SEW EURODRIVE

Operating Instructions

Decentralized Drive and Application Controller

MOVIPRO® PHC22A-A150M1-E25A-99/S11

with connection for energy management

Edition 03/2015

21356203/EN

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1 General information

1.1 About this documentation

This documentation is an integral part of the product. The documentation is intended for all employees who perform assembly, installation, startup, and service work on the product.

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

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

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

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

1.2.2 Structure of section-related safety notes

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

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

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard

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Hazard symbol	Meaning
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of risk of crushing
	Warning of suspended load
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

- ⚠ **SIGNAL WORD** Type and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the hazard.

1.3 Rights to claim under limited warranty

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

1.4 Exclusion of liability

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

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1.5 Other applicable documentation

Observe the corresponding documentation for all connected devices. Observe the following documentation in addition to the operating instructions:

Title	Part number
"MOVIPRO® Functional Safety" manual	19289626/EN
"Drive Power Solution – MOVI-DPS Energy Interface EKK-A-....-I06-500-.-0/E1." operating instructions	21293007/EN

1.6 Product names and trademarks

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

1.7 Copyright notice

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2 Safety notes

2.1 Preliminary information

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The user must ensure that the basic safety notes are read and observed. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the operating instructions carefully and understood them. If you are unclear about any of the information in this documentation, or if you require further information, please contact SEW-EURODRIVE.

The following safety notes are primarily concerned with the use of the unit described in these operating instructions. If you use other components from SEW-EURODRIVE, also refer to the safety notes for these particular components in the corresponding documentation.

Please also observe the supplementary safety notes in the individual chapters of this documentation.

2.2 General information

⚠ WARNING

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

Severe or fatal injuries.

- All work related to transportation, storage, installation, assembly, connection, startup, maintenance, and repair may only be carried out by qualified personnel, in strict observance of
  - The relevant detailed documentation
  - The warning and safety signs on the unit
  - All other relevant project planning documents, startup instructions and wiring diagrams
  - The specific regulations and requirements for the system
  - The national/regional regulations governing safety and the prevention of accidents.
- Never install damaged products.
- Submit a complaint to the shipping company immediately in the event of damage.

Removing covers without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to machinery.

Refer to the following chapters for more information.

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2.3 Target group

Mechanical work of any kind may be carried out only by trained 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 have the following qualifications:

- Training in mechanical engineering (for example, as a machinist or mechatronics technician) and the successful completion of final examinations.
- Knowledge of this documentation.

Electrical work of any kind may be carried out only by skilled persons. In the context of this documentation, skilled persons are persons who are familiar with the electrical installation, startup, troubleshooting, and maintenance of the product and who have the following qualifications:

- Training in electrical engineering (for example, as an electronics technician or mechatronics technician) and the successful completion of final examinations.
- Knowledge of this documentation.

In addition to that, they must be familiar with the relevant safety regulations and laws, especially with the requirements of the performance levels in accordance with DIN EN ISO 13849-1 and all other standards, directives and laws specified in this documentation. The above-mentioned persons must have the express authorization of the company to operate, program, parameterize, identify, and ground units, systems, and circuits in accordance with safety technology standards.

All work in the areas of transportation, storage, operation, and waste disposal must be performed by suitably trained personnel.

2.4 Designated use

The device can be used in mobile and stationary operation in industrial and commercial plants for the operation of AC asynchronous motors with squirrel cage rotor or permanent-field AC synchronous motors. The motors must be suitable for operation with frequency inverters. Do not connect any other loads to the device. The device can take on control and communication tasks.

In case of installation in electrical systems or machines, startup of the device (i.e. start of designated operation) is prohibited until it is determined that the machine meets the requirements stipulated in the EC Directive 2006/42/EC (Machinery Directive). Observe standard EN 60204-1. Startup (i.e. the start of designated use) is only permitted under observance of the EMC Directive (2004/108/EC).

The unit meets the requirements stipulated in the Low Voltage Directive 2006/95/EC. The standards included in the declaration of conformity are used for the unit.

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

2.5 Functional safety technology

The unit may not perform safety functions without higher-level safety systems unless these functions are described and expressly permitted in the relevant documentation.

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2.6 Transport

Inspect the shipment for transport damage as soon as you receive the delivery. Inform the shipping company immediately of any damage. If necessary, put startup on hold.

Note the following points regarding transport:

- Before transportation, cover the connections with the supplied protection caps.
- Place the unit only on the cooling fins or on a side without connectors during transportation.
- Ensure that the unit is not subjected to mechanical impact during transportation.

If necessary, use suitable, sufficiently rated handling equipment. Prior to startup, remove the transport protection.

Observe the information on climatic conditions as stated in chapter "Technical Data".

2.7 Installation/assembly

Ensure that the unit is installed and cooled according to the regulations in the related documentation.

Protect the unit from excessive strain. Especially during transportation and handling, do not allow the components to be deformed or insulation spaces altered. Electrical components must not be mechanically impaired or irreparably damaged.

The following applications are prohibited unless explicitly permitted:

- Use in potentially explosive atmospheres
- Use in environments exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in applications that are subject to mechanical vibration and impact loads in excess of the requirements in EN 61800-5-1.

Observe the notes in the "Mechanical installation" chapter.

2.8 Electrical connection

Observe the applicable national accident prevention regulations when working on a live unit.

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

Preventive measures and protection devices must meet the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

Necessary preventive measures for mobile use:

Type of energy transfer	Preventive measure
Direct power supply	• Ground connection
MOVITRANS® contactless energy transfer system	• Protective separation DIN VDE 0100-410 / IEC 60364-4-41 • Electrostatic discharge (ESD) protection

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Necessary preventive measures for stationary use:

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

2.9 Safe disconnection

The unit meets all requirements for the safe disconnection of power and electronics connections in accordance with EN 61800-5-1. To ensure safe disconnection, all connected circuits must also comply with the requirements for safe disconnection.

2.10 Startup/operation

⚠ CAUTION

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

Injury

- Secure hot surfaces by covering them.
- Install the protection devices according to the regulations.
- Check the protection device at regular intervals.
- Let the unit and the connected options cool down before you start working on them.

Do not deactivate monitoring and protection devices even for a test run.

When in doubt, switch off the unit whenever changes occur in relation to normal operation (e.g. increased temperatures, noise, oscillation). Determine the cause of the fault and consult SEW-EURODRIVE, if necessary.

Where required, systems in which such units are installed must be equipped with additional monitoring and protection devices in accordance with the respective applicable safety regulations, e.g. the law governing technical equipment, accident prevention regulations, etc.

Additional protective measures may be necessary for applications with increased hazard potential. You must check the functionality of protection devices each time you change the configuration.

Connections that are not being used must be covered with the supplied protection caps during operation.

Do not touch live components or power connections immediately after disconnecting the unit from the voltage supply because some capacitors may still be charged. Adhere to a minimum switch-off time of 10 minutes. Observe the corresponding labels on the unit.

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

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

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive re-starting automatically. If, for safety reasons, this is not permitted for the drive-controlled machine, disconnect the unit from the supply system before correcting the error.

2.11 Inspection/maintenance

⚠ WARNING

Danger of electric shock due to exposed, live parts in the unit.

Severe or fatal injuries

- Never open the unit.
- Only SEW-EURODRIVE is authorized to carry out repairs.

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3 Unit structure

3.1 Type designation

The type designation of the drive and application controller MOVIPRO® PHC22A-A150M1-E25A-99/S11 includes the following characteristic unit data:

PHC22A	MOVIPRO® drive and application controller
-	
A	Energy supply: Three-phase alternating current
150	Rated input power: 15 kW
M1	1 integrated power section
-	
E2	Fieldbus connection: PROFINET IO
5A	Function level: CCU
-	
99	Unit design: customer specific unit
/	
S11	PROFIsafe option S11

3.2 Scope of delivery

The following components are included in the scope of delivery:

Component	Part number
PHC22A-A150M1-E25A-99/S11	18258964
SD memory card OMC41B-T1	18228771
Protective covers for all plug connectors	-
Grounding kit	12704628
Jumper plug energy management	18166903

3.3 Short designation

The following short designations are used in this documentation:

Type designation	Short designation
PHC22A-A150M1-E25A-99/S11	Unit

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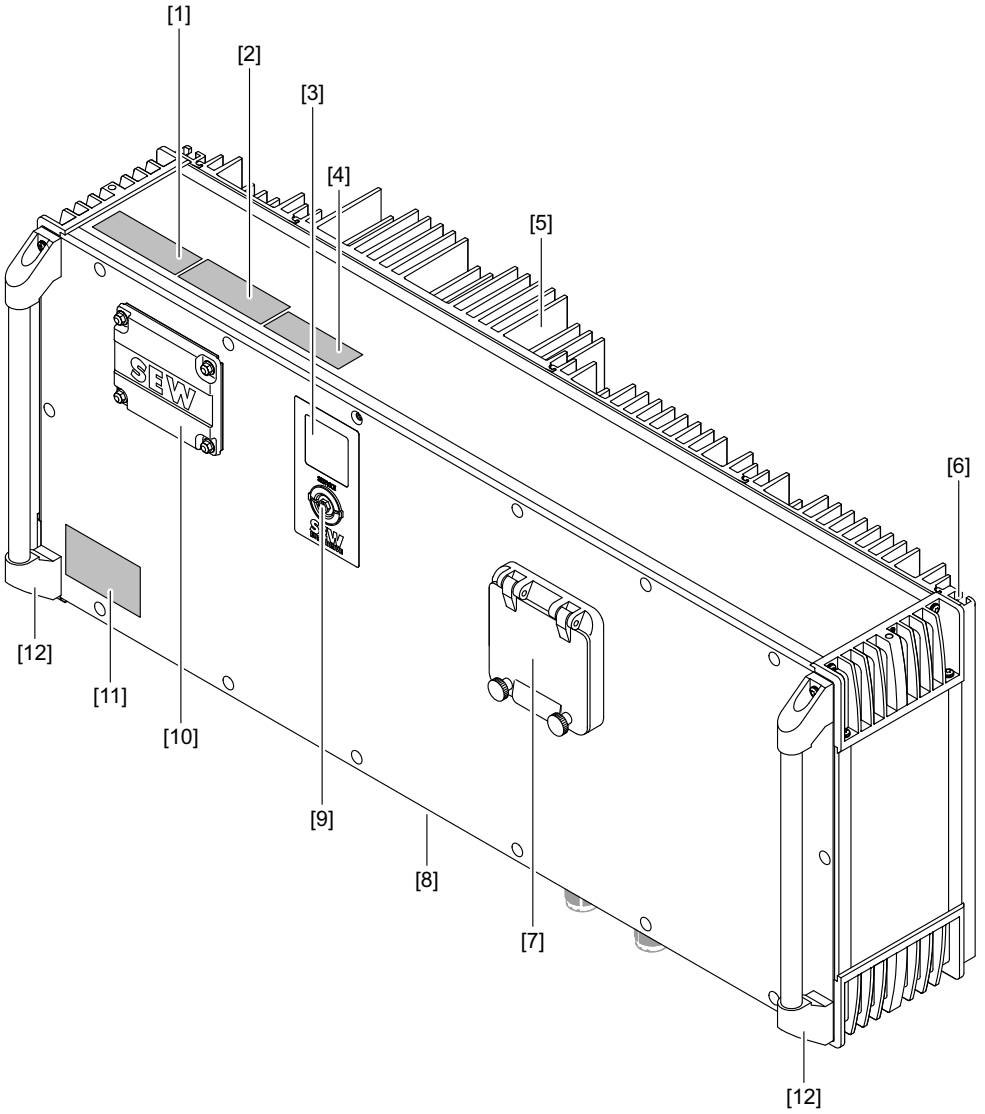
3.4 Unit overview

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



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[1] Main nameplate
[2] Nameplate of function modules (optional)
[3] Status display
[4] MAC address label
[5] Cooling fins
[6] T-slot profile
[7] Miniature circuit breaker (optional)
[8] Connection block
[9] Service interface
[10] Memory card cover
[11] Connection block label
[12] Handles (optional)

You can equip the unit with handles for easier handling. For more information, refer to the Addendum to the "MOVIPRO® – Accessories" operating instructions.

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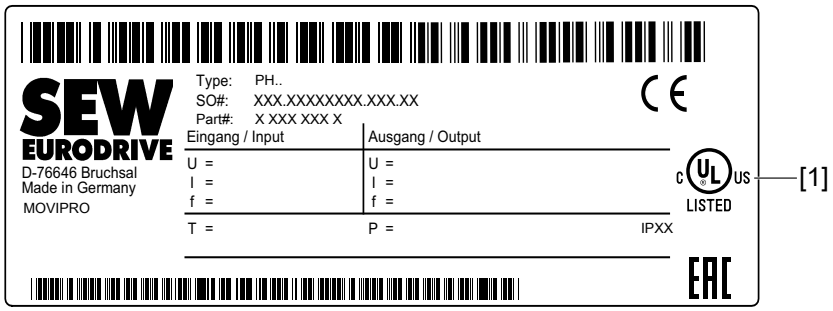
3.5 Labels on the unit

3.5.1 Main nameplate

The following figure shows an example of a nameplate:



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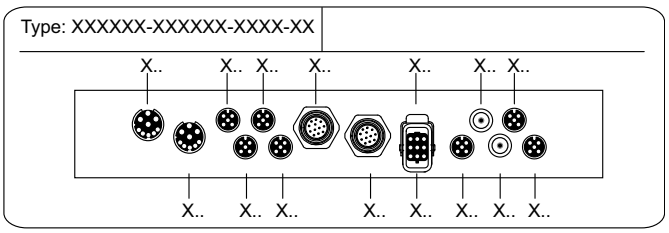
[1] UL approval depending on the unit variant

The main nameplate lists the following information:

- Type designation (*Type*)
- Production number (*SO#*)
- Part number (*Part#*)
- Voltage (*U*)
- Current (*I*)
- Frequency (*f*)
- Ambient temperature (*T*)
- Rated output power (*P*)
- Degree of protection (*IP*)

3.5.2 Connection block label

The designations of the individual connections of the unit are given on the connection block label. The following figure shows an example of a connection block label:



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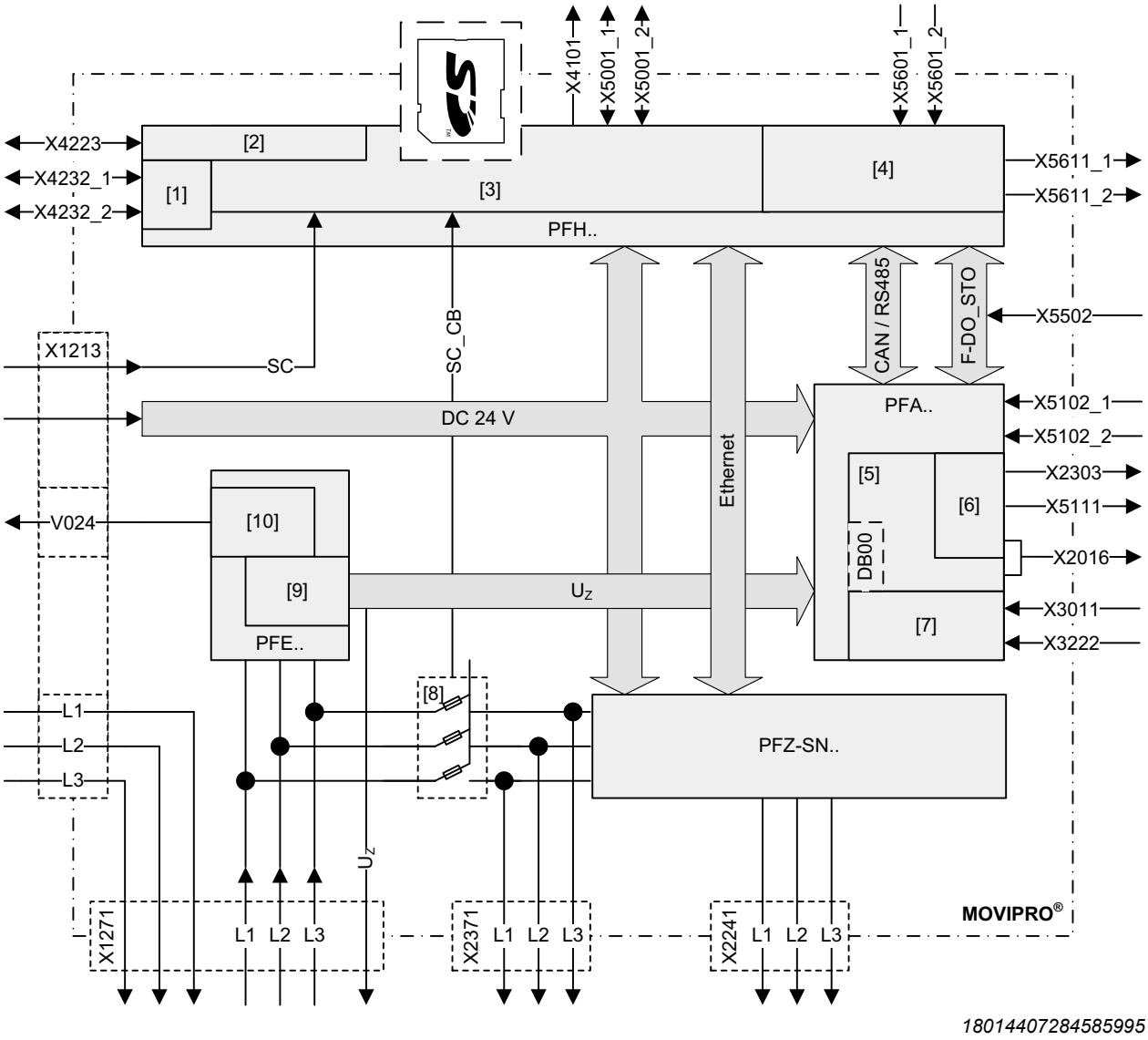
3.6 Operating principle

The block diagram below shows the basic structure of the unit. The following section describes the internal elements:



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PFH.. – Communication and control unit

[1] PROFINET fieldbus unit (→ 🗎 19)

[2] Service unit (→ 🗎 21)

[3] Processing unit (→ 🗎 20)

[4] PROFIsafe option S11 (→ 🗎 20)

PFA.. – Internal axis

[5] Frequency inverter on MOVIDRIVE® basis (→ 🗎 19)

[6] Safety-relevant BST brake module

[7] Encoder evaluation (→ 🗎 19)

PFZ-SN.. – Actuator module

[8] Circuit breaker (→ 🗎 17)

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[C] Power supply PFE..

[9] Supply system rectifier (→ 🗎 18)

[10] 24 V power supply unit for internal components (→ 🗎 18)

3.7 Function Units

3.7.1 Actuator module PFZ-SN..

The actuator module PFZ-SN.. modulates the SNI signal onto the supply system cable. This means the same cable is used for communication and power supply of the connected components (**SNI** = **S**ingle Line **N**etwork **I**nstallation). The actuator module PFZ-SN.. can service up to 10 SNI actuators.

The NET LED indicates the communication status between the application controller and component. For the position of the NET LED on the application controller, refer to chapter "Electrical Connections" (→ 🗎 46). For information about the status messages output by the NET LED, refer to chapter "Operation".

Circuit breaker

NOTICE

Increased wear on contacts caused by activating the miniature circuit breaker in energized state

Damages to the unit

- Always actuate the miniature circuit breakers in a de-energized state.

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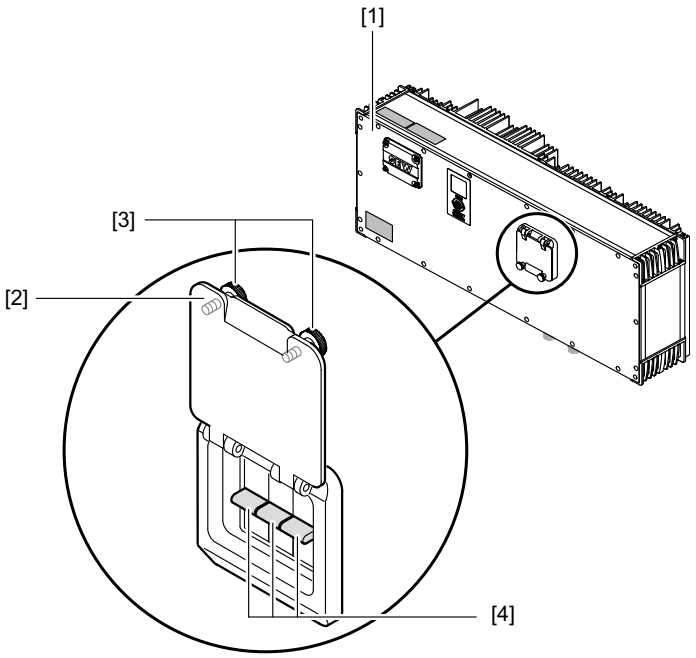
The miniature circuit breakers are located below a plastic cover that is secured by screw plugs:



9007205082719883

[1] Unit
[2] Plastic cover
[3] Screw plugs
[4] Miniature circuit breaker

The miniature circuit breakers protect the line phases leading out of the following plug connectors from overcurrent:

- X2241, AC 400 V output for unit supply with Single Line Network Installation (SNI)
- X2371, AC 400 V output to supply external devices

3.7.2 PFE.. power supply

When MOVI-DPS EKK is connected

Refer to section "Safety notes" > "Startup/operation" in the operating instructions "MOVI-DPS energy and power interface EKK-A-....-I06-500-0-0/E..".

24 V power supply unit for internal components

The unit is equipped with an integrated power supply that uses the DC link voltage to generate a DC 24 V supply for internal components.

Supply system rectifier

Energy is supplied to the unit via a three-phase alternating current supply system and a line rectifier. The line rectifier supplies the DC link voltage.

3.7.3 Internal axis PFA..

The function module consists of the following internal elements.

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Frequency inverter on MOVIDRIVE® basis

The frequency inverter controls synchronous and asynchronous motors. For further information on system properties and motor assignment refer to the "MOVIDRIVE® MDX60B/61B" system manual.

Encoder evaluation

Encoder evaluation enables the drive inverter to control different motor types, such as synchronous servomotors. For detailed information on encoder evaluation, refer to section "Technical data > Axis data".

Motor types

The unit supports the following motor series from SEW-EURODRIVE:

- DRE..
- DRS..
- DRP..
- CM..

Safety-relevant BST brake module

⚠ WARNING

Failure of the BST safety-related brake module and sudden brake application if performance data are exceeded.

Severe or fatal injuries.

- For safety applications observer the information in the "MOVIPRO® – Functional safety" manual.

The safety-related BST brake module supplies and controls the SEW-EURODRIVE disc brakes connected to the motors. Only use approved disk brakes. Redundant systems may use multiple brake coils.

Observe the maximum voltage and power levels. For more information, refer to section "Technical Data". For information on the control outputs, refer to section "Startup" > "Brake module control".

For further information, refer to the following documentation:

- "Safety-Related BST Brake Module" operating instructions
- "MOVIPRO® Functional Safety" manual

3.7.4 Communication and control unit

The function module consists of the following internal elements.

PROFINET fieldbus unit

The device has a PROFINET module for connection to the fieldbus. The bus is connected via plugs as described in chapter "Electrical connections".

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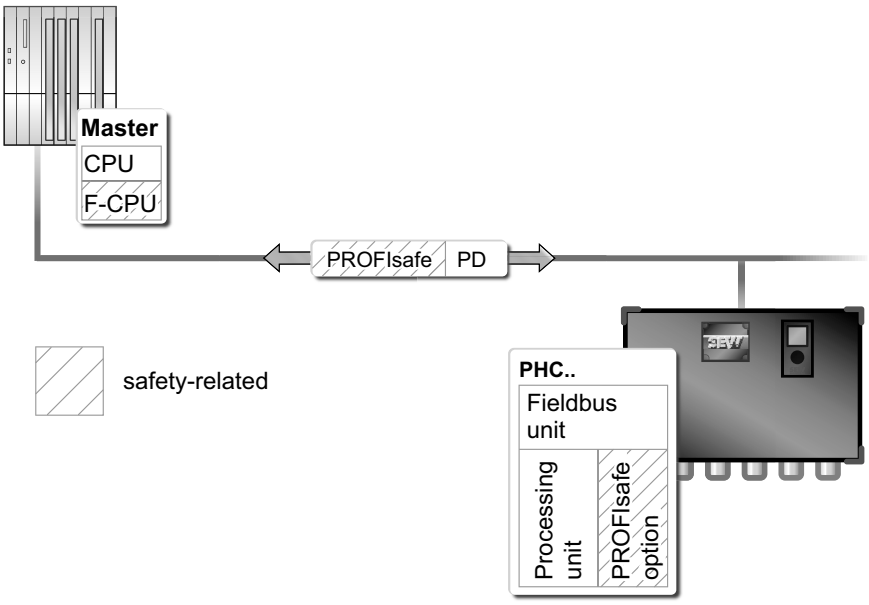
PROFIsafe option S11

The application controller supports parallel operation of standard and safety-related communication via a bus system or network. The safety-related PROFIsafe communication can be carried out via PROFINET.

The data exchange between bus master and application controller takes place via the respective communication system that simultaneously acts as a "gray channel" for the safety-related application. The transmitted bus messages contain standard information for conventional application controller operation and the PROFIsafe safety telegram. Depending on the configuration, the maximum available expansion level enables exchanges of PROFIsafe safety data, parameter and process data between the bus master and the application controller.

The following figure outlines the communication:



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Processing unit

The unit is equipped with a MOVI-PLC® processor unit.

The engineering of the communication and control unit comprises the following activities:

- Configuration
- Parameterization
- Programming

These activities are carried out using MOVITOOLS® MotionStudio engineering software. The software enables startup and error diagnostics for all SEW-EURODRIVE units. The unit is connected to the engineering computer via the service interface.

For further information, refer to the "Controller DHE21B / DHF21B / DHR21B (standard), DHE41B / DHF41B / DHR41B (advanced)" manual.

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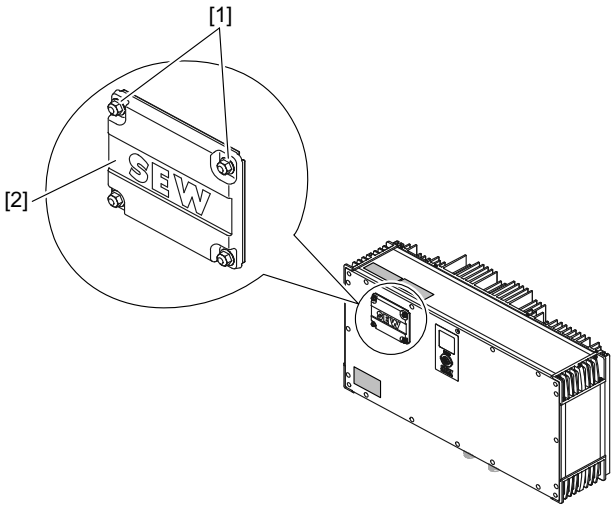
SD memory card

The slot for the memory card is located under the memory card cover on the top of the unit. The cover ensures the degree of protection of the unit and enables easy access in the event of a required replacement or any other maintenance procedures.

The following figure shows the memory card cover:



27021598965048843

[1] Retaining nuts (4×)
[2] Memory card cover

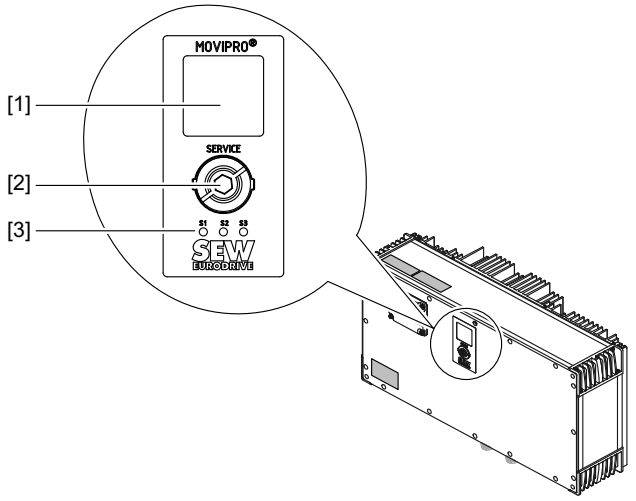
Removing the memory card cover

1. Loosen the 4 retaining nuts.
2. Lift the memory card cover upwards.

Service unit

The service unit is used for startup, diagnostics and maintenance of the unit. It is equipped with a status display, 3 status LEDs and a service interface.

The following figure shows the service unit:



9007207512455435

[1] Status display
[2] Ethernet service interface (Ethernet RJ45)
[3] Status LED

The status display and status LEDs display status and error messages and thus enable you to record the current state of the unit.

For further information, refer to section "Operation" >"Status messages" and the documentation of the application software.

The Ethernet service interface connects the unit with an engineering PC for configuration and maintenance purposes.

Ethernet service interface:

- Standard IP address: 192.168.10.4
- Subnet mask: 255.255.255.0

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4 Integrated safety technology

⚠ WARNING

Failure of the safety components due to improper startup.

Severe or fatal injuries.

- Only use the unit in combination with functional safety technology when you have the "MOVIPRO® – Functional Safety" manual at hand and you have ensured compliance with the requirements for operation with functional safety.

4.1 Standards

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

- DIN EN 1037: 2008
- EN ISO 13849-1: 2008
- EN ISO 13849-2: 2008

4.2 Safety functions

You can use the following drive-related safety function:

- STO – Safe Torque Off according to EN 61800-5-2: 2007
- SS1(c) Safe Stop 1 – function variant c according to EN 61800-5-2: 2007
- SBC – Safe Brake Control according to EN 61800-5-2: 2007

4.3 Safety concept

The following safety concepts can be realized with this unit:

- Axis module with safe torque off
- Safety-related brake module
- PROFIsafe option S11

4.4 Additional information

For detailed information, refer to the "MOVIPRO® – Functional Safety" manual.

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5 Mechanical installation

5.1 Requirements

⚠ WARNING

Risk of crushing if the load falls

Severe or fatal injuries

- Do not sit or stand underneath the load.
- Secure the area in which the mechanical installation is to take place.

NOTICE

Risk of collision

Damage to plant and unit components

- Always position the unit in such a way that it will not collide with other components or design elements along the travel route.

The following preconditions must be fulfilled for the mechanical installation:

- Trained specialists perform the installation.
- The information provided in the technical data and the permitted conditions for the operating location of the unit are observed.
- The minimum clearance and distance and the required gaps for using a mounting plate are complied with; see the "Minimum clearance" section.
- The unit is only mounted using the intended mounting options.
- The selection and dimensioning of the mounting and locking elements are in line with the applicable standards, the technical data of the units and the local requirements.
- The bore dimensions are calculated in line with the particular method of fastening. See the following sections.
- The mounting and locking elements fit into the existing bores, threads and countersinks.
- All display and actuator elements are visible and accessible after installation.

5.1.1 Mounting position

The mounting position for units with cooling fins depends on the application:

Application	Mounting position	Speed	Power reduction
Stationary	Vertical [1]	-	-
	Horizontal [2]		50%
Mobile	Vertical [1]	Slow traveling velocity ≤ 0.5 m/s	-
	Horizontal [2]		50%
	Vertical [1]	Fast traveling velocity > 0.5 m/s	-
	Horizontal [2]		-

In stationary applications, the horizontal mounting position [2] causes a power reduction of 50% due to reduced convection.

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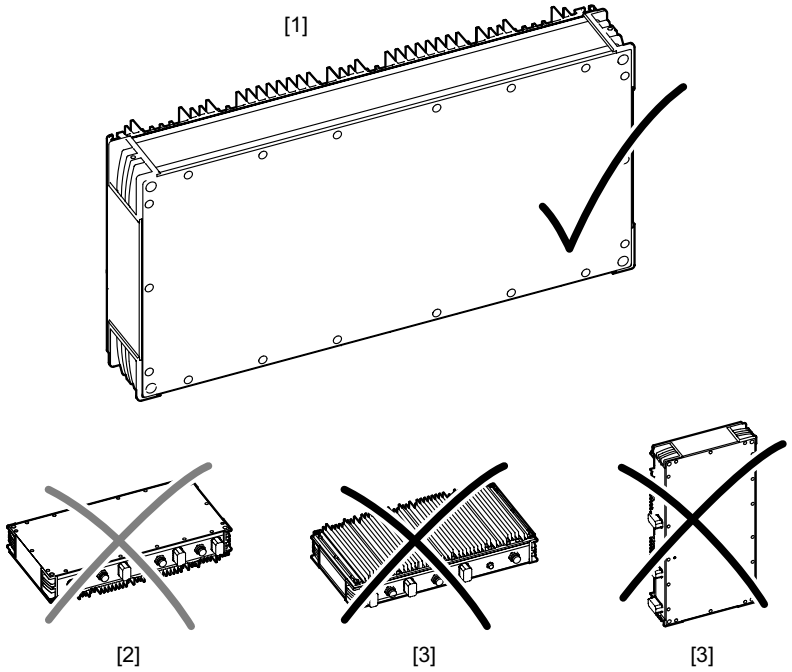
When using a horizontal mounting position for a mobile application, the cooling fins must be parallel to the travel direction so that sufficient cooling and convection are possible.

The following figure shows permissible and impermissible mounting positions:



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[1] Permissible vertical mounting position
[2] Conditionally permitted horizontal mounting position
[3] Impermissible mounting positions

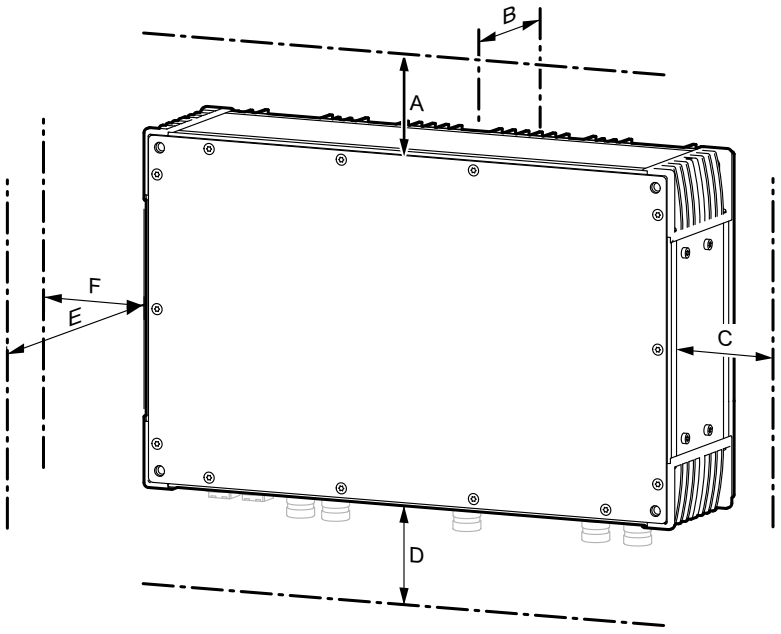
5.1.2 Minimum clearance

INFORMATION

- Make sure to provide the required minimum clearance when installing for:
  - the connection of the cables and plug connectors
  - Handling the display elements, diagnostics elements and actuator elements
  - heat convection at the level of the cooling fins, if installed
- Refer to the dimension drawing in the chapter "Technical data" for information on the required space.

Vertical installation

The following figure shows the required minimum clearance sizes of the unit:



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Refer to the following table for the minimum distance sizes and minimum clearance sizes:

Clearance	Function	Size
A: Above	Space for optimum heat convection: The cooling fins may not be located in a closed hollow space.	≥ 200 mm (7.9 in)
B: Behind the cooling fins	Space for optimum heat convection	≥ 15 mm (0.59 in)
C: To the side on the right	Space for connection cables, plug connectors, add-on elements and elements for operation, such as maintenance switch	See dimension drawing
D: Below	Space for connection cables and plug connectors	See dimension drawing
E: Unit cover	Space for display elements, diagnostics elements and actuator elements, e.g. service unit	≥ 150 mm (5.91 in)
F: On the side (optional)	Space for connection cables, plug connectors, add-on elements and elements for operation, such as maintenance switch	See dimension drawing

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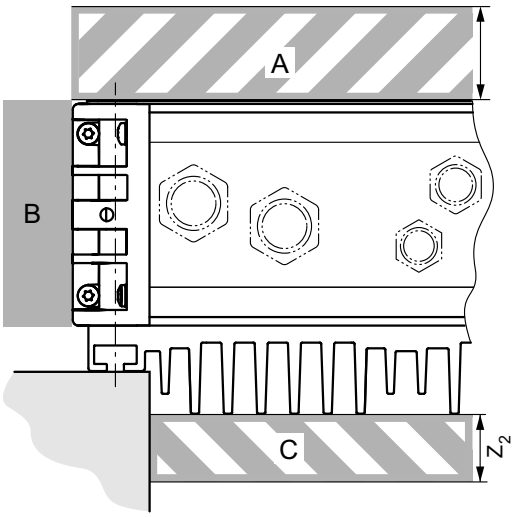
Horizontal installation

The following figure shows the required minimum clearance sizes of the unit:



36028797483068939

[A] Housing cover clearance
[B] Clearance on the side
[C] Clearance below the cooling fins
[Z_1] Housing cover clearance height
[Z_2] Cooling fins clearance height

Refer to the following table for the minimum distance sizes and minimum clearance sizes:

Clearance	Function	Size
A: Housing cover Height Z_1	Space for display elements, diagnostics elements and actuator elements, e.g. service unit	Z_1 = min. 150 mm (5.91 in)
B: On the side (optional)	Space for connection cables, plug connectors, add-on elements and elements for operation, such as maintenance switch	See dimension drawing
C: Behind the cooling fins Height Z_2	Space for optimum heat convection: The cooling fins may not be located in a closed hollow space.	Z_2 ≥ 15 mm (0.59 in)

5.1.3 Waste heat

Ensure that the cooling fins can dissipate waste heat into the environment by free convection.

Observe the following notes to ensure optimum heat convection:

- Use SEW mounting systems or suitable spacers, e.g.:
  - Spacers
  - Profiles
  - Square pipes
  - Mounting plates
  - T-beams

  - Rails
- Ensure that the cooling fins are not located in a closed hollow space.
- It is essential that a minimum distance of 15 mm (0.59 in) between the highest cooling fin and the next surface, e.g. a mounting plate, is maintained.
- Avoid heat sources in the immediate proximity of the unit.

5.2 Assembly

Use one of the following mechanical mounting options:

- Mounting with mounting brackets
- Mount using the through bores

5.2.1 Mounting with mounting brackets

⚠ CAUTION

Risk of injury due to protruding parts

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 3.2 Nm (28 in-lb).

Required material

- SEW-EURODRIVE "Large bracket mounting set" accessory (part number 12708305):
  - 4 mounting brackets
  - 8 M5 × 8 studs
- Holding fixture, e.g. square pipe with an edge length ≤ 32 mm
- Suitable fastening and locking elements, e.g. M6 or M8 screws of suitable length with washers

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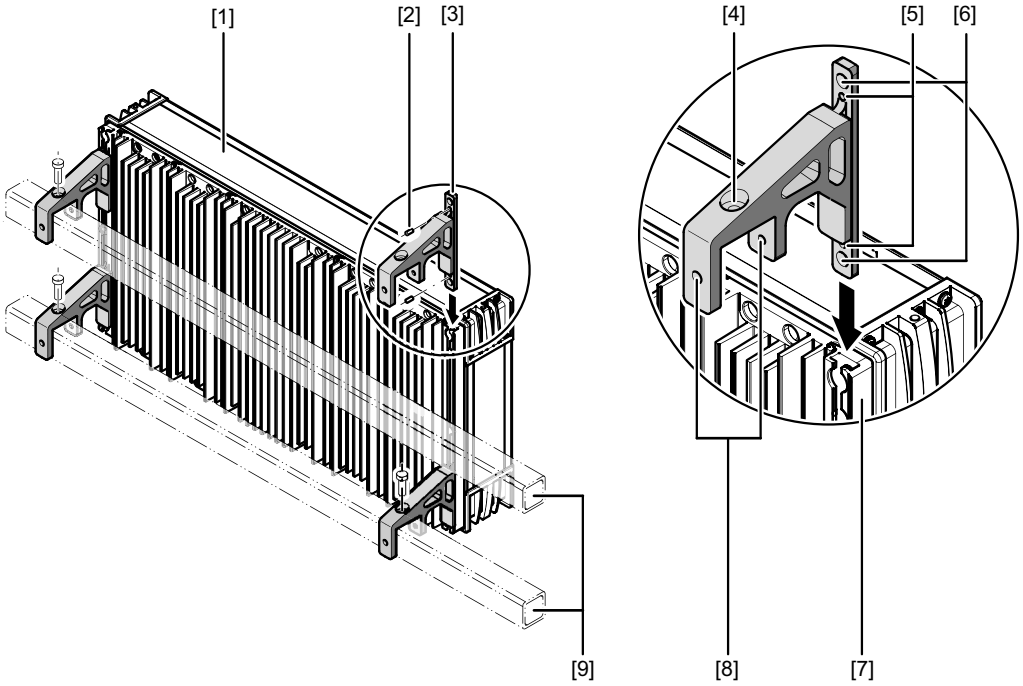

63050395199050507

[1] Unit
[2] M5 × 8 studs
[3] Large mounting bracket
[4] Bore for M8 screw of suitable length with washer
[5] Bore for M5 × 8 stud
[6] Bore for M8 × 30 screw
[7] T-slot
[8] Bore for M6 screw of suitable length with washer
[9] Holding fixture, e.g. square pipe with an edge length ≤ 32 mm

Fastening the mounting plates

1. Insert the mounting bracket [3] into the T-slot [7] of the unit [1] so that the upper edge of the bracket is flush with the upper end of the slot.
2. In order to prevent the mounting bracket [3] from slipping out of position in the T-slot [7], fix the mounting bracket with M8 x 30 screws [6] in the through holes of the unit.
3. Firmly fasten the mounting bracket [3] using the studs [2] supplied in the T-slot [7].
4. Repeat the steps for the other mounting bracket.

Preparing the holding fixture

Square pipes can be used as a holding fixture for the unit. Use only square pipes with an edge length ≤ 32 mm for mounting the unit to avoid mechanical interference.

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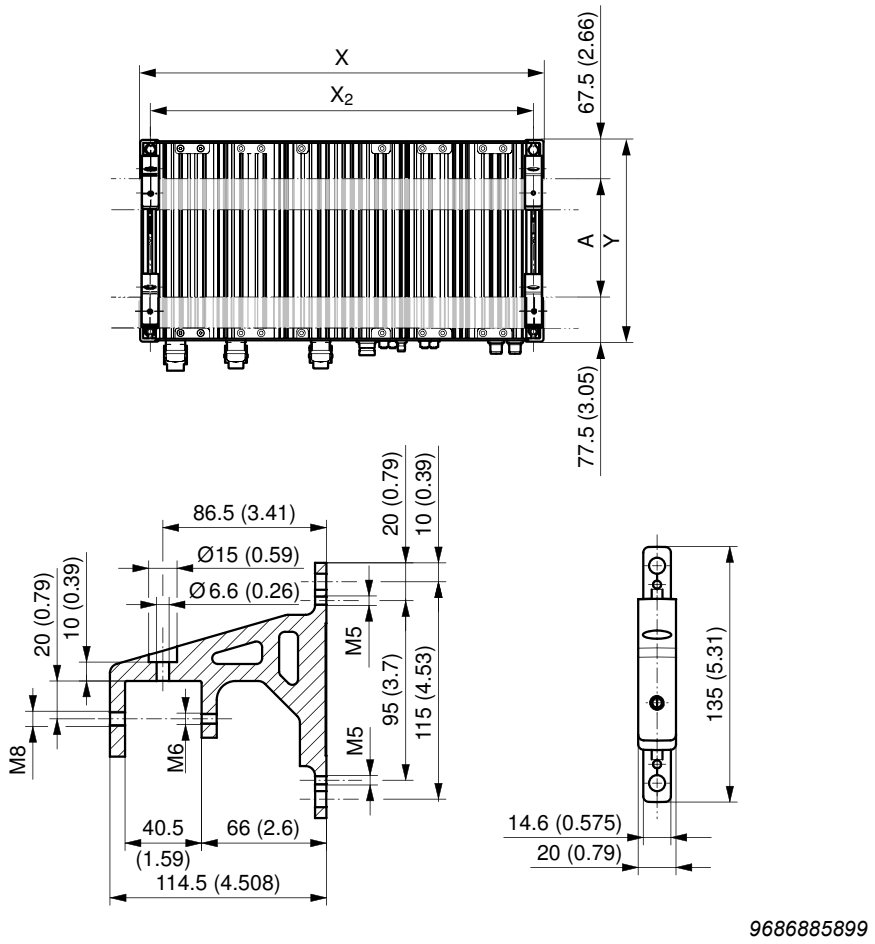
The following figure shows the required dimensions:



X, Y Housing dimensions; see chapter "Technical Data"
X_2 Bore dimension
A Distance

Procedure

1. Refer to the dimension drawing in the "Technical data" (→ 🖹 113) chapter for the housing dimensions X and Y.
2. Refer to the following table for dimensions of the tapped holes in the holding fixture:

Bore dimension	Value
X_2	Housing dimension X − 30 mm (1.2 in)

3. Mark the tapped holes of the holding fixture.
4. Cut the threads for the bolts [7] at the marked points.
5. Refer to the following table for distance dimensions for the holding fixture:

Distance	Value
A	Housing dimension Y − 145 mm (5.71 in)

6. Mark the spacing at the installation location.
7. Mount the holding fixture at the installation location at the calculated distance.

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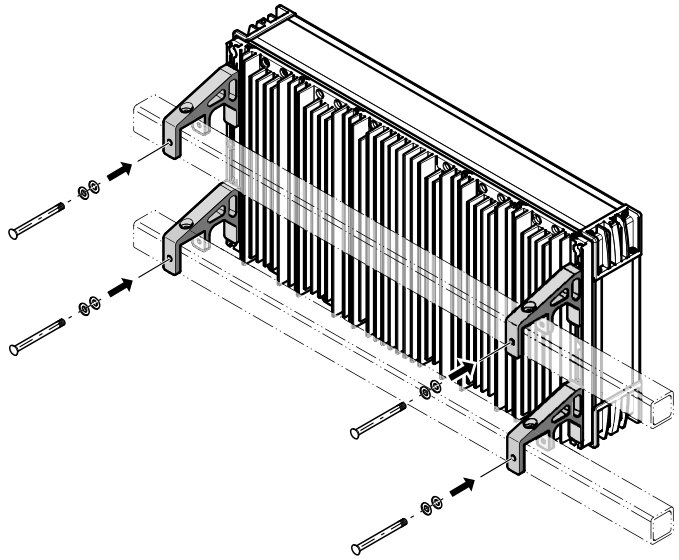
Mounting the unit

1. Use the mounting brackets to hang the unit on the fixture.
2. Fasten the mounting brackets securely using the M6 screws through the bores on the holding fixture.



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5.2.2 Mounting using the through bores

⚠ CAUTION

Risk of injury due to protruding parts

Minor injuries

- Wear suitable protective gloves.

NOTICE

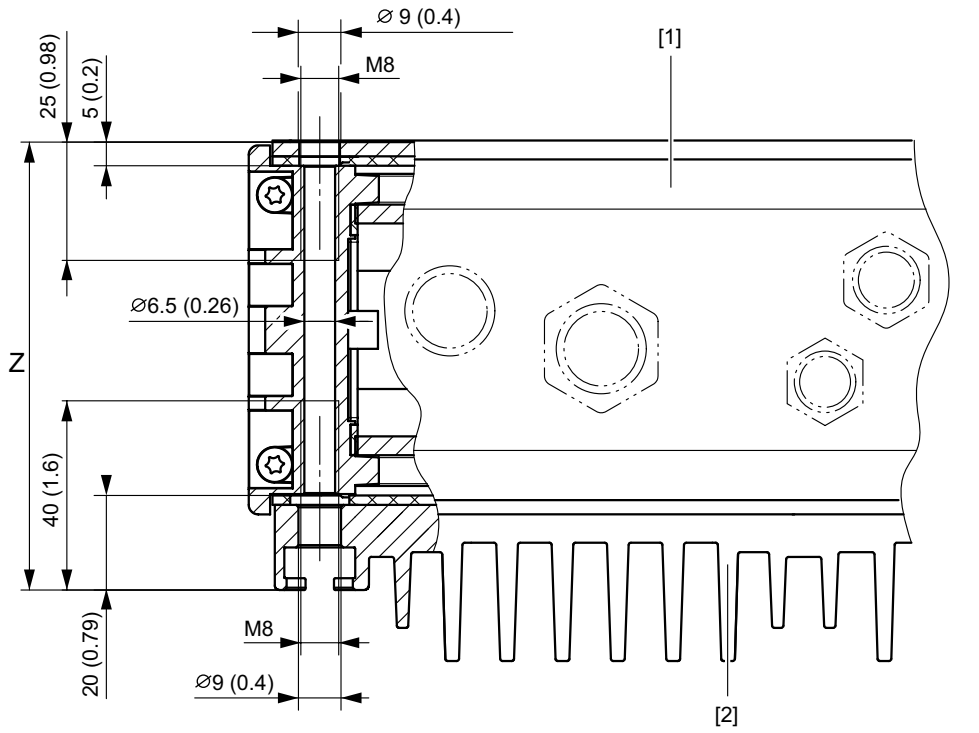
External force too high

Damage to the thread or the screw

- Do not exceed the maximum tightening torque of 3.2 Nm (28 in-lb).

In order to attach the unit, it is equipped with 4 through bores in the corner profiles with a diameter of 6.5 mm (0.26 in) and M8 threads on both sides with countersinks.

The following figure shows the design of the through bore and the minimum clearance in mm (in):



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[1] Unit
[2] Cooling fins
Z Height of the through bore + T-slot (see the dimension drawing in the "Technical data" (→ 🗎 113) chapter)

Fastening the unit from the front

INFORMATION

It is not possible to mount the unit in this way when using the handles.

Required material

- In order to comply with the required minimum distances and clearances, use one of the following mounting elements:
  - Suitable spacers
  - Mounting plate (with an appropriate cut-out for long cooling fins)
- Suitable mounting and locking elements, e.g. M6 screws of an appropriate length with washers
- Suitable locking devices, e.g. lock washers

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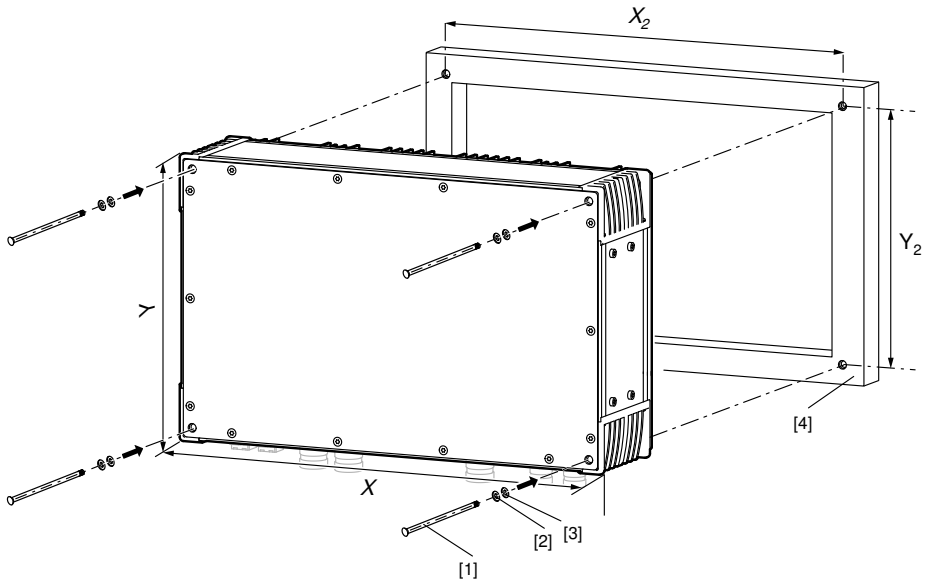


45035996748517515

[1] Mounting elements, e.g. M6 screws
[2] Locking elements, e.g. lock washers
[3] Mounting elements, e.g. washers
[4] Mounting surface, e.g. mounting plate
X, Y Housing dimensions
X_2, Y_2 Bore dimensions

Procedure

1. Refer to the dimension drawing in the "Technical data" chapter for the housing dimensions X and Y.
2. Refer to the following table for dimensions of the bores:

Bore dimension	Value
X_2	Housing dimension X − 30 mm
Y_2	Housing dimension Y − 30 mm

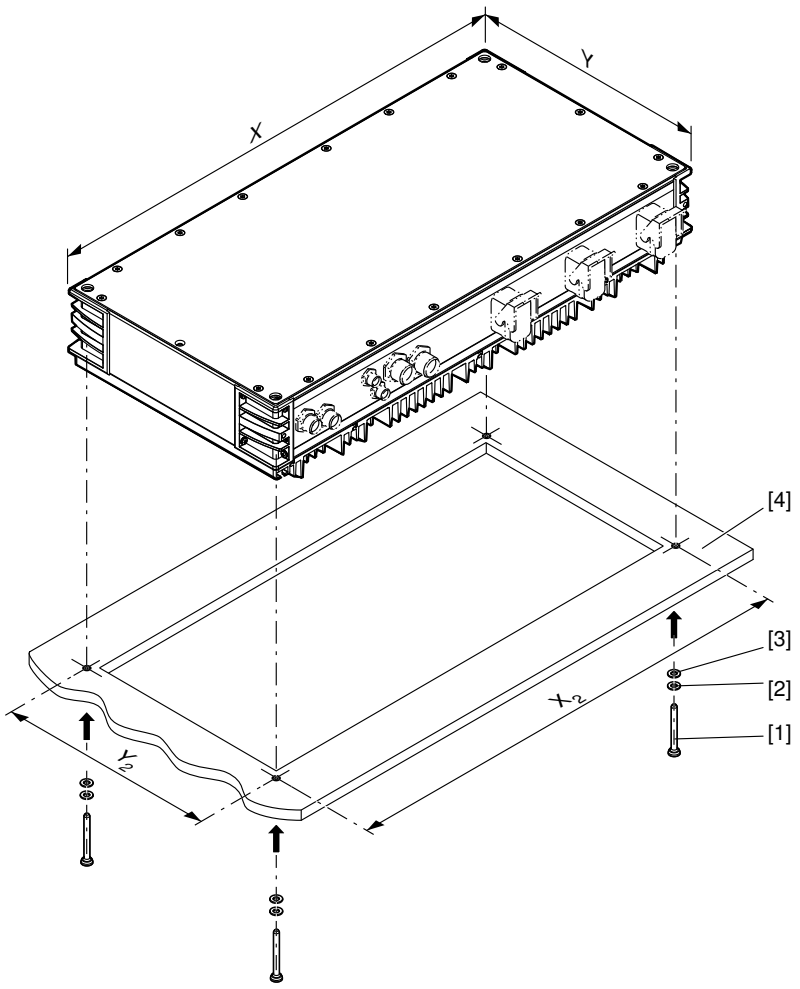
3. Mark the tapped holes on the mounting surface [4].
4. Drill the bores at the marked points.
5. Firmly screw the unit on the mounting surface [4] from the front via the through bores. Use suitable mounting and locking elements, e.g.:
   - M6 screws [1]
   - lock washers [2] and
   - washers [3].

Fastening the unit from the back

Required material

- In order to comply with the required minimum distances and clearances, use one of the following mounting elements:
  – Suitable spacers
  – Mounting plate (with an appropriate cut-out for long cooling fins)

- Suitable mounting and safety elements, e.g. M8 screws of an appropriate length with washers
- Suitable locking devices, e.g. lock washers



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[1] Mounting elements, e.g. M8 screws
[2] Locking elements, e.g. lock washers
[3] Mounting elements, e.g. washers
[4] Mounting surface, e.g. mounting plate
X, Y Housing dimensions
X_2, Y_2 Bore dimensions

Proceed as follows to mount the unit:

1. Refer to the dimension drawing in the "Technical data" chapter for the housing dimensions X and Y.
2. Refer to the following table for dimensions of the bores:

Bore dimension	Value
X_2	Housing dimension X − 30 mm
Y_2	Housing dimension Y − 30 mm

3. Mark the tapped holes on the mounting surface [4].
4. Drill the bores at the marked points.

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5. Firmly screw the unit on the mounting surface [4] from the back via the through bores. Use suitable mounting and locking elements, e.g.:
   - M6 screws [1]
   - Lock washers [2]
   - Washers [3]

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6 Electrical installation

6.1 General information

Observe the following notes on electrical installation:

- Observe the general safety notes.
- Strictly observe all instructions referring to the technical data and the permissible conditions regarding the place of installation.
- The integrated line filter reduces the bleeder resistance to less than 500 kΩ. Therefore do not include the unit in the system test.

6.2 Low-voltage supply systems

The unit 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 mistripping due to the earth capacitance of the inverter.

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

6.3 Contactors

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

6.4 Electromagnetic compatibility (EMC)

INFORMATION

The unit can cause EMC interference within the permitted limit range according to DIN EN 61800-3.

This unit is a drive system of the category C3 (see DIN EN 61800-3).

For detailed information on EMC-compliant installation, refer to the publication "Drive Engineering – Electromagnetic Compatibility in Drive Engineering."

6.5 Cable routing

Observe the following when routing the cables:

- Use suitable cables to connect the power supply and the communication. Refer to chapter "Electrical connections" for descriptions of connections.
- Route power cables and signal lines in separate cable ducts.
- Maintain the greatest possible distance between power cables and signal lines.
- Avoid using long cables running parallel to one another.

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For detailed information on EMC-compliant installation, refer to the publication “Drive Engineering – Electromagnetic Compatibility in Drive Engineering”.

6.6 Using prefabricated cables

SEW-EURODRIVE uses prefabricated cables for certifications, type tests and approval of the units. The cables provided by SEW-EURODRIVE fulfill all requirements necessary to ensure that the unit and all connected components function properly. The units under consideration are always the basic units including all connected components and corresponding connection cables.

This is why SEW-EURODRIVE recommends to use only the prefabricated cables specified in the documentation.

In accordance with EN ISO 13849, when using units 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 unit's functional safety documentation.

6.6.1 Use of 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 unit properties or that the unit will function correctly.

When using third-party cables to connect the unit and/or unit components, make sure to comply with all applicable national regulations. Note that the technical features of the unit or system of units might be affected inadvertently when using non-SEW cables. This concerns in particular the following properties:

- Mechanical properties (such as IP protection class, cable carrier suitability)
- Chemical properties (such as the absence of silicone and halogen, resistance against substances)
- Thermal properties (e.g. temperature stability, heating of the unit, 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)

Non-SEW 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

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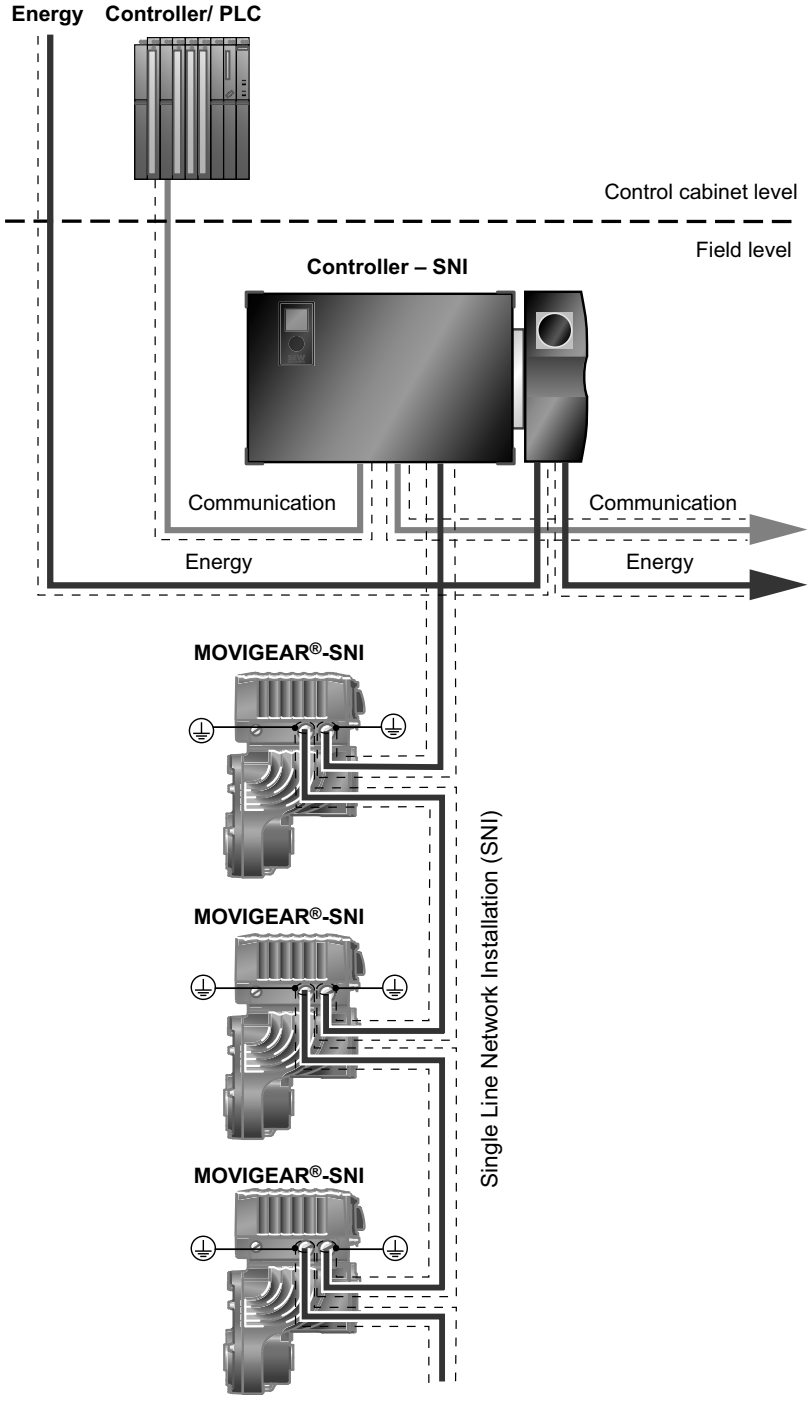
6.7 Installation topology of SNI

The following figure shows the basic installation topology with SNI interface. The application of MOVIGEAR® SNI is depicted as an example:



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The approved cable length between the SNI controller and the last SNI actuator is 100 m when the mandatory cable is used.

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6.8 Installation altitude higher than 1000 m above sea level

Units with a system voltage of phase to ground of 300 V or phase to phase of 500 V can be used at an altitude of more than 1000 m above sea level up to a maximum of 4000 m above sea level under the following conditions:

- The nominal continuous power is reduced due to the reduced cooling above 1000 m; see the chapter "Technical Data".
- For 2000 m AMSL and higher, the air and creepage distances are only sufficient for overvoltage class 2. If the installation calls for overvoltage class 3, you will have to install additional external overvoltage protection to limit overvoltage peaks to 2.5 kV phase-to-phase and phase-to-ground.
- If safe electrical disconnection is required, it must be implemented outside the unit at altitudes of more than 2000 m above sea level (safe electrical disconnection in accordance with EN 61800-5-1 and/or EN 60204-1).
- Overvoltage classes according to EN 60664

6.9 Shielding

Required material

Use shielded power supply and electronics cables.

1. Connect the shield and make sure it is grounded over a wide area at both ends.
2. For cables with multiple shields, also connect the inner shield at both ends making sure it is grounded over a wide area.

Required documents

For external bus connections, refer to the bus-specific installation instructions.

6.10 Unit output

NOTICE

Damage to the unit if the unit output is subjected to capacitive loads.

Damage to the units

- Only connect ohmic/inductive loads.
- Never connect capacitive loads.

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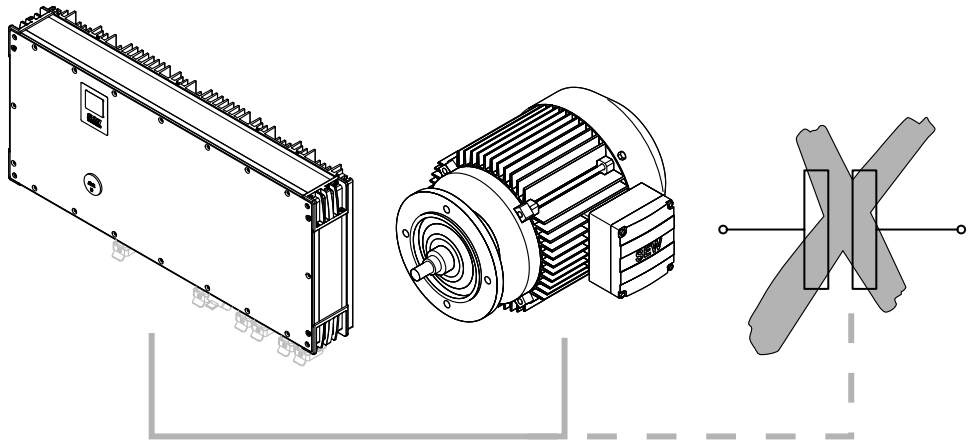
No capacitive loads may be connected to the unit output. A capacitive load occurs, for example, when very long cables are used to connect the motor. For this reason, the motor supply cable must not exceed 30 m (98 ft).



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6.11 Motor types

The unit supports the following motor series from SEW-EURODRIVE:

- DRE..
- DRS..
- DRP..
- CM..

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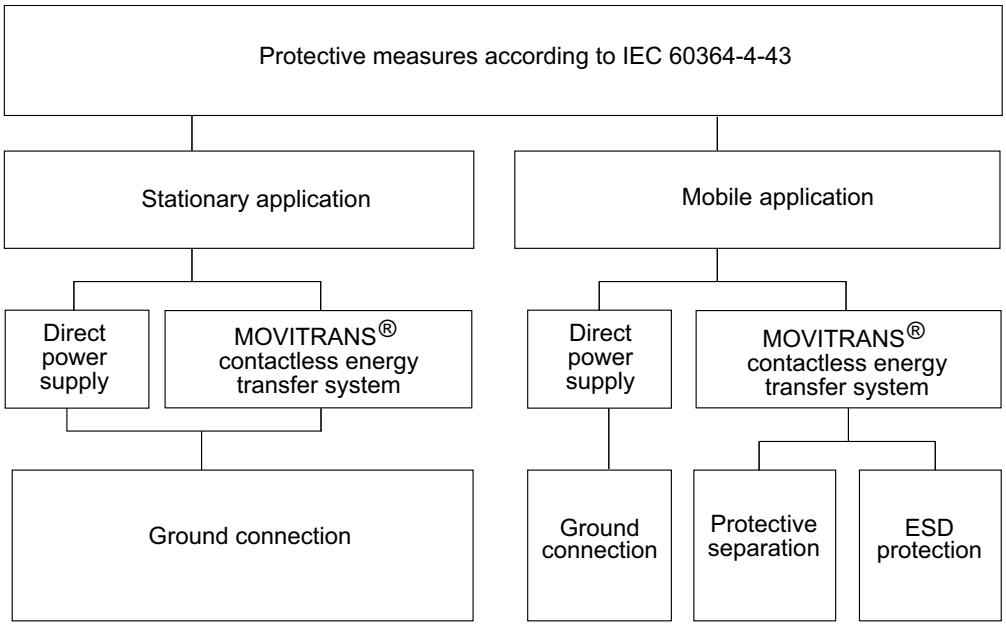
6.12 Protective measures against electrical hazards

6.12.1 Overview

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



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6.12.2 PE connection

⚠ WARNING

Electric shock due to incorrect connection of PE or equipotential bonding.

Severe or fatal injuries

- Observe the installation notes.

The stationary units must be grounded.

Observe the following rules when grounding the unit:

- Ground the unit using the shortest possible route.
- Use a green/yellow grounding cable.
- Use the shortest possible low-impedance, RF-compatible cables.

Leakage currents ≥ AC 3.5 mA/DC 10 mA may occur during normal operation. Observe the following to comply with EN 61800-5-1:

- **Supply system lead < 10 mm^2 (AWG 7):**

  Route a **second PE conductor with the same cable cross section as the supply system lead** in parallel to the protective earth via separate terminals. Alternatively, use a **copper protective earth conductor with a cross section of 10 mm^2 (AWG 7)**.

- **Supply system lead 10 mm^2 to 16 mm^2 (AWG 7 to AWG 6):**

  Route a **copper protective earth conductor with the cross section of the supply system lead**.

- **Supply system lead 16 mm^2 to 35 mm^2 (AWG 6 to AWG 2):**

  Route a **copper protective earth conductor with a cable cross section of 16 mm^2**.

- **Supply system lead > 35 mm^2 (AWG 2):**

  Route a **copper protective earth conductor with half the cross section of the supply system lead**.

6.12.3 PE connection for mobile applications

For mobile applications, the type of energy transfer determines how to apply grounding or equipotential bonding.

The following energy transfer types can be used:

- Direct power supply, for example via a conductor rail
- Contactless energy transfer system with MOVITRANS®

Direct power supply

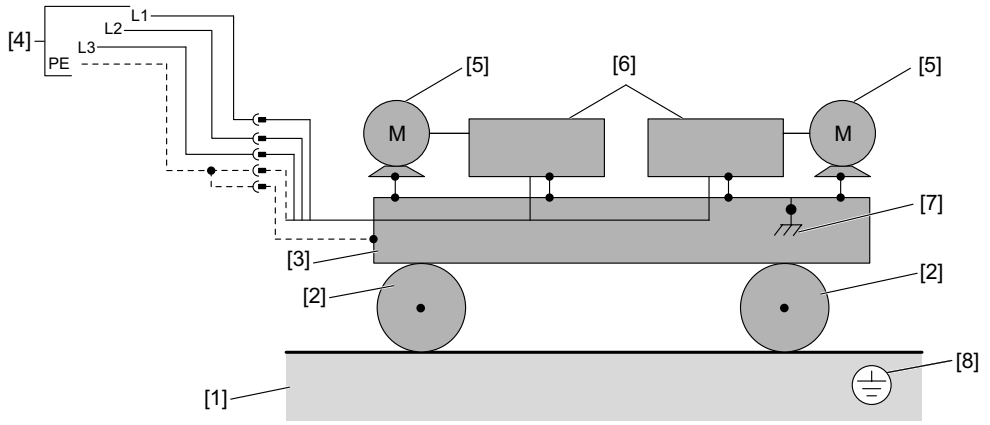
Equip all electrical equipment in mobile systems with direct power supply, such as motor, application controller, etc., with a ground connection (PE).

Comply with the following rules:

- Ground the unit with the shortest possible route (PE).
- Use a green/yellow grounding cable.

Ground the unit using 2 mobile contact outlets (sliding contacts) or using a trailing cable.

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



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

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6.12.4 Unit connection points for grounding or equipotential bonding

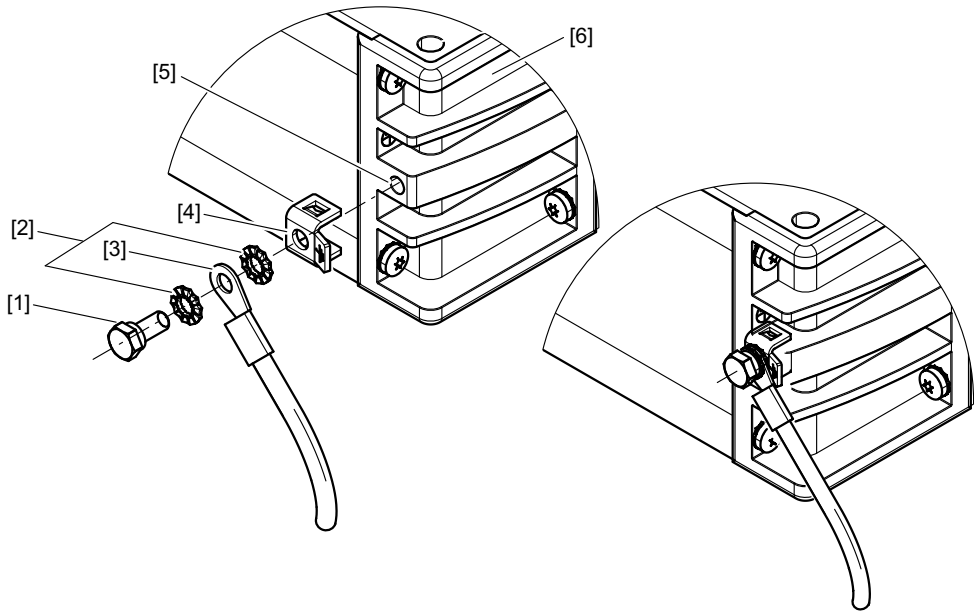
The connection points for grounding or equipotential bonding are marked on the housing corners of the units with the symbol ⏚.

The bores in the housing corners are prepared for M5 self-tapping screws, for example M5 x 12 according to DIN ISO 3506 or equivalent.

Adhere to the following rules when you install the grounding or the equipotential bonding:

- Secure the grounding or equipotential bonding cable using connection elements that breach the surface as shown in the figure below.
- Use the grounding kit included in the delivery.
- Mount the parts as shown in the figure. Observe the maximum tightening torque of 5 Nm (40 in-lb).

The following figure shows the positions of the connection points and the sequence in which to install the individual parts:



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[1] Screw, self-tapping
[2] Tooth lock washer
[3] Crimp cable lug for M5
[4] Terminal yoke
[5] Ground symbol ⏚
[6] Housing corner

6.12.5 Residual current device

⚠ WARNING

No protection against electric shock if an incorrect type of residual current device is used.

Severe or fatal injuries.

- Use only universal current sensitive residual current devices of type B for 3-phase frequency inverters.

- A 3-phase frequency inverter creates a DC component in the leakage current and may greatly reduce the sensitivity of a type-A residual current device. A type-A residual current device is therefore not permitted as a protection device.

  Use only a type-B residual current device.
- If the use of a residual current device is not stipulated in the standards, SEW-EURODRIVE recommends not using a residual current device.

6.12.6 Line fuse types

Install the fuses at the beginning of the power supply cables behind the supply bus junction.

Line protection types in operation classes gL, gG:

- Rated fusing voltage ≥ rated line voltage
- Depending on the frequency inverter capacity utilization, the rated fusing current must be dimensioned for 100% of the frequency inverter current.

Miniature circuit breaker with characteristics B, C:

- Power circuit breaker nominal voltage ≥ nominal line voltage
- The nominal current of the miniature circuit breaker must be 10% above the frequency inverter current.

6.13 Connection block

⚠ WARNING

Electric shock due to connecting or disconnecting plug connectors when voltage is applied.

Severe or fatal injuries.

- Disconnect all supply voltages.
- Ensure that there is no voltage present in the inverter.
- Never plug or unplug the plug connectors while they are energized.
- **When MOVI-DPS EKK is connected:** Never disconnect the plug connector at the energy management port if you do not know the actual state of charge of the MOVI-DPS storage bundle. Also refer to the operating instructions of the connected MOVI-DPS energy or power interface.

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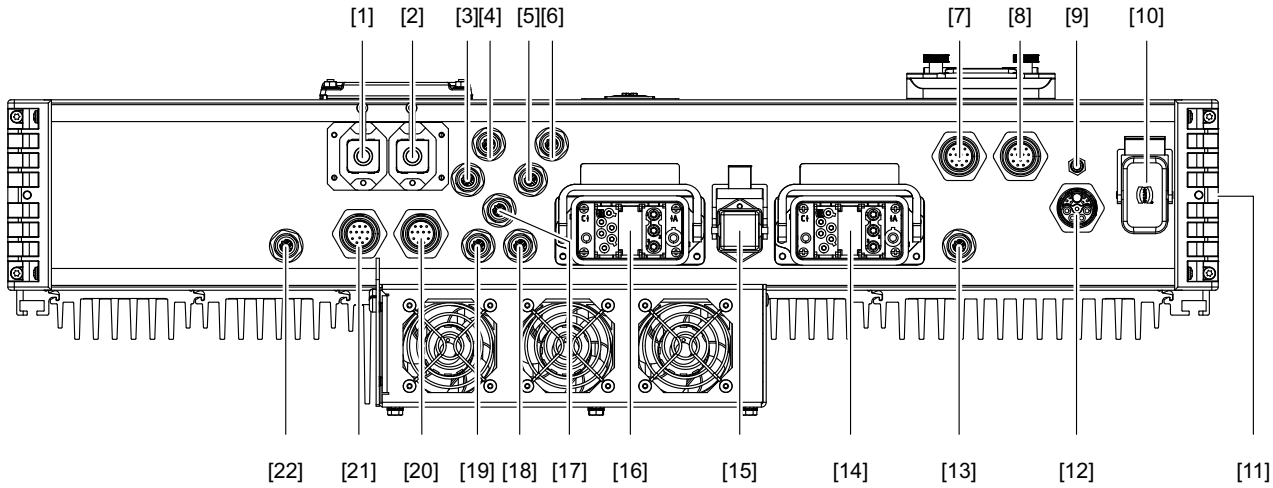

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[1] X4232_2, Ethernet fieldbus (→ 🗎 80)
[2] X4232_1, Ethernet fieldbus (→ 🗎 80)
[3] X5611_2, Digital outputs – safety-related (→ 🗎 94)
[4] X5601_2, Digital inputs – safety-related (→ 🗎 92)
[5] X5611_1, Digital outputs – safety-related (→ 🗎 93)
[6] X5601_1, Digital inputs – safety-related (→ 🗎 91)
[7] X5001_2: Digital inputs/outputs – communication and control unit (→ 🗎 82)
[8] X5001_1: Digital inputs/outputs – communication and control unit (→ 🗎 81)
[9] NET LED (→ 🗎 17)
[10] X2371: AC 400 V output (→ 🗎 66)
[11] X1213: AC 400 V input/DC 24 V supply for interface box (up to 15.0 kW – coded) (→ 🗎 49)
[12] X2241: AC 400 V output (SNI) (→ 🗎 62)
[13] X4101: CAN bus – system bus (→ 🗎 75)
[14] X1271: Connection for energy management (→ 🗎 54)
[15] X2303: Braking resistor (→ 🗎 60)
[16] X2016: Motor with brake control (→ 🗎 56)
[17] X5102_2: Digital inputs – Frequency inverter (→ 🗎 86)
[18] X5502: Safe disconnection – input (→ 🗎 89)
[19] X5102_1: Digital inputs – Frequency inverter (→ 🗎 85)
[20] X3011: Motor encoder (HIPERFACE, Sin/Cos, TTL, HTL, RS422) (→ 🗎 68)
[21] X3222: Multi distance encoder (HIPERFACE, SSI, Sin/Cos, TTL, HTL, RS422) (→ 🗎 72)
[22] X5111: Fan subassembly (→ 🗎 88)

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6.14 Electrical connections

6.14.1 Representation of connections

The wiring diagrams show the contact end of the connections.

6.14.2 Designation key

The connection designations are based on the following structure: *Xabbc_mn*.

The individual positions represent the following information:

X	Terminal
a	**Group** 1 = Power input 2 = Power output 3 = Encoder 4 = Bus 5 = Inputs and outputs
bb	**Function** Function of the connection within a group
c	**Type** Wiring diagram of the connection within a function
_	
m	**Group number (optional)** Groups connections with the same signal
n	**Number (optional)** In case of several connections in one group

6.14.3 Connection cables

Connection cables are not included in the scope of delivery.

Prefabricated cables for connections between SEW components can be ordered from SEW-EURODRIVE. For each connection, the available prefabricated cables are listed. Specify the part number and the required length of cable in your order.

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

Cable designs:

The table below shows the various illustrations and what they mean:

Illustration	Meaning
	Fixed length
	Variable length

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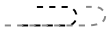
Illustration	Meaning
	Suitable for cable carriers
	Not suitable for cable carriers

INFORMATION

For more detailed information on cable types, refer to the "Technical data" chapter.

6.14.4 Cable structure

Diagram

The cable design is specified as follows. The example is a cable with a (4X2X0.25) design:

(	Cable shield
4	Number of core pairs (in twisted cables only)
X	
2	Number of cores
X	G - with green-yellow PE conductor X - without PE conductor
0.25	Core cross section in mm^2
)	Cable shield
+	A plus sign is added to additional cores with other features.
…	

Examples

The following examples illustrate the scheme which specifies the cable design:

- **3G1.5:**

  Cable with 3 cores of 1.5 mm^2 each, one green-yellow cable
- **((2X2X0.25)+4G2.5):**

  Shielded hybrid cable with
  - 4 twisted-pair cables of 0.25 mm^2 each, shielded, and
  - 4 power cores of 2.5 mm^2 each, one green-yellow cable.

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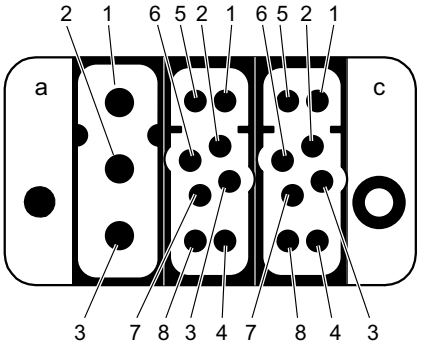
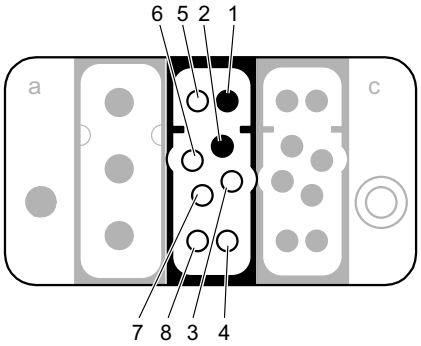
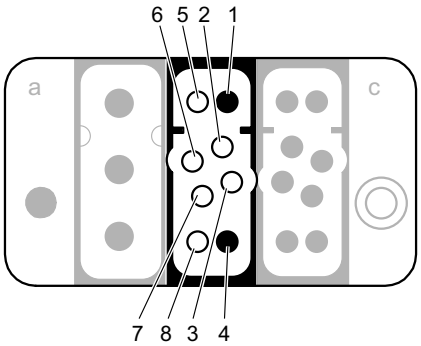
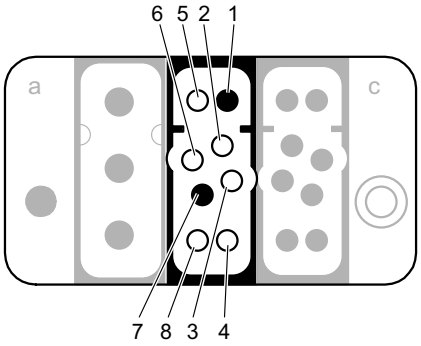
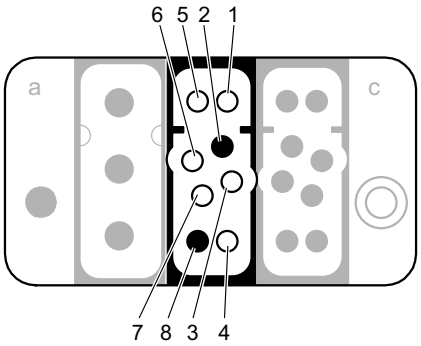
6.14.5 X1213: AC 400 V input/DC 24 V supply for interface box (up to 15.0 kW – coded)

Function		
• AC 400 V unit supply input • DC 24 V input and output • With signal contact for external maintenance switch • For connecting an interface box (PZM)		
Connection type		
Han-Modular® 10 B, male, 1 single lever		
Wiring diagram		
 *9007201697235339*		
Assignment		
No.	**Name**	**Function**
[a] Han® C module, male		
1	L1	Line connection phase 1
2	L2	Line connection phase 2
3	L3	Line connection phase 3
[b] Han® EE module, male		
Coding of the unit power, see section "coding" (→ 🗎 50)		
[c] Han® EE module, male		
1	+24V_C	DC 24 V input – backup voltage
2	SC	Signal contact for external maintenance switch
3	VO24	DC 24 V output
4	n.c.	Not assigned
5	0V24_C	0V24 reference potential – backup voltage
6	n.c.	Not assigned
7	GND	Reference potential
8	n.c.	Not assigned
Hinged frame		
–	PE	PE connection

Coding

The following table shows the assignment of the different coding to the respective unit power ratings and the corresponding power interfaces:

Unit power	Coding of the connections	Interface box
2.2 kW		PZM2xA-A075-D02-00 PZM2xA-A150-D03-00 PZM2xA-A022-M13-00
4.0 kW		PZM2xA-A075-D02-00 PZM2xA-A150-D03-00 PZM2xA-A040-M14-00
7.5 kW		PZM2xA-A075-D02-00 PZM2xA-A150-D03-00 PZM2xA-A075-M16-00
11.0 kW		PZM2xA-A150-D03-00

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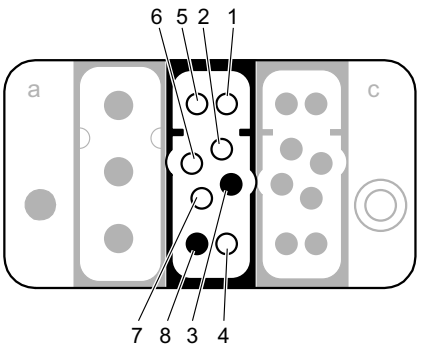
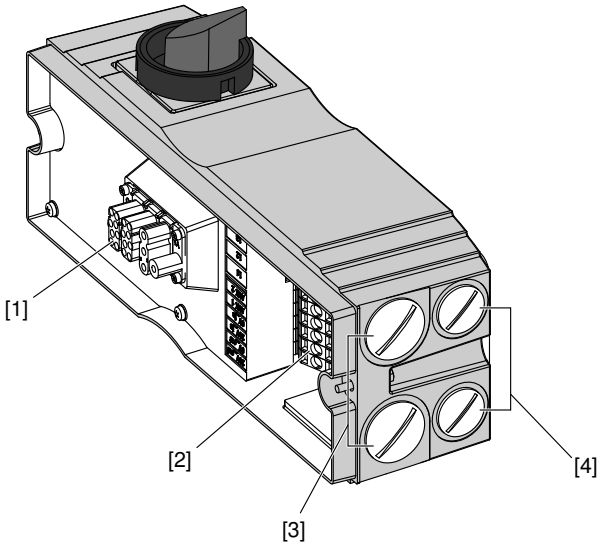
Unit power	Coding of the connections	Interface box
15.0 kW		PZM2xA-A150-D03-00

Interface box connections

The following table shows the connections of the interface box:



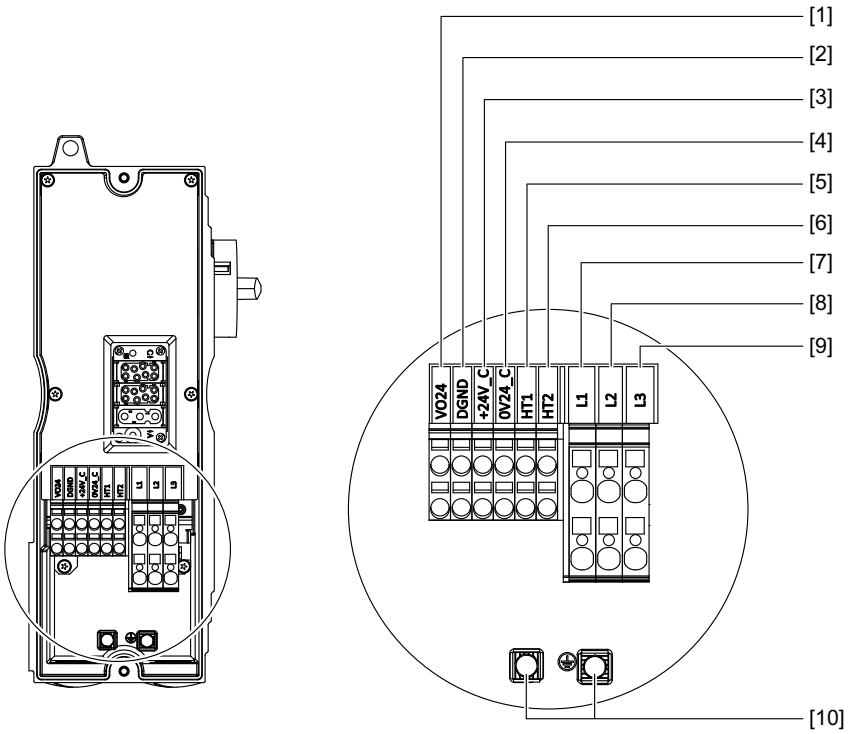
18014400464385931

[1] Connection to unit (Han® 10 B, female)
[2] Terminal strip, power input
[3] Covers of the screw fitting holes (M32 × 1.5)[1)]
[4] Covers of the screw fitting holes (M25 × 1.5)[1)]

1) The screw fittings are not included in the scope of delivery.

X1 terminal strip of the interface box

The following figure shows the terminal strip of the interface box:



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Terminal strip X1 (power input terminal strip)			Terminal cross section
	Name	Function	
[1]	VO24	DC 24 V output	6 mm²
[2]	GND	Reference potential / DC 24 V output	
[3]	+24V_C	DC 24 V input	
[4]	0V24_C	0V24 reference potential – input	
[5]	HT1	Auxiliary terminal for additional voltage levels (without internal function)	
[6]	HT2	Auxiliary terminal for additional voltage levels (without internal function)	
[7]	L1	Phase L1	10 mm²
[8]	L2	Phase L2	
[9]	L3	Phase L3	
[10]	PE	Equipotential bonding/protective earth conductor	

DC 24 V supply

The unit is equipped with a DC 24 V output that can be used to supply the unit from the DC link.

To use the 24 V supply from the DC link, you must jumper the following terminals:

- 1 with 3
- 2 with 4

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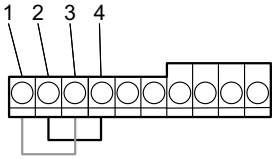
The following figure illustrates the wiring for using the 24 V supply from the DC link:



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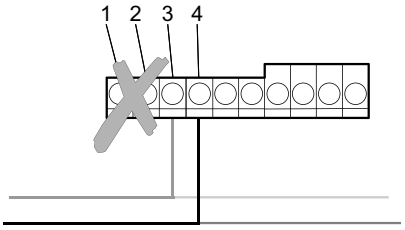
To use an external DC 24 V backup voltage, connect it to the following terminals:

- 3
- 4

In this case, terminals **1 and 2 must not be used**!

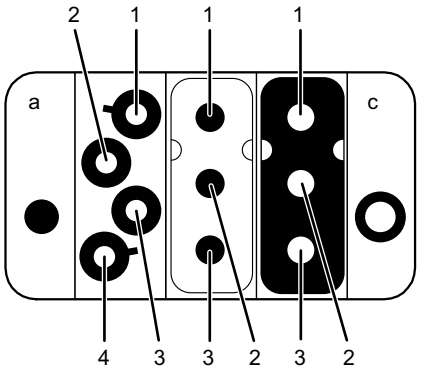
The following figure illustrates the wiring for using an external 24 V supply:



18014400675412875

6.14.6 X1271: Connection for energy management

Function
AC 400 V and DC link connection for jumpering the line phases or for connecting energy management components
Connection type
Han-Modular® 10 B, female-male-female, 1 single locking latch
Wiring diagram



13557105803

Assignment		
No.	**Name**	**Function**
[a] Han® C protected module, female		
1	n.c.	Not assigned
2	+Uz	DC link (+)
3	n.c.	Not assigned
4	-Uz	DC link (–)
[b] Han® C module, male		
1	L1_In	Line connection phase 1 – Input
2	L2_In	Line connection phase 2 – Input
3	L3_In	Line connection phase 3 – Input
[c] Han® C module, female		
1	L1_Out	Line connection phase 1 – Output
2	L2_Out	Line connection phase 2 – Output
3	L3_Out	Line connection phase 3 – Output
Hinged frame		
PE	PE	PE connection

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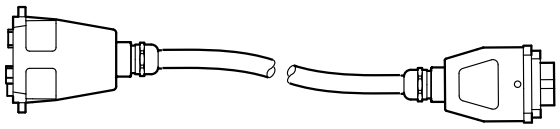
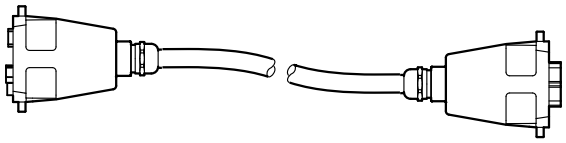
Connection cables

Cable	Length/installation type	Component
Part number: 18166873 Cable design: (3G6)  Han® 10B, male-female-male ↔ Han® Q4/2, female	Variable length, max. 5 m 	MOVI-DPS EKK.../E12
Part number: 18166865 Cable design: (7G6)  Han® 10B, male-female-male ↔ Han® 6B, female-female	Variable length, max. 5 m 	MOVI-DPS EKK.../E11

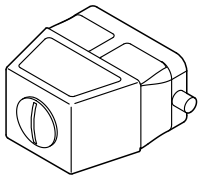
Connection components

Jumper plug energy management

Part number 18166903

Structure	
Modules	**Jumpered pins**
[B] – [C]	1 – 1
	2 – 2
	3 – 3

Connection: Han® 10 B, male-female-male



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6.14.7 X2016: Motor with brake control

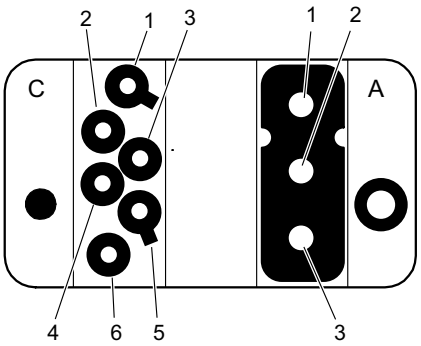
NOTICE

Damage or malfunction due to motors with built-in brake rectifiers.

Damage to the external brake rectifier, malfunction of the motor brake, malfunction of the unit, damage to internal components of the unit.

- Do not use motors with built-in brake rectifiers in conjunction with this unit.

Function		
Power connection for motor with brake up to 15 kW		
Connection type		
Han-Modular® 10 B, female, 1 single lever		
Wiring diagram		



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Assignment		
No.	**Name**	**Function**
[A] Han® C module, female		
1	U	Motor phase U output
2	V	Motor phase V output
3	W	Motor phase W output
[C] Han® E protected module, female		
1	TF/TH/KTY+	Motor temperature sensor (+)
2	15	SEW brake terminal 15 (blue)
3	13	SEW brake terminal 13 (red)
4	14	SEW brake terminal 14 (white)
5	n.c.	Not assigned
6	TF/TH/KTY-	Motor temperature sensor (–)
Hinged frame		
PE	PE	PE connection

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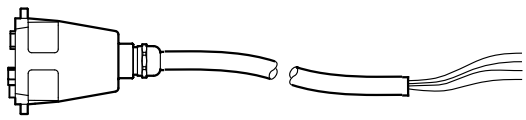
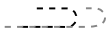
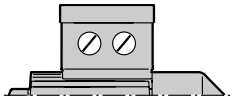
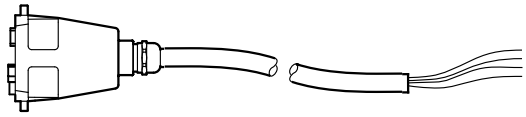
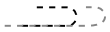
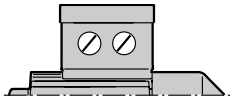
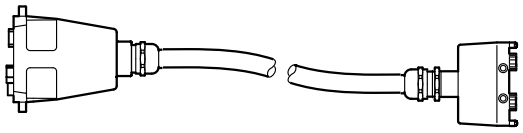
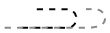
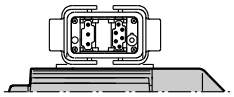
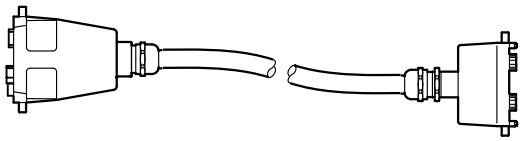
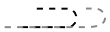
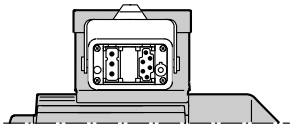
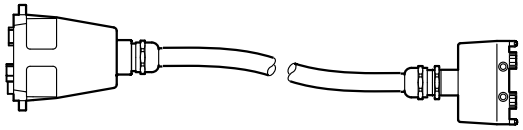
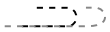
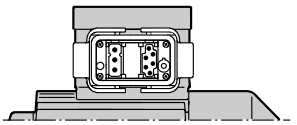
Connection cables

11,0 kW (IEC)

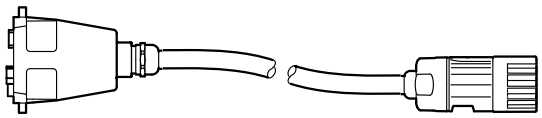
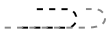
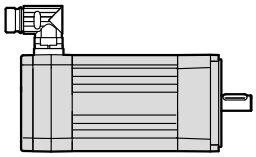
Cable	Length/installation type	Type	Component
Part number: 18120644  Han® 10 B ↔ Open (terminal box connection M5)	Variable length 	D/4.0	DR112 – 132 
Part number: 18120741  Han® 10 B ↔ Open (terminal box connection M6)	Variable length 	D/4.0	DR160 
Part number: 18120652  Han® 10 B ↔ ABB8	Variable length 	D/4.0	DR112 – 160 

11,0 kW (IEC/UL) to 15,0 kW (IEC)

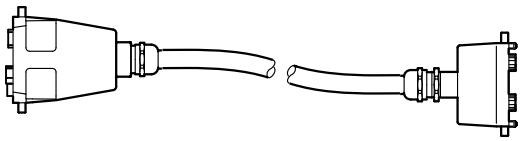
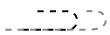
Cable	Length/installation type	Type	Component
Part number: 18110444  Han® 10 B ↔ ABE8	Variable length 	D/6.0	DR112 – 160 

Cable	Length/installation type	Type	Component
Part number: 18110312  Han® 10 B ↔ ABC8	Variable length 	D/6.0	DR112 – 160 

11.0 kW to 15.0 kW

Cable	Length/installation type	Type	Component
Part number: 18110614  Han® 10 B ↔ SBC50	Variable length 	E/6.0	CM 

Phase reversal cable

Cable	Length/installation type	Type
Part number: 18145299 For units from 11,0 kW (IEC/UL) to 15,0 kW (IEC)  Han® 10 B ↔ ABE8	Variable length 	D/6.0

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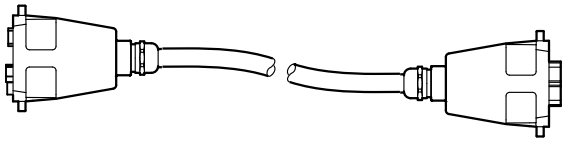
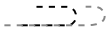
Adapter cable

Cable	Length/installation type	Type
Part number: 18119964 MOVIPRO® size 2 to size 1  Han® 10 B ↔ Han® 6 B	Variable length 	D/2.5

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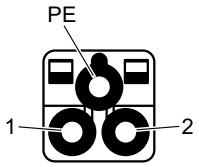
6.14.8 X2303: Braking resistor

Function
Power connection for external braking resistor
Connection type
Han® Q 2/0, female, I-coded
Wiring diagram



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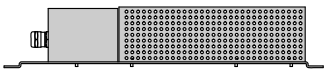
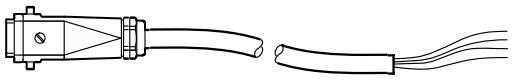
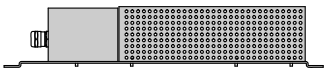
Assignment

No.	Name	Function
1	+R	Braking resistor (+)
2	-R	Braking resistor (–)
3	PE	PE connection

Connection cables

Cable	Length/installation type	Component
Part number: 18121969 Cable design: (3G2.5) Core cross section: 2.5 mm  Han®Q 2/0 ↔ Open with conductor end sleeves	Variable length 	External braking resistor  Terminal cross section: 6 mm²
Part number: 18121977 Cable design: (3G6.0) Core cross section: 6 mm²  Han®Q 2/0 ↔ Open with conductor end sleeves	Variable length 	External braking resistor  Terminal cross section: 6 mm²

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Conductor assignment

Part number	Signal name	Color coding
18121969 18121977	+R	Black/1
	-R	Black/2
	PE connection	Green/yellow

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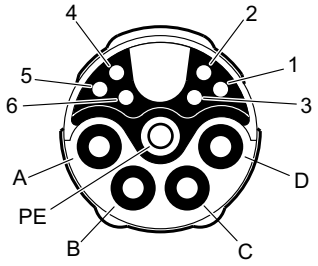
6.14.9 X2241: AC 400 V output (SNI)

The following table shows information about this connection:

Function		
AC 400 V output for unit supply with Single Line Network Installation (SNI)		
Connection type		
M23 H-Tec, SEW P-insert 11-pole, female, coding ring red		
Wiring diagram		
 *9007207371130251*		
Assignment		
No.	Name	Function
A	L1_SNI	Actuator supply phase 1 with SNI communication
B	L2_SNI	Actuator supply phase 2 with SNI communication
C	L3_SNI	Actuator supply phase 3 with SNI communication
D	n.c.	Not assigned
PE	PE	PE connection
1	n.c.	Not assigned
2	n.c.	Not assigned
3	n.c.	Not assigned
4	n.c.	Not assigned
5	n.c.	Not assigned
6	n.c.	Not assigned

Connection cables

The following tables list the cables available for this connection:

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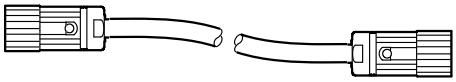
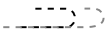
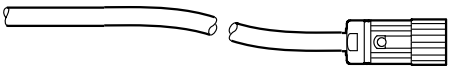
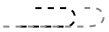
Cable cross section 2.5 mm²

Connection cables	Conformity / part number	Cable type, see also technical data	Length/ installation type	Cable cross section / operating voltage
 M23, coding ring: red — M23, coding ring: red	CE: 18127509	HELUKA-BEL® TOP-FLEX® – EMV-UV-2YSL-CYK-J	Variable 	2.5 mm² / AC 500 V
	UL: 18150381	HELUKA-BEL® TOP-FLEX® – EMV-UV-2YSL-CYK-J-UL/CSA	Variable 	
	CE/UL: 18120679	HELUKA-BEL® TOP-SERV® – 109	Variable 	
 Open — M23, coding ring: red	CE: 18127517	HELUKA-BEL® TOP-FLEX® – EMV-UV-2YSL-CYK-J	Variable 	2.5 mm² / AC 500 V
	UL: 18150403	HELUKA-BEL® TOP-FLEX® – EMV-UV-2YSL-CYK-J-UL/CSA	Variable 	
	CE/UL: 18120687	HELUKA-BEL® TOP-SERV® – 109	Variable 	

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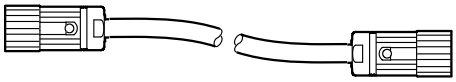
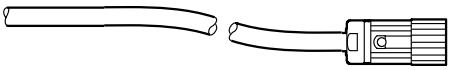
Cable cross section 4 mm²

Connection cables	Conformity / part number	Cable type, see also technical data	Length/ installation type	Cable cross section / operating voltage
 M23, coding ring: red — M23, coding ring: red	CE: 18127525	HELUKABEL® TOPFLEX® – EMV-UV-2YSL-CYK-J	Variable 	4 mm² / AC 500 V
	UL: 18150411	HELUKABEL® TOPFLEX® – EMV-UV-2YSL-CYK-J-UL/CSA	Variable 	
	CE/UL: 18120695	HELUKABEL® TOPSERV® – 109	Variable 	
 Open — M23, coding ring: red	CE: 18127533	HELUKABEL® TOPFLEX® – EMV-UV-2YSL-CYK-J	Variable 	4 mm² / AC 500 V
	UL: 18153259	HELUKABEL® TOPFLEX® – EMV-UV-2YSL-CYK-J-UL/CSA	Variable 	
	CE/UL: 18120709	HELUKABEL® TOPSERV® – 109	Variable 	

Connection of cables with open end

The following tables show the conductor assignment of cables with the following part numbers:

Part number	Signal name	Color coding
18127517	L1_SNI	Brown
18150403	L2_SNI	Black
18127533	L3_SNI	Gray
18153259	PE	Green/yellow

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Part number	Signal name	Core color/designation
18120687 18120709	L1_SNI	Black / 1
	L2_SNI	Black / 2
	L3_SNI	Black / 3
	PE	Green/yellow

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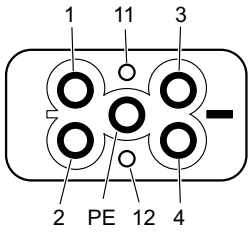
6.14.10 X2371: AC 400 V output

Function
AC 400 V output to supply external devices
Connection type
Han® Q 4/2, female
Wiring diagram



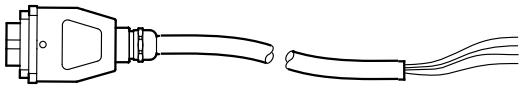
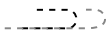
18014400953610763

Assignment

No.	Name	Function
1	L1	Line connection phase 1
2	L2	Line connection phase 2
3	L3	Line connection phase 3
4	n.c.	Not assigned
11	n.c.	Not assigned
12	n.c.	Not assigned
PE	PE	PE connection

Connection cables

The following table shows the cables available for this connection:

Cable	Length/installation type	Component
Part number: 18150187 Cable design: (4G2.5)  Han® Q 4/2 ↔ Open with conductor end sleeves	Variable length 	–

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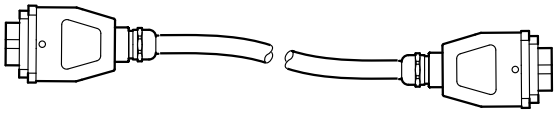
Cable	Length/installation type	Component
Part number: 18150306 Cable design: (4G2.5)  Han® Q 4/2 ↔ Han® Q 4/2 male	Variable length 	–

Conductor assignment

Part number	Signal name	Color coding
18150187	L1	Black / U
	L2	Black / V
	L3	Black / W
	PE	Green/yellow

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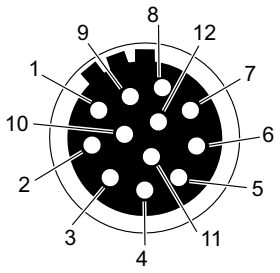
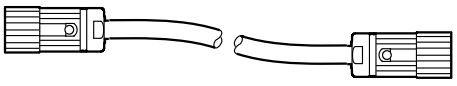
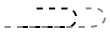
6.14.11 X3011: Motor encoder

Function		
Connection for HIPERFACE®, sin/cos, TTL, HTL and RS422 encoders		
Connection type		
M23, P insert 12-pole, female, +20°-coded		
Wiring diagram		
 *2459939339*		
Assignment		
No.	**Name**	**Function**
1	C	Signal track C (K0)
2	/C	Negated signal track C (/K0)
3	A	Signal track A (K1)
4	/A	Negated signal track A (/K1)
5	B	Signal track B (K2)
6	/ B	Negated signal track B (/K2)
7	Data-	Data line (-)
8	Data+	Data line (+)
9	TF/TH/KTY+	Motor temperature sensor (+)
10	TF/TH/KTY-	Motor temperature sensor (–)
11	GND	Reference potential
12	+12V	DC 12 V output

Connection cables

Cables	Length/ installation type	Component
Part number: 18121454 (with temperature sensor) Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ M23, 12-pole, 0°-coded	Variable length 	• AK0H • AK1H • AS1H • EK0H • EK1H • ES1H

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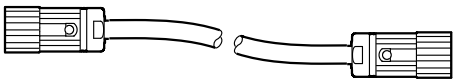
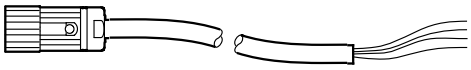
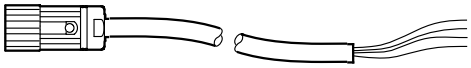
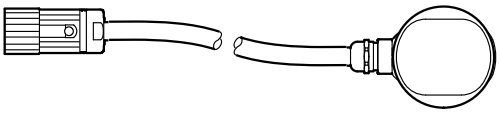
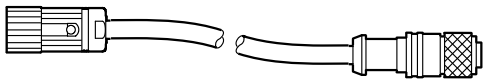
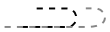
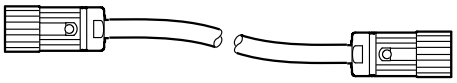
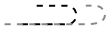
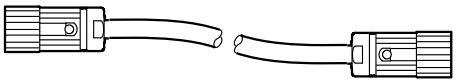
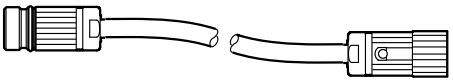
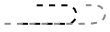
Cables	Length/ installation type	Component
Part number: 18121926 (without temperature sensor) Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ M23, 12-pole, 0°-coded	Variable length	• AS3H • AS4H • AV1H • AV6H
Part number: 18121438 (without temperature sensor) Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ open with conductor end sleeves	Variable length	• A.7W • AG7Y • AS7Y • E.7C • E.7R • E.7S • EH1. • EI7. • EV1. • ES1. • ES2.
Part number: 18121446 (with temperature sensor) Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ open with conductor end sleeves	Variable length	• AK1H • EK1H • ES1H • AS1H
Part number: 18110991 (without temperature sensor) Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ encoder cover	Variable length	• A.7W • E.7C • E.7R • E.7S

Cables	Length/ installation type	Component
Part number: 18121950 (without temperature sensor) Cable design: (4X2X0.25)  M23, 12-pole, 20°-coded ↔ M12, 8-pole	Variable length 	• EI7.
Part number: 11717238 Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ M23, 12-pole, 0°-coded	Variable length 	• AV1H • AS3H • AS4H
Part number: 18109594 Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ open with conductor end sleeves	Variable length 	• ES1S • ES2S • EV1S
Part number: 18114806 (Not suitable for HIPERFACE® encoders) Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ M23, 12-pole, 20 °-coded	Variable length 	• E..T • E..C • E..S • E..R

Conductor assignment of special cables

The following table shows the conductor assignment of cables with the following part numbers:

1 810 959 4

Signal name	Color coding
C	Brown
/C	White

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Signal name	Color coding
A	Red
/A	Blue
B	Yellow
/ B	Green
GND	Gray/Pink + Gray
+12V	Red/Blue + Pink

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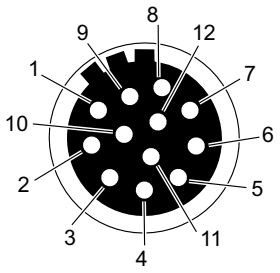
6.14.12 X3222: Multi-distance encoder (HIPERFACE®, SSI, Sin/Cos, TTL, HTL, RS422)

Function
Connection for HIPERFACE®, SSI, sin/cos, TTL, HTL and RS422 encoders
Connection type
M23, P insert 12-pole, female, +20°-coded
Wiring diagram



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Assignment

No.	Name	Function
1	CLK (C)	Clock line (Signal track C (K0))
2	/CLK (/C)	Negated clock line (Negated signal track C (/K0))
3	A	Signal track A (K1)
4	/A	Negated signal track A (/K1)
5	B	Signal track B (K2)
6	/ B	Negated signal track B (/K2)
7	Data-	Data line (-)
8	Data+	Data line (+)
9	GND	Reference potential
10	+24V	DC 24 V output Total current load of DC 24 V encoder supply ≤ 400 mA
11	GND	Reference potential
12	+12V	DC 12 V output Total current load of DC 12 V encoder supply ≤ 650 mA

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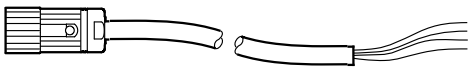
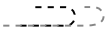
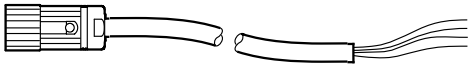
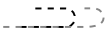
Connection cables

Cable	Length/ installation type	Component
Part number: 18121934 Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ Open with conductor end sleeves	Variable length 	HIPERFACE® / SSI encoder (12 V)
Part number: 18121942 Cable design: (6X2X0.25)  M23, 12-pole, 20°-coded ↔ Open with conductor end sleeves	Variable length 	HIPERFACE® / SSI encoder (24 V)

Conductor assignment

Part number	Signal name	Color coding
• 18121934	CLK	Brown
	/CLK	White
	A	Red
	/A	Blue
	B	Yellow
	/ B	Green
	Data-	Purple
	Data+	Black
	GND	Gray/Pink + Pink
	+12V	Red/Blue + Gray

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Part number	Signal name	Color coding
• 18121942	CLK	Brown
	/CLK	White
	A	Red
	/A	Blue
	B	Yellow
	/ B	Green
	Data-	Purple
	Data+	Black
	GND	Gray/Pink + Pink
	+24V	Red/Blue + Gray

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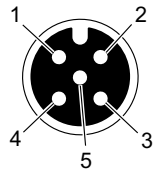
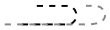
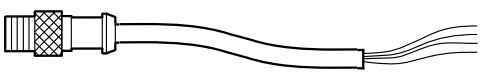
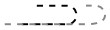
6.14.13 X4101: CAN bus – system bus

Function		
Internal CAN bus (system bus) – output		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 *18014400774298251*		
Assignment		
No.	**Name**	**Function**
1	CAN_SHLD	Shield/equipotential bonding
2	+24V	DC 24 V output
3	GND	Reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)

INFORMATION

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

Connection cables

Cable	Length/installation type	Component
Standard lengths: 1 m: Part number 13237748 2 m: Part number 13237756 3 m: Part number 13286315 4 m: Part number 13286323 5 m: Part number 13286331 10 m: Part number 13286358 15 m: Part number 13286366 **Custom lengths:** 1.5 m: Part number 13286293 2.5 m: Part number 13286307 Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)  M12, male, A-coded ↔ M12, female, A-coded	Fixed length 	–
Standard lengths: 2 m: Part number 13281364 5 m: Part number 13281402 **Custom lengths:** 1 m: Part number 13281348 1.5 m: Part number 13281356 2.5 m: Part number 13281372 3 m: Part number 13281380 4 m: Part number 13281399 10 m: Part number: 13281410 15 m: Part number: 13281429 Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)  M12, male, A-coded ↔ open	Fixed length 	–

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Conductor assignment

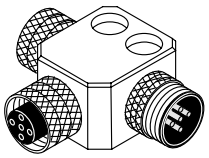
Part number	Signal name	Color coding
13281348	CAN_SHLD	-
13281356	+24V	Red
13281364	GND	Black
13281372	CAN_H	White
13281380	CAN_L	Blue
13281399		
13281402		
13281410		
13281429		

Connection components

CAN T-piece

Part number: 13290967

Connection: M12

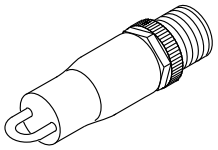


5656744075

CAN terminating resistor

Part number: 13287036

Connection: M12

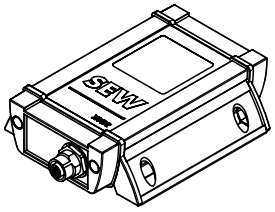


63050395932099851

PZO00A-SAZIR0-C000-02 display unit

Part number: 28214072

Connection: M12



13362062603

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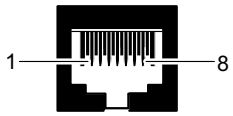
6.14.14 X4223: Ethernet service interface

Function		
Ethernet service interface of the communication and control unit		
Connection type		
Ethernet-RJ45		
Wiring diagram		
 *9007201609174667*		
Assignment		
No.	**Name**	**Function**
1	TX+	Transmit line (+)
2	TX-	Transmit line (-)
3	RX+	Receive line (+)
4	res.	Reserved
5	res.	Reserved
6	RX-	Receive line (-)
7	res.	Reserved
8	res.	Reserved

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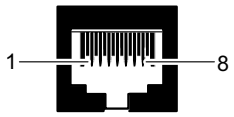
6.14.15 X4232: Ethernet fieldbus

The following table shows information about this connection:

Function		
Ethernet fieldbus interface		
Connection type		
Push-pull RJ45		
Wiring diagram		
 *9007201609174667*		
Assignment		
No.	Name	Function
1	TX+	Transmit line (+)
2	TX-	Transmit line (-)
3	RX+	Receive line (+)
4	res.	Reserved
5	res.	Reserved
6	RX-	Receive line (-)
7	res.	Reserved
8	res.	Reserved

NOTICE

RJ45 patch cable without push-pull connector housing not snapped into place.

Damage to the push-pull RJ45 connection.

- Only use push-pull RJ45 mating connectors in accordance with IEC PAS 61076-3-117.

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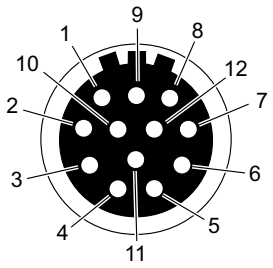
6.14.16 X5001_1: Digital inputs/outputs – communication and control unit

Function		
Digital inputs/outputs of the communication and control unit		
Connection type		
M23, P insert 12-pole, female, 0°-coded		
Wiring diagram		
 *9007201519561099*		
Assignment		
No.	**Name**	**Function**
1	DI00 / DO00	Digital input DI00 or digital output DO00
2	DI01 / DO01	Digital input DI01 or digital output DO01
3	DI02 / DO02	Digital input DI02 or digital output DO02
4	DI03 / DO03	Digital input DI03 or digital output DO03
5	DI04	Digital input DI04
6	DI05	Digital input DI05
7	DI06	Digital input DI06
8	DI07	Digital input DI07
9	0V24	0V24 reference potential
10	0V24	0V24 reference potential
11	+24V	DC 24 V output
12	FE	Equipotential bonding / functional earth

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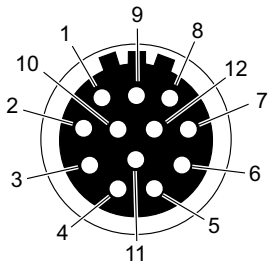
6.14.17 X5001_2: Digital inputs – communication and control unit

Function		
Digital inputs of the communication and control unit		
Connection type		
M23, P insert 12-pole, female, 0°-coded		
Wiring diagram		
 *9007201519561099*		
Assignment		
No.	**Name**	**Function**
1	DI08	Digital input DI08
2	DI09	Digital input DI09
3	DI10	Digital input DI10
4	DI11	Digital input DI11
5	DI12	Digital input DI12
6	DI13	Digital input DI13
7	DI14	Digital input DI14
8	DI15	Digital input DI15
9	0V24	0V24 reference potential
10	0V24	0V24 reference potential
11	+24V	DC 24 V output
12	FE	Equipotential bonding / functional earth

Connection cables

The following table shows the cables available for the connection X5001_1 and X5001_2:

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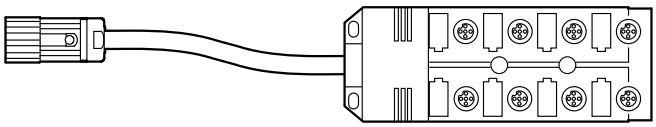
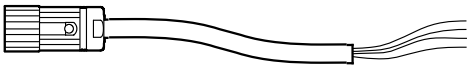
Cable	Length/ installation type
Length: 1 m, part number: 13309269 **Length: 2 m, part number: 13309277** **Length: 3 m, part number: 13309285** **Length: 5 m, part number: 13309293** **Length: 10 m, part number: 13309307** Cable design: (3X0.75+8X0.34)  M23, 12-pole, male, 0°-coded ↔ sensor/actuator box with 8 slots M12	Fixed length
Part number: 11741457 Cable design: (6X2X0.25)  M23, 12-pole, 0°-coded ↔ open with conductor end sleeves	Variable length

Extension cable

The following extension cable is available for the sensor/actuator box:

Cable	Length/installation type
Part number: 18123465 Cable design: (6X2X0.25)  M23, 12-pole, male, 0°-coded (1:1 assignment) ↔ M23, 12-pole, female, 0°-coded	Variable length

Conductor assignment

The following table shows the conductor assignment of the cable with part number 11741457

Conductor assignment X5001_1

Signal name	Color coding
DI00	Pink
DI01	Gray

Signal name	Color coding
DI02	Red
DI03	Blue
DI04	Yellow
DI05	Green
DI06	Violet
DI07	Black
0V24	Brown
0V24	White
+24V	Gray pink
FE	Red blue

Conductor assignment X5001_2

Signal name	Color coding
DI08	Pink
DI09	Gray
DI10	Red
DI11	Blue
DI12	Yellow
DI13	Green
DI14	Violet
DI15	Black
0V24	Brown
0V24	White
+24V	Gray pink
FE	Red blue

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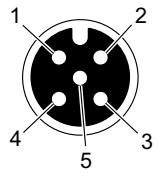
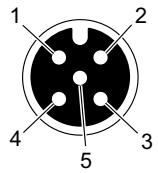
6.14.18 X5102_1: Digital inputs – Frequency inverter

The following table shows information about this connection:

Function		
Digital inputs/outputs – frequency inverter		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 *18014400774298251*		
Assignment		
No.	Name	Function
1	+24V	DC 24 V output
2	DI03	Digital input DI03
3	0V24	0V24 reference potential
4	DI02	Digital input DI02
5	FE	Equipotential bonding/functional earth

6.14.19 X5102_2: Digital inputs – Frequency inverter

The following table shows information about this connection:

Function		
Digital inputs/outputs – frequency inverter		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 *18014400774298251*		
Assignment		
No.	Name	Function
1	+24V	DC 24 V output
2	DI05	Digital input DI05
3	0V24	0V24 reference potential
4	DI04	Digital input DI04
5	FE	Equipotential bonding/functional earth

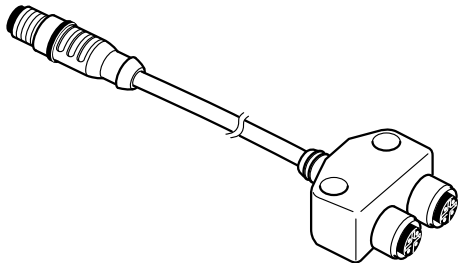
Y adapter

For connecting 2 sensors/actuators to an M12 plug connector, use a Y adapter with extension.

The Y adapter is available from different manufacturers:

- **Manufacturer:** Escha

  Type: WAS4-0,3-2FKM3/..



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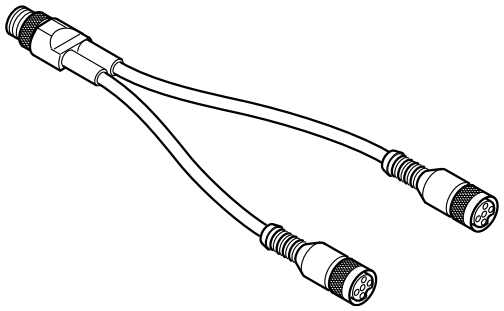
- **Manufacturer:** Binder

  Type: 79 5200..

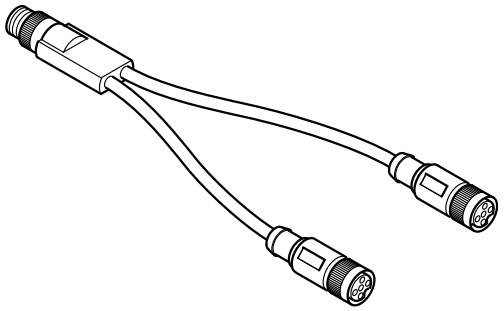


1180380683

- **Manufacturer:** Phoenix Contact

  Type: SAC-3P-Y-2XFS SCO/.../...

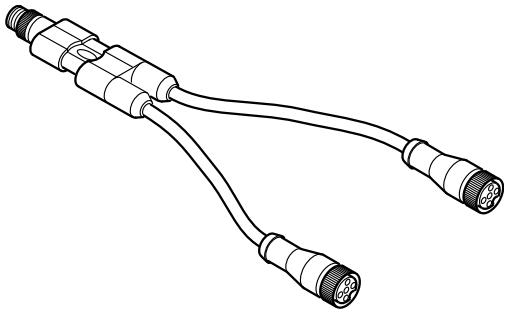
  The cable sheath is made of PVC. Provide suitable UV protection.



1180375179

- **Manufacturer:** Murr

  Type: 7000-40721-..



1180386571

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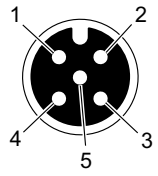
6.14.20 X5111: Fan subassembly

Function		
Temperature-controlled DC 24 V output for additional external fan		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 *18014400774298251*		
Assignment		
No.	Name	Function
1	res.	Reserved
2	res.	Reserved
3	0V24	0V24 reference potential
4	+24V_FAN	DC 24 V output – fan (switching signal)
5	res.	Reserved

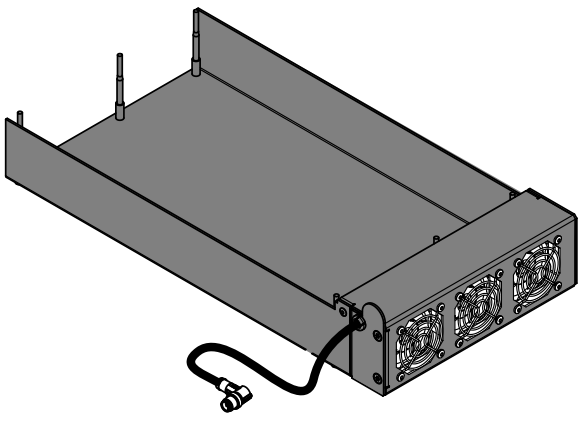
Connection component

The following components are suitable for this connection:

Fan subassembly

Part number: 12709700

Connection: M12



2610269323

6.14.21 X5502: Safe disconnection – input

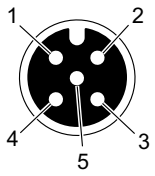
⚠ WARNING

Risk of injury due to non safety-related disconnection of the unit if the connection is jumpered.

Severe or fatal injuries.

- Jumper this connection only if the unit will not perform any safety functions according to EN ISO 13849-1.

This connection is identified with a yellow ring.

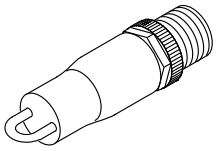
Function		
Input for safe disconnection		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 *18014400774298251*		
Assignment		
No.	**Name**	**Function**
1	+24V	DC 24 V output
2	STO-	0V24 reference potential for safe disconnection
3	0V24	0V24 reference potential
4	STO+	DC 24 V input for safe disconnection
5	res.	Reserved

INFORMATION

Use only shielded cables for this connection.

Jumper plug

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



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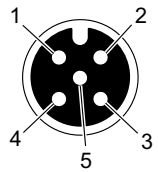
6.14.22 X5601_1: Digital inputs – safety-related

The following table shows information about this connection:

Function		
Safety-related inputs		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 *18014400774298251*		
Assignment		
No.	Name	Function
1	F-SS0	DC 24 V sensor supply for safe inputs
2	F-DI01	Safety-related digital input F-DI01
3	GND	Reference potential
4	F-DI00	Safety-related digital input F-DI00
5	F-SS1	DC 24 V sensor supply for safe inputs

Connection cables

INFORMATION

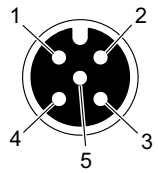
Use only shielded cables for this connection.

Note that

- You only connect sensors with contacts to the safe F-DIn inputs in accordance with the fail-safe principle (e.g. emergency switching off buttons, door contact switches etc.)
- Both sensor supplies F-SS0 and F-SS1 are always clocked.
- F-SS0 is connected via the respective sensor with F-DI00 and F-DI02 (fixed assignment).
- F-SS1 is connected via the respective sensor with F-DI01 and F-DI02 (fixed assignment)
- unused inputs do not have to be connected. An open input is always read as a "0" signal.

6.14.23 X5601_2: Digital inputs – safety-related

The following table shows information about this connection:

Function		
Safety-related inputs		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 *18014400774298251*		
Assignment		
No.	Name	Function
1	F-SS0	DC 24 V sensor supply for safe inputs
2	F-DI03	Safety-related digital input F-DI03
3	GND	Reference potential
4	F-DI02	Safety-related digital input F-DI02
5	F-SS1	DC 24 V sensor supply for safe inputs

Connection cables

INFORMATION

Use only shielded cables for this connection.

Note that

- You only connect sensors with contacts to the safe F-DIn inputs in accordance with the fail-safe principle (e.g. emergency switching off buttons, door contact switches etc.)
- Both sensor supplies F-SS0 and F-SS1 are always clocked.
- F-SS0 is connected via the respective sensor with F-DI00 and F-DI02 (fixed assignment).
- F-SS1 is connected via the respective sensor with F-DI01 and F-DI02 (fixed assignment)
- unused inputs do not have to be connected. An open input is always read as a "0" signal.

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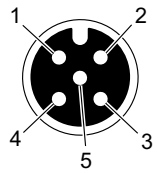
6.14.24 X5601_1: Digital outputs – safety-related

The following table shows information about this connection:

Function		
Safety-related outputs		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 *18014400774298251*		
Assignment		
No.	Name	Function
1	res.	Reserved
2	F-DO00_M	Safety-related digital output F-DO00 (sinking signal)
3	GND	Reference potential
4	F-DO00_P	Safety-related digital output F-DO00 (sourcing signal)
5	res.	Reserved

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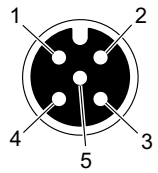
6.14.25 X5611_2: Digital outputs – safety-related

The following table shows information about this connection:

Function		
Safety-related outputs		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		



18014400774298251

Assignment		
No.	Name	Function
1	res.	Reserved
2	F-DO01_M	Safety-related digital output F-DO01 (sinking signal)
3	GND	Reference potential
4	F-DO01_P	Safety-related digital output F-DO01 (sourcing signal)
5	res.	Reserved

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7 Startup

7.1 General information

INFORMATION

Observe the general safety notes in chapter "Safety Notes / General information".

⚠ WARNING

Risk of injury due to uncontrolled unit behavior caused by ineffective emergency stop circuit

Severe or fatal injuries

- The installation may only be carried out by trained specialists.

⚠ WARNING

Risk of injury due to unit malfunction caused by incorrect unit setting

Severe or fatal injuries

- The installation may only be carried out by trained specialists.
- Check the parameters and data sets.
- Always use the appropriate functional settings.

⚠ WARNING

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Observe the startup notes.
- Set the controller inhibit.
- Switch off the output stage.
- De-couple the drive.
- Deactivate auto reset for drives that start up automatically.

⚠ WARNING

Electric shock due to missing or defective protection covers.

Severe or fatal injuries.

- Install the protective covers according to the regulations.
- Installation may only be carried out by qualified personnel.
- Never start the unit if the protective covers are not installed.

⚠ WARNING

Danger of electric shock due to open connections

Severe or fatal injuries

- The installation may only be carried out by trained specialists.
- Never start the unit if the touch guard is not installed.

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NOTICE

Danger due to arcing

Damage to electrical components

- Do not plug or unplug the power connectors during operation.

INFORMATION

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

7.2 Prerequisites

⚠ WARNING

Danger of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Observe the startup notes.
- Set the controller inhibit.
- Switch off the output stage.
- De-couple the drive.
- Deactivate auto reset for drives that start up automatically.

The following conditions apply to startup:

- The drive controller must be installed correctly both mechanically and electrically.
- The system and connected drives must be configured correctly.
- Appropriate safety measures are taken to prevent the drives from starting up unintentionally.
- Appropriate safety measures must be taken to prevent risk of injury or damage to machines.

The following hardware is required for startup:

- PC or laptop with Ethernet interface
- Ethernet cable, prefabricated with an M12 D coded plug connector on the unit side

7.3 Lifting applications

⚠ WARNING

Danger of fatal injury if the hoist falls

Severe or fatal injuries.

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

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7.4 SD memory card

Operating the processor unit requires the SD memory card. The SD memory card contains the firmware, the IEC program and user data. The slot for the memory card is located under the memory card cover on the top of the unit.

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8 Operation

⚠ WARNING

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

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

Severe or fatal injuries.

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

⚠ WARNING

Electric shock due to connecting or disconnecting plug connectors when voltage is applied.

Severe or fatal injuries.

- Disconnect all supply voltages.
- Ensure that there is no voltage present in the inverter.
- Never plug or unplug the plug connectors while they are energized.
- **When MOVI-DPS EKK is connected:** Never disconnect the plug connector at the energy management port if you do not know the actual state of charge of the MOVI-DPS storage bundle. Also refer to the operating instructions of the connected MOVI-DPS energy or power interface.

⚠ WARNING

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Observe the startup notes.
- Set the controller inhibit.
- Switch off the output stage.
- De-couple the drive.
- Deactivate auto reset for drives that start up automatically.

⚠ WARNING

Electric shock due to charged capacitors

Severe or fatal injuries

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

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⚠ CAUTION

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

Injury

- Secure hot surfaces by covering them.
- Install the protection devices according to the regulations.
- Check the protection device at regular intervals.
- Let the unit and the connected options cool down before you start working on them.

INFORMATION

- For operating modes with encoder feedback, parameters must not be changed in cycles faster than 2 seconds. This ensures that the encoders are initialized.
- The maximum output frequency in the VFC operating modes without encoder feedback 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.

8.1 Energy management components

You can connect the unit to energy management components via the connection X1271. For operation without energy management components the supplied jumper plug must be used to jumper the phases of the AC 400 V input.

8.2 Relative cyclic duration factor (cdf)

The cyclic duration factor (cdf) is the ratio between the load duration and the cycle duration. The duration of the duty cycle is the sum of times of operation and times at rest and de-energized. A typical value for the cycle duration is 10 minutes.

$$cdf = \frac{\textit{total time of operation} \qquad (t1 + t2 + t3)}{\textit{cycle duration}\,(T)} \cdot 100\,\%$$

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8.3 Duty cycles

8.3.1 Ambient conditions

The following ambient conditions apply according to cdf specification IEC 60034-1 (2005):

- Ambient temperature ϑ_U [+5 °C – +40 °C (+41 – +104 °F)]

  Every temperature increase by 1 °C (1.8 °F) results in a cdf decrease of 4%.

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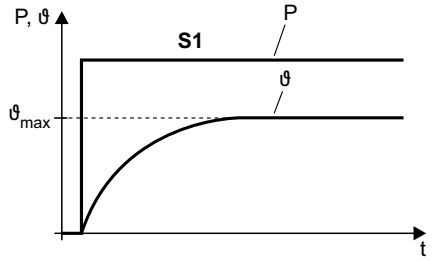
- I_D = 100 % I_N at f_{PWM} = 4 kHz
- Installation location up to 1000 m above sea level

8.3.2 Duty type S1

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



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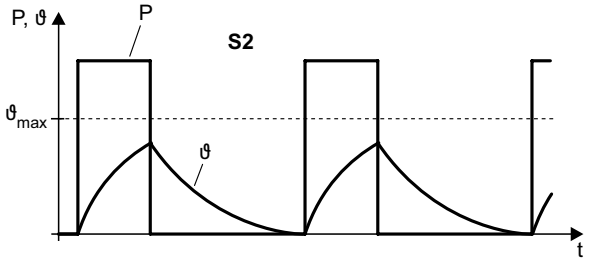
8.3.3 Duty type S2

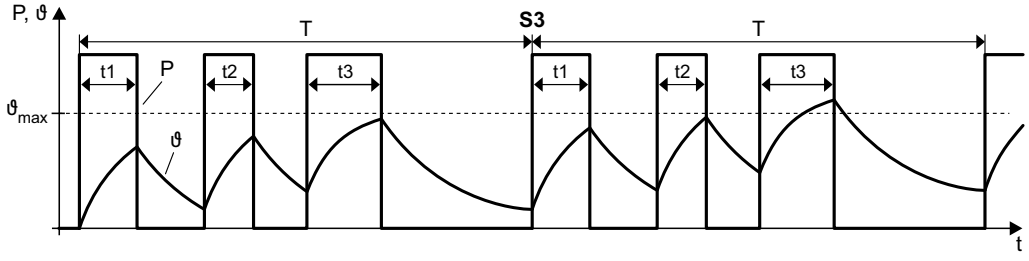
Short-time duty: Operation at constant load for a limited, given time followed by a time at rest. The motor returns to ambient temperature during the rest period.



2325835787

8.3.4 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 "cyclic duration factor (cdf)" in %.



2325831947

8.3.5 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 "cyclic duration factor (cdf)" in % and the number of cycles per hour.

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8.4 Status and error messages

The 7-segment display provides information on the status of the MOVIPRO®. In case of repeated malfunctions, contact the SEW Service staff.

The display of the 7-segment display shows the current status of the unit. If several statuses or errors are active at the same time, the error with the highest priority is displayed.

8.4.1 Status displays

Initial startup

When you switch on the programmable unit for the first time, it displays the following:

Code	Possible cause	Measure
no_ → CnF **S2:** Flashing green **S3:** Lit green	No executable IEC program is loaded.	Load your user program into the unit.

Unit status

The following unit statuses are possible after successful initial configuration:

Code	Meaning	Response	Possible cause	Measure
oFF	The maintenance switch is switched off.			Switch on the maintenance switch. **Units without interface box:** Check the DC 24 V cabling and the cabling of the switch feedback.
InI	Initialization: A connection is established with all internal components. This can take several minutes after a unit replacement.			
run	The connection has been established successfully. The statuses of the components or the application are displayed after 3 s.			
Flashing dot	Application module of the "PFA-..." power section is running.			

Code	Meaning	Response	Possible cause	Measure
buS → Err	Fieldbus error			• Check the fieldbus cabling to the higher-level controller. • Check the fieldbus parameterization of the unit and the higher-level controller.
OFL	Internal communication error			**While backing up data or restoring a data backup:** Wait a few minutes until the display changes. **In normal operation:** • Disconnect the unit from the AC 400 V supply and the DC 24 V supply for at least 30 s. • Restart the unit.
8.8.8. **S2:** Flashing green **S3:** Off			Application module not running / not loaded	Create a configuration with the Application Configurator and load it into the unit.

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Code	Meaning	Response	Possible cause	Measure
Ax.F → 111	Communication error with the power section	Not able to establish a connection with the "PFA-..." power section (connection failed).		**When using the application module "Transparent 3PD"** • In MOVITOOLS® MotionStudio, right-click the unit. • Choose [Application modules] > [Application Configurator]. • Choose [Open configuration from controller]. Check the following settings, and adjust them, if necessary: – Controller interface = SBUS_1 – Axis address = 20 – Unit type = MOVIPRO LT **When using other application modules** • In MOVITOOLS® MotionStudio, right-click the power section of your unit. • Choose [Technology Editor] > [Drive startup for MOVI-PLC/CCU] and start up the drive.
Ax.F → 116	Communication error with the power section	The existing connection to the "PFA-..." power section was interrupted.		
SF1	Communication error with the power section			• Disconnect the unit from the AC 400 V supply and the DC 24 V supply for at least 30 s. • Restart the unit.
SF2	Error in external periphery			Check the cabling of the digital inputs and outputs as well as the connections of the communication package.

Code	Meaning	Response	Possible cause	Measure
SF3	Error while loading the application module		Non-enabled application module loaded	• Set parameter P802 "Factory setting" of the "PFA-..." power section to "Delivery status". • Load an enabled application module into the "PFA-..." power section.
SF → 10	Error in Application Configurator communication		Configuration with Application Configurator not completed.	Complete the configuration with the Application Configurator and load it into the unit.
SF → 20	Error during data backup	Data backup on SD memory card failed, upload aborted		Start data backup again.
SF → 21	Error during data backup	Data backup on SD memory card failed	SD memory card is write protected	Remove write protection from SD memory card.
SF → 22	Error during data restoring	Data restoring to the unit failed, download aborted.		Start data restoring again.
SF → 23	Error during data restoring	Data restoring to the unit failed	Controller not inhibited	Set the unit to one of the following states: • Controller inhibit (A1.1) • Safe stop (A1.u)
SF → 99	Internal system error			
SF → 110	Actuator voltage overload error		Actuator voltage overload	Check the cabling of the digital inputs and outputs.
SF → 120	Error due to overload in sensor voltage of group 1		Overload sensor voltage group 1	Check the cabling of the digital inputs and outputs.
SF → 121	Error due to overload in sensor voltage of group 2		Overload sensor voltage group 2	Check the cabling of the digital inputs and outputs.

8.4.2 Inverter status

⚠ WARNING

Risk of injury due to incorrect interpretation of display **U = "Safe Torque Off" active**

Severe or fatal injuries.

- The display **U = "Safe Torque Off" active** is not safety-related. Thus it must not be used safety-related.

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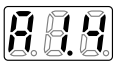
The inverter status is indicated by displaying the address/number of the axis and the corresponding status code in the form of A1.y.

INFORMATION

The unit status display takes priority over the inverter status display. If the maintenance switch is switched off of a fieldbus error occurs, no inverter status is displayed.

The following figure shows the display for the "Enable" status of axis 1:



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The following table shows the various status codes:

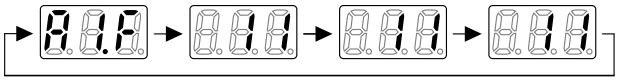
Status display	Device status (high byte in status word 1)	Meaning
0	0_{dec}	DC 24 V operation (inverter not ready)
1	1_{dec}	Controller inhibit active
2	2_{dec}	No enable
3	3_{dec}	Standstill current
4	4_{dec}	Enable
5	5_{dec}	n-control
6	6_{dec}	M-control
7	7_{dec}	Hold control
8	8_{dec}	Factory setting
9	9_{dec}	Limit switch reached
A	10_{dec}	Technology option
c	12_{dec}	IPOS$^{plus®}$ reference travel
d	13_{dec}	Flying start
E	14_{dec}	Calibrate encoder
F	Error code	Fault indicator (flashing)
U	17_{dec}	"Safe Torque Off" active
• (blinking dot)	–	Application module running

If the transition function of the status display is disabled using the processing unit, the bus is no longer monitored. If an error occurs in this case, the status display may still display the last status before occurrence of the error. This is why you should only switch off the monitoring function in exceptional cases, and inform the respective personnel accordingly.

8.4.3 Inverter error

In case of an inverter error, the status display alternatively shows the address/number of the axis and 3 times the corresponding error code.

The following figure shows the display for an "Overtemperature" error of axis 1:



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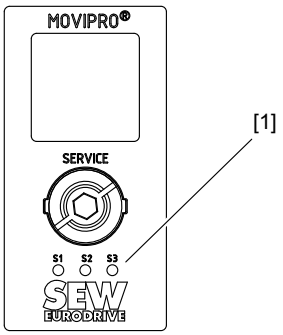
For a list of error codes, refer to section "Service".

8.4.4 Status LED

The status LEDs are located on the service unit of the MOVIPRO® and show the status of the fieldbus and the unit.



1954344587

[1] Status LEDs S1, S2, S3

Status LED S2 PLC status

State LED	Possible cause	Measure
Flashing green	• The firmware of the communication and control unit is running correctly.	–
Flashing green/orange	• Data backup is created/ restored.	–
Lights up orange	• Boot is active.	–
Flashing orange	• Firmware is being updated or • Bootloader update required.	–
Flashing red	• SD card is not inserted. • File system on the SC card is corrupt. • Boot process has failed.	• Switch the unit off and back on again. If the error reoccurs, contact SEW service.

Status LED S3

State LED	Possible cause	Measure
Lit green	• Program is running.	–
Off	• No program is loaded.	• Replace the SD card.

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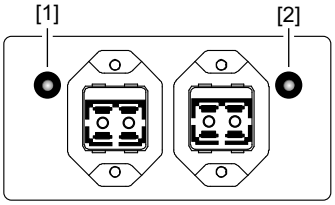
Status LEDs FO1 and FO2 Ethernet connection push-pull SCRJ

The two LEDs "FO1" and "FO2" indicate the signal quality of the respective optical transmission line.

The LEDs are located to the left and right of the two Ethernet fieldbus connections push-pull SCRJ:



4083348491

[1] FO1
[2] FO2

Status LED	Possible cause	Measure
Off	The signal level is 2 dB or more. The signal quality is good.	–
Lights up yellow	The optical signal level has fallen below 2 dB. This can have the following reasons: • Aging effect of the polymer fiber. • The plug connector is not properly connected. • The externally connected cable is faulty or damaged.	• Check whether the plug connector is inserted correctly. • Check the damping of the externally connected cable.

9 Service

9.1 Inspection/maintenance

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

- Connection cables:

  Damaged or fatigued cables must be replaced immediately.
- Cooling fins:

  To ensure sufficient cooling, remove any deposits that accumulate.
- If there is a fan subassembly, check its individual axial fans for functionality.

INFORMATION

Only SEW-EURODRIVE is authorized to carry out repairs.

9.2 Unit replacement

9.2.1 Notes on replacing units

The unit allows for a quick unit replacement. It is equipped with a replaceable memory card on which all unit data can be stored.

If the unit has to be replaced, the plant can be started up again quickly by simply replugging the memory card.

After the startup procedure, you have to download the unit data to the memory card.

INFORMATION

Observe the following notes during unit replacement:

- Only insert the memory card when the unit is switched off.
- After the unit replacement, the parameters last saved on the SD card are used.
- If an absolute encoder is used as motor encoder or synchronous encoder, you have to perform a reference travel during initial startup or after a unit or encoder replacement.
- If you are using an encoder with HIPERFACE® interface, a unit or encoder replacement is detected automatically and the message "IPOS reference" is reset.
- If you use an encoder with SSI interface, you have to adapt the encoder position to the mechanical plant conditions via a reference travel.

INFORMATION

Observe the following information for **programmable** units:

- The status display depends on the programming.**Conditions:** The module for the data backup function (data management) must be integrated in the program!

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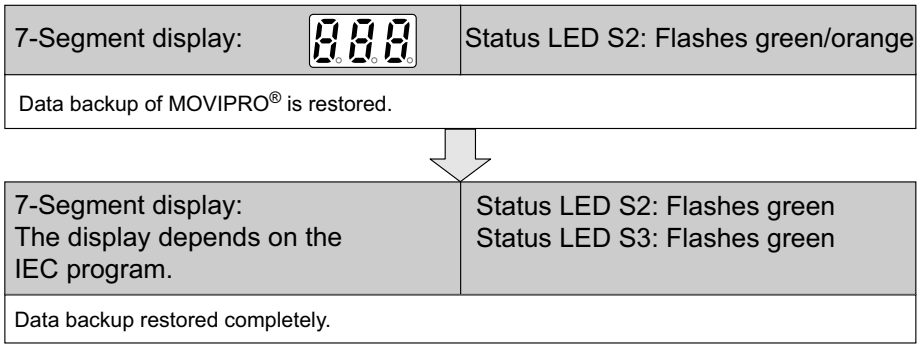
9.2.2 Replacing the unit

Proceed as follows to replace the unit:

1. Perform a data backup now if you are not certain whether the current unit parameterization is stored on the SD memory card.
2. Disconnect the unit and remove it from the system.
3. Remove the SD memory card of the unit via the service cover plate on the housing cover.
4. Insert the memory card into a new unit via the service cover plate.
5. Install the new unit in the system and connect it to the power supply.
6. Switch on the new unit.



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7. The parameters saved on the SD memory card are now available again. If a different parameter set is needed for the new unit change it now. Back up the changed unit data on the SD memory card again after startup.
8. For applications with motor encoder or distance encoder, you must perform a reference travel.

9.3 Encoder replacement

9.3.1 Replacing incremental encoders

Incremental encoders for positioning always require a reference travel after startup. This is why there are no special measures required in the event of a unit or encoder (motor) replacement.

9.3.2 Replacing absolute encoders.

MOVIPRO® stores the position of absolute encoders with 32 bit. This allows for representing a larger absolute area than with an encoder with typical 12 bits in the single-turn range and 12 bits in the multi-turn range. However, this also means that you must reference the encoder in case of a unit or encoder (motor) replacement.

9.3.3 Replacing linear encoder systems

If you replace an absolute linear encoder system without encoder overflow in such a way that the encoder system provides the same values as before the replacement, a reference travel is not required.

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9.3.4 Replacing HIPERFACE® encoders

With HIPERFACE® encoders, you can use parameter P948 to specify whether or not a reference travel is required after an encoder replacement.

9.4 Display

The status display indicates the status of the unit. It is operated by the processor unit. Refer to the software documentation for detailed information on possible error messages.

9.5 Error information of the power section

9.5.1 Fault memory

The error memory (P080) stores the last 5 error messages (faults t-0 through t-4) of the inverter. The oldest error message is deleted whenever more than 5 error messages have occurred.

The following information is stored when an error occurs:

- Error which has occurred
- Status of digital inputs/outputs
- Operating state of the inverter
- Inverter status
- Heat sink temperature
- Speed
- Output current
- Active current
- Unit utilization
- DC link voltage
- Operating hours
- Enable hours
- Parameter set
- Motor utilization

9.5.2 Reset

⚠ WARNING

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Observe the startup notes.
- Set the controller inhibit.
- Switch off the output stage.
- De-couple the drive.
- Deactivate auto reset for drives that start up automatically.

An error message can be acknowledged by:

- Switching the voltage supply off and then on

  Always maintain a minimum switch-off time of 1 minute.
- Reset using the parameters of the frequency inverter
- Reset via the process data interface

Auto reset performs up to 5 unit resets with an adjustable restart time.

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9.6 Shutdown

9.6.1 Unit with connected MOVI-DPS

Proceed as follows to shut down the unit:

- Inhibit the output stage of the unit.
- Disconnect the unit from the supply system.
- Observe the instructions in the documentation of the connected MOVI-DPS.

9.6.2 Unit without connected MOVI-DPS

⚠ 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 unit, disconnect it from the power supply using appropriate measures.

9.7 Storage

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

- If you shut down and store the unit for a longer period, you must cover the connections with the supplied protection caps.
- Place the unit on a side without connectors during storage.
- Ensure that the unit is not subject to mechanical impact during storage.
- Connect the unit to the supply voltage for at least 5 minutes every 2 years.

Observe the notes about the storage temperature in the “Technical data” chapter.

9.8 Extended storage

If the unit is stored for a long time, connect it to the power supply for at least 5 minutes every 2 years. Otherwise, the service life of the unit may be reduced.

Procedure when maintenance has been neglected:

Electrolytic capacitors are used in the frequency inverters. They are subject to aging effects when de-energized. This effect can damage the capacitors if the unit is connected using the nominal voltage after a longer period of storage.

If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the line voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview:

- Stage 1: AC 0 V to AC 350 V within a few seconds
- Stage 2: AC 350 V for 15 minutes

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- Stage 3: AC 420 V for 15 minutes
- Stage 4: AC 500 V for 1 hour

9.9 Waste disposal

Observe the applicable national regulations. Dispose of materials separately in accordance with the nature of the materials and the regulations in force, for example:

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

9.10 Additional information

For additional service information, refer to chapter "Service" of the project description of the system solution.

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10 Technical data

10.1 Basic unit

INFORMATION

Operation without MOVI-DPS changes the technical data. Observe the latest edition of the relevant documentation.

General	
Ambient temperature	+5 – +40 °C (non-condensing, no moisture condensation) The unit provides intrinsic thermal safety. Once the heat sink temperature exceeds a certain level, a disconnection is triggered and an "Overtemperature" error message is generated.
Derating ambient temperature	EN 60721-3-3
Climate class	Class 3K3
Storage temperature	-25 – +70 °C
Degree of protection	IP54
Weight	38.5 kg
Dimensions W × H × D	750 × 420 × 190 mm

Input data X1213	
Supply type	3-phase AC connection
Input voltage range	3 × AC 380 – 500 V
Nominal input current At I_l = AC 400 V	AC 15.8 A
Nominal input current with optional fan:	AC 28.8 A
Nominal input frequency	50 – 60 Hz

Output data	
Operating mode	S1 (IEC 60034-1)
Rated output power	8.4 kW
Rated output power with optional fan	15 kW

The total rated output power is crucial for the maximum output power of the unit. The power data of the individual axes may deviate from these values.

24 V backup voltage	
Nominal input voltage	DC 24 V -15% / +20% (EN 61131-2)
Internal consumption	< 1 A, typ. 750 mA
Total current consumption	Own consumption + output current on buses and I/Os

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AC 400 V output X2371 / AC 400 V output (SNI) X2241	
Nominal output voltage	U_I
Line connection fusing (via circuit breaker for total current)	10 A trip characteristic K
Maximum line length	100 m

The integrated 10 A fuses are connected before the line output. Note the required cable cross sections of at least AWG 14 for UL installations.

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10.2 Axis data

Motor with brake control X2016	
Axis type	PFA-MD150B
Nominal output power According to EN 60034-1	15 kW at f_{A1} = 4 kHz
Nominal output current According to EN 60034-1	AC 32 A
Current limiting (motor and regenerative operation, duration depending on capacity utilization)	AC 48 A
Output voltage	3 × AC 0 – 500 V
PWM frequency	Adjustable: 4 / 8 / 12 / 16 kHz
Speed range	− 6000 – 0 – + 6000 min^{-1}
Resolution	0.2 min^{-1} over the entire range
Rated brake voltage Terminals 13 / 15	DC 167 V
SEW brake type	AC 400 V
Nominal brake current Terminals 13/15 per motor output	DC 0.7 A
Brake acceleration current Terminals 13/14 per motor output	4 – 8.5 x the holding current, depending on brake type
Maximum braking power	120 W (0,161 HP)
Temperature sensor when 2 motors are connected	TH (series connection via both motors)
Temperature sensor when 1 motor is connected	TF / TH / KTY: The temperature sensor contacts of the motor connection not in use must be jumpered.
Maximum motor cable length	30 m

Braking resistor	
Minimum permitted braking resistance (4Q operation)	15 Ω

INFORMATION

For more information, refer to the "MOVIPRO® Accessories" addendum to the operating instructions.

10.3 Communication and control unit

10.3.1 Processing unit

MOVI-PLC® *advanced* DHR41B	
Digital inputs	PLC-compatible (IEC 61131-2), sampling cycle 1 ms
Signal level	24 V= "1" = contact closed 0 V = "0" = contact open
Digital outputs	500 mA / output Dissipation of inductive switch-off energy up to 0.7 J (freewheeling diodes are not integrated) All outputs are short-circuit proof, protected against overloads, and interference-voltage-proof. There is no integrated free-wheeling diode.
Memory card	PC readable
Engineering	Engineering is performed via the ETHERNET service interface and the PLC Editor in the MOVITOOLS® MotionStudio PC software. Additional engineering access via PROFINET, EtherNet/IP and Modbus/TCP interface.
Fieldbus connections	Push-pull RJ45 Integrated Ethernet switch with auto-crossing and auto-negotiation function.

24 V voltage supply of the buses	
Output voltage	DC 24 V ± 10%
Output current	500 mA / output The total output power of the 24 V supplies must not exceed 48 W.

10.3.2 PROFINET interface

PROFINET interface	
PROFINET protocol variant	PROFINET IO RT
Supported baud rate	100 Mbit/s (full duplex)
SEW ident number	$010A_{hex}$
Unit ident number	4
Connection technology	M12 (D-coded) or RJ45 (push-pull)
Integrated switch	Supports auto-crossing, auto-negotiation
Permitted cable types	Category 5 and higher, class D according to IEC 11801
Maximum cable length (from switch to switch)	100 m according to IEEE 802.3
GSD file name	GSDML-V2.1-SEW-MOVIPRO-yyyymmdd.xml
Bitmap file name	SEWMOVIPRO1.bmp

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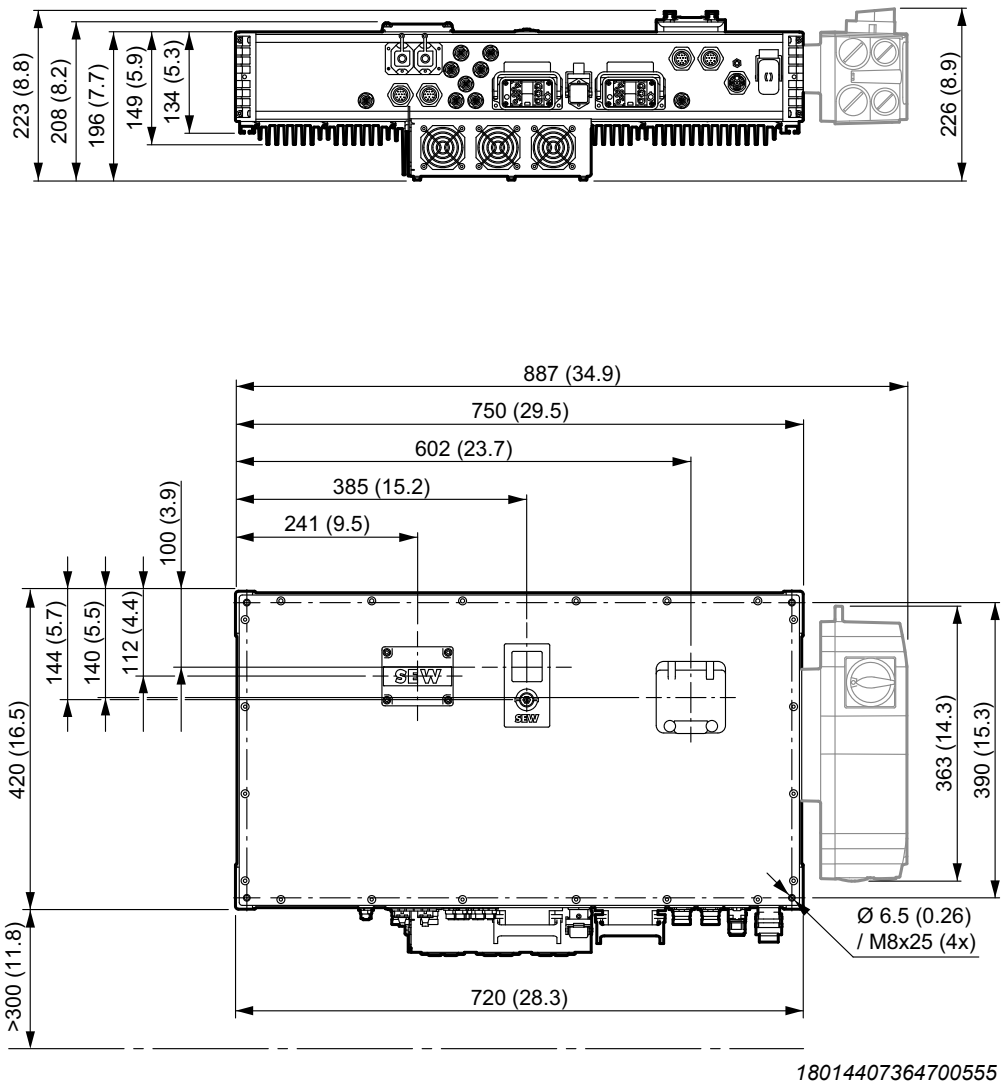
10.4 Dimension drawing

The dimension drawing shows the mechanical dimensions of the drive controller in mm (in):



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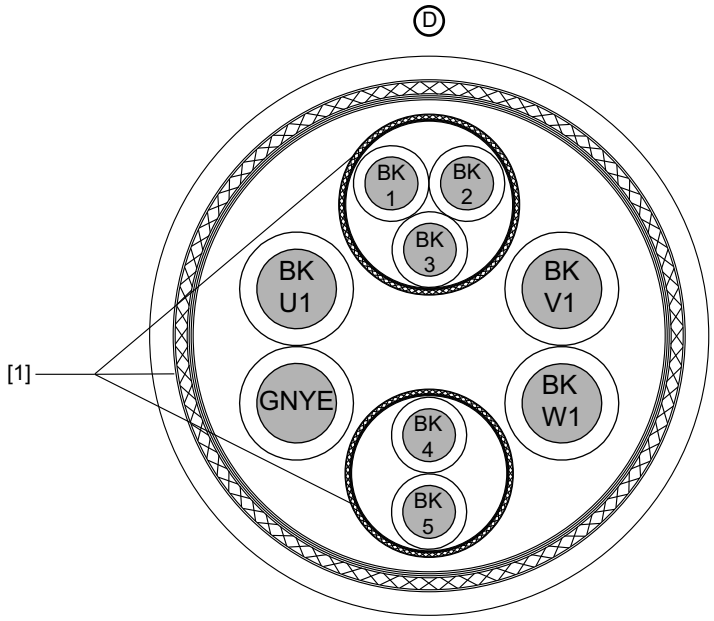
[1] Recommended clearance for connection cables (can vary depending on the cables used)

10.5 Hybrid cable type "D"

10.5.1 Mechanical structure

The following figure shows the mechanical structure of the cable:



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[1] Shield

	Cable type				
	D/1.5	**D/2.5**	**D/4.0**	**D/6.0**	**D/10.0**
Supply cores (mm^2)	4 x 1.5	4 x 2.5	4 x 4.0	4 x 6.0	4 x 10.0
Control core pair (mm^2)	2 x 0.75	2 x 0.75	2 x 0.75	2 x 0.7	2 x 0.75
Brake control (mm^2)	3 x 1.0	3 x 1.0	3 x 1.5	3 x 1.5	3 x 1.5
Conductor insulation	PP (polypropylene)				
Conductor	Bare E-Cu litz wire, extra fine wires with individual wire 0.15 mm				
Shield	Made of tinned E-Cu wire				
Overall diameter (mm)	13.9	17.2	19.0	21.5	25.3
Color of outer cable jacket	Orange				
Outer cable jacket insulation	TPE-U (polyurethane)				

10.5.2 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 ≤ 3 ms^{-1}

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  - Min. bending radius: 10 x cable diameter
- Minimum bending radius for fixed installation: 5 x 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 sheath 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:

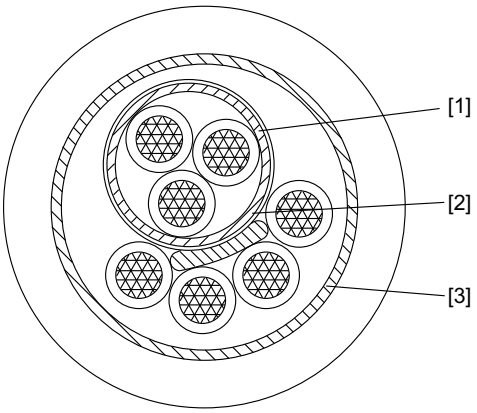
Fixed installation	Cable carrier installation
–40 °C to +90 °C (current-carrying capacity to DIN VDE 0298-4)	-5 °C to +90 °C (current-carrying capacity to DIN VDE 0298-4)
–30 °C to +80 °C according to UL758	-5 °C to +80 °C according to UL758

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

10.6 Hybrid cable type "E"

10.6.1 Mechanical structure

The following figure shows the mechanical structure of the cable:



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

	Cable type			
	E/1.5	**E/2.5**	**E/4.0**	**E/6.0**
Supply cores (mm^2)	4 x 1.5	4 x 2.5	4 x 4.0	4 x 6.0
Brake control (mm^2)	3 x 1.0	3 x 1.0	3 x 1.0	3 x 1.5
Conductor insulation	TPM			

	Cable type			
	E/1.5	**E/2.5**	**E/4.0**	**E/6.0**
Conductor	Blank CU litz wire			
Shield	Made of tinned Cu wire			
Overall diameter (mm)	15.0	16.3	15.3	17.4
Color of outer cable jacket	Orange			
Outer cable jacket insulation	PUR (polyurethane)			

10.6.2 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 ≤ 3 ms^{-1}
  - Min. bending radius: 10 x cable diameter
- Minimum bending radius for fixed installation: 5 x 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 sheath 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 °C to +80 °C
  - -20 °C to +60 °C
- Temperature range for transportation and storage:
  - –40 °C to +90 °C (current-carrying capacity to DIN VDE 0298-4)
  - –30 °C to +80 °C according to UL758

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11 Additional documentation

The following documentation contains further information:

Title	Part number
Addendum to the "MOVIPRO® – Accessories" operating instructions	19446012/EN
"Controllers DHE21B/DHF21B/DHR21B (Standard), DHE41B/DHF41B/DHR41B (advanced)" manual	16897226/EN
"MOVIPRO® ADC with PROFINET Interface" manual	19298412/EN
"MOVIPRO® Functional Safety" manual	19289626/EN

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12 MAXOLUTION® Competence Center

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	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
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	Brumath	SEW-USOCOME 1 rue de Bruxelles F-67670 Mommenheim	Tel. +33 3 88 37 48 48
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	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
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	Ulm	SEW-EURODRIVE GmbH & Co KG Dieselstraße 18 D-89160 Dornstadt	Tel. +49 7348 9885-0 Fax +49 7348 9885-90 dc-ulm@sew-eurodrive.de
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Greece			
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Sales	Reykjavik	Varma & Vélaverk ehf. Knarrarvogi 4 IS-104 Reykjavík	Tel. +354 585 1070 Fax +354 585)1071 http://www.varmaverk.is vov@vov.is
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	Pune	SEW-EURODRIVE India Private Limited Plant: Plot No. D236/1, Chakan Industrial Area Phase- II, Warale, Tal- Khed, Pune-410501, Maharashtra	Tel. +91 21 35301400 salespune@seweurodriveindia.com
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	Medan	PT. Serumpun Indah Lestari Jl.Pulau Solor no. 8, Kawasan Industri Medan II Medan 20252	Tel. +62 61 687 1221 Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041 sil@serumpunindah.com serumpunindah@yahoo.com http://www.serumpunindah.com
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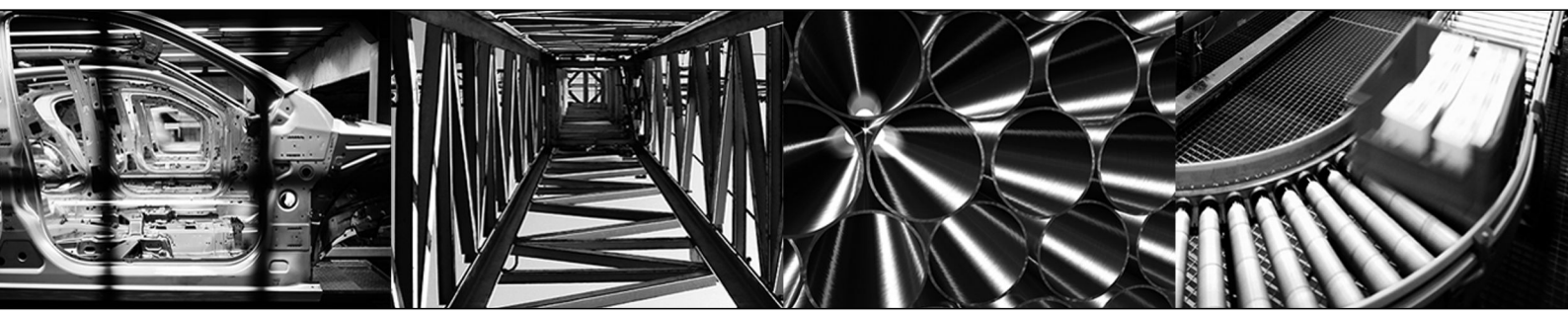

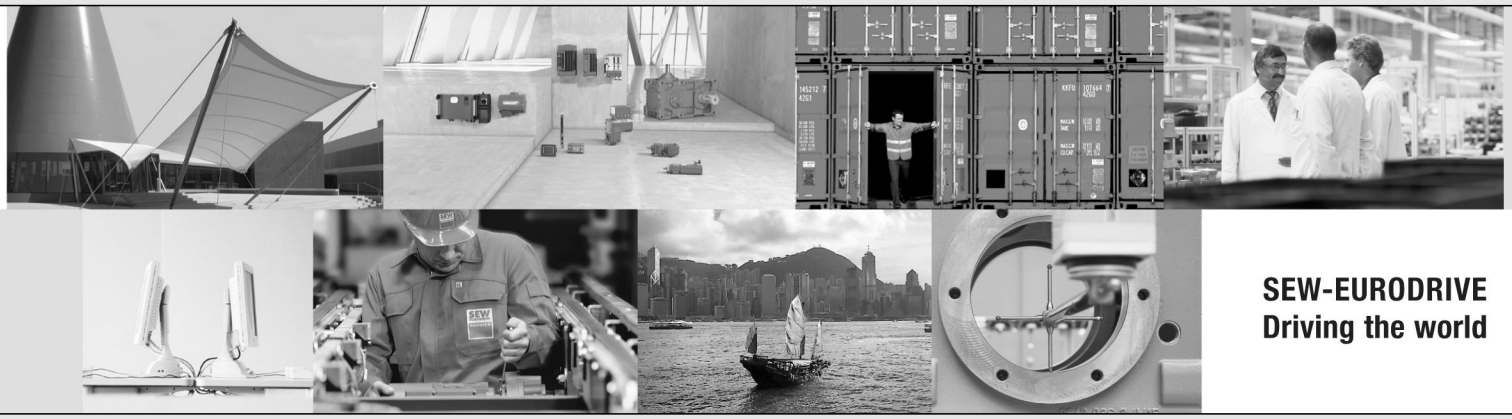

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