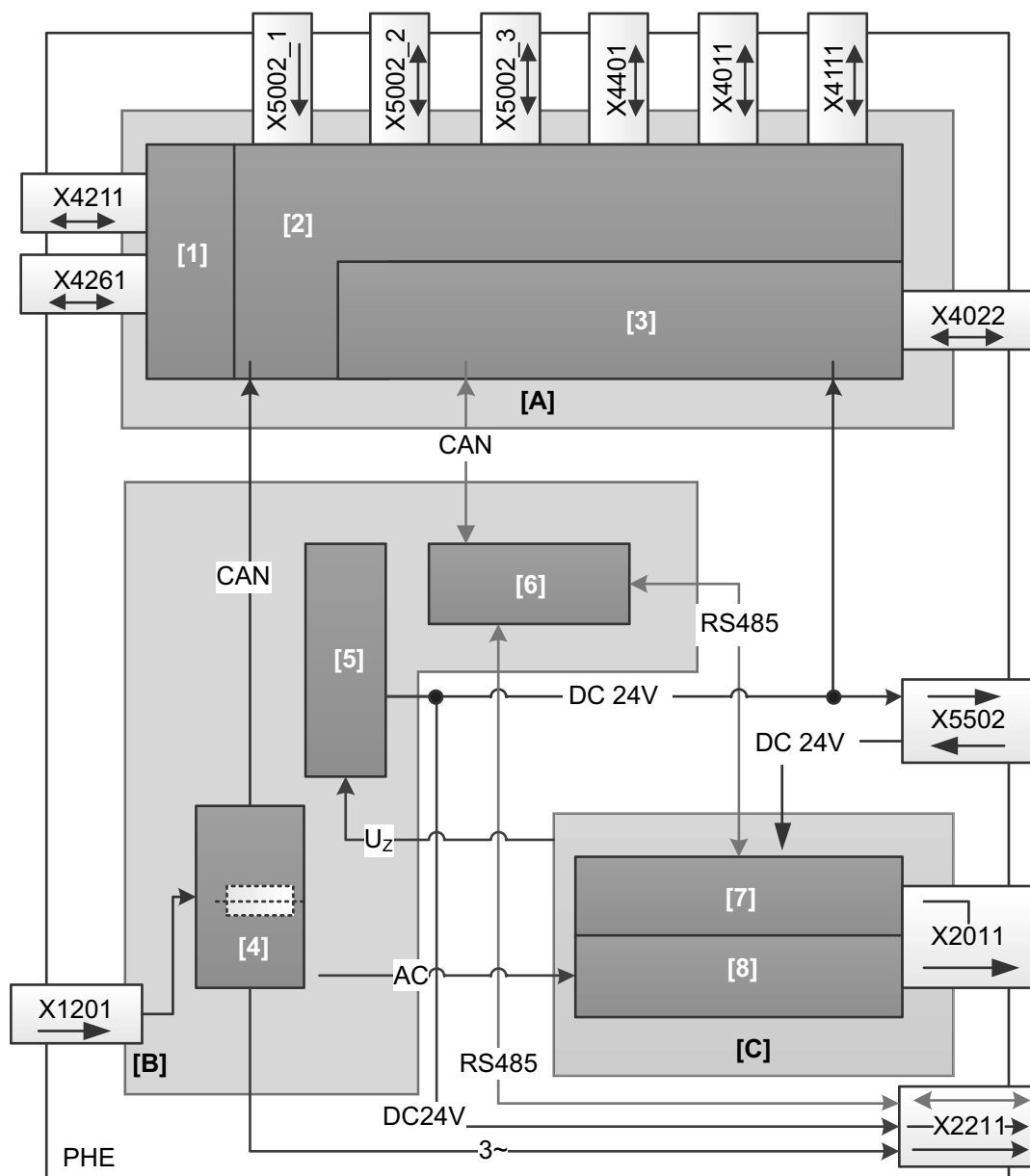
If you are unsure about the accessories you require, contact SEW-EURODRIVE. For further information on accessories, refer to the following documentation: "MOVIPRO® – Accessories" addendum to operating instructions. The following accessories are available for the device:

ID module	
ID module	17974186
Mounting accessories	
For further information, refer to chapter "Mechanical installation" (→ 36).	
EMS angle bracket	28218248
Connection cable	
Refer to the corresponding connections described in chapter "Electrical connections" (→ 60) for information on connection cables for motors and other components.	
Connection component	
STO jumper plug	11747099
CAN terminating resistor 120 Ω	13287036
CAN T-piece	13290967
Display unit	
For further information, refer to the following documentation: "MOVIPRO® Accessories PZO00A-SAZIR0-C000-03 Display Unit" addendum to the operating instructions.	
PZO00A-SAZIR0-C000-03	28249186
Keypad	
For further information, refer to the following documentation: "MOVIPRO® Accessories – PZO00A-BFBIR0-01/.. Keypad" operating instructions.	
PZO00A-BFBIR0-01/L001	17975972
PZO00A-BFBIR0-01/L002	17975980
PZO00A-BFBIR0-01/L003	17975999
PZO00A-BFBIR0-01/L004	17976006
PZO00A-BFBIR0-01/L005	17976014

3.7 Operating principle

3.7.1 Power supply three-phase current

The following block diagram shows the schematic structure of the device in the design **with** radio modem:



44019848715

[A] – Communication and control unit

- [1] Radio modem
- [2] Micro DLC controller type
- [3] Integrated service unit

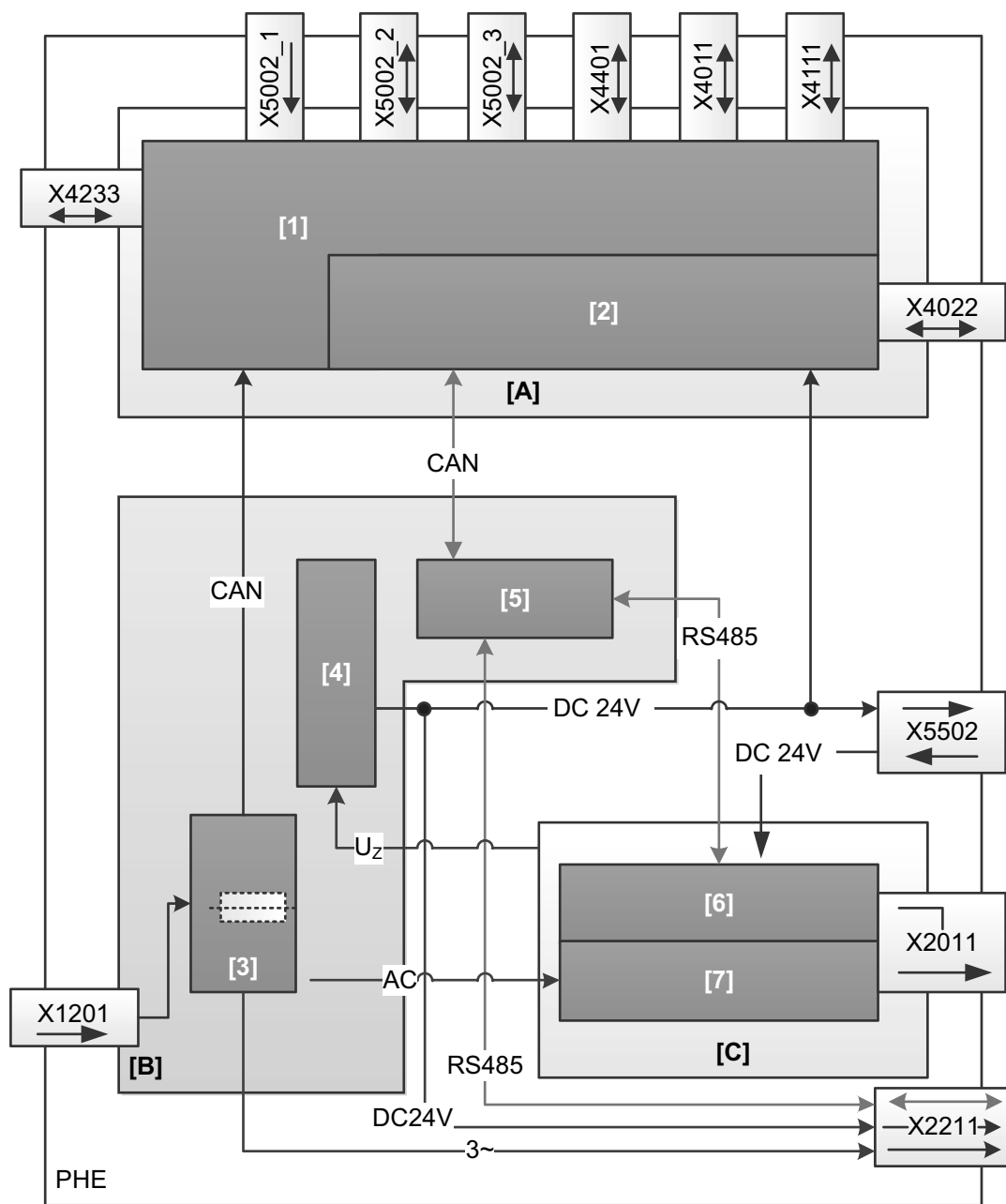
[B] – Energy supply

- [4] Phase failure detection
- [5] High-voltage switched-mode power supply
- [6] Interface adapter

[C] – Power section

- [7] Frequency inverter on MOVIMOT® basis
- [8] Brake control

The following block diagram shows the schematic structure of the device in the design **without** radio modem:



44019873291

[A] – Communication and control unit

[1] Micro DLC controller type

[2] Integrated service unit

[B] – Energy supply

[3] Phase failure detection

[4] High-voltage switched-mode power supply

[5] Interface adapter

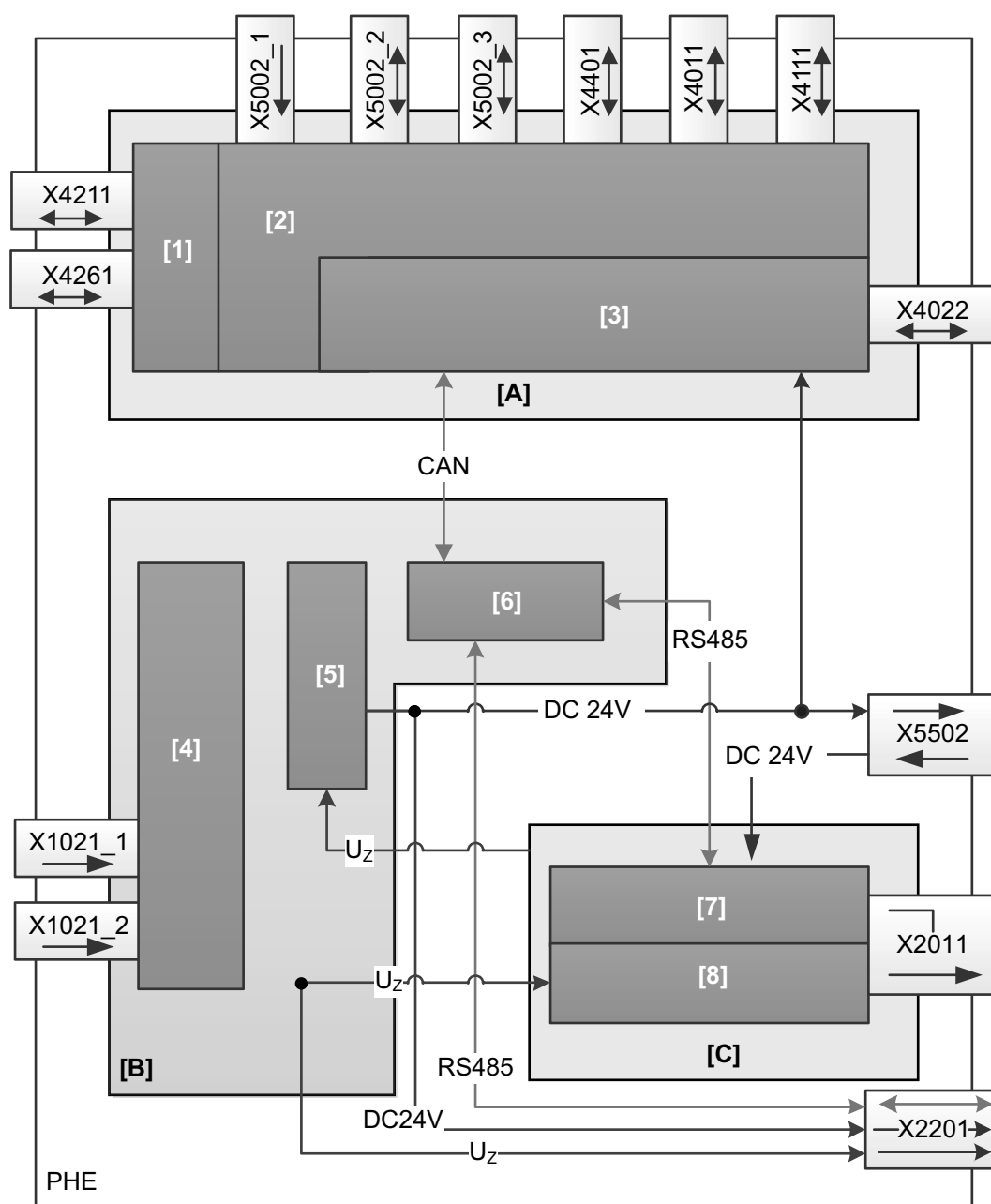
[C] – Power section

[6] Frequency inverter on MOVIMOT® basis

[7] Brake control

3.7.2 MOVITRANS® power supply

The following block diagram below shows the basic structure of the device **with** radio modem:



44020207371

[A] – Communication and control unit

- [1] Radio modem
- [2] Micro DLC controller type
- [3] Integrated service unit

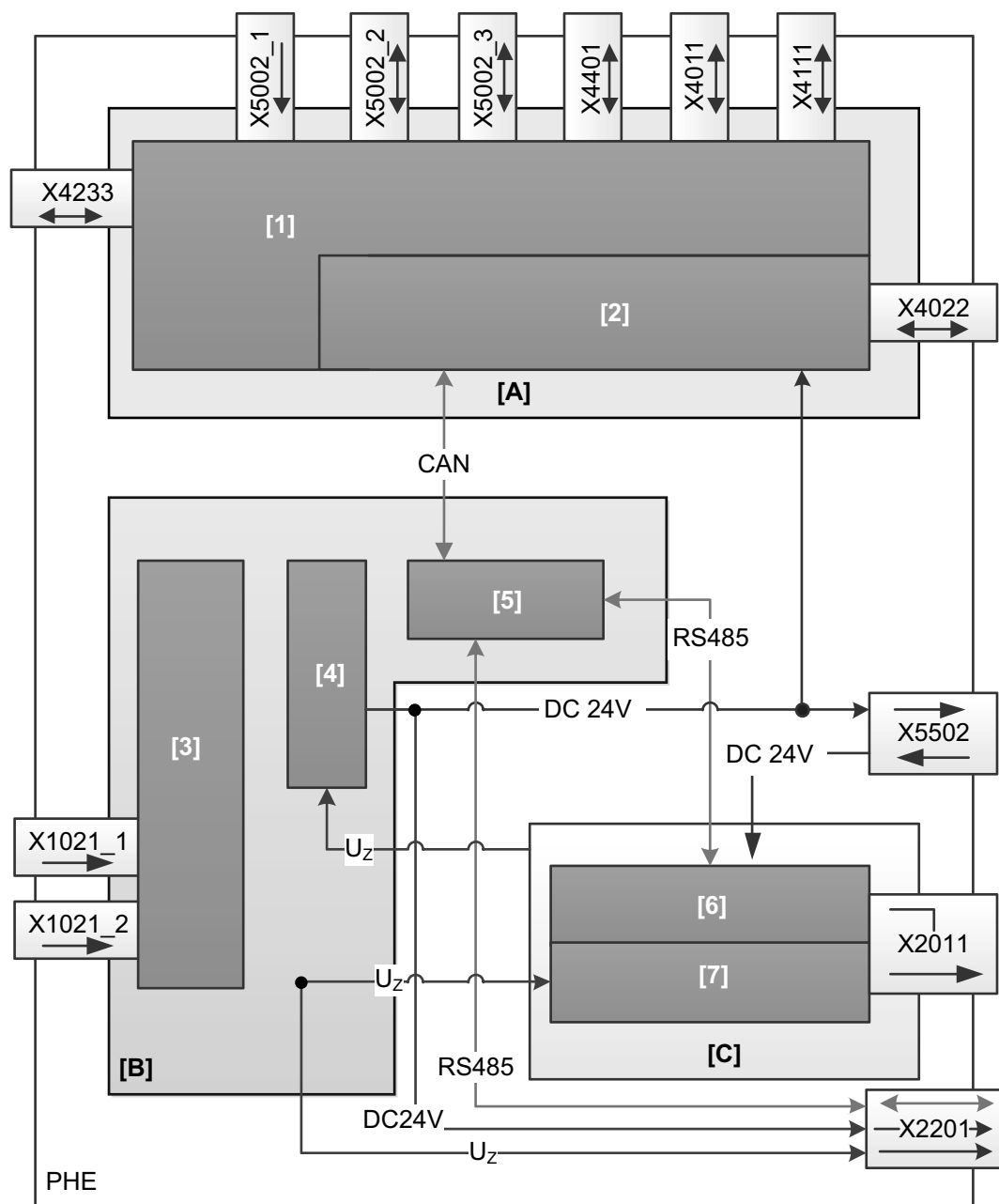
[B] – Energy supply

- [4] MOVITRANS® mobile converter
- [5] High-voltage switched-mode power supply
- [6] Interface adapter

[C] – Power section

- [7] Frequency inverter on MOVIMOT® basis
- [8] Brake control

The block diagram below shows the basic structure of the device **without** radio modem:



44020217995

[A] – Communication and control unit

[1] Micro DLC controller type

[2] Integrated service unit

[B] – Energy supply

[3] MOVITRANS® mobile converter

[4] High-voltage switched-mode power supply

[5] Interface adapter

[C] – Power section

[6] Frequency inverter on MOVIMOT® basis

[7] Brake control

3.8 Function units

3.8.1 Power section

The function module consists of the following internal elements.

Frequency inverter on MOVIMOT® basis

The frequency inverter controls asynchronous motors. Observe the permitted motor assignments in chapter "Technical data" (→ 96).

Brake control

The brake control system is responsible for the supply and control of the SEW-EURODRIVE disk brakes. Only connect approved SEW-EURODRIVE disk brakes to the device.

Motor types

INFORMATION



Unsuitable motor monitoring can lead to a malfunction. Only connect motors with thermostat (TH) to the device.

The device supports a variety of global motors from SEW-EURODRIVE. For a list of motor types, refer to chapter "Motor types" (→ 101).

Observe the possible brake voltage in chapter "Output data" (→ 99).

3.8.2 Communication and control unit

The function module consists of the following internal elements.

Controller type

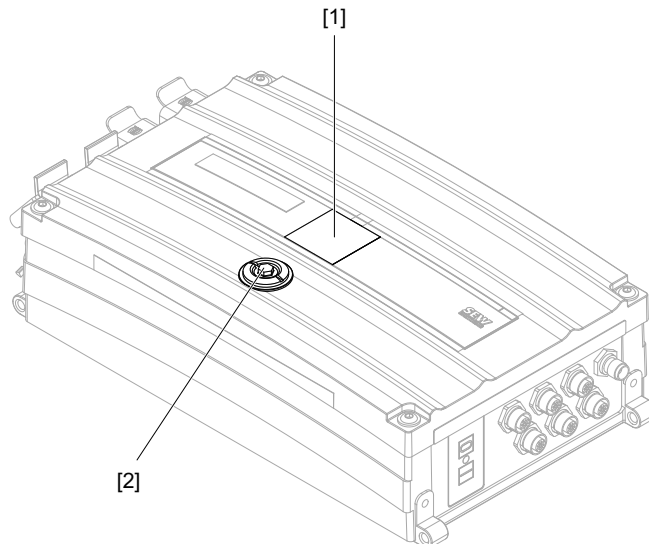
The device is equipped with a Micro DLC controller. It is programmed in the high-level language C. The device is designed for operation with the SEW-EURODRIVE SEWOS operating system. This allows for quick configuration of customer-specific plants. It is based on a system of central data management and diagnostics as well as a decentralized controller. You need a data server with MOVIVISION® software in order to operate a device with SEWOS.

For further information, refer to the following documentation: "MOVIVISION® Operating and Display Software for LSI Operator Panel" manual.

Service unit

The service unit is used for startup, diagnostics and maintenance of the device. It is equipped with a status display, a service interface and an infrared interface.

The following figure shows the service unit:



27021599577530379

- [1] Status display, infrared interface
- [2] Service interface

Status display

The status display shows status and error messages and thus enables you to record the current state of the device.

For more information refer to chapter "Status and error messages" (→ 88) and the documentation on the user program (for the respective system solution). In case of questions, contact SEW-EURODRIVE.

RS485 service interface

The RS485 service interface connects the device with an engineering PC for configuration and maintenance purposes.

For further information, refer to chapter "Electrical connections" (→ 60).

Infrared interface

You can use the infrared keypad to remotely control the device via the infrared interface. The infrared keypad is available separately as accessories.

For further information, refer to the "MOVIPRO® Accessories PZO00A-BFBIR0-01/.. Keypad" operating instructions.

Fieldbus interface

Depending on the design, one of the following communication options is available:

Ethernet

The device is equipped with a UDP-capable Ethernet interface for connection to the fieldbus. The fieldbus is connected via plug connectors.

For further information, refer to chapter "Electrical connections" (→ 60).

WLAN

NOTICE

Damage to the radio modem due to missing terminating resistors.

Damage to the radio modem.

- Connect a 50 Ω terminating resistor to those antenna ports that are not in use.

The MOVIPRO® device has a "Radio Ethernet Client 5 GHz" (REC5) radio modem for connection to a wireless infrastructure network. It can be used for the frequency blocks 2.4 GHz (IEEE 802.11b/g) and 5 GHz (IEEE 802.11a).

The radio connection is designed for communication with the higher-level controller. The MOVIPRO® device is accessible as a terminal in the network.

For more information, technical data and certifications, refer to the following documentation: "MOVIPRO® REC5 Radio Modem" addendum to the operating instructions.

Interface adapter

The built-in interface adapter converts the commands from the CAN bus of the communication and control unit to RS485 commands. This means the built-in frequency inverter on MOVIMOT® basis can be operated as a slave.

3.8.3 Power supply

The function unit consists of the following internal elements.

MOVITRANS® passive mobile converter

The power supply of the mobile system part is realized contactless with the MOVITRANS® system.

The pick-ups installed at the device take power supplied by the permanently installed line cable. The line cable has a medium frequency of 25 kHz at 60/85 A. The line cable induces currents with a frequency of 25 kHz in the pick-ups by means of magnetic coupling.

The mobile converter integrated in the device provides the internal DC link. The mobile converter converts the currents in the pick-ups to a DC voltage of DC 500 – 750 V depending on the mobile converter type used.

Depending on the mobile converter in use, either a serial or parallel resonance is formed with the suitable pick-up. If several pick-ups are used, each circuit is established individually. They are only combined after rectification. In this way, the pick-ups operate independently of each other.

Phase failure detection

The device is equipped with a phase failure detection that allows selective monitoring of the line phases. Devices with an auxiliary axis connection are equipped with fuses in the power input path. These devices have the type designation "PHE10A-A...-3.X1..".

The phase failure detection stimulates the 3 digital inputs of the DI0.0, DI0.1 and DI0.2 controller. The levels of the input signals have the following meaning:

Level	Meaning
High	Phase present
Low	Phase failed

In the following cases, the respective digital input signal switches from "High" to "Low":

- one of the 3 phases fails
- one of the fuses trips

The application can evaluate these 3 digital signals accordingly and therefore allows to check if all phases are present before the inverter is enabled.

Pressure compensation element

The device is equipped with a pressure compensation element. This prevents damage to installed components caused by condensation that can form due to temperature variation and pressure peaks. This enables the use under unfavorable operating conditions.

4 Functional safety

4.1 Integrated safety technology

4.1.1 Safe state

For safety-related operation of the device, safe torque off is defined as safe condition, see "STO – Safe Torque Off" (→ 30). The safety concept is based on this definition.

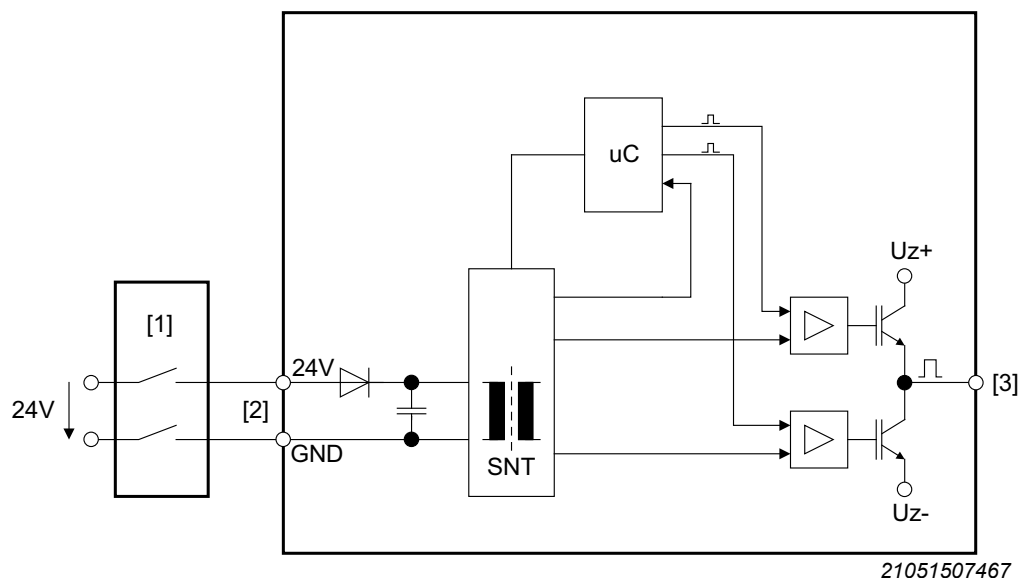
4.1.2 Safety concept

- The device allows for the connection of an external safety controller or an external safety relay. They de-energize all active elements that generate the pulse trains to the power output stage (IGBT) when a connected command device (e.g. emergency stop button with latching function) is activated. For this purpose, the safety-related DC 24 V supply is disconnected.

This ensures that the frequency inverter no longer supplies power to the motor for generating torque.

- Disconnecting the safety-related DC 24 V supply voltage ensures that the voltage supplies required for operating the drive are safely interrupted.
- Instead of galvanic isolation of the drive from the supply system using contactors or switches, the disconnection of the safety-related DC 24 V supply described here safely prevents the gating of the power semiconductors in the frequency inverter. This means the rotary-field generation for the respective motor is deactivated even though the mains voltage is still present.

The following figure shows the safety concept:



- [1] Safety relay, external
[2] Safety-related 24 V voltage supply
[3] Motor phase

INFORMATION

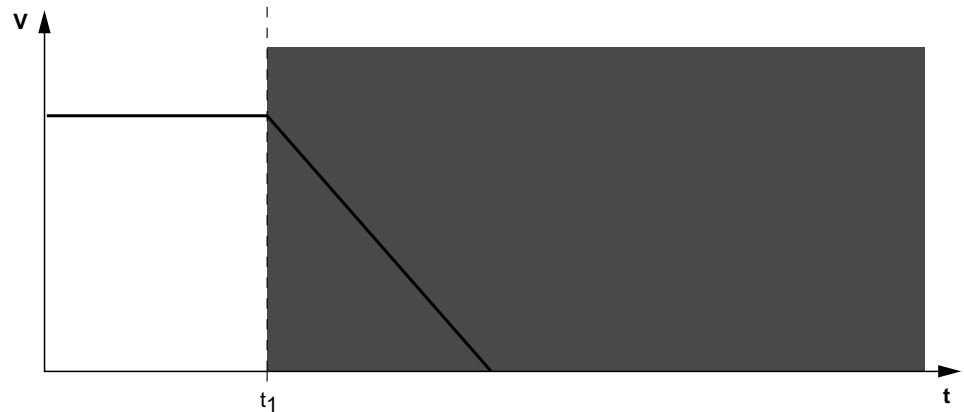
Observe chapter "Restrictions" (→ 31).



4.1.3 Safety subfunctions

STO – Safe Torque Off

If the STO function is activated, the drive inverter no longer supplies power to the motor. As a result, the drive cannot generate torque. This safety subfunction corresponds to a non-controlled stop according to EN 60204-1, stop category 0.



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- = Safety subfunction active
- v = Speed
- t = Time
- t_1 = Point of time when STO is triggered

INFORMATION

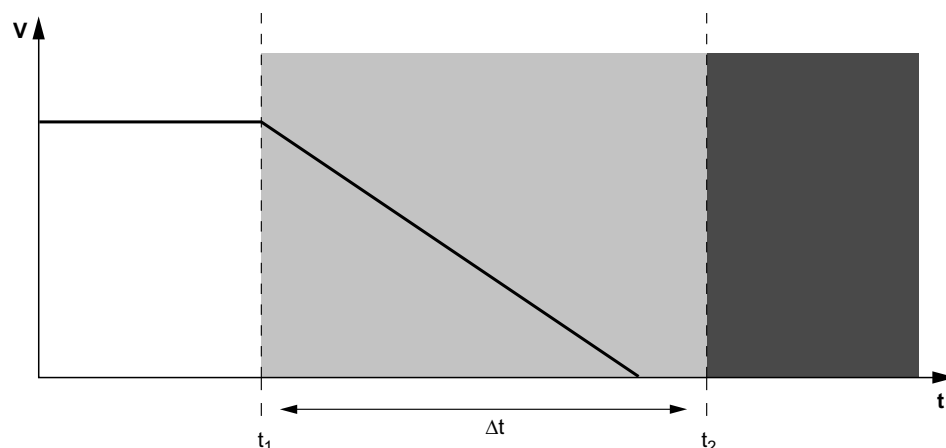


The motor coasts to a halt or is stopped mechanically.
Controlled standstill is preferred, if possible.

SS1-t – Safe Stop 1 with time control

When the SS1-t function is active, the drive inverter brings the motor to a standstill electrically. The STO safety subfunction will be triggered after a specified, safety-related time.

This safety subfunction corresponds to a controlled stop of the drive according to EN 60204-1, stop category 1.



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-  = Safety subfunction monitored
-  = STO safety subfunction active
- v = Speed
- t = Time
- t_1 = Point of time when SS1-t is activated and motor deceleration is triggered
- t_2 = Point of time when STO is triggered
- Δt = Safety-related period of time

INFORMATION



- The SS1-t function does not monitor the stopping of the drive.
- The safety-related period of time Δt allows the drive to come to a stop. In the event of a fault, the drive does not come to a stop and becomes de-energized at the time t_2 (STO).

4.1.4 Limitations

INFORMATION



The safety function STO does not provide galvanic isolation. It therefore does not provide any protection against electric shocks. As a result, it is not possible to implement an emergency off setup with the STO safety function in the normative sense. For that purpose, the entire system needs to be deactivated with a line disconnecter.

- The brake controller integrated in this device and the standard brake integrated in brakemotors are not safety-related and therefore not part of the safety functions described in chapter "Drive safety functions". If the brake controller and/or the motor brake fails, the drive can coast for much longer depending on the application (i.e. the friction and inertia of the system). In the case of regenerative loads (e.g. lifting axes, declining conveying lines), the drive can even accelerate. This must be taken into account in the risk analysis of the system/machine. Additional safety measures will have to be implemented (e.g. safety brake system).
 - Use the device only with an additional brake system for application-specific safety functions that require active deceleration (braking) of the dangerous movement.

- When using the SS1(c) function as described in chapter "Drive safety functions", the brake ramp of the drive is not monitored with respect to safety. In the case of an error, the drive might not be decelerated during the delay time, or it might even be accelerated in the worst case. In this event, the safety-related deactivation via the "STO function" (→ 30) is only activated after the set time delay has passed. You must take the resulting danger into account in the risk analysis of the system/machine and you must implement additional safety measures.
- The system/machine manufacturer must perform a system/machine-specific risk analysis without fail. The use of the device must be taken into account.
- The safety concept is only suitable for performing mechanical work on driven system/machine components.
- If the 24 V supply voltage is disconnected, the supply voltage is still present at the frequency inverter DC link.
- To perform work on the electrical section of the drive system, you must disconnect the supply voltage using an external maintenance switch.

4.2 Safety requirements

4.2.1 Requirements

The safety functions of the device may only be used for safe operation of the system or machine if they are integrated correctly in an application-specific, higher-level safety function or safety system.

We recommend that the system/machine manufacturer performs a risk assessment.

The system/machine manufacturer should perform a functional test after successful startup. The system/machine manufacturer and the operator are responsible for compliance of the system or machine with applicable safety regulations.

The following requirements are mandatory when installing and operating the device in safety-related applications.

4.2.2 Installation requirements

- You must not shorten hybrid cables from SEW-EURODRIVE. Use these hybrid cables with the original cable lengths and the prefabricated plug connectors. Ensure proper connections.
- Observe the following when routing the safety-related control cables and the cable to the temperature circuit breaker (TH):
 - Route these cables separately from power supply cables. The hybrid cables from SEW-EURODRIVE are excluded.
 - Route these lines in separate cables. The hybrid cables from SEW-EURODRIVE are excluded.
 - Ensure that there is no parasitic voltage.
 - Route these cables in an EMC-compliant manner.
 - Apply the shielding on both sides of the housing.
 - Route the cables permanently so that they are protected against external damage.
- Outside an electrical installation space, you must use shielded cables.
- Design the cabling in accordance with the standard EN 60204-1.

- Observe the values specified for safety components without fail when designing the safety circuits.
- The maximum length for the cable between the safety controller and the device is 30 m.
- Do not use the safety-related 24 V supply voltage for feedback.
- For all 24 V supply voltages of the inverter, the field distributor and all stations on the fieldbus, only voltage sources with safe disconnection (SELV/PELV) in accordance with EN 60204-1 and EN 61131-2 are permitted.

In the event of a single fault, the voltage between the outputs or between any output and grounded parts may not exceed DC 60 V.

- For safety-related applications with the device, you must remove the jumper plug at X5502.
- When planning the installation, observe the technical data of the device.
- A degree of protection of at least IP 54 must be guaranteed. This can be achieved only if unused connectors and covers are sealed correctly.

4.2.3 Requirements for the external safety controller

You can also use a safety relay as an alternative to a safety controller. In that case, observe the following requirements.

- For safety-relevant applications up to Performance Level d to EN ISO 13849-1, the safety controller and all other safety-related subsystems must be approved for at least Performance Level d to EN ISO 13849-1 or SIL 2 to EN 61508. To determine the performance level of the overall application, you can use the method described in EN ISO 13849-1 to combine several safety-related subsystems without a PFH-value calculation. However, SEW-EURODRIVE recommends determining the PFH value for the overall application. You can find the PFHd value for the device in chapter "Technical data" (→ 96).
- For safety-related applications up to SIL 2 to EN 62061, the safety controller and all other safety-related subsystems must be approved for at least SIL 2 to EN 61508 or Performance Level d to EN ISO 13849-1. You must also determine the probability of a dangerous failure per hour (PFHd value). The PFH value of the device applies when determining the PFHd value for the overall application.

Application	Safety controller requirements
Performance Level d to EN ISO 13849-1	Performance Level d to EN ISO 13849-1 SIL 2 to EN 61508
SIL 2 to EN 62061	Performance Level d to EN ISO 13849-1 SIL 2 to EN 61508

- The wiring with the external safety controller must be suitable for the required safety class (see manufacturer documentation). Safety circuits require 2-pole disconnection.
- The values specified for the safety controller must be strictly adhered to when designing the circuit.

- The switching capacity of the safety relays or the relay outputs of the safety controller must correspond at least to the maximally permitted, limited output current of the 24 V voltage supply.

Observe the manufacturer's instructions concerning the permitted contact loads and fusing that may be required for the safety contacts. If the manufacturer provides no specific information, the contacts must be protected with 0.6 times the nominal value of the maximum contact load specified by the manufacturer.

- To ensure protection against unintended restart in accordance with DIN EN ISO 14118, you must design and connect the safety controllers in such a way that resetting the control device alone does not lead to a restart. A restart may be performed only after a manual reset of the safety circuit.

4.2.4 Startup requirements

- Startup of the system/machine must be documented. The safety functions of the system/machine must be checked and verified.

Observe the limitations for the safety functions of the device provided in chapter "Limitations" (→ 31) when verifying safety functions. If necessary, deactivate non-safety-related parts and components, such as the motor brake, that affect the result of the verification.

- For operating the device in safety-related applications, the disconnecting device and correct wiring must always be verified and documented during startup. A disconnecting device is, for example, a safety relay or a safety controller.
- During the startup procedure/function test, the correct assignment of the respective voltage supply must be checked by a measurement.
- The function test must be carried out in succession for all potentials, i.e. separately.

4.2.5 Requirements for operation

- Operation is only allowed within the limits specified in the data sheets. This applies to both the external safety relay and the device.
- To achieve performance level d, the STO function must be checked at least once a year. Depending on the process, the performance level can also be checked each time the machine/system is switched on.
- To prevent mechanical damage or crossfaults, control the cables regularly. Observe the information on intervals in the service plan of the system and plant manufacturer.

4.3 Connection variants

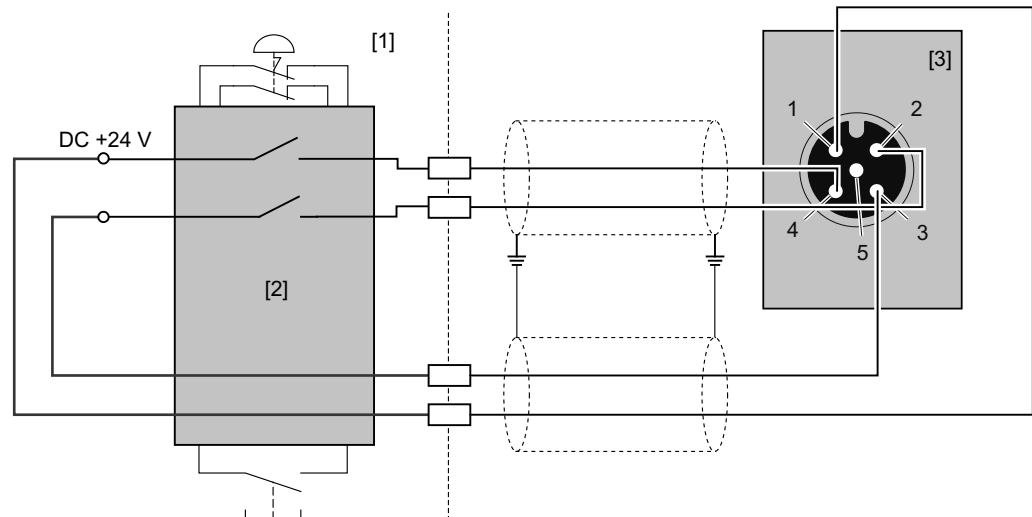
4.3.1 Basic considerations

- For group disconnection, several devices can be provided with 24 V by a single safety relay. The maximum number "n" of devices results from the maximum permitted contact rating of the safety relay and the maximum permitted voltage drop of the DC 24 V supply for these devices.
- Other requirements of the safety relay manufacturer (such as protecting the output contacts against welding) must be strictly observed. The basic conditions described in the conditions of the certification report for the device also applies to cable routing.

- For EMC reasons, the maximum cable length is limited to 30 m. Other instructions published by the manufacturer on the use of safety relays for specific applications must also be observed.
- A calculation based on the technical data for the device must be performed separately for each group disconnection.

4.3.2 Connection of an external safety relay for STO with M12 plug connector

The following figure shows a connection example with a safety relay and disconnection of all poles:



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- [1] Installation space
[2] Safety relay
[3] Device with plug connector X5502 for STO

5 Mechanical installation

5.1 Requirements



⚠ WARNING

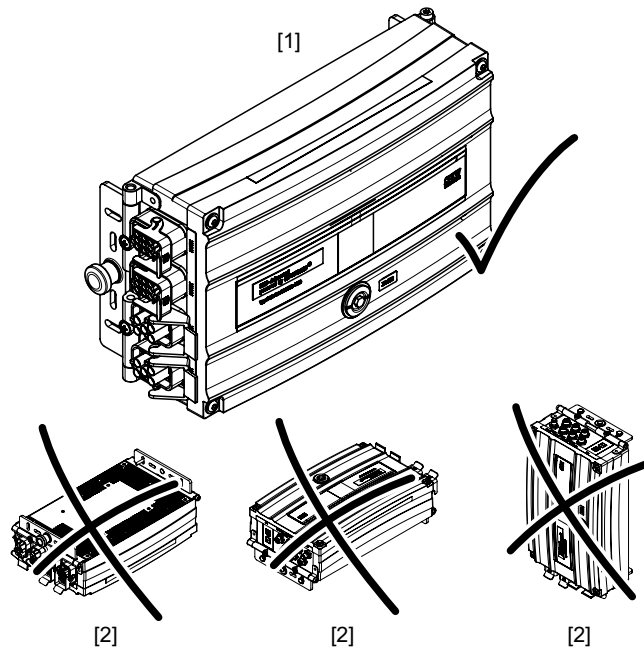
Risk of crushing if the load falls.

Severe or fatal injuries.

- Do not stand under the load.
 - Secure the area where loads can fall down.
-
- Trained specialists perform the installation.
 - The information provided in the technical data and the permitted conditions for the operating location of the device are observed.
 - The minimum clearance and the required gaps for using a mounting plate are complied with. For more information, refer to chapter "Minimum clearance" (→ 37).
 - Only mount the device using the mounting options intended for it.
 - The selection and dimensioning of the mounting and locking elements are in line with the applicable standards, the technical data of the devices and the local requirements.
 - The bore dimensions are calculated in line with the respective type of fixture. For more information, refer to chapter "Installation" (→ 39).
 - The mounting and locking elements fit into the existing bores, threads and counter-sinks.
 - All display and actuator elements are visible and accessible after installation.
 - The device is positioned in a way that it will not collide with other components or design elements along the travel path.
 - Fasten the device so that it is not exposed to shocks or vibrations during operation that exceed loads according to DIN EN 60721-3-3/-5 3M7/5M2.

5.2 Mounting position

The following figure shows permitted and not permitted mounting positions:



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- [1] Permitted vertical mounting
[2] Impermissible mounting positions

5.3 Minimum clearance

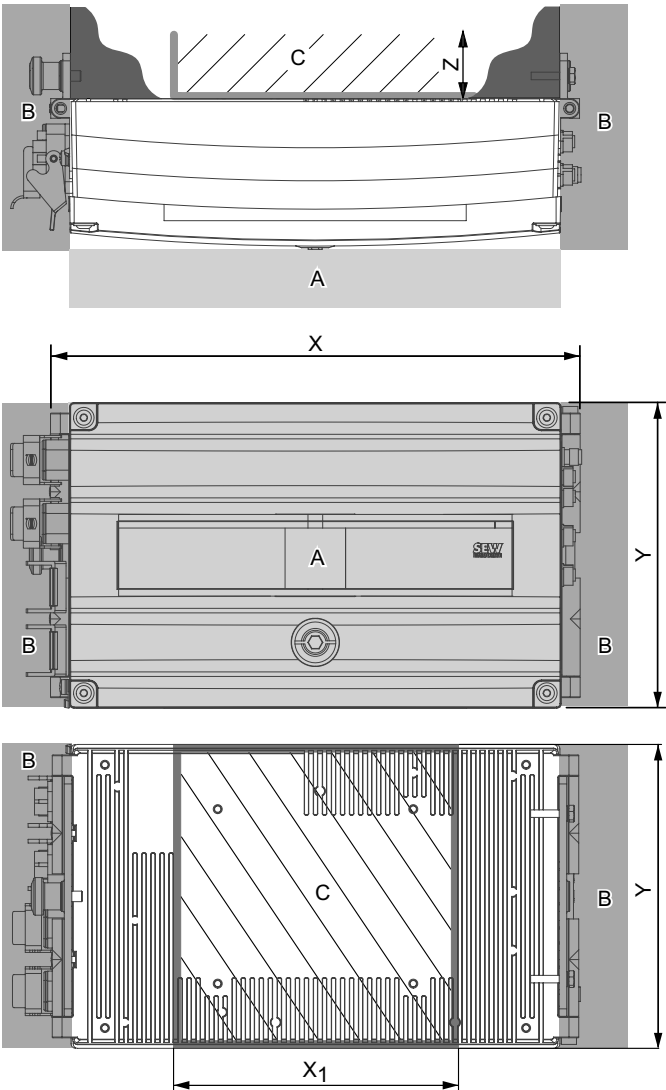
INFORMATION



- Observe the following minimum clearances during installation:
 - When connecting the cables and plug connectors
 - When handling the display, diagnostics and operating elements
 - For heat convection at the cooling fins if the product has cooling fins
- For more information on the required minimum clearances, refer to the dimension drawings in chapter "Technical data" (→ 96).

Keep a distance from the housing cover according to the C1 standard to ensure access to display and diagnostic elements.

The following figure shows the minimum distances and clearances at all sides of the device:



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- A Clearance for housing cover
- B Clearance on the side
- C Clearance at bottom of housing
- X, Y Housing dimensions
- X₁ Cut-out dimensions
- Z Clearance at bottom of housing

The following table lists the minimum distances and clearances. Housing dimensions are listed in chapter "Technical data" (→ 96).

Clearance	Function	Size
A: Housing cover - Width X - Depth Y	Space for display elements, diagnostics elements and actuator elements, e.g. service unit	See dimension drawings in chapter "Technical data" (→ 96)

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Clearance	Function	Size
B: On the side	Room for connection cables, plug connectors, mounted elements, and actuator elements such as maintenance switches	> 120 mm
C: Bottom of the housing - Width X_1 - Depth Y - Height Z	Room for optimum heat convection	X_1 = housing dimension X – 50 mm - Y = housing dimension (see dimension drawing) $Z \geq 15$ mm

5.4 Cooling

Observe the following:

- Avoid heat sources in the immediate proximity of the device.

5.5 Installation



⚠ CAUTION

Risk of injury due to sharp edges.

Minor injuries.

- Wear suitable protective gloves.



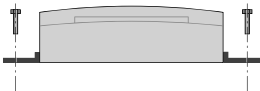
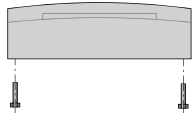
NOTICE

External force too high.

Damage to the thread or the screw.

- Do not exceed the maximum tightening torque of 3.1 Nm – 3.5 Nm.

The following options are available for mechanical mounting:

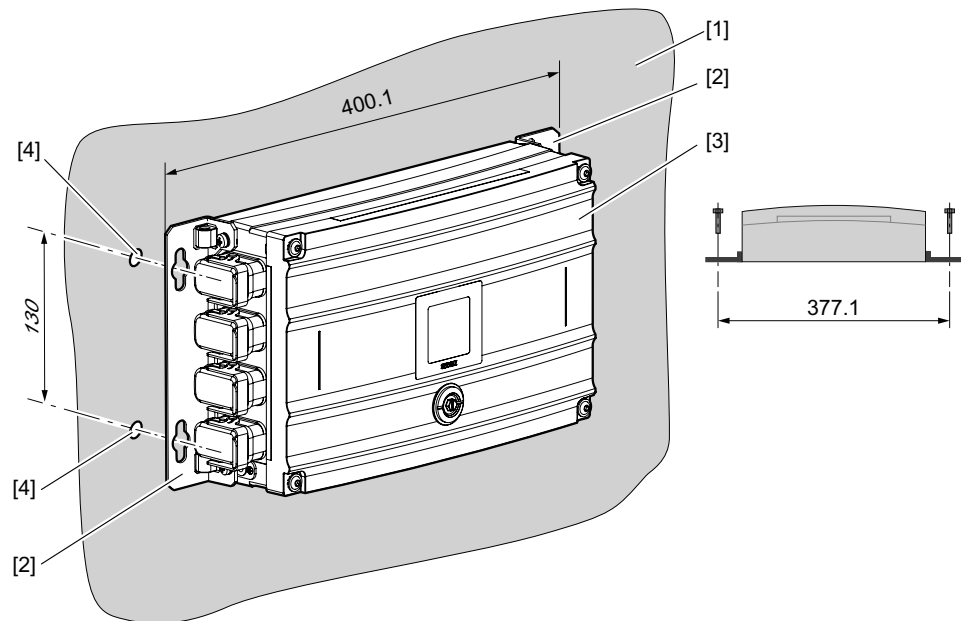
Design	Fastening
1 	Fixed angle brackets 4 × screwed
2 	Tapped holes on the rear of the device See chapter "Technical data" (→ 96) 4 × screwed

Use the accessories that are available from SEW-EURODRIVE for mounting using angle brackets:

- "EMS angle bracket", part number 28218248

5.5.1 Fixed angle brackets

The following figure shows an example of the main mounting elements and dimensions:



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- [1] Mounting surface
- [2] Angle bracket
- [3] Device
- [4] Tapped holes

Mounting the angle brackets

Accessories "EMS angle bracket" (part number 28218248):

- 2 × angle bracket
- 4 × M5 × 16 screw

1. Mount the angle brackets to the connection sides of the device using the M5 screws via the available tapped holes.

Mounting the device

1. Refer to the dimension drawing for the distances regarding the boreholes for mounting the angle bracket.
2. Mark the boreholes at the installation location.
3. Cut 2 M5 threads at the marked locations on each side.
4. Use suitable locking devices, e.g. lock washers according to DIN 7980 and washers according to DIN EN ISO 7090.
5. Mount the device on the angle brackets with 2 suitable M5 screws with the required length on each side, e.g. cap screws according to DIN EN ISO 4762.

6 Electrical installation

6.1 Three-phase current power supply

6.1.1 Installation notes

Observe the following points for electrical installation:

NOTICE

Ground fault at motor or brake output.

Damage to property.

- During installation, avoid conductive connections between motor and brake output and the ground potential.

Observe the following points for electrical installation:

- Observe the general safety notes.
- Comply with all instructions referring to the technical data and the permissible conditions where the device is operated.
- The integrated line filter reduces the leakage resistance to less than 500 kΩ. Therefore, do not include the device in the system test.

6.1.2 Low-voltage supply systems

The device is suited and allowed for operation in the following systems:

- TN and TT systems with directly grounded star point
- IT systems with non-grounded star point

SEW-EURODRIVE recommends using insulation monitors with pulse-code measurement. The use of such devices prevents the earth-leakage monitor from mis-tripping due to the earth capacitance of the inverter.

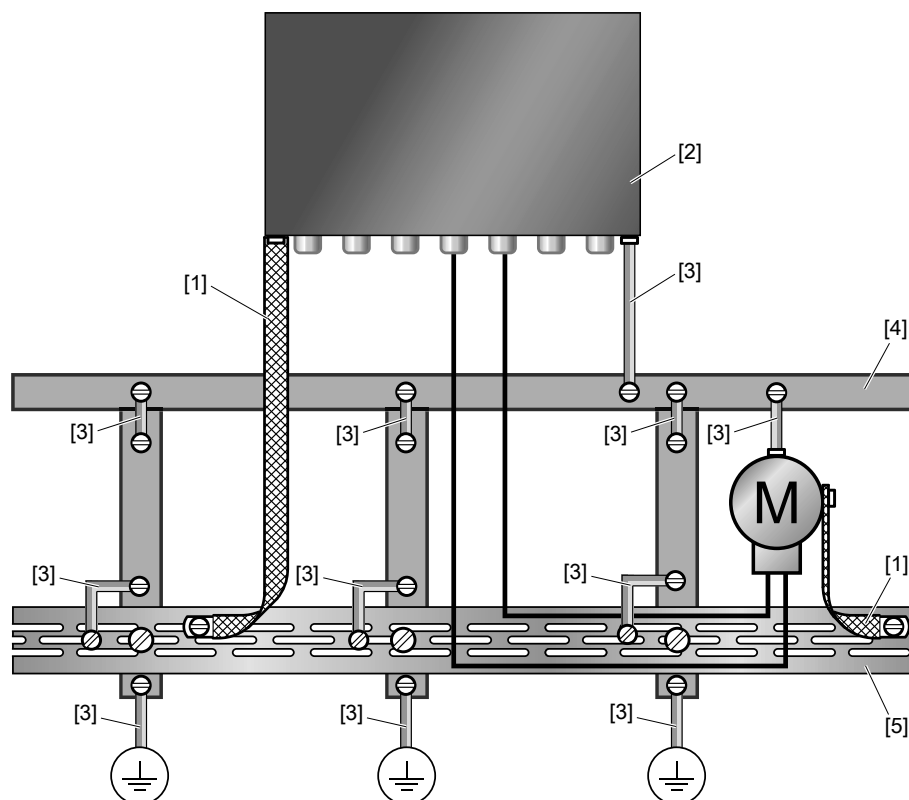
No EMC limits are specified for interference emission in IT systems.

6.1.3 Electromagnetic compatibility (EMC)

For further information on EMC-compliant installation, refer to the following documentation: "Drive Engineering – Practical Implementation, Electromagnetic Compatibility (EMC) in Drive Engineering".

EMC-compliant installation

Ensure that there is a HF-capable equipotential bonding for all drive components. Use low-impedance, HF-capable connectors such as HF litz wire or ground straps. Standard PE conductors do not achieve sufficient equipotential bonding regarding HF and EMC. Further information can be found in chapter "Installing ground connection or equipotential bonding" (→ 49).



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- | | | | |
|-----|----------------------------|-----|--------------------------------------|
| [1] | HF litz wire, ground strap | [4] | Machine base / vehicle support frame |
| [2] | Product | [5] | Cable duct |
| [3] | Protective earth (PE) | | |

6.1.4 Line components

Selecting the residual current device

The inverter can cause a direct current in the PE conductor.

Proceed as follows to select the residual current device:

1. If using a residual current device is not mandatory according to the standards, SEWEURODRIVE recommends not using a residual current device.
2. **▲ WARNING!** No protection against electric shock if an incorrect type of residual current device is used. Severe or fatal injuries.
If a residual current device (residual current device RCD or residual current monitor RCM) is provided, use an all-current-sensitive RCD or RCM of type B.
3. If a residual current device is required, select the residual current device according to the requirements for fire protection or system protection. Observe the tripping characteristic, the deceleration and the rated tripping current of the residual current device during selection.

Selecting line fuses

Install the fuses at the beginning of the supply line behind the supply bus junction.

Observe the following when designing the line fuses:

- Design the fuses according to the current carrying capacity of the conductor rail in use.
- Observe applicable regulations and standards. The line fuses must fulfill their protective function. For UL installations, observe the specifications in chapter "UL-compliant installation" (→ 47).
- Do not select the line fuse larger than required to protect the supply system cable and conductor rails. If the cross section of the supply cable to the device is not sufficient, select a stronger supply cable.
- Observe the information on current supply in chapter "Input data" (→ 99).
- The rated current of the line fuses must be dimensioned generously for the maximum continuous power (sum of all consumers).
- If you use circuit breakers, SEW-EURODRIVE recommends devices with tripping characteristic C, tripping characteristic D or slower. The rated current should be at least 1 A per vehicle. This means: At least 16 A for 16 vehicles, at least 25 A for 25 vehicles.
- If the line fuse trips unexpectedly when switching on, a line choke can be connected upstream to the central supply. For information on suitable line chokes, refer to chapter "ND.. line chokes" in the following documentation: "MOVIDRIVE® MDX60B/61B" system manual.

The following applies when using fuses on the vehicles:

Line protection types in utilization categories gL, gG:

- Nominal fusing voltage $\geq$ nominal line voltage
- Depending on the frequency inverter utilization, the nominal fusing current must be dimensioned for 100% of the frequency inverter nominal current.

Miniature circuit breaker with characteristics B, C:

- Miniature circuit breaker nominal voltage $\geq$ nominal line voltage
- The nominal current of the miniature circuit breaker must be 10% above the frequency inverter nominal current.

Contactors

Only use contactors in utilization category AC-3 (EN 60947-4-1) as line and brake contactors.

6.2 MOVITRANS® power supply

6.2.1 Installation notes

NOTICE

Ground fault at motor or brake output.

Damage to property.

- During installation, avoid conductive connections between motor and brake output and the ground potential.

Observe the following points for electrical installation:

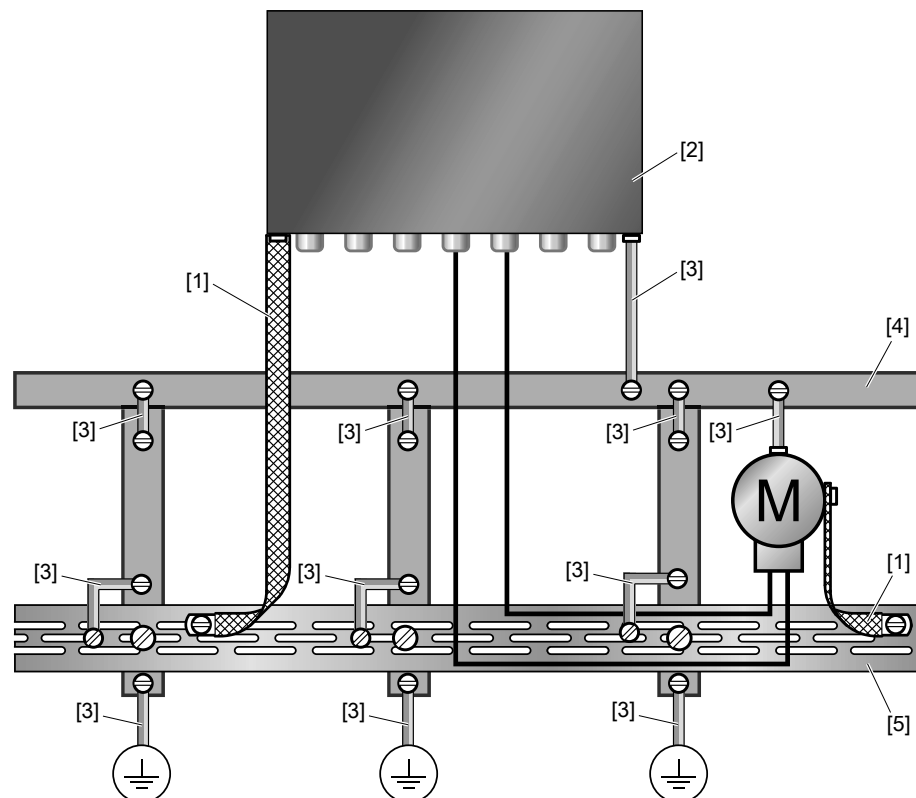
- Observe the general safety notes.
- Comply with all instructions referring to the technical data and the permissible conditions where the device is operated.

6.2.2 Electromagnetic compatibility (EMC)

For further information on EMC-compliant installation, refer to the following documentation: "Drive Engineering – Practical Implementation, Electromagnetic Compatibility (EMC) in Drive Engineering".

EMC-compliant installation

Ensure that there is a HF-capable equipotential bonding for all drive components. Use low-impedance, HF-capable connectors such as HF litz wire or ground straps. Standard PE conductors do not achieve sufficient equipotential bonding regarding HF and EMC. Further information can be found in chapter "Installing ground connection or equipotential bonding" (→ 49).



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- | | | | |
|-----|----------------------------|-----|--------------------------------------|
| [1] | HF litz wire, ground strap | [4] | Machine base / vehicle support frame |
| [2] | Product | [5] | Cable duct |
| [3] | Protective earth (PE) | | |

6.3 UL-compliant installation

INFORMATION



Due to UL requirements, the following chapter is always printed in English and in some cases in French, regardless of the language of this documentation.

6.3.1 (Field wiring) Power terminals

Use 75 °C copper wire only.

6.3.2 Short circuit current rating

Suitable for use on a circuit capable of delivering not more than 5000 rms symmetrical amperes when protected by 25 A, 600 V non-semiconductor fuses or 500 V minimum 25 A maximum inverse time circuit breakers.

Max. voltage is limited to 500 V.

6.3.3 Branch circuit protection

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

WARNING - The opening of the branch-circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electric shock, current-carrying parts and other components of the controller should be examined and replaced if damaged. If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

ATTENTION - LE DÉCLENCHEMENT DU DISPOSITIF DE PROTECTION DU CIRCUIT DE DÉRIVATION PEUT ÊTRE DÙ À UNE COUPURE QUI RÉSULTE D'UN COURANT DE DÉFAUT. POUR LIMITER LE RISQUE D'INCENDIE OU DE CHOC ÉLECTRIQUE, EXAMINER LES PIÈCES PORTEUSES DE COURANT ET LES REMPLACER S'ILS SONT ENDOMMAGÉS. EN CAS DE GRILLAGE DE L'ÉLÉMENT TRAVERSÉ PAR LE COURANT DANS UN RELAIS DE SURCHARGE, LE RELAIS TOUT ENTIER DOIT ÊTRE REMPLACÉ.

For maximum branch circuit protection see table below:

Model	SCCR: 5 kA/500 V	
	When protected by:	
	Non Semiconductor Fuses (currents are maximum values)	Inverse-Time Circuit Breaker (currents are maximum values)
PHE1.A-...	25 A/600 V	25 A/500 V

6.3.4 Motor overload protection

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

The trip current is adjusted to 140 % of the rated motor current. For further information, refer to chapter "Technical data".

6.3.5 Environmental rating

Type 1

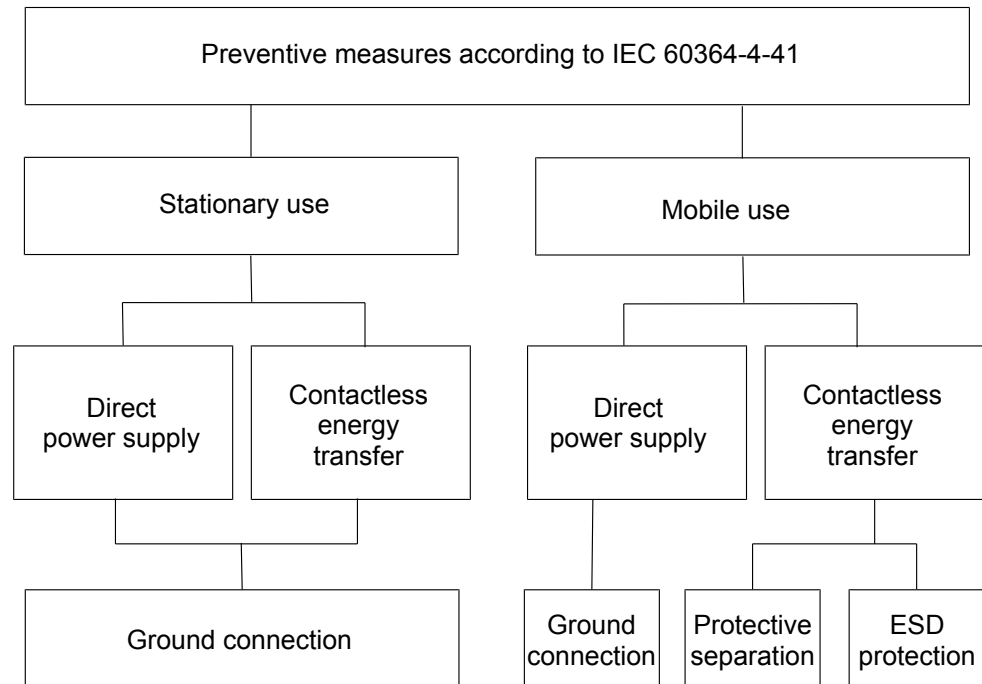
6.3.6 Wiring diagrams

For wiring diagrams, refer to chapter "Electrical installation".

6.4 Protective measures against electrical hazards

6.4.1 Overview

The following figure is an overview of the preventive measures against electrical hazards:



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6.4.2 Installing ground connection or equipotential bonding



⚠ WARNING

Electric shock due to faulty ground connection or faulty protective bonding.
Severe or fatal injuries.

- Make sure you install the ground connection and protective bonding correctly.

You must protect all electrical operating resources, such as the device or the motor, using ground connection or protective bonding.

Tools required

Socket wrench with wrench size 8 mm

Leakage currents

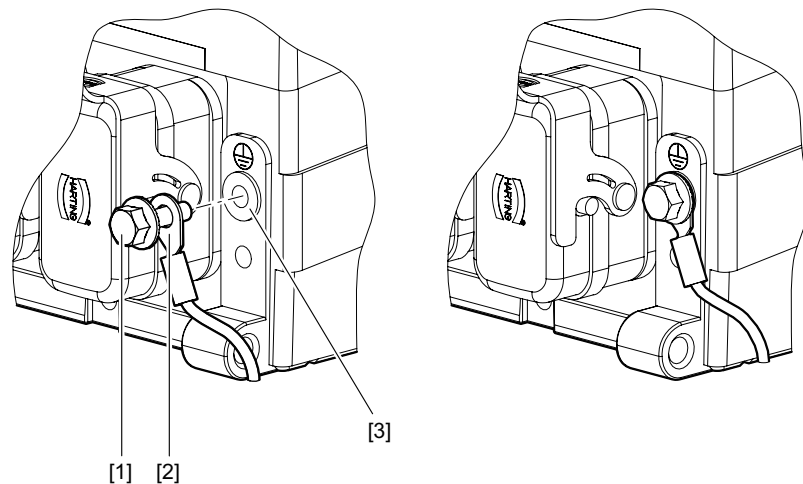
Leakage currents $\geq$ AC 3.5 mA/DC 10 mA may occur during normal operation. To avoid dangerous shock currents in accordance with EN 61800-5-1, strictly observe the following:

- The protective earth (PE) connection must meet the requirements for systems with high earth-leakage currents.
- Note that the required cable cross section of the PE conductor depends on the cable cross section of the supply cable. Select the cable cross section of the PE conductor according to the following requirements:
 - Supply cable $< 10 \text{ mm}^2$: Install two PE conductors with a cable cross section corresponding to the supply cable. Both PE conductors have to be connected to different connection points and routed in parallel. Alternatively, use a copper PE conductor with a cable cross section of 10 mm^2 .
 - Supply cable $10 \text{ mm}^2 - 16 \text{ mm}^2$: Route a copper PE conductor with a cable cross section corresponding to the supply cable.

Procedure

Always ground the device using the shortest possible route.

The connection points for ground connection or equipotential bonding are on the narrow sides of the device. They are marked with a "ground" $\oplus$ icon.



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- [1] M5 × 10 screw
- [2] Crimp cable lug for M5
- [3] Connection point

✓ Note the different cable cross section of the supply line during installation.

1. Remove the screw.
2. Push the crimp cable lug onto the screw.
3. Tighten the screw with a maximum tightening torque of 2.5 Nm.

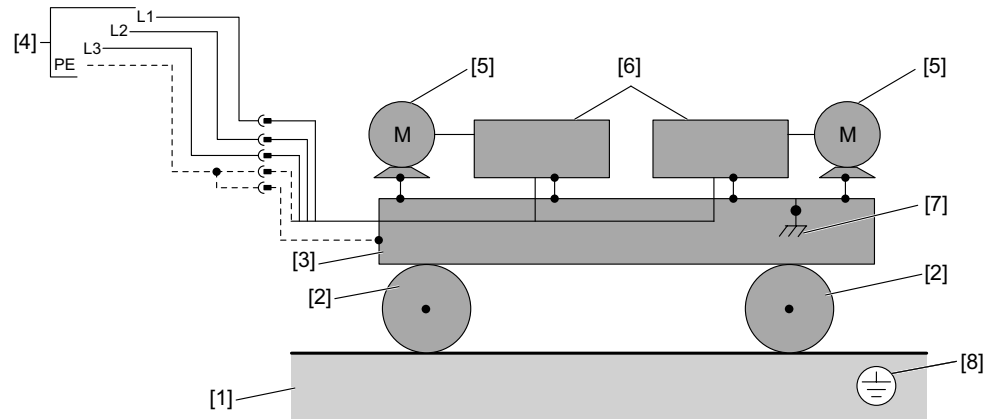
Connection points for mobile applications

For mobile applications, the type of energy transfer determines how you have to apply preventive measures against electrical hazards.

Direct power supply

The ground connection protects mobile systems with direct power supply against electrical hazards. Ensure the ground connection using 2 mobile contact outlets (sliding contacts) or a trailing cable.

The following figure shows a sample mobile system with direct power supply via sliding contacts:



18014398844514443

- [1] Stationary system component
- [2] Wheels
- [3] Vehicle support frame
- [4] Power supply
- [5] Motor
- [6] Drive and application controller
- [7] Vehicle GND
- [8] Ground

Contactless energy transfer system

The following preventive measures protect mobile systems with contactless energy transfer against electrical hazards:

- Protective separation
- Discharge measures

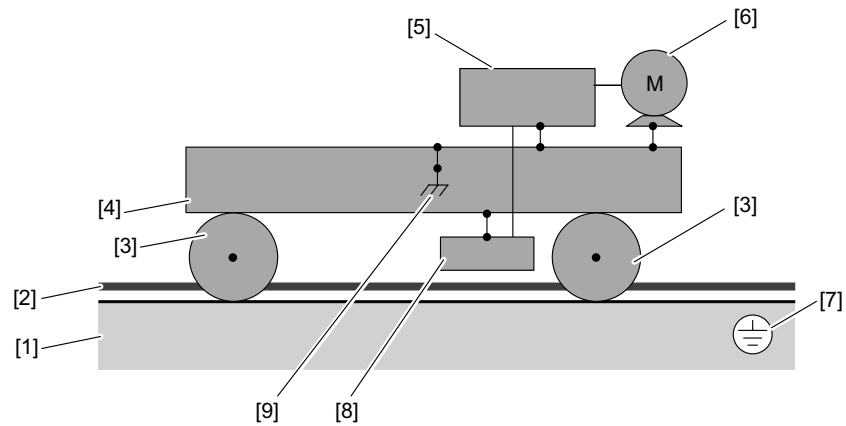
Protective separation

All electrical equipment on the mobile part, such as on a vehicle, must be equipotentially bonded to each other.

- Establish high-frequency equipotential bonding via the vehicle support frame (vehicle GND).
- Provide metal-to-metal contact over a large surface area.
- Use high-frequency equipotential bonding cables with a minimum cross section of 10 mm².
- Mark the equipotential bonding cables according to DIN EN 61140 (IEC 61140) and color-code them according to IEC 60445.

Equipotential bonding on mobile systems ensures that in case of a fault, no contact voltages occur.

The following figure shows a sample mobile system with contactless energy transfer system:



35742672011

[1]	Dissipative floor coverings or work areas	[6]	Motor
[2]	Line cable	[7]	Ground
[3]	Dissipative or conductive track rollers or wheels	[8]	Pick-up
[4]	Vehicle support frame	[9]	Vehicle GND
[5]	Drive and application controller		

General information

- All cables must have double basic insulation. Double insulation is also required for the supply cable of the pick-up. These requirements are always met when using MOVITRANS® components.
- Dissipation of electrical charges between vehicle support frame (vehicle mass) and a ground potential is permitted.
- If it is required in certain production steps, temporary grounding of the vehicle support frame is permitted.
- Grounding of mobile systems in areas with "ground connection" as preventive measure does not result in a higher risk potential and is therefore permitted.
- A possible potential transfer to mobile components (vehicles) via third-party equipment must be ruled out during planning and operation.

Information for operation

For operation in IT systems, you have to confirm the following within the context of the cyclic system checks on mobile parts and on the complete system:

- The insulation capacity of the equipment
- The effectiveness of the equipotential bonding

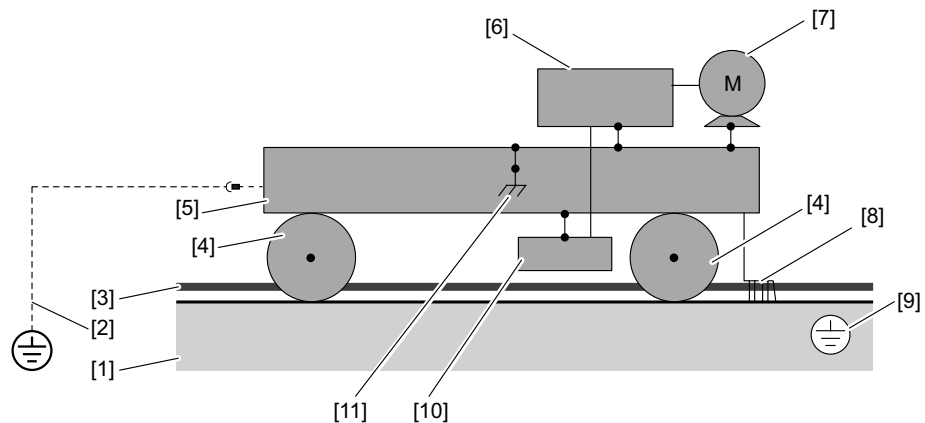
Discharge measures

To ensure optimum protection against electrostatic discharge (ESD) and capacitive coupling, you have to take measures between the mobile component and the stationary end for dissipating the charges. This is particularly important for mobile systems such as lifting gears, floor conveyor vehicles, or floor conveyor systems.

You can dissipate charges as follows:

- Via conductive components, such as:
 - Combs
 - Brushes
 - Springs
 - Sliders
- Via dissipative or conductive track rollers or wheels
- Via dissipative floor coverings or work areas

If it is required in certain production steps, temporary grounding of the vehicle support frame is permitted.



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- | | |
|---|-------------------------------|
| [1] Dissipative floor coverings or work areas | [7] Motor |
| [2] Temporary ground connection | [8] Conductive component part |
| [3] Line cable | [9] Ground |
| [4] Dissipative or conductive track rollers or wheels | [10] Pick-up |
| [5] Vehicle support frame | [11] Vehicle GND |
| [6] Drive and application controller | |

6.5 Motor types



INFORMATION

Unsuitable motor monitoring can lead to a malfunction. Only connect motors with thermostat (TH) to the device.

The device supports a variety of global motors from SEW-EURODRIVE. For a list of motor types, refer to chapter "Motor types" (→ [101](#)).

Observe the possible brake voltage in chapter "Output data" (→ [99](#)).

6.6 Cable routing

Observe the following when routing the cables:

- Use suitable cables to connect power supply and communication. For more information on connection descriptions, refer to chapter "Electrical connections" (→ [60](#)).
- Route power cables and signal cables in separate cable ducts.
- Maintain the greatest possible distance between power cables and signal cables.
- Avoid using long cables running parallel to one another.

For further information on EMC compliant installation, refer to the following documentation: "Drive Engineering – Practical Implementation, Electromagnetic Compatibility (EMC) in Drive Engineering".

6.7 Shielding

- Use shielded power and electronics cables.
- Connect the shield and make sure it is grounded over a wide area at both ends. When using cables with multiple shielding, also make sure that the inner shields are grounded over a wide area at both ends.
- Use EMC-capable plug connectors.
- For external bus connections, refer to the bus-specific installation instructions.

6.8 Using prefabricated cables

SEW-EURODRIVE uses prefabricated cables for certifications, type tests and approval of the devices. The cables available from SEW-EURODRIVE meet all the requirements necessary for the functions of the device and the connected components. The devices under consideration are always the basic devices including all components to be connected and corresponding connection cables.

For this reason, SEW-EURODRIVE recommends that you only use the prefabricated cables listed in the documentation.

In accordance with EN ISO 13849, when using devices with integrated safety functions, you must also adhere to all of the conditions and requirements for the installation and routing of cables described in the corresponding device's functional safety documentation.

6.8.1 Using third-party cables

If third-party cables are used – even if these cables are technically equivalent – SEW-EURODRIVE will not accept any liability and cannot guarantee compliance with device properties or that the device will function correctly.

If you use third-party cables for connecting the device and connected components, ensure their compliance with applicable national regulations. Note that the technical features of the device or unit network might be affected inadvertently when using third-party cables. This concerns in particular the following properties:

- Mechanical properties (e.g. IP degree of protection, cable carrier suitability)
- Chemical properties (e.g. silicone and halogen free, resistance to substances)
- Thermal properties (e.g. thermal stability, increase in device temperature, flammability class)
- EMC behavior (such as interference emission limit values, compliance with interference immunity values stipulated in standards)
- Functional safety (approvals according to EN ISO 13849-1)

Third-party cables not explicitly recommended by SEW-EURODRIVE must meet at least the requirements of the following standards and have been permitted according to these standards:

- IEC 60309
- IEC 61984
- IEC 60204

6.9 Terminal strips



⚠ WARNING

Electric shock when disconnecting or connecting voltage-carrying plug connectors.

Severe or fatal injuries.

- Disconnect all supply voltages.
 - Make sure that the device is de-energized.
 - Never plug or unplug the plug connectors while they are energized.
-



INFORMATION

Some connections depend on the device design. For information regarding the type of connection present at your device, refer to the device designation and the designations of the function units on the nameplates. For further information on function units, refer to chapter "Device structure" (→  15).



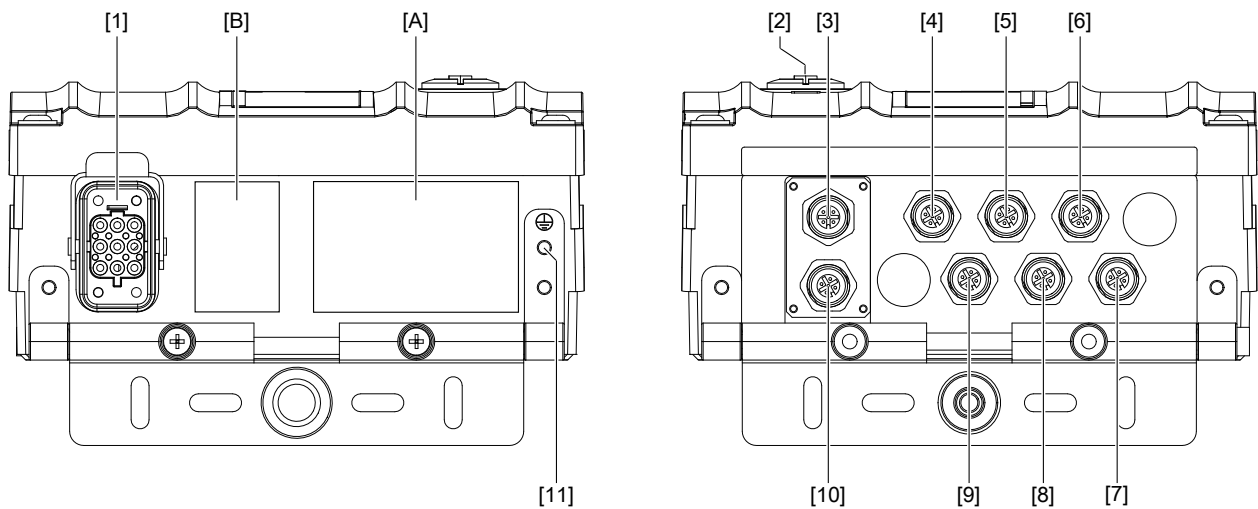
INFORMATION

For further information on the individual connections and connection cables, refer to chapter "Electrical connections" (→  60).

Connection [B] is only occupied if the device has an auxiliary axis connection. The type designation indicates whether an auxiliary axis is connected. See chapter "Type designation" for additional information.

Make sure that the latches of the connections engage after you plugged the plug connectors into the connections.

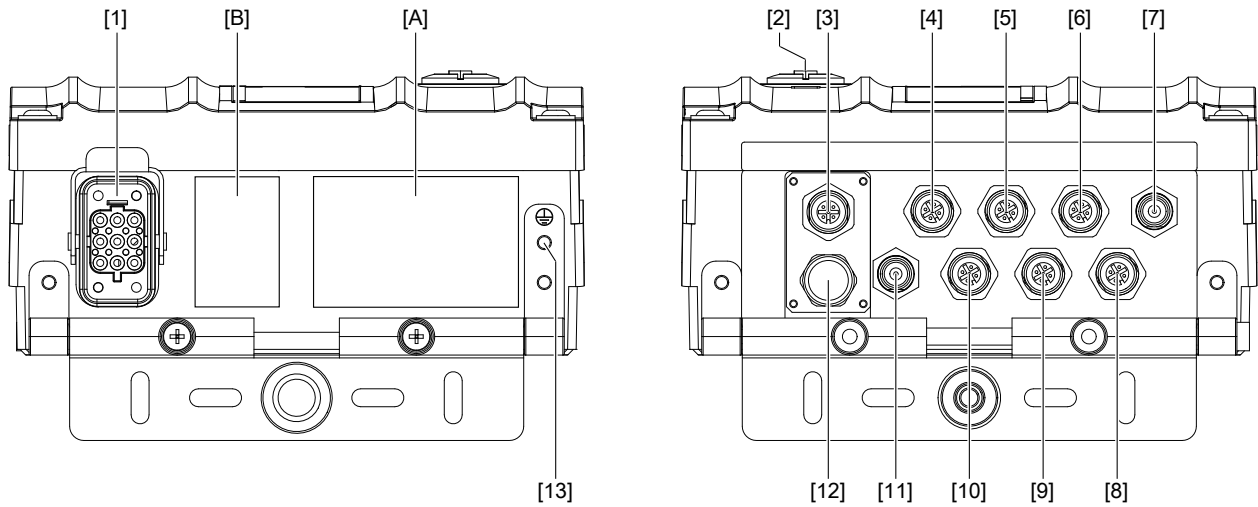
6.9.1 Design with Ethernet interface



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- | | | |
|------|---------|--|
| [A] | → | Power supply connection |
| [B] | → | Auxiliary axis connection |
| [1] | X2011 | Motor with brake control |
| [2] | X4022 | RS485 interface – service |
| [3] | X5502 | Safe disconnection – input |
| [4] | X5002_1 | Digital inputs/outputs – communication and control unit |
| [5] | X5002_3 | Digital inputs/outputs – communication and control unit |
| [6] | X4401 | ID module |
| [7] | X4111 | CAN bus – external |
| [8] | X4011 | RS485 interface – external |
| [9] | X5002_2 | Digital inputs/outputs – communication and control unit |
| [10] | X4233 | Ethernet fieldbus |
| [11] | | Device connection point for grounding or equipotential bonding |

6.9.2 Design with radio modem



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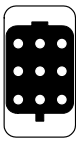
- [A] → Power supply connection
 [B] → Auxiliary axis connection
 [1] X2011 Motor with brake control
 [2] X4022 RS485 interface – service
 [3] X5502 Safe disconnection – input
 [4] X5002_1 Digital inputs/outputs – communication and control unit
 [5] X5002_3 Digital inputs/outputs – communication and control unit
 [6] X4401 ID module
 [7] X4211 WLAN antenna (main)
 [8] X4111 CAN bus – external
 [9] X4011 RS485 interface – external
 [10] X5002_2 Digital inputs/outputs – communication and control unit
 [11] X4261 WLAN antenna (aux)
 [12] Pressure compensating valve, only available for devices with type designation PHE10A-...-32..
 [13] Device connection point for grounding or equipotential bonding

6.9.3 Power supply connection

Type designation	Connection	
PHE10A-A...-3.X1..	[1] [2]	[1] Not used [2] X1201: AC 400 V input
PHE10A-T...-3.X1..	[1] [2]	[1] X1021_2: MOVITRANS® THM20C pick-up [2] X1021_1: MOVITRANS® THM20C pick-up

31544673/EN – 09/2023

6.9.4 Auxiliary axis connection

Type designation	Connection	
PHE10A-A...-3.X1..	[1] 	[1] X2211: MOVIMOT® auxiliary axis
PHE10A-T...-3.X1..	[1] 	[1] X2201: MOVIMOT® auxiliary axis

6.10 Electrical connections

6.10.1 Representation of connections

The diagrams show the contact end of the connections.

6.10.2 Connection cables



INFORMATION

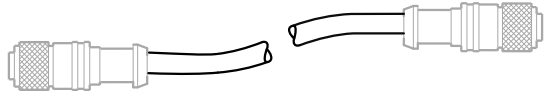
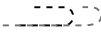
For more information about cable types, see chapter "Technical data" (→ 96).

Connection cables are not included in the delivery. Prefabricated cables for connecting SEW-EURODRIVE components are available to order. For each connection, the available prefabricated cables are listed. Specify the part number and length of the required cable in your order.

The number and design of the required connection cables depend on the design of the devices and the components to be connected. This is why you do not need all listed cables.

Cable types

The table below shows the depictions used and what they mean:

Depiction	Meaning
	Fixed length
	Variable length
	Suitable for cable carriers
	Not suitable for cable carriers

6.10.3 Cable structure

Diagram

The following table shows the cable structure based on an example:

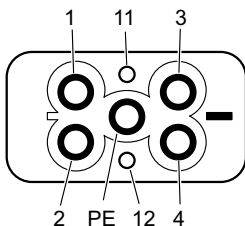
Figure	Meaning
(	Cable shield
4	Number of core pairs (in twisted cables only)
X	
2	Number of cores
X	G – with protective earth, green-yellow X - without protective earth
0.25	Core cross section in mm ²
)	Cable shield
+	A plus sign is added to cores with other features.
...	

Examples

The following examples illustrate the cable structure:

- **3G1.5:**
Cable with 3 cores of 1.5 mm² each, one of them is a green-yellow PE conductor.
- **((2X2X0.25)+4G2.5):**
Shielded hybrid cable with
 - 4 twisted-pair cables of 0.25 mm² each, shielded, and
 - 4 power cores of 2.5 mm² each, one of them is a green-yellow PE conductor.

6.10.4 X1021: MOVITRANS® THM20C pick-up

Function		
Unit supply with MOVITRANS® THM20C pick-up		
Connection type		
Han® Q 4/2, female		
Pin assignment		
		
No.	Name	Function
1	THM Pole 1	MOVITRANS® pick-up pole 1
2	n.c.	Not connected
3	THM Pole 2	MOVITRANS® pick-up pole 2
4	n.c.	Not connected
11	n.c.	Not connected
12	n.c.	Not connected
PE	PE	PE connection

THM20C/THM20E pick-ups

Note that you can only use the THM20C pick-up for the X1021 connection. For more information on the connection components and the direction of the cable outlet, refer to the following documentation: "MOVITRANS® line U-shaped Pick-Ups THM10C/THM20C".

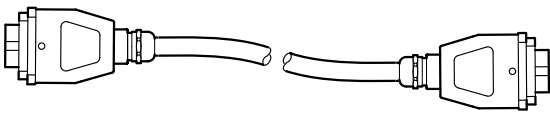
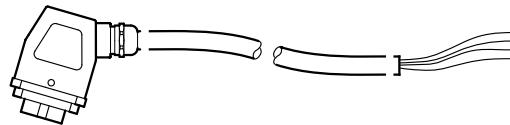
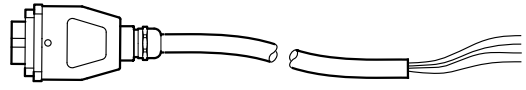
6.10.5 X1201: AC 400 V input

Function		
AC 400 V input to supply devices up to 16 kW		
Connection type		
Han® Q 4/2, male		
Pin assignment		
No.	Name	Function
1	L1	Supply system phase 1
2	L2	Supply system phase 2
3	L3	Supply system phase 3
4	n.c.	Not connected
11	n.c.	Not connected
12	n.c.	Not connected
PE	PE	PE connection

Connection cables

Cable	Length/installation type	Component
Length 6.3 m: Part number: 11723815 Cable design: 4G2.5 Han® Q 4/2 ↔ tab connectors 6.3	Fixed length 	Sliding contacts
Part number: 11745614 Cable design: 4G4 Han® Q 4/2 ↔ open with conductor end sleeves	Variable length 	—

31544673/EN – 09/2023

Cable	Length/installation type	Component
Part number: 18150306 Cable design: (4G2.5)  Han® Q 4/2 ↔ Han® Q 4/2 male	Variable length 	—
Part number: 18174213 Cable design: (4G2.5)  Han® Q 4/2 ↔ Open with conductor end sleeves	Variable length 	—
Part number: 18174221 Cable design: 4G2.5 Only permitted for decentralized supply units with device output power of up to 8 kW.  Han® Q 4/2 ↔ open with conductor end sleeves	Variable length 	—

Conductor assignment

Part number	Signal name	Color coding
11745614	L1	Black / U
	L2	Black / V
18174213	L3	Black / W
18174221	PE	Green/yellow

6.10.6 X2011: Motor with brake control

INFORMATION



To avoid damage or malfunction of the drive system, do not use motors with built-in brake rectifier in conjunction with this product.

Function

Power connection for motor with brake up to 4 kW

Connection type

Han® Q 8/0, female

Pin assignment

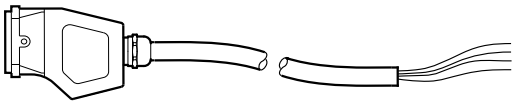
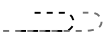
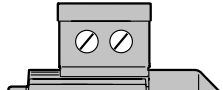
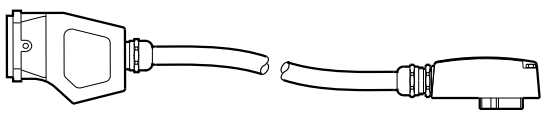
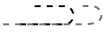
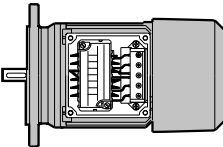
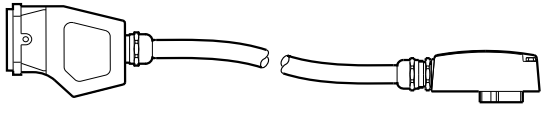
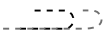
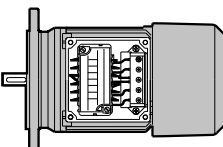
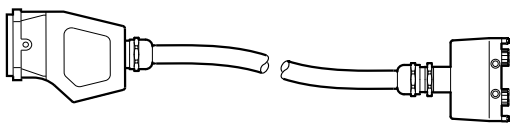
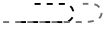
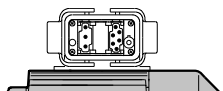
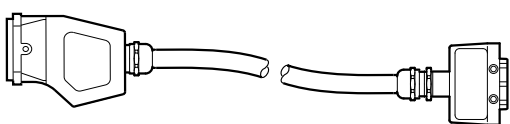
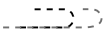
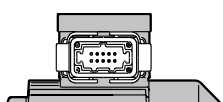
No.	Name	Function
1	U	Motor phase U output
2	14	Brake terminal 14 (white)
3	W	Motor phase W output
4	15	Brake terminal 15 (blue)
5	TF/TH/KTY+ ¹⁾	Motor temperature sensor (+)
6	13	Brake terminal 13 (red)
7	V	Motor phase V output
8	TF/TH/KTY- ¹⁾	Motor temperature sensor (-)
PE	PE	PE connection

1) You must observe the specifications in chapter "Technical data" regarding the permitted temperature sensors (TF, TH or KTY).

31544673/EN – 09/2023

Connection cables

The following table shows the cables available for this connection. The cables are approved up to 2.2 kW according to IEC / UL.

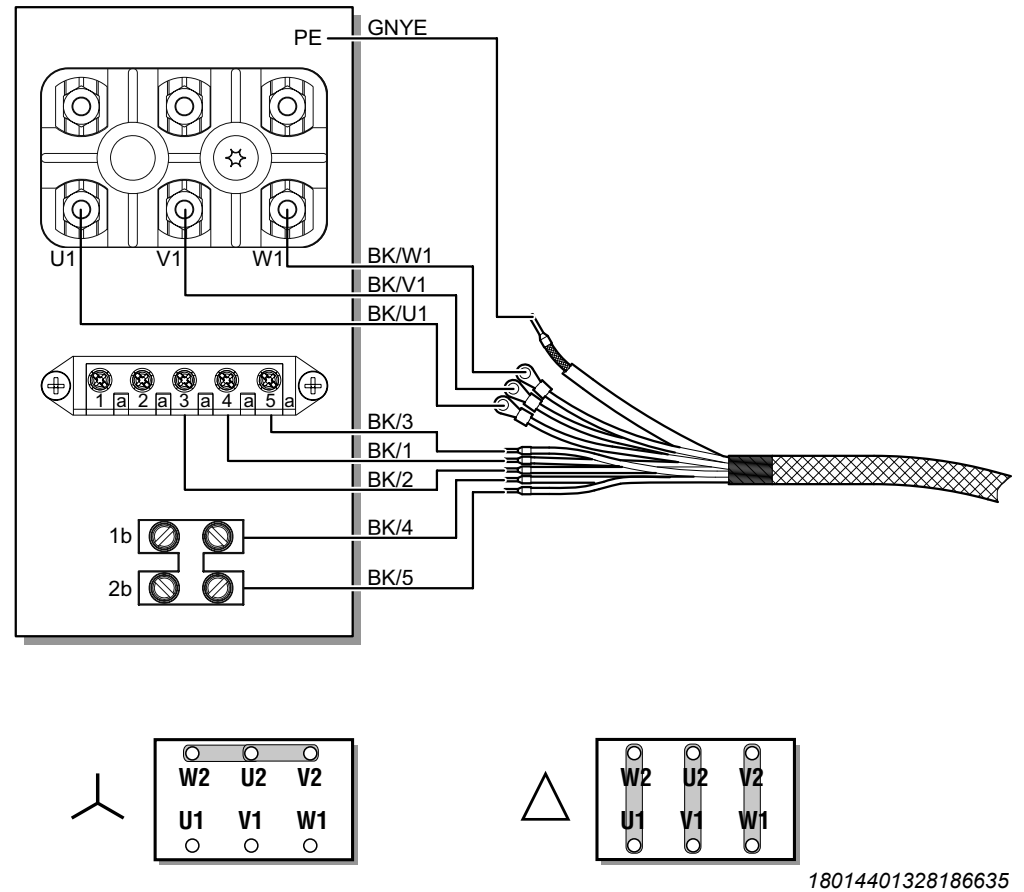
Cables	Length/ installation type	Component
Part number: 18125794  Han® Q 8/0 ↔ terminal box connection M4	Variable length 	DRS71 – 90 DRE80 – 90 
Part number: 18127703  Han® Q 8/0 ↔ IS 	Variable length 	DRS71 – 90  DRE80 – 90M  
Part number: 18127681  Han® Q 8/0 ↔ IS 	Variable length 	DRS71 – 80M  DRE80 – 80M  
Part number: 18127711  Han® Q 8/0 ↔ ABB8	Variable length 	DRS71 – 90 DRE80 – 90M 
Part number: 18127738  Han® Q 8/0 ↔ ASB8	Variable length 	DRS71 – 90 DRE80 – 90M 

Conductor assignment

Part number	Signal name	Color coding
18125794 18143776	U1	Black/U1
	V1	Black/V1
	W1	Black/W1
	4a	Black/1
	3a	Black/2
	5a	Black/3
	1b	Black/4
	2b	Black/5
	PE connection	Green-yellow + shield end (Inner shield)

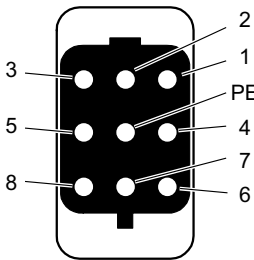
Connecting the hybrid cable

The following figure shows the connection of the hybrid cable to the terminal box of the motor. Also observe the wiring diagram of the respective motor.

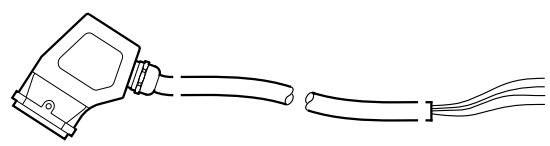
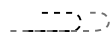


31544673/EN – 09/2023

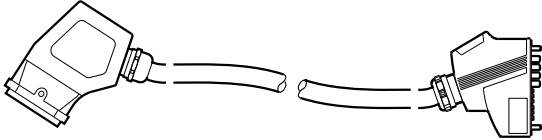
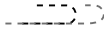
6.10.7 X2201: MOVIMOT® auxiliary axis

Function		
Power connection for MOVIMOT® auxiliary axis with DC 560 V supply		
Connection type		
Han® Q 8/0, female		
Pin assignment		
		
No.	Name	Function
1	+Uz	DC link (+)
2	n.c.	Not connected
3	-Uz	DC link (-)
4	+24V	DC 24 V output
5	GND	Reference potential
6	RS+	RS485 data line (+)
7	CP	Coding pin
8	RS-	RS485 data line (-)
PE	PE	PE connection

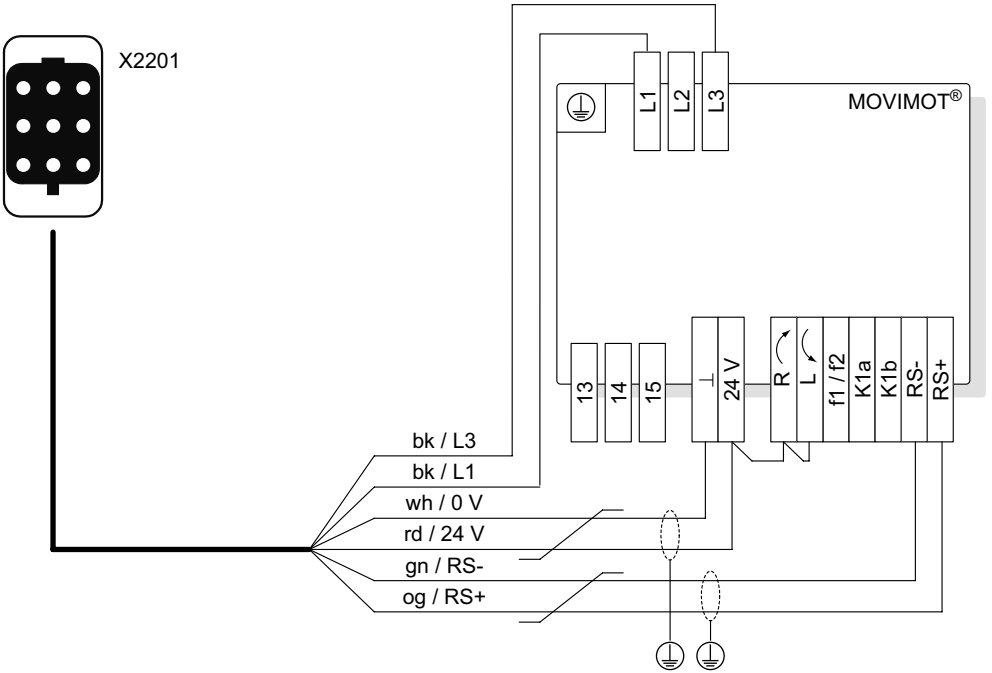
Connection cables

Cables	Length/installation type	Component
Part number: 11744987 Cable design: 4G1.5+(3X0.75)+(2X0.75)  Han®Q 8/0 ↔ Open with conductor end sleeves	Variable length 	MOVIMOT® MM 03D-503-00 – MM 22D-503-00

31544673/EN – 09/2023

Cables	Length/installation type	Component
Part number: 18224520 Cable design: 4G1.5+(3X0.75)+(2X0.75)  Han® Q 8/0 ↔ APGX	Variable length 	MOVIMOT® MM 03D-503-00 – MM 22D-503-00

The following figure shows an example of the wiring of an external MOVIMOT® with DC supply:

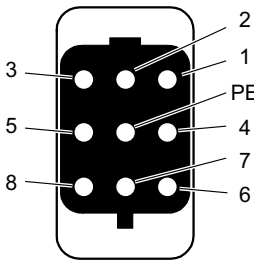


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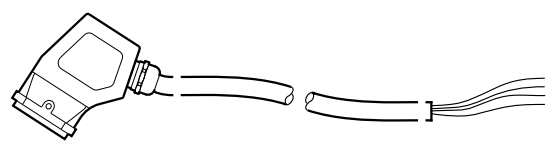
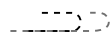
Conductor assignment

Part number	Signal name	Color coding
11744987	+Uz	Black/1
	-Uz	Black/3
	+24V	Red/24 V
	GND	White/0 V
	RS+	Orange/RS+
	RS-	Green/RS-
	PE	Green/yellow

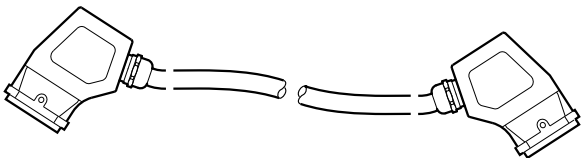
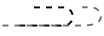
6.10.8 X2211: MOVIMOT® auxiliary axis

Function		
Power connection for MOVIMOT® auxiliary axis with AC 400 V supply		
Connection type		
Han® Q 8/0, female		
Pin assignment		
		
No.	Name	Function
1	L1	Supply system phase 1
2	CP	Coding pin
3	L3	Supply system phase 3
4	+24V	DC 24 V output
5	GND	Reference potential
6	RS+	RS485 data line (+)
7	L2	Supply system phase 2
8	RS-	RS485 data line (-)
PE	PE	PE connection

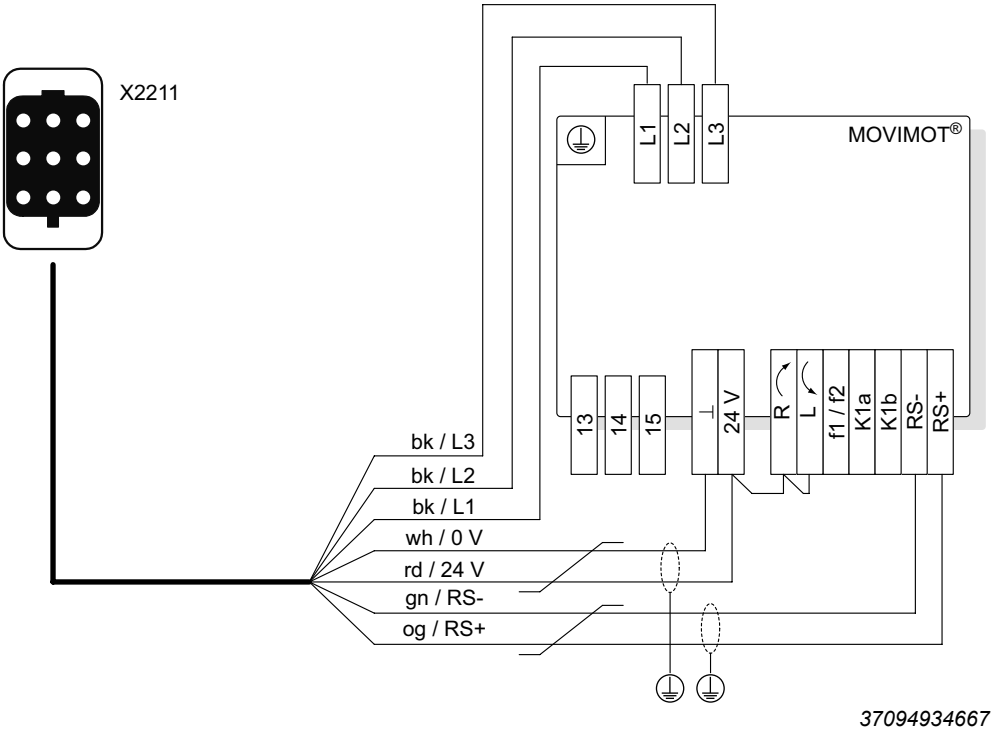
Connection cables

Cables	Length/installation type	Component
Part number: 11744995 Cable design: 4G1.5+(3X0.75)+(2X0.75)  Han®Q 8/0 ↔ Open with conductor end sleeves	Variable length 	MOVIMOT® MM 03D-503-00 – MM 22D-503-00

31544673/EN – 09/2023

Cables	Length/installation type	Component
Part number: 18123511 Cable design: 4G1.5+(3X0.75)+(2X0.75)  Han® Q 8/0 ↔ Han® Q 8/0	Variable length 	MOVIMOT® MM 03D-503-00 – MM 22D-503-00

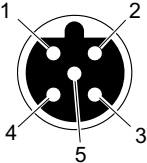
The following figure shows an example of the wiring of an external MOVIMOT® with DC supply:



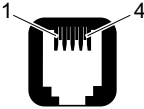
Conductor assignment

Part number	Signal name	Color coding
11744995	L1	Black/L1
	L3	Black/L3
	+24V	Red/24 V
	GND	White/0 V
	RS+	Orange/RS+
	L2	Black/L2
	RS-	Green/RS-
	PE	Green/yellow

6.10.9 X4011: RS485 interface – external

Function		
RS485 interface for external components		
Connection type		
M12, 5-pin, female, B-coded		
Pin assignment		
		
No.	Name	Function
1	+24V	DC 24 V output
2	RS-	RS485 data line (-)
3	GND	Reference potential
4	RS+	RS485 data line (+)
5	res.	Reserved

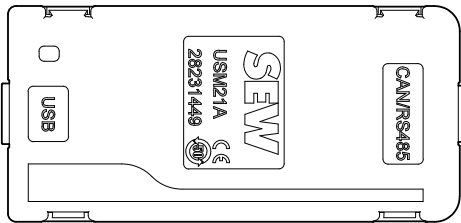
6.10.10 X4022: RS485 interface – service

Function		
RS485 service interface		
Connection type		
RJ10		
Pin assignment		
		
No.	Name	Function
1	GND	Reference potential
2	RS-	RS485 data line (-)
3	RS+	RS485 data line (+)
4	+5V	DC 5 V output

Connection component

USM21A interface adapter

Part number: 28231449
Connection: RJ10



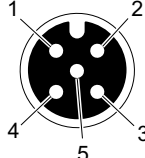
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6.10.11 X4111: CAN bus – external

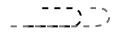
INFORMATION



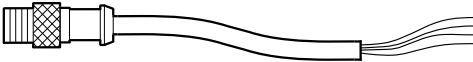
If there is no station connected here, you must terminate the bus with a 120 Ω resistor.

Function		
CAN bus for external components		
Connection type		
M12, 5-pin, female, A-coded		
Pin assignment		
		
No.	Name	Function
1	CAN_SHLD	Shield/equipotential bonding CAN bus
2	+24V	DC 24 V output
3	GND	Reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)

Connection cables

Cable	Length/installation type	Component
Length 5 m: Part number: 13286331 Length 10 m: Part number: 13286358 Length 15 m: Part number: 13286366 Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)  M12, male, A-coded ↔ M12, female, A-coded	Set length 	—

31544673/EN – 09/2023

Cable	Length/installation type	Component
Length 5 m: Part number: 13281402 Length 10 m: Part number: 13281410 Length 15 m: Part number: 13281429 Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)  M12, male, A-coded ↔ Open	Set length 	—

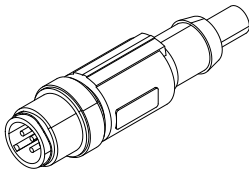
Conductor assignment

Part number	Signal name	Conductor color
13281348	CAN_SHLD	—
13281356	+24V	Red
13281364	GND	Black
13281372	CAN_H	White
13281380	CAN_L	Blue
13281399		
13281402		
13281410		
13281429		

CAN terminating resistor

Part number: 13287036

Connection: M12



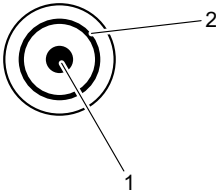
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6.10.12 X4211: WLAN antenna (main)



INFORMATION

If the connection is not used, you must terminate the bus with a 50 Ω resistor.

Function		
Antenna connection for WLAN communication, parameterizable for send and receive functions		
Connection type		
R-TNC socket		
Pin assignment		
		
No.	Name	Function
1	inner conductor	Inner conductor
2	outer conductor	Outer conductor

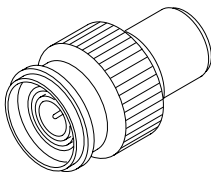
Connection cables

Cable	Length/installation type	Component
Part number: 11744154  R-TNC ↔ R-SMA, male	Variable length 	Near field coupler

For more information, technical data and certifications, refer to the following documentation: "MOVIPRO® REC5 Radio Modem" addendum to the operating instructions.

50 Ω terminating resistor

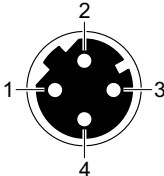
Part number: 19069146
 Connection R-TNC connector



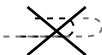
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31544673/EN – 09/2023

6.10.13 X4233: Ethernet fieldbus

Function		
Ethernet fieldbus interface, 4-pin		
Connection type		
M12, 4-pin, female, D-coded		
Pin assignment		
		
No.	Name	Function
1	TX ⁺	Sending cable (+)
2	RX ⁺	Receiving cable (+)
3	TX ⁻	Sending cable (-)
4	RX ⁻	Receiving cable (-)

Connection cable

Cable	Length/installation type	Component
Part number: 19105401 Cable design: (2X2X0.14)  M12, 4-pole, D-coded, male ↔ M12, 4-pole, D-coded, female	Fixed length 2 m 	—

31544673/EN – 09/2023

6.10.14 X4261: WLAN antenna (aux)

INFORMATION



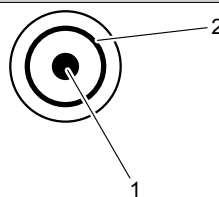
If the connection is not used, you must terminate the bus with a 50 Ω resistor.

Function

Antenna connection for WLAN communication, parameterizable for send and receive functions

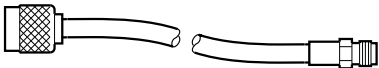
Connection type

R-TNC socket

Pin assignment

No.	Name	Function
1	inner conductor	Inner conductor
2	outer conductor	Outer conductor

Connection cables

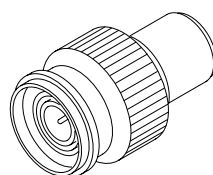
Cable	Length/installation type	Component
Part number: 11744154  R-TNC ↔ R-SMA, male	Variable length 	Near field coupler

For more information, technical data and certifications, refer to the following documentation: "MOVIPRO® REC5 Radio Modem" addendum to the operating instructions.

50 Ω terminating resistor

Part number: 19069146

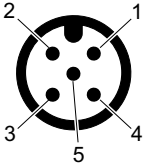
Connection R-TNC connector



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31544673/EN – 09/2023

6.10.15 X4401: ID module

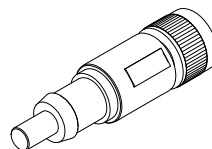
Function		
Interface for ID module from SEW-EURODRIVE		
Connection type		
M12, 5-pin, male, A-coded		
Pin assignment		
		
No.	Name	Function
1	GND	Reference potential
2	IDM-Data	ID module data line
3	res.	Reserved
4	res.	Reserved
5	res.	Reserved

Connection component

ID module

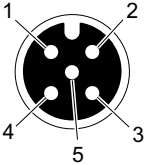
Part number: 17974186

Connection M12

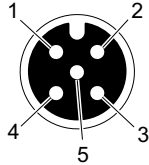


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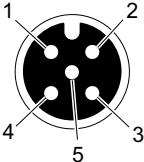
6.10.16 X5002_1: Digital inputs/outputs – communication and control unit

Function		
Digital inputs/outputs of the communication and control unit		
Connection type		
M12, 5-pin, female, A-coded		
Pin assignment		
		
No.	Name	Function
1	+24V	DC 24 V output
2	DI11	Data reception direction11
3	0V24	0V24 reference potential
4	DI10	Data reception direction10
5	FE	Equipotential bonding / functional earth

6.10.17 X5002_2: Digital inputs/outputs – communication and control unit

Function		
Digital inputs/outputs of the communication and control unit		
Connection type		
M12, 5-pin, female, A-coded		
Pin assignment		
		
No.	Name	Function
1	+24V	DC 24 V output
2	DI13/DO11	Data reception direction 13 oder Digital output 11
3	0V24	0V24 reference potential
4	DI12/DO10	Data reception direction 12 oder Digital output 10
5	FE	Equipotential bonding / functional earth

6.10.18 X5002_3: Digital inputs/outputs – communication and control unit

Function		
Digital inputs/outputs of the communication and control unit		
Connection type		
M12, 5-pin, female, A-coded		
Pin assignment		
		
No.	Name	Function
1	+24V	DC 24 V output
2	DI17/DO15	Data reception direction 17 oder Digital output 15
3	0V24	0V24 reference potential
4	DI16/DO14	Data reception direction 16 oder Digital output 14
5	FE	Equipotential bonding / functional earth

6.10.19 X5502: Safe disconnection – input

INFORMATION



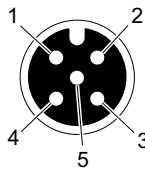
To avoid non safety-related shutdown, jumper this connection only if the product will not perform any safety functions according to EN ISO 13849-1.

INFORMATION



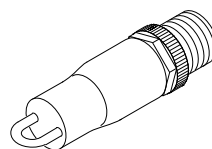
Use only shielded cables for this connection.

This connection is marked with a yellow ring.

Function		
Input for safe disconnection		
Connection type		
M12, 5-pin, female, A-coded		
Pin assignment		
		
No.	Name	Function
1	+24V	DC 24 V output
2	STO-	0V24 reference potential for safe disconnection
3	0V24	0V24 reference potential
4	STO+	DC 24 V input for safe disconnection
5	res.	Reserved

STO jumper plug

Part number: 11747099
Structure: bridged 1+4/2+3
Connection: M12



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7 Startup

7.1 For your safety



NOTICE

Danger due to arcing.

Damage to electrical components.

- Do not disconnect power connections during operation.
- Do not connect power connections during operation.



INFORMATION

To ensure fault-free operation, do not disconnect or connect signal cables during operation.

7.2 Requirements

The following conditions apply to startup:

- The device must be installed correctly both mechanically and electrically.
- The system and connected drives must be configured correctly.
- Safety measures prevent accidental drive startup.
- Safety measures prevent danger to persons or machines.

7.2.1 Required hardware

- PC or laptop with USB interface
- USB11A interface adapter

7.3 Device configuration

7.3.1 Settings

During startup, the different components of the device are configured, parameterized and/or installed:

- Configuration of the radio modem settings
- Configuring the controller
- Parameterization of the frequency inverter

Use the X4022 (RS485 interface – service) interface to establish the connection to the controller of the device.

7.3.2 Software

Use the latest version of the following software to make all the required settings: MOVIVISION® parameter and diagnostics tool

7.3.3 Connected MOVIMOT®

The connected MOVIMOT® units communicate with the communication and control unit as RS485 slave. In this respect, observe the following points:

Setting the RS485 address

Set an RS485 address other than 0 at the MOVIMOT® unit. When using several MOVIMOT® units, the RS485 address of all MOVIMOT® units can be identical.

Setting the setpoint potentiometer f1 of MOVIMOT® (maximum frequency)

Set the setpoint potentiometer f1 to the value "10".

Setting the setpoint potentiometer f2 of MOVIMOT® (minimum frequency)

Set the setpoint potentiometer f2 to the value "0".

7.3.4 Further information

For further information, refer to the following documentation:

- "MOVIVISION® Parameter and Diagnostics Tool" manual
- "MOVIVISION® – MOVIPRO® Software Interface" manual
- "MOVIMOT® MM..D" operating instructions

8 Operation

8.1 For your safety



⚠ WARNING

Risk of injury and possible damage to property if the motor starts up unintentionally. Fatal or severe injuries and damage to property.

- Set the device to a safe state.
- Switch off the output stage.
- De-couple the drive.
- Deactivate auto-reset for drives that start up automatically.



⚠ WARNING

Electric shock caused by dangerous voltages at the connections, cables and motor terminals.

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

Severe or fatal injuries.

- Do not switch under load.
- Before performing any work on the device, disconnect it from the voltage supply. Dangerous voltages may still be present for up to 10 minutes after the controller is switched off.
- Inhibit the output stage of the frequency inverter before changing the switch at the device output.



⚠ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

- Observe a minimum switch-off time after disconnecting the supply voltage: **10 minutes.**



⚠ CAUTION

Risk of burns due to hot surfaces of the device or connected options, e.g. braking resistors.

Injury.

- Provide covers to secure hot surfaces.
- Install the protection devices according to the regulations.
- Check the protection devices on a regular basis.
- Let the device and the connected options cool down before you start working on them.

INFORMATION



- In VFC operating modes without encoder feedback, the maximum output frequency is 150 Hz.
- The maximum output frequency in the V/f operating mode and all operating modes with encoder feedback is 599 Hz.
- If the maximum output frequency is exceeded, error 08 "Speed monitoring" is displayed.

INFORMATION



- After disconnecting the device from the current supply, adhere to a minimum switch-off time of 5 seconds before re-establishing the current supply.
- The avoid bouncing, do not switch the device on and off again in quick succession.

8.2 Relative cyclic duration factor (cdf)

The cyclic duration factor (cdf) is the ratio between the period of loading and the cycle duration. The cycle duration is the sum of times of operation and times at rest and de-energized. The typical value for the cycle duration is 10 min.

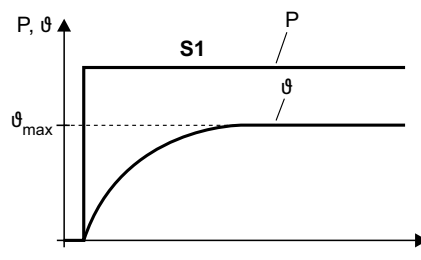
$$cdf = \frac{\text{total time of operation} \quad (t_1 + t_2 + t_3)}{\text{cycle duration (T)}} \times 100\%$$

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8.3 Duty cycles

8.3.1 Duty type S1

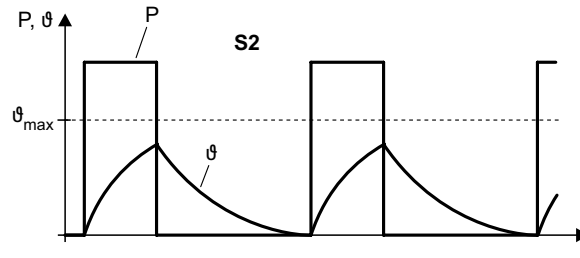
Continuous duty: Operation with a constant loading condition, the motor achieves a thermal steady state.



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8.3.2 Duty type S2

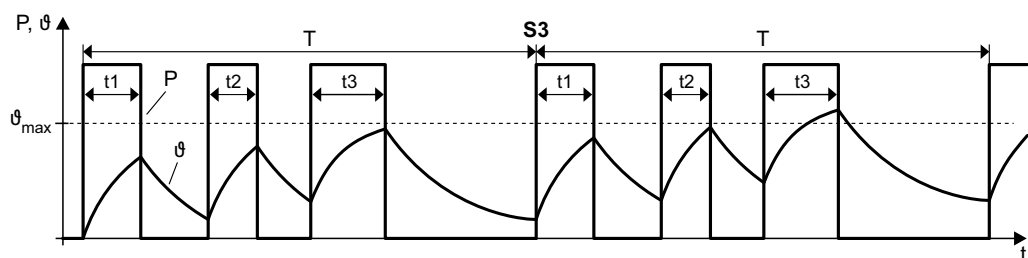
Short-time duty: Operation at constant loading condition for a limited, given time followed by a time at rest. The motor returns to ambient temperature during the rest period.



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8.3.3 Duty type S3

Intermittent periodic duty: The switch-on sequence does not affect the temperature rise. Characterized by a sequence of identical duty cycles, each including a time of operation at constant load and a time at rest. Described by the relative cyclic duration factor (cdf) in %.



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8.3.4 Duty types S4 to S10

Intermittent periodic duty: The startup current affects the temperature rise. Characterized by a sequence of identical duty cycles, each including a time of operation at constant load and a time at rest. Described by the relative cyclic duration factor (cdf) in % and the number of cycles per hour.

8.4 Status and error messages

The device's status display shows the current operating status. There are two kinds of status and error messages: from the device and from the user program. Status and error messages from the device are issued when no user program is active.

For more information on possible status and error messages of the user program, refer to the user program documentation (for the relevant system solution). In case of questions, contact SEW-EURODRIVE.

INFORMATION



If the timeout monitoring function of the status display is switched off, the last status issued by the user program is shown.

Only switch off the timeout monitoring function in exceptional cases. Inform the operating personnel accordingly.

The following table shows the device's status and error messages:

Code	Possible cause	Measure
SEW	The device is ready for operation. No user program has been loaded or started.	If the status message is shown for a longer period, load the user program into the device.
.....	The user program has not updated the values of the status display within 3 s. An error has occurred in the user program, the device or the internal system bus.	- Restart the device. Check whether the device starts correctly. If the device does not start, reload the user program into the device. - If the status message is displayed repeatedly, contact SEW-EURODRIVE Service.
SF 888	The device cannot boot after switch-on. The communication and control unit has a serious error.	Contact the SEW-EURODRIVE service.

8.5 IT security

8.5.1 Hardening measures



Perform the following hardening measures:

- Report incidents concerning IT security by e-mail to cert@sew-eurodrive.com.
- Regularly check which Security Advisories are available in the Online Support of SEW-EURODRIVE.
- Evaluate the error memories and diagnostics information of your products regularly and check whether there are entries that affect IT security.

8.5.2 Guidelines for secure operation



Various service accesses can be activated on the device. Authentication is implemented by using static access data. This data is not used to defend against attacks on IT security but rather to protect against unintentional modification. This is the reason why they cannot be changed.

To prevent misuse of these service accesses, network access must be restricted according to the state of the art. For more information, refer to section "IT security of the environment" (→ 10).

8.5.3 Guidelines for user account management



The product uses various administrative service accounts. These are not relevant for operation and are only used for service purposes. The account is protected by static device-specific access data.

9 Service

9.1 Inspection/maintenance

INFORMATION



Never open the device. Only SEW-EURODRIVE may perform repairs.

The device is maintenance-free. SEW-EURODRIVE does not stipulate any regular inspection work. However, it is recommended that you check the following components regularly:

- Connection cable:
If cables become damaged or fatigued, replace them immediately.
- Cooling fins (if available):
Remove any deposits to ensure sufficient cooling.
- Fans (if available):
Check whether the fans function properly.

9.2 Device replacement

9.2.1 Notes on device replacement

The device is connected to its peripherals with plug connectors that allow for quick device replacement. Hardware and software support the easy replacement of a defective device. The ID module connected to X4401 plays a central role in this.

This is where all the settings regarding the access to the central data server are saved during startup. After a device replacement, the device can use the information from the ID module to log-on to the system controller and request a valid data set.

INFORMATION



Observe the following notes during device replacement:

- Insert the ID module only when the device is switched off.
- All network-specific data, e.g. the IP address of the controller, is stored in the ID module. This allows for quick and easy replacement of devices without having to set all parameters anew. However, specific startup steps, such as referencing, must be carried out again.

9.2.2 Replacing the device

Proceed as follows to replace the device:

1. Disconnect the device and remove it from the system.
2. Loosen the screw fitting of the ID module and remove it from the X4401 connection.
3. Plug the ID module into connection X4401 of a new device and tighten the screw fitting.
4. Install the new device in the system and connect it to the supply system.

For more information, refer to the "MOVIVISION® – MOVIPRO® Software Interface" manual.

9.3 Status display

The status display shows status and error messages and thus enables you to record the current state of the device.

For more information refer to chapter "Status and error messages" (→ 88) and the documentation on the user program (for the respective system solution). In case of questions, contact SEW-EURODRIVE.

9.4 Acknowledging fault messages

The drive may restart automatically depending on the setting after fault elimination or after a reset. Establish a safe working environment before eliminating a fault if automatic restart of the driven machine is not permitted for safety reasons.

9.4.1 Manual reset

To perform a manual reset, switch off the voltage supply. Adhere to a minimum switch-off time of 1 minute. Switch the supply voltage back on.

9.5 Electronics Service by SEW-EURODRIVE

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

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

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

9.6 Cleaning

Before cleaning the device, disconnect it from the grid. Disconnect the conductor rail from the power if required.

Clean the device only with solvent-free cleaning agent.

9.7 Shutdown



⚠ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

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

To shut down the device, disconnect it from the power supply using appropriate measures.

9.8 Storage

Observe the following instructions when shutting down or storing the device:

- Cover the connections with the supplied protection caps.
- Place the device on a side without connectors.
- Ensure that the device is not subject to mechanical impact.

Observe the notes on storage temperature in chapter "Technical data" (→ 96).

9.9 Three-phase current power supply

9.9.1 Extended storage

Electrolytic capacitors are used in the frequency inverters. They are subject to aging effects when de-energized. If the device is connected to the voltage supply directly after a long storage period, the capacitors can be damaged.

In case of extended storage, connect the device to the supply voltage for at least 5 minutes every 2 years. Otherwise, the service life of the device will be reduced.

If you have not performed maintenance regularly every 2 years, SEW-EURODRIVE recommends that you increase the supply 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:

- Stage 1: AC 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

9.10 MOVITRANS® power supply

9.10.1 Extended storage

Electrolytic capacitors are used in the frequency inverters. They are subject to aging effects when de-energized. If the device is connected to the voltage supply directly after a long storage period, the capacitors can be damaged.

In case of extended storage, connect the device to the supply voltage for at least 5 minutes every 4 years. Otherwise, the service life of the device will be reduced.

If the 4-year cycle is neglected, SEW-EURODRIVE recommends connecting the device to a MOVITRANS® supply with reduced line cable current. To do so, set the *Nominal line cable current* parameter in the MOVITRANS® supply according to the following overview to slowly increase the internal voltage supply:

The following graduations are recommended:

- Stage 1: Power on with 50% of the line cable current
- Stage 2: 50% line cable current for 15 minutes
- Stage 3: 75% line cable current for 15 minutes
- Stage 4: 100% line cable current for 1 hour

9.11 IT security guidelines for secure disposal

9.11.1 Removing the product from its intended environment



If the data stored on the product is considered relevant for IT security, remove it as described in the section "Secure removal of data stored in the product." (→ 94)

9.11.2 Removing reference and configuration data in the environment



Reference files, configuration files, log files, and other data belonging to the product can be stored in the environment on other devices, such as a higher-level controller or a local OPC-UA client. If the stored data is considered relevant for IT security, remove it from the corresponding devices.

9.11.3 Secure removal of data stored in the product



You can reset the data saved in the product to the factory settings using the MOVIVISION® software.

This includes the following data, provided that it is present in this device variant:

- Configuration of the device
- Device name
- IP address
- Log files
- Application software
- Control parameters

The following data is not reset during this procedure and can be modified individually, if it is present in the device variant:

- Parameterization of the frequency inverters

9.11.4 Removing a customer data backup



You can delete a customer data backup using the MOVIVISION® software.

Some of the data of the product is stored on removable storage media. If the data on the removable storage medium is classified as sensitive data from the operator's point of view and is not intended for later use, it can be deleted using the MOVIVISION® software before waste disposal.

9.12 Waste disposal

Dispose of the product and all parts separately in accordance with their material structure and the national regulations. Put the product through a recycling process or contact a specialist waste disposal company. If possible, divide the product into the following categories:

- Iron, steel or cast iron
- Stainless steel
- Magnets
- Aluminum
- Copper
- Electronic parts
- Plastics

The following materials are hazardous to health and the environment. These materials must be collected and disposed of separately:

- Oil and grease

Collect used oil and grease separately according to type. Ensure that the used oil is not mixed with solvent. Dispose of used oil and grease correctly.

- Screens
- Capacitors
- Rechargeable batteries
- Batteries



Waste disposal according to WEEE Directive 2012/19/EU

This product and its accessories may fall within the scope of the country-specific application of the WEEE Directive. Dispose of the product and its accessories according to the national regulations of your country.

For further information, contact the responsible SEW-EURODRIVE branch or an authorized partner of SEW-EURODRIVE.



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

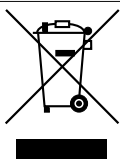
This product contains batteries or accumulators. Dispose of this product and the batteries or accumulators separately from the municipal waste according to the national regulations.

10 Technical data

10.1 Marks

10.1.1 Basic device

The device complies with the following regulations and guidelines:

Mark	Definition
	The CE marking indicates compliance with the following European directives: • Low Voltage Directive 2014/35/EU • EMC Directive 2014/30/EU • RoHS Directive 2011/65/EU • Applied harmonized standards: – EN 61800-5-1 – EN 61800-3/A1 – EN IEC 63000 • For the versions of the standards valid during development and testing of the device, refer to the declaration of conformity.
	The waste disposal of this product is performed in compliance with the WEEE Directive 2012/19/EU.
	The EAC mark states compliance with the requirements of the technical regulations of the Customs Union (Eurasian Economic Union), Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia.
	The China RoHS mark states compliance with Directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment and their packaging.
	The RCM mark declares compliance with the technical regulations of the Australian Communications and Media Authority (ACMA).
	The UKCA mark states compliance with the following British directives¹⁾ • Low Voltage Directive S.I. 2016/1101²⁾ • EMC S. I. 2016/1091 • Machinery Safety S. I. 2008/1597 • Directive S. I. 2012/3032 for limiting the use of certain hazardous substances in electrical and electronic equipment • Ecodesign Regulation S. I. 2019/539

1) The selectable approvals UKCA (Great Britain) and NM (Morocco) are mutually exclusive.

2) For products with functional safety, the requirements from the Low Voltage Directive are fulfilled by the Machinery Safety S.I. 2008/1597.

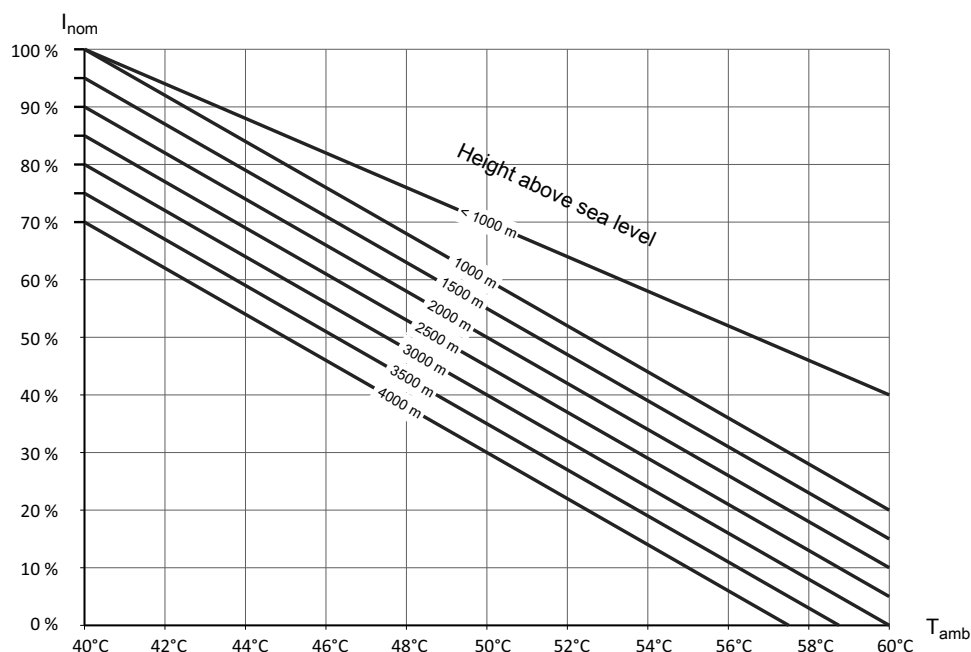
10.2 General

Basic device		
Type designation	PHE10A-A...-...A-00/...	PHE10A-T...-...A-00/...
Interference immunity	Complies with EN 61800-3 Interference suppression level A according to EN 55011	
Interference emission	Limit value class C3 according to EN 61800-3	Limit value class C3 according to EN 61800-3 for interference emission
Ambient temperature with derating	+40 to +60 °C h < 1000 m above sea level: I _{nom} reduction by 3% per K h > 1000 m above sea level: I _{nom} reduction by 4% per K For more information, see chapter "Current reduction (derating)" (→ 98).	
Installation altitude with derating	h > 1000 m above sea level: I _{nom} reduction by 1% per 100 m h > 2000 m above sea level: V _{line} reduction by 6 V per 100 m Observe chapters "Current reduction (derating)" (→ 98) and "Restrictions of use" (→ 11).	
Climate class according to EN 60721-3-3	Class 3K3, no condensation	
Storage temperature to EN 60721-3-3	-25 to +70 °C	
Degree of protection	IP54	
Permitted vibration and impact load	according to EN 61800-5-1	
Weight	6.0 kg	6.3 kg
Dimensions W × H × D	340 × 202 × 100 mm	

10.3 Current reduction (derating)

The following diagram shows how to reduce the output current in dependence of installation altitude and ambient temperature for a PWM of 4 kHz. Refer to chapter "Technical data" (→ 96) for a detailed description of the parameters.

Also observe the "Restrictions of use" (→ 11) and the reduction of the line voltage V_{line} by 6 V per 100 m.



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I_{nom} = Nominal current strength
 T_{amb} = Ambient temperature

10.4 Input data

Input data		
	X1201	X1021_1/1021_2
Type designation	PHE10A-A...-...A-00/...	PHE10A-T...-...A-00/...
Power supply	Three-phase current	MOVITRANS® (THM20C008 pick-up)
Nominal input voltage	3 × AC 380 – 500 V	AC 150 – 350 V
Nominal input current	AC 3.5 A	AC 2.3 A
Nominal input frequency	50 – 60 Hz	25 kHz
Maximum permitted rated short-circuit current at the line input of the device (SCCR, I _{cc})	5 kA	
Maximum rated current of the supply fuse (branch circuit protection)	25 A	

10.5 Output data

Output data		
Duty type	S1 (IEC 60034-1)	
Type designation	PHE10A-A15-...A-00/...	PHE10A-T11-...A-00/...
Maximum rated output power	1.5 kW at f _{PWM} = 8 kHz	1.1 kW ¹⁾ at f _{PWM} = 4 kHz

1) The rated output power depends on the type of pick-up connected, the current in the line cable and the distance between pick-up and line cable. The performance data of the individual axes may differ from this. Observe the operating instructions of the pick-up for dimensioning the overall application.

10.6 Axis data

Motor with brake control X2011		
Type designation	PHE10A-A...-3..	PHE10A-T...-3..
Axis type	MM15D-503-00	
Connection of the motor	Star/delta parameterizable	
Nominal output power	1.5 kW (2.0 HP) at $f_{PWM} = 8 \text{ kHz}$	1.1 kW (1.5 HP) at $f_{PWM} = 4 \text{ kHz}$
Nominal output current	AC 4.0 A	AC 3.2 A
Current limiting	AC 6 A, motor mode Duration depends on the capacity utilization	AC 4.8 A, motor mode Duration depends on the capacity utilization
Output voltage	3 × AC 0 – 500 V	
PWM frequency	Adjustable: 4/8/16 kHz	
Output frequency	2 – 120 Hz	
Resolution	0.01 Hz	
Brake type	BE1/BE05	
Rated brake voltage (terminals 13, 15)	AC 120 V/ AC 230 V /AC 400 V	
Temperature sensor	TH	
Maximum motor cable length	15 m	

INFORMATION



The unit features load- and speed-dependent overload protection with thermal memory.

INFORMATION



The motor output is protected against overload and short circuit.

External overload devices at the motor output of the device are not required. The motor protection functions are described below.

Motor protection functions	
Hardware input TH for protecting the motor against thermal overload	Use this input in combination with a motor with temperature monitor (TH) to protect the motor against thermal overload.
Load- and speed-dependent overload protection with thermal memory	You can activate and deactivate this function using the MOVIVISION® plant and parameterization software. For further information, refer to chapter "Motor types" (→ 54).
Motor overcurrent protection with time delay	• Trigger threshold 140% of the motor current • Tripping time: 60 – 134 s ¹⁾
Ground fault monitoring	The device does not have ground fault monitoring. For further information, refer to chapter "Installation notes" (→ 45).

1) Depending on speed and start temperature

10.7 Motor types

The device supports the following global motors from SEW-EURODRIVE:

Power rating	Motor types	Brake, standard	Brake, option
0.25 kW	DT63L4, 50 Hz, 400 V (IEC)	BR03	–
	DR63L4, 50/60 Hz (global)	BR03	–
	DRN71MS4, 50/60 Hz (global)	BE03	BE05
	DR63L4, 50 Hz, 400 V (IEC)	BR03	BR03
	DRE80S4, 50 Hz, 400 V (IEC)	BE05	BE1
	DRN71MS4, 50 Hz, 400 V (IEC)	BE03	BE05
	DRN71MS4, 60 Hz, 460 V (IEC)	BE03	BE05
	DRN71MS4, 60 Hz, 460 V (ABNT)	BE03	BE05
	DR2S63M4, 50 Hz, 400 V (IEC)	BE03	BE03
	DR2S63M4, 60 Hz, 460 V (IEC)	BE03	BE03
	DRU71SJ4, 50 Hz, 400 V (IEC)	BE05	BE1
0.37 kW	DT71D4, 50 Hz, 400 V (IEC)	BMG05	–
	DZ71D4, 60 Hz, 380 V (ABNT)	BE05	BMG05
	DRS71S4, 60 Hz, 380 V (ABNT)	BE05	BE1
	DRS71S4, 50/60 Hz (global)	BE05	BE1
	DRN71M4, 50/60 Hz (global)	BE05	BE1
	DRS71S4, 50 Hz, 400 V (IEC)	BE05	BE1
	DRS71S4, 60 Hz, 460 V (IEC)	BE05	BE1
	DRE80S4, 50 Hz, 400 V (IEC)	BE05	BE1
	DRN71M4, 50 Hz, 400 V (IEC)	BE05	BE1
	DRN71M4, 60 Hz, 460 V (IEC)	BE05	BE1
	DRN71M4, 60 Hz, 460 V (ABNT)	BE05	BE1
	DR2S71MS4, 50 Hz, 400 V (IEC)	BE05	BE1
	DR2S71MS4, 60 Hz, 460 V (IEC)	BE05	BE1
	DRE71SJ4, 50 Hz, 400 V (IEC)	BE05	BE1
	DRU71MJ4, 50 Hz, 400 V (IEC)	BE05	BE1

Power rating	Motor types	Brake, standard	Brake, option
0.55 kW	DT80K4, 50 Hz, 400 V (IEC)	BMG1	–
	DZ80K4, 60 Hz, 380 V (ABNT)	–	BMG1
	DRS71M4, 60 Hz, 380 V (ABNT)	BE1	BE05
	DRS71M4, 50/60 Hz (global)	BE1	BE05
	DRN80MK4, 50/60 Hz (global)	BE1	BE05
	DRS71M4, 50 Hz, 400 V (IEC)	BE1	BE05
	DRS71M4, 60 Hz, 460 V (IEC)	BE1	BE05
	DRE80M4, 50 Hz, 400 V (IEC)	BE1	BE05
	DRN80MK4, 50 Hz, 400 V (IEC)	BE1	BE05
	DRN80MK4, 60 Hz, 460 V (IEC)	BE1	BE05
	DRN80MK4, 60 Hz, 460 V (ABNT)	BE1	BE05
	DR2S71M4, 50 Hz, 400 V (IEC)	BE1	BE05
	DR2S71M4, 60 Hz, 460 V (IEC)	BE1	BE05
	DRE71MJ4, 50 Hz, 400 V (IEC)	BE1	BE05
	DRU80SJ4, 50 Hz, 400 V (IEC)	BE1	BE05
0.75 kW	DT80N4, 50 Hz, 400 V (IEC)	BMG1	–
	DZ80N4, 60 Hz, 380 V (ABNT)	–	BMG1
	DRE80S4, 60 Hz, 380 V (ABNT)	BE1	BE05
	DRE80M4, 50/60 Hz (global)	BE1	BE05
	DRN80M4, 50/60 Hz (global)	BE1	BE05
	DRS80S4, 50 Hz, 400 V (IEC)	BE1	BE05
	DRS80S4, 60 Hz, 460 V (IEC)	BE1	BE05
	DRE80M4, 50 Hz, 400 V (IEC)	BE1	BE05
	DRE80M4, 60 Hz, 460 V (IEC)	BE1	BE05
	DRN80M4, 50 Hz, 400 V (IEC)	BE1	BE05
	DRN80M4, 60 Hz, 460 V (IEC)	BE1	BE05
	DRN80M4, 60 Hz, 460 V (ABNT)	BE1	BE05
	DR2S80MK4, 50 Hz, 400 V (IEC)	BE1	BE05
	DR2S80MK4, 60 Hz, 460 V (IEC)	BE1	BE05
	DRE71MJ4, 50 Hz, 400 V (IEC)	BE1	BE05
	DRU80MJ4, 50 Hz, 400 V (IEC)	BE1	BE2

Power rating	Motor types	Brake, standard	Brake, option
1.1 kW	DT90S4, 50 Hz, 400 V (IEC)	BMG2	–
	DZ90S4, 60 Hz, 380 V (ABNT)	–	BMG2
	DRE80M4, 60 Hz, 380 V (ABNT)	BE2	BE1
	DRE90M4, 50/60 Hz (global)	BE2	BE1
	DRN90S4, 50/60 Hz (global)	BE2	BE1
	DRS80M4, 50 Hz, 400 V (IEC)	BE2	BE1
	DRS80M4, 60 Hz, 460 V (IEC)	BE2	BE1
	DRE90M4, 50 Hz, 400 V (IEC)	BE2	BE1
	DRE90M4, 60 Hz, 460 V (IEC)	BE2	BE1
	DRN90S4, 50 Hz, 400 V (IEC)	BE2	BE1
	DRN90S4, 60 Hz, 460 V (IEC)	BE2	BE1
	DRN90S4, 60 Hz, 460 V (ABNT)	BE2	BE1
	DR2S80M4, 50 Hz, 400 V (IEC)	BE2	BE1
	DR2S80M4, 60 Hz, 460 V (IEC)	BE2	BE1
	DRE80SJ4, 50 Hz, 400 V (IEC)	BE2	BE1
	DRU90MJ4, 50 Hz, 400 V (IEC)	BE2	BE1
1.5 kW (star connection only)	DT90L4, 50 Hz, 400 V (IEC)	BMG2	–
	DZ90L4, 60 Hz, 380 V (ABNT)	–	BMG2
	DRE90M4, 60 Hz, 380 V (ABNT)	BE2	BE1
	DRE90L4, 50/60 Hz (global)	BE2	BE1
	DRN90L4, 50/60 Hz (global)	BE2	BE1
	DRS90M4, 50 Hz, 400 V (IEC)	BE2	BE1
	DRS90M4, 60 Hz, 460 V (IEC)	BE2	BE1
	DRE90L4, 50 Hz, 400 V (IEC)	BE2	BE1
	DRE90L4, 60 Hz, 460 V (IEC)	BE2	BE1
	DRN90L4, 50 Hz, 400 V (IEC)	BE2	BE1
	DRN90L4, 60 Hz, 460 V (IEC)	BE2	BE1
	DRN90L4, 60 Hz, 460 V (ABNT)	BE2	BE1
	DRE80MJ4, 50 Hz, 400 V (IEC)	BE2	BE1
	DRU90LJ4, 50 Hz, 400 V (IEC)	BE2	BE5

10.8 Information pursuant to EU Ecodesign Regulation 2019/1781

Model identifier		MOVIPRO® PHE advanced
Performance class		015
(1) Power loss in % of the apparent output power	0;25	1.59
	0;50	1.75
	0;100	2.14
	50;25	1.63
	50;50	1.83
	50;100	2.31
	90;50	1.91
	90;100	2.48
(1) Power loss in standby	W	12.0
	%	0.4
(2) Efficiency level according to IEC 61800-9-2		IE2
(3) Manufacturer		SEW-EURODRIVE GmbH & Co KG RG Mannheim, HRB 230207 D-76646 Bruchsal
(5) Apparent output power	kVA	2.77
(6) Indicative motor rated power output	kW	1.50
(7) Rated output current	A	4.00
(8) Maximum operating temperature	°C	40
(9) Rated supply frequency	Hz	50 – 60
(10) Range of rated supply voltage	V	3 × 380 – 500

10.9 Auxiliary axes

MOVIMOT® auxiliary axis		
	X2211	X2201
Power connection	AC 380 – 500 V	DC 600 V
Nominal output voltage		
Power connection	16 A	10 A
Current limiting	Tripping characteristic T for integrated fuses	
Electronic supply	DC 24 V (-15% – +20%)	
Nominal output voltage		
Electronic supply	1.4 A	
Current limiting		
Compatible MOVIMOT® type	MM 03D-503-00 – MM 15D-503-00	
Interface to MOVIMOT®	MOVILINK®	
Type	RS485	
Transmission rate	9600 bit/s (31 250 bit/s) ¹⁾	
Typical cycle times	35 ms , (5 ms) ¹⁾	
Maximum cable length	30 m	

1) The values shown in bold are the default values. The control software can actively switch to the values in brackets.

AC 400 V auxiliary axis	
Power connection	3 × AC 380 – 500 V
Nominal output voltage	
Power connection	16 A
Current limiting	Tripping characteristic T for integrated fuses
Maximum cable length	30 m

10.10 Communication and control unit

10.10.1 Control type



INFORMATION

The overall output power of the 24 V voltage supply at the plug connectors for buses and digital inputs/outputs must not exceed 25 W.



INFORMATION

The total current of all external 24 V consumers may not exceed 1 A at the digital outputs and the communication interfaces (buses).

Micro DLC	
Type	MOVIPRO® Network Controller (MNC)
Potential difference between the digital inputs and outputs	300 V _{RMS}

Binary inputs	
Compatibility	PLC-compatible according to IEC 61131-2:2008-04 "Standard operating ranges for digital inputs (current sinking)"
Internal resistance	≈ 3 kΩ
Current consumption	≈ 10 mA
High level	DC +13 V – +30 V
Low level	DC -3 V – +5 V
Activation delay	Typ. 250 μs
Power off delay	Typ. 250 μs

Binary outputs	
Compatibility	PLC-compatible according to IEC 61131-2:2008-04 "Rated values and operating ranges (DC) for current-sourcing digital DC outputs" All outputs are protected against short circuit and overload and external-voltage-proof up to 30 V.
Output current	Max. DC 500 mA per digital output
Inductive loads	Dissipation of inductive switch-off energy up to 1 J per output Freewheeling diodes are not integrated.
Low level	DC 0 V
High level	DC 24 V
Activation delay	Typ. 110 μs
Power off delay	Typ. 110 μs

24 V voltage supply of the interfaces (buses and digital I/O)	
Nominal voltage	DC 24 V ± 10%
Nominal current	Max. DC 500 mA per connection

24 V voltage supply of the interfaces (buses and digital I/O)

Maximum power consumption of all external 24 V consumers connected to the interfaces	DC 1 A (25 W)
--	---------------

10.11 Safety technology

10.11.1 General Information

Safety characteristics

Approved safety classes of the device	Performance level d according to EN ISO 13849-1
Probability of dangerous failure per hour (PFH value)	1 FIT
Service life	10 years
Safe state	Frequency inverter does not generate a rotating field, torque is switched off (STO), connected brakes are de-energized

10.11.2 STO interfaces

X5502

Control voltage range for a safe state	Pin 2, 4	DC 0 V – 5 V
Maximum permitted residual current in safe state	Pin 2, 4	DC 10 mA
Control voltage range for a non-safe state	Pin 2, 4	DC 18 V – 30 V
Nominal output current	Pin 1, 3	DC 500 mA
Output current limit	Pin 1, 3	Max. DC 2 A (until thermal switch-off)
Power consumption	Pin 2, 4	4 W (plus the additional power at the electronics port of an optional external axis)
Input capacitance	Pin 2, 4	100 µF (plus the additional capacity at the electronics port of an optional external axis)

10.12 Dimension drawings

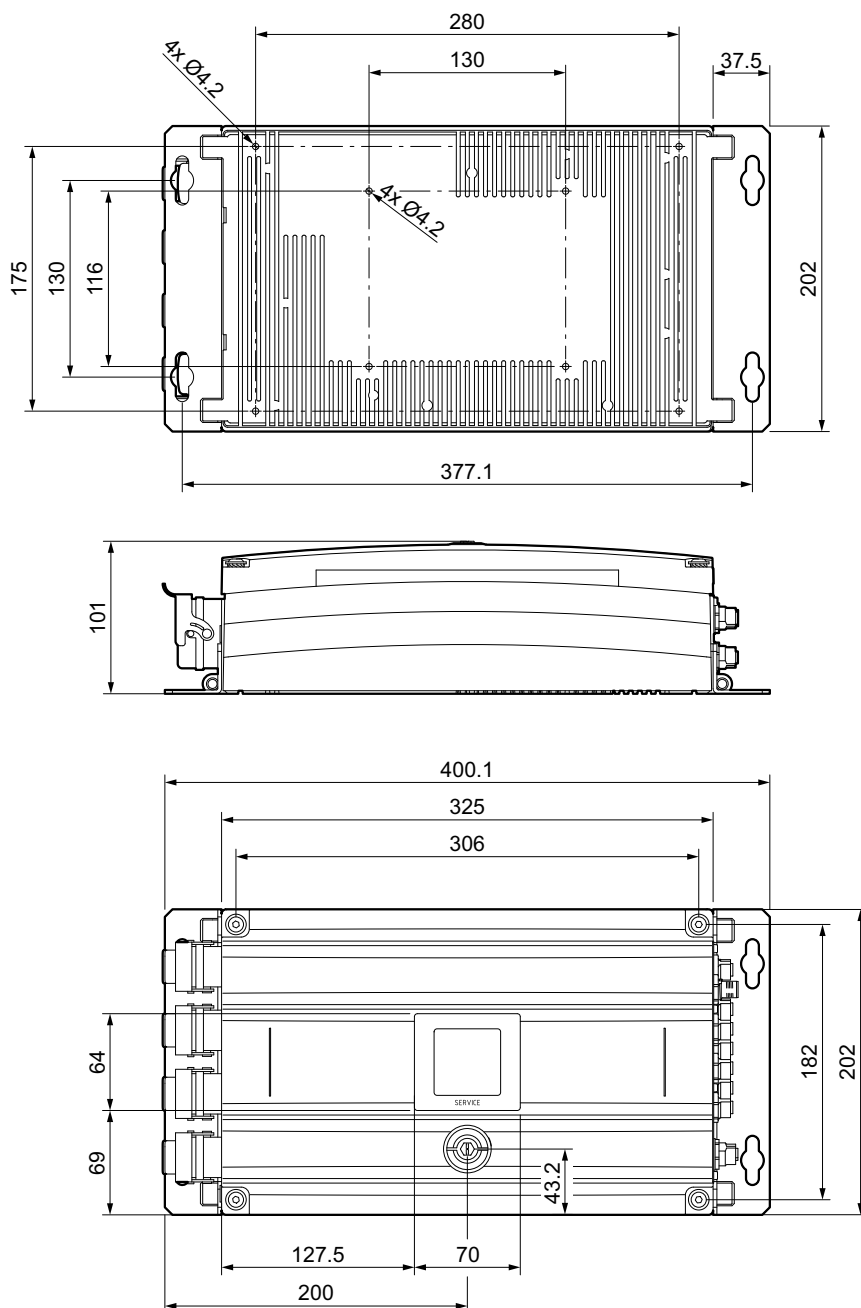
10.12.1 Basic device

INFORMATION



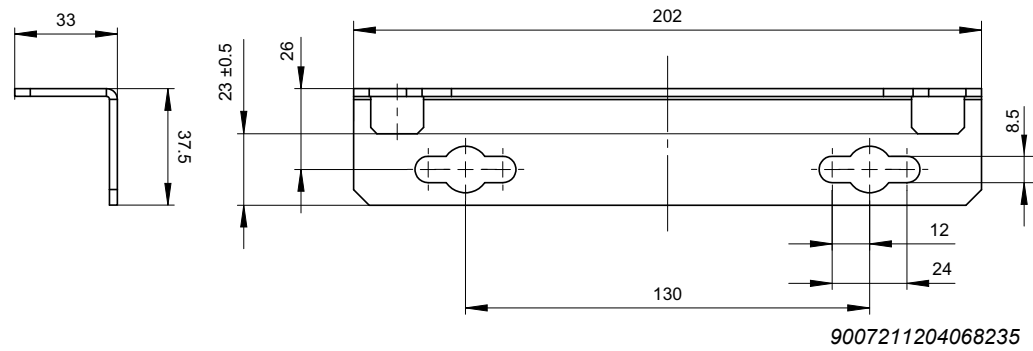
For the connections, connection cables and connected components, observe a clearance of 120 mm to the side.

The dimension drawing shows the mechanical dimensions in mm:



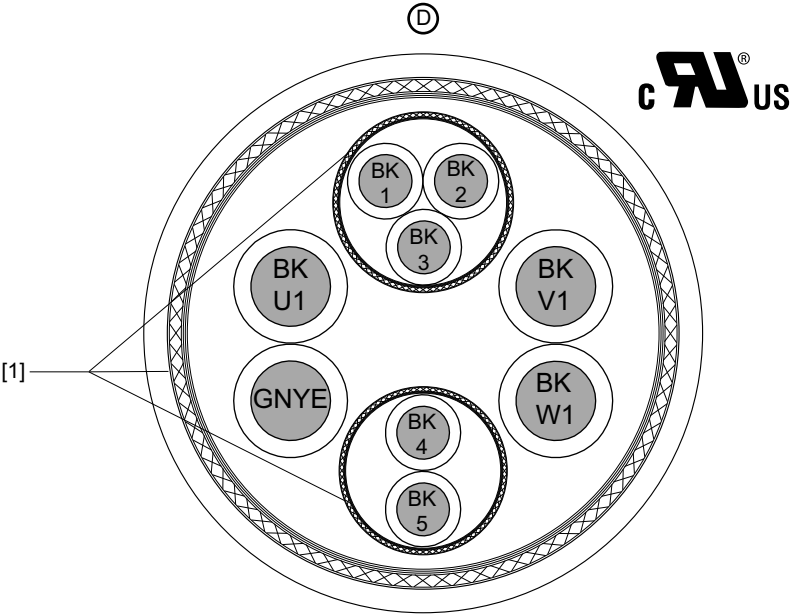
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10.12.2 Mounting bracket



10.13 Hybrid cable type "D"

10.13.1 Mechanical design



5436771083

[1] Shield

Cable type	D/1.5 18110886	D/2.5 11747013	D/4.0 18119573	D/6.0 11747021	D/10.0 11747048
Supply cores	4 × 1.5 mm ²	4 × 2.5 mm ²	4 × 4.0 mm ²	4 × 6.0 mm ²	4 × 10.0 mm ²
Control core pair	2 × 0.75 mm ²	2 × 0.75 mm ²	2 × 0.75 mm ²	2 × 0.75 mm ²	2 × 0.75 mm ²
Brake control	3 × 1.0 mm ²	3 × 1.0 mm ²	3 × 1.5 mm ²	3 × 1.5 mm ²	3 × 1.5 mm ²
Conductor insulation	PP (polypropylene)				
Conductor	Bare E-Cu strand, extra fine wires with individual wire 0.15 mm				
Shield	Made of tinned E-Cu wire				
Overall diameter	15.0 mm	17.2 mm	19.0 mm	21.5 mm	25.3 mm
Color of outer cable jacket	Orange				
Outer cable jacket insulation	TPE-U (polyurethane)				

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10.13.2 Properties

All cable types have the following properties:

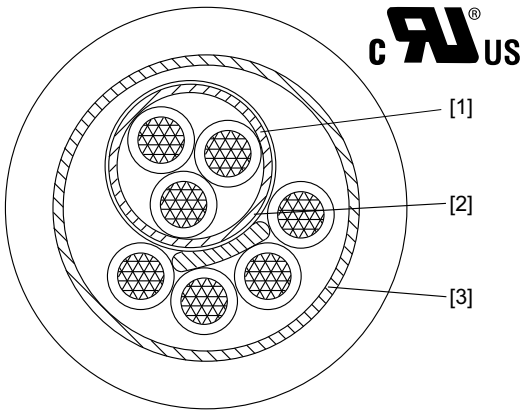
- Maximum 600 V operating voltage for all cores
- Approved according to European and American standards
- Suitable for cable carriers:
 - Bending cycles > 5 million
 - Travel speed $\leq 3 \text{ ms}^{-1}$
 - Minimum bending radius: $10 \times$ cable diameter
- Minimum bending radius for fixed installation: $5 \times$ cable diameter
- Resistance against oil according to VDE 0250 part 407
- General resistance to acids, alkalis, cleaning agents
- General resistance against dusts (e.g. bauxite, magnesite)
- Insulation and jacket material halogen-free
- Within the specified temperature range, free from substances interfering with wetting agents (silicone-free)
- Flame-retardant according to VDE 0472 part 804 (method B IEC 60 332-1)
- Temperature range for processing and operation:

Fixed installation	Cable carrier installation
-40 °C to +90 °C (load capacity according to DIN VDE 0298-4)	-5 °C to +90 °C (load capacity according to DIN VDE 0298-4)
-30 °C to +80 °C according to UL758	-5 °C to +80 °C according to UL758

- Temperature range for transportation and storage:
 - -40 °C to +90 °C (load capacity according to DIN VDE 0298-4)
 - -30 °C to +80 °C according to UL758

10.14 Hybrid cable type "E"

10.14.1 Mechanical design



5436773643

- [1] Shielded "three-conductor" cable
- [2] EMC shielding, "three-conductor" cable
- [3] Plaiting for complete EMC shielding

Cable type	E/1.5 01768948	E/2.5 01768956	E/4.0 00150509	E/6.0 00150630
Supply cores	4 × 1.5 mm ²	4 × 2.5 mm ²	4 × 4.0 mm ²	4 × 6.0 mm ²
Brake control	3 × 1.0 mm ²	3 × 1.0 mm ²	3 × 1.0 mm ²	3 × 1.5 mm ²
Conductor insulation	TPM			
Conductor	Blank CU litz wire			
Shield	Made of tinned Cu wire			
Overall diameter	15.0 mm	16.3 mm	15.3 mm	17.4 mm
Color of outer cable jacket	Orange			
Outer cable jacket insulation	PUR (polyurethane)			

10.14.2 Properties

All cable types have the following properties:

- Maximum 600 V operating voltage for all cores
- Approved according to European and American standards
- Suitable for cable carriers:
 - Bending cycles > 5 million
 - Travel speed $\leq 3 \text{ ms}^{-1}$
 - Minimum bending radius: $10 \times$ cable diameter
- Minimum bending radius for fixed installation: $5 \times$ cable diameter
- Resistance against oil according to VDE 0250 part 407
- General resistance to acids, alkalis, cleaning agents
- General resistance against dusts (e.g. bauxite, magnesite)
- Insulation and jacket material halogen-free
- Within the specified temperature range, free from substances interfering with wetting agents (silicone-free)
- Flame-retardant according to VDE 0472 part 804 (method B IEC 60 332-1)
- Temperature range for processing and operation:
 - $-50 \text{ }^{\circ}\text{C}$ to $+80 \text{ }^{\circ}\text{C}$
 - $-20 \text{ }^{\circ}\text{C}$ to $+60 \text{ }^{\circ}\text{C}$
- Temperature range for transportation and storage:
 - $-40 \text{ }^{\circ}\text{C}$ to $+90 \text{ }^{\circ}\text{C}$ (load capacity according to DIN VDE 0298-4)
 - $-30 \text{ }^{\circ}\text{C}$ to $+80 \text{ }^{\circ}\text{C}$ according to UL758

Index

A

Accessories	20
Acknowledging fault messages	91
Angle bracket	40
Assembly	
Safety notes	12

B

Block diagram	21, 23
Brake control	25

C

Cable	60
Cable design	61
Cable routing	54
CDF, see cyclic duration factor	87
Cleaning	91
Conditions, safety	32
Requirements for the installation	32
Requirements for the safety controller	33
Requirements on startup	34
Conditions, safety-related	
Requirements for operation	34
Connection cable	60
Connection component	
CAN terminating resistor	75
Connection components	
50 Ω terminating resistor	76, 78
ID module	79
STO jumper plug	83
THM20C/THM20E pick-ups	62
USM21A interface adapter	73
Connection via M12 plug connector	
External safety relay	35
Connections	60
Contactless energy transfer system	51
Contactors	44
Controller	26
Controller type	26
Cooling	39
Derating	11, 98
Installation altitude	11, 98
Copyright notice	7

D

Decimal separator	7
Derating	11
Diagram	98
Designated use	10
Designation	
Short name of the device	16
Device	
Shutting down the device	92
Device configuration	84
Device designation	15
Device overview	19
Dimension drawing	108
Dimension drawings	
Basic device	108
Mounting bracket	109
Discharge measures	53

E

Electrical hazard	49
Electrical installation	12, 41, 45
Cable routing	54
Safety notes	12
Electromagnetic compatibility (EMC)	41, 45
Electronics Service	91
Embedded safety notes	6
EMC (electromagnetic compatibility)	41, 45
EMC conditions	32
EMC-compliant installation	42, 46
Ethernet	27
Extended storage	93
External safety controller, requirement for	33
External safety relay, requirement for	33

F

Fieldbus interface	27
Frequency inverter	25
Function units	25
Functional principle	21, 23
Functional safety technology	
Safety note	11
Fuse	43

G

Ground connection	49, 50
Grounded star point.....	41

H

Hybrid cables.....	32
Cable type "D"	110
Cable type "E"	112

I

Information	
Designation in the documentation	6
Infrared interface	27
Input fuse	43
Inspection	90
Installation	39
Ground connection	49
Low-voltage supply systems	41
UL-compliant	47
Installation notes	41, 45
Derating	11
Installation altitude > 1000 m	11
Installation regulations.....	32
Insulation monitor	41
Integrated safety technology	29
Safety subfunctions	30
IT system	41

L

Limitations	31
Line fuse	43
Line protection	43

M

MAC address label	18
Maintenance	90
Marks	96
Maximum line length	35
Mechanical installation	36
Cooling	39
Installation	39
Minimum clearance	37
Mounting position	37
Waste heat	39
Memory card	
Device replacement.....	90

Micro DLC.....	26
Minimum clearance	37
Motor types	25, 54
Mounting position	37
MOVIMOT®.....	25
MOVITRANS® mobile converter	28

N

Nameplate	17
Nomenclature	15

O

Operating modes	87
Operation	
Operating modes	87
Safety notes	14

P

Parameterization	84
Pressure compensation element.....	28
Preventive measures against electrical hazards .	49
Probability of a dangerous failure.....	33
Product names	7
Protective bonding.....	49
Protective separation.....	13
Pulse code measuring process	41

R

RCD (residual current device)	43
Relative cyclic duration factor.....	87
Remove stored data	94
Removing jumpers	33
Repair	90, 91
Replacing devices	90
Requirement	
For external safety controller.....	33
For installation	32
For operation	34
For startup	34
Reset	91
Reset, manual	91
Residual current device	43
Restriction of use.....	11
Rights to claim under limited warranty	7
RS485 service interface	26
RS485 – Service	73

S

Safe state	29
Safety conditions	32
Safety controller, requirement for	33
Safety functions	11
Safety notes	
Assembly	12
Designation in the documentation	6
Installation	12
Installation altitude > 1000 m	11
Operation	14
Preliminary information	8
Startup	14
Structure of section-related	6
Safety relay	
Requirement for	33
Safety subfunctions	30
SS1-t – Safe Stop 1	30
STO – Safe Torque Off	30
Safety technology	29
Limitations	31
Safe state	29
Technical data	107
Safety-relevant conditions	32
Scope of delivery	16
SD memory card	
Device replacement	90
Section-related safety notes	6
Separation, protective	13
Service	
Device replacement	90
Replacing devices	90
Service unit	26
Shielding	55
Short designation	16
Shutdown	92
Signal words in safety notes	6
Software	84
SS1-t – Safe Stop 1	30
Startup	
Device configuration	84
Safety notes	14
Status display	26, 91
STO – Safe Torque Off	30
Storage	92

T

Target group	9
Technical data	96
Input data	99
Motor types	101
Output data	99
Safety technology	107
Terminal strip	56
TN system	41
Trademarks	7
Transport	12
TT system	41
Type designation	15

U

UL-compliant installation	47
Use	10

V

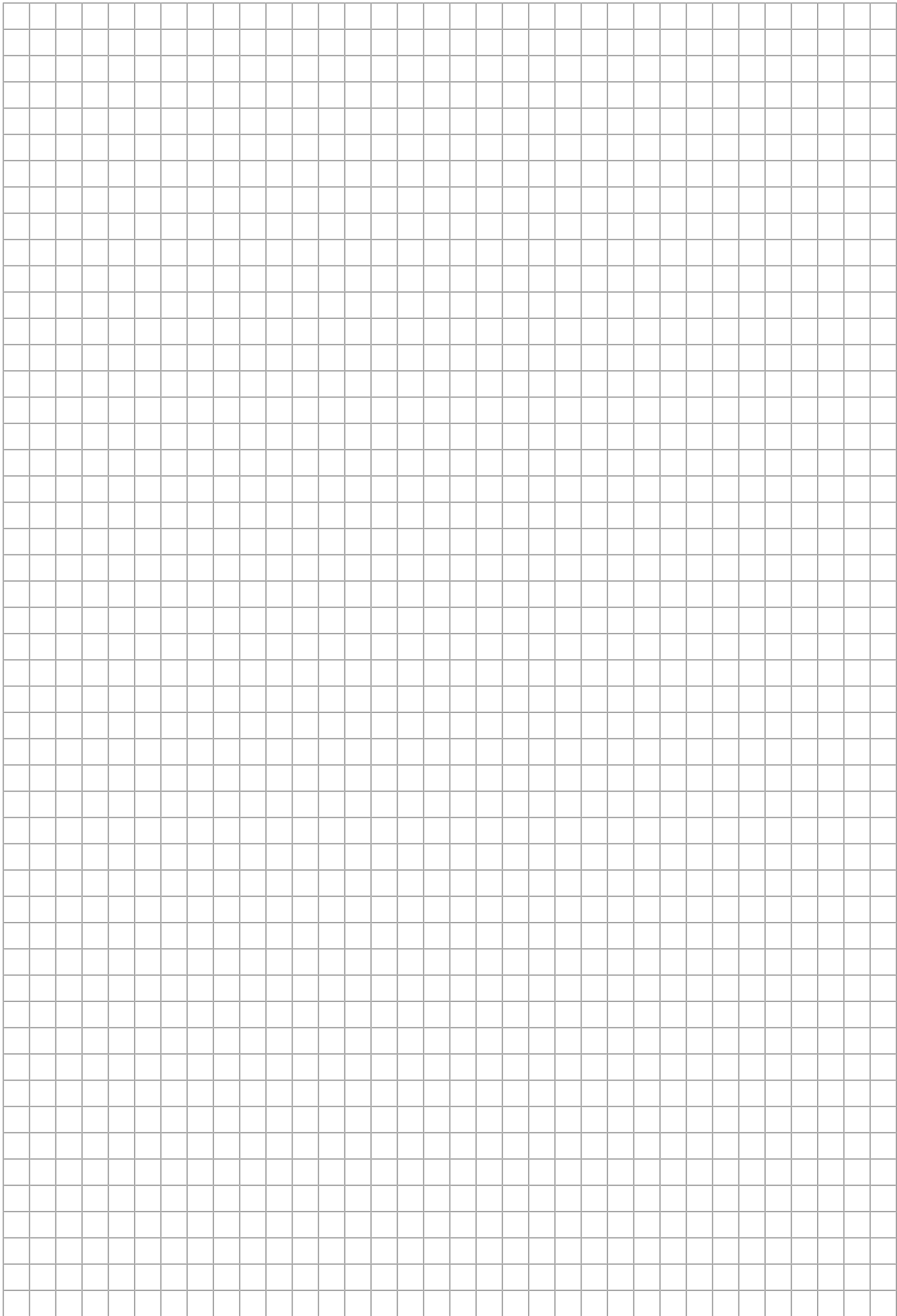
Verification of disconnection devices	34
Verifying safety functions	34

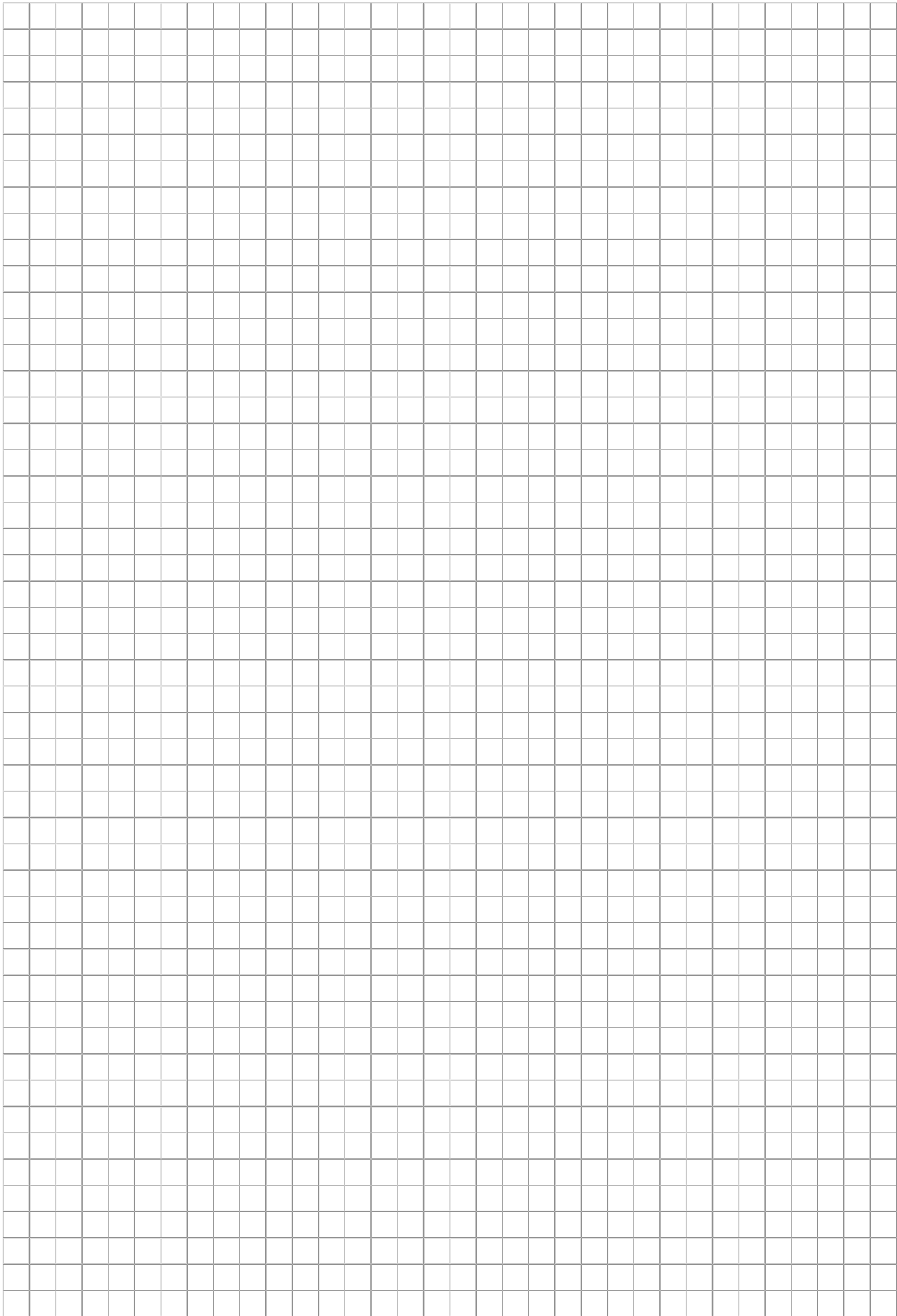
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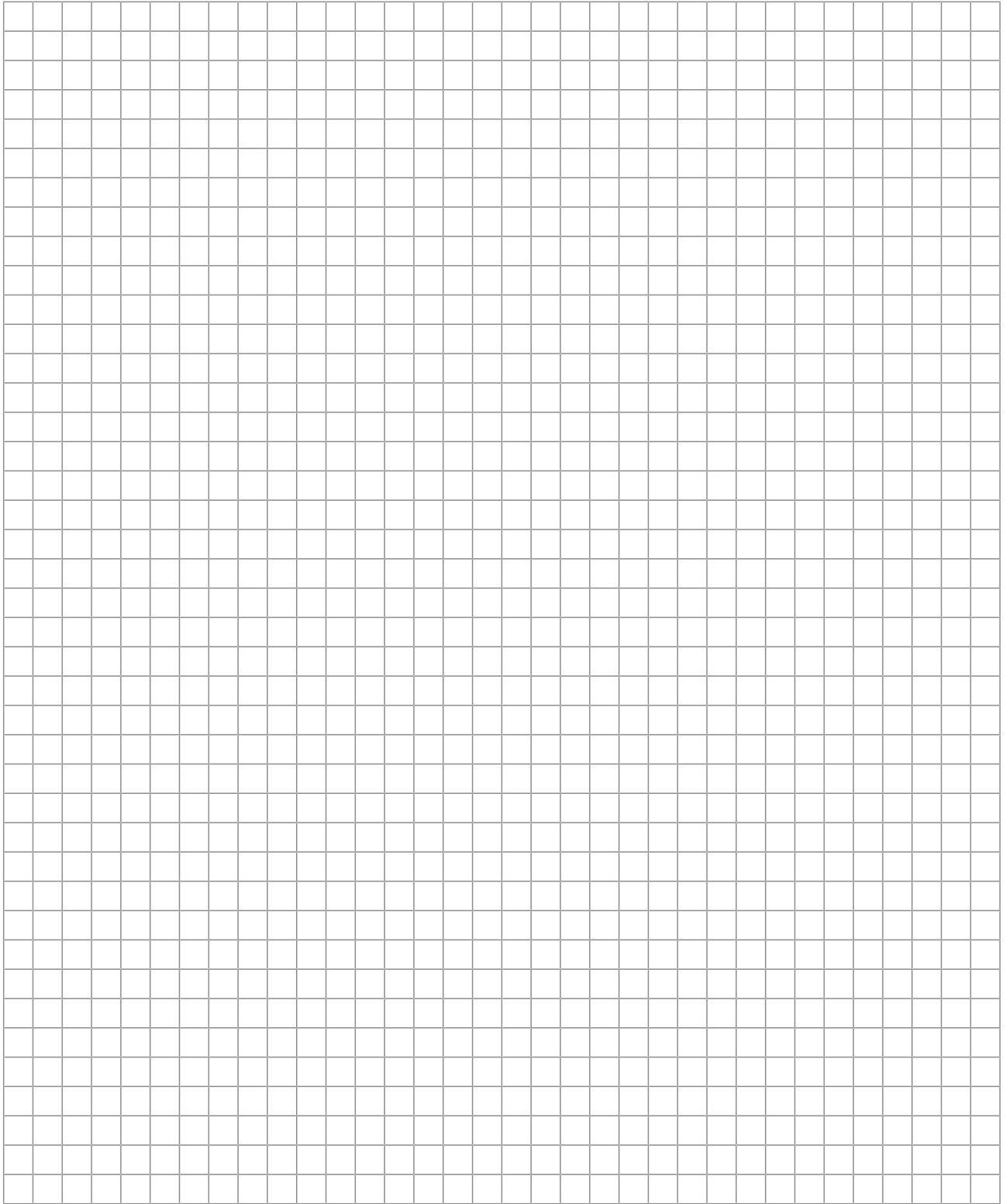
Warning notes	
Structure of the embedded safety notes	6
Waste heat	39
Wiring diagrams	60
Wiring specifications	33
WLAN	27

X

X1021	62
X1201	63
X2011	65
X2201	68
X2211	70
X4011	72
X4022	73
X4111	74
X4211	76
X4233	77
X4261	78
X4401	79
X5002	80, 81, 82
X5502	83









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