



SEW
EURODRIVE

Operating Instructions



Drive and Application Controller
MOVIPRO® PHE..B-A15-.1X0B1A-00



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1 General information

1.1 About this documentation

The current version of the documentation is the original.

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

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

1.2 Other applicable documentation

Observe the corresponding documentation for all further components.

1.3 Structure of the safety notes

1.3.1 Meaning of signal words

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

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

1.3.2 Structure of section-related safety notes

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

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



SIGNAL WORD







Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

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

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

1.3.3 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.

1.4 Rights to claim under limited warranty

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

1.5 Product names and trademarks

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

1.6 Copyright notice

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2 Safety notes

2.1 Preliminary information

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

2.2 Duties of the user

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

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

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

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

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

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

2.3 Target group

Specialist for mechanical work	<p>Any mechanical work may only be performed by adequately qualified specialists. Specialists in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting, and maintenance of the product who possess the following qualifications:</p> <ul style="list-style-type: none"> • Qualification in the mechanical area in accordance with the national regulations • Familiarity with this documentation
Specialist for electrotechnical work	<p>Any electrotechnical work may only be performed by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting, and maintenance of the product who possess the following qualifications:</p> <ul style="list-style-type: none"> • Qualification in the electrotechnical area in accordance with the national regulations • Familiarity with this documentation
Additional qualification	<p>In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation. The persons must have the express authorization of the company to operate, program, parameterize, label, and ground units, systems, and circuits in accordance with the standards of safety technology.</p>
Instructed persons	<p>All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the instruction is that the persons are capable of performing the required tasks and work steps in a safe and correct manner.</p>

2.4 Designated use

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

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

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

The product is designed for mobile use.

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

- AC asynchronous motors with squirrel-cage rotor

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

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

2.5 Functional safety technology

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

2.6 Transport

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

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.
- Before transportation, cover the connections with the supplied protection caps.
- Only place the product on the cooling fins or on the side without connectors during transportation.
- Always use lifting eyes if available.

If necessary, use suitable, sufficiently dimensioned handling equipment.

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

2.7 Installation/assembly

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

Protect the product from strong mechanical strain. The product and its mounting parts must never protrude into the path of persons or vehicles. Ensure that components are not deformed and insulation spaces are not changed, particularly during transportation and handling. Electric components must not be mechanically damaged or destroyed.

Observe the notes in chapter "Mechanical installation" (→ 18) in the documentation.

2.7.1 Restrictions of use

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

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

The product can be used at altitudes above 1000 m above sea level up to 4000 m above sea level under the following conditions:

- The reduction of the nominal output current and/or the line voltage is considered according to the data in chapter "Technical data" (→ 68) in the documentation.
- Above 2000 m above sea level, the air and creeping distances are only sufficient for overvoltage class II according to EN 60664. At altitudes above 2000 m above sea level limiting measures must be taken, which reduce the line side overvoltage from category III to category II for the entire system.
- If a protective electrical separation (in accordance with EN 61800-5-1 and EN 60204-1) is required, then implement this outside the product at altitudes of more than 2000 m above sea level

2.8 Electrical installation

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

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

2.8.1 Required preventive measure

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

2.9 Protective separation

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

2.10 Startup/operation

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

If you use the product in a mobile application, you must ensure that it is not moved from a de-energized section to a section supplied with energy. The product must be in a de-energized section in order to actively connect it.

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

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

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

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

10 minutes.

Observe the corresponding information signs on the product.

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

Cover unused connections with the supplied protection caps during operation.

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

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

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

Hot surfaces

The surfaces of components (e.g. heat sink, braking resistance, drives) can be very hot during operation. Observe the following information to avoid risk of burns:

- Do not touch the components during operation.
- Let the components cool down before you start working on the components.
- Observe the hazard symbols on the product.

3 Device structure

3.1 Type designation

The type designation contains the following data:

PHE	MOVIPRO® drive and application controller
.	Motor connection: 1 = HAN® Q8/0 2 = HAN® 10E
.	Signal interfaces: 1 = Communication package 1 2 = Communication package 2
B	basic
-	
A	Power supply: Three-phase current
15	Maximum S1 device power: 1.5 kW
-	
.	Brake control: 2 = Control for 2-wire brakes 3 = Control for 3-wire brakes from SEW-EURODRIVE
1	Design: with operation switch
X0	Auxiliary axis connection: without connection for an auxiliary axis
B1	Communication type: Half-wave
A-00	Generation A standard device

3.2 Scope of delivery

The scope of delivery includes the following components:

Component	Part number
Drive and Application Controller MOVIPRO® PHE..B-A15-.1X0B1A-00	—
Protective covers for motor and signal connections and the braking resistor connection	—

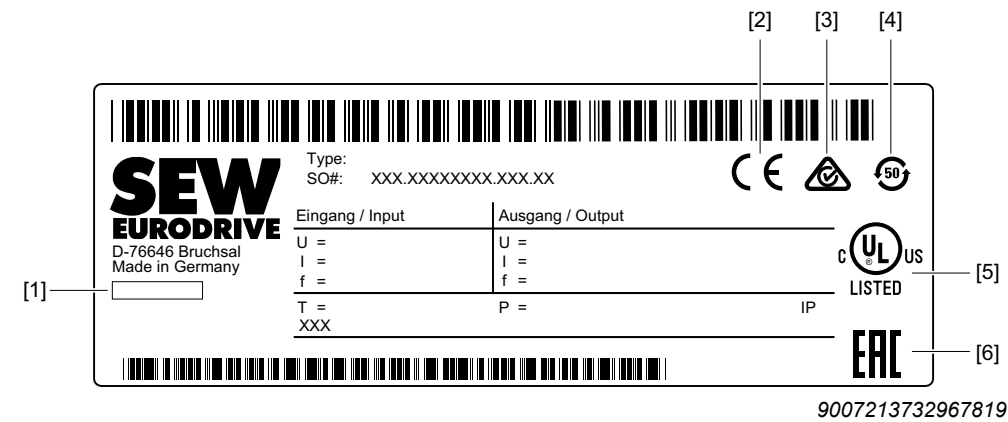
3.3 Short designation

The following short designations are used in this documentation:

Component	Short designation
Drive and Application Controller MOVIPRO® PHE..B-A15-.1X0B1A-00	Device

3.4 Nameplate

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



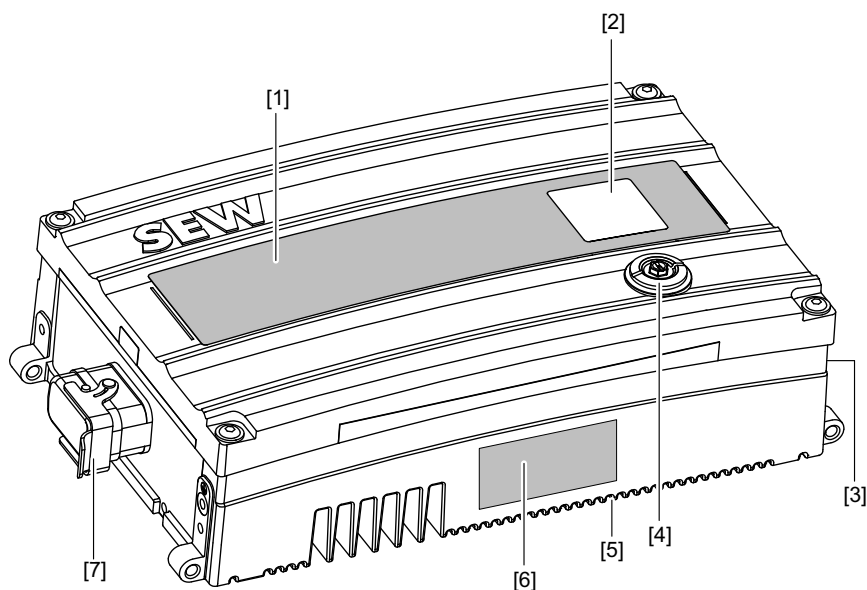
- [1] Product name
- [2] CE marking
- [3] RCM approval (depending on device certification)
- [4] China RoHS-2 marking
- [5] UL approval (depending on device certification)
- [6] EAC marking

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

Value	Specification
Type	Type designation
SO#	Production number
V	Voltage
I	Current
f	Frequency
T	Ambient temperature
P	Rated output power
IP	Degree of protection
XXX	Status bar

3.5 Device overview

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



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- [1] Status and error codes label
- [2] Status display and infrared interface
- [3] Connection block (connections depend on the device design)
- [4] Service interface
- [5] PE connection
- [6] Nameplate
- [7] Motor connection (connection depends on the device design)

3.6 Accessories

3.6.1 Available accessories

INFORMATION



The scope of delivery does not include accessories, such as installation and mounting material or connection cables.

INFORMATION



The following prerequisites must be fulfilled to ensure fault-free operation:

- The M12 parameter memory must be plugged in.
- With communication package 1, connect the jumper plug mentioned in the following table or connect a suitable external operating switch. See chapter "X1551:" (→ 38) for additional information: "DC 24 V connection for external operating switches" (→ 38).

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

Keypad	
For further information, refer to the following documentation: "MOVIPRO® Accessories – PZO00A-BFBIR0-01/.. Keypad" operating instructions.	
PZO00A-BFBIR0-01/L005	17976014
Braking resistors	
For further information, refer to chapter "Technical data" (→ 68).	
BW200-003/k1.5	08282919
BW200-005/k1.5	08282838
M12 parameter memory	
For further information, refer to the following documents: "MOVIVISION® EMS basic" manual.	
M12 parameter memory	17976340
Mounting accessories	
For further information, refer to chapter "Mechanical installation" (→ 18).	
EMS mounting kit angle brackets	28218248
For further information, refer to the following documentation: "MOVIPRO® EMS angle bracket mounting kit" information sheet.	
Connection component	
Jumper plug	11747099
Interface adapters	
USB-11A interface adapter (USB to RS485)	08248311
USB/M12 adapter cable	19104979
Sensor/actuator box	
For further information, refer to chapter "Electrical connections" (→ 34).	
Sensor/actuator box 4/3-L-M12-M8	19111142
Connection cable sensor/actuator box 1 m	18161073
Connection cable sensor/actuator box 2 m	18151081
Connection cable sensor/actuator box 3 m	18161103
Connection cable sensor/actuator box 4 m	18161111
Connection cable sensor/actuator box 5 m	18161138

4 Mechanical installation

4.1 Requirements



⚠ WARNING

Risk of crushing if the load falls.

Severe or fatal injuries.

- Do not stand under the load.
- Secure the area where loads can fall down.

NOTICE

Risk of collision.

Damage to plant and device components.

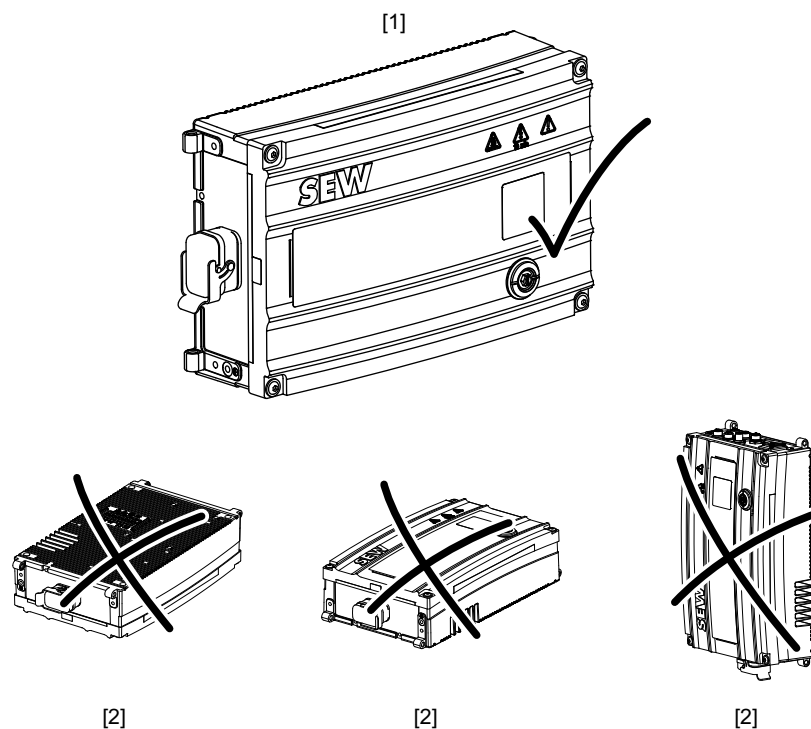
- Always position the device so that it will not collide with other components, design elements or persons along the travel path.

Comply with the following prerequisites:

- Trained specialists perform the installation.
- The information provided in the technical data and the permitted conditions for the operating location of the device are observed.
- The minimum clearance and the required gaps for using a mounting plate are complied with. For further information, refer to chapter Minimum clearance.
- The device 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 devices and the local requirements.
- The bore dimensions are calculated in line with the respective type of fixture. For further information, refer to chapter Assembly.
- The mounting and locking elements fit into the existing bores, threads and counter-sinks.
- All display and actuator elements are visible and accessible after installation.

4.2 Mounting position

The following figure shows permitted and not permitted mounting positions:



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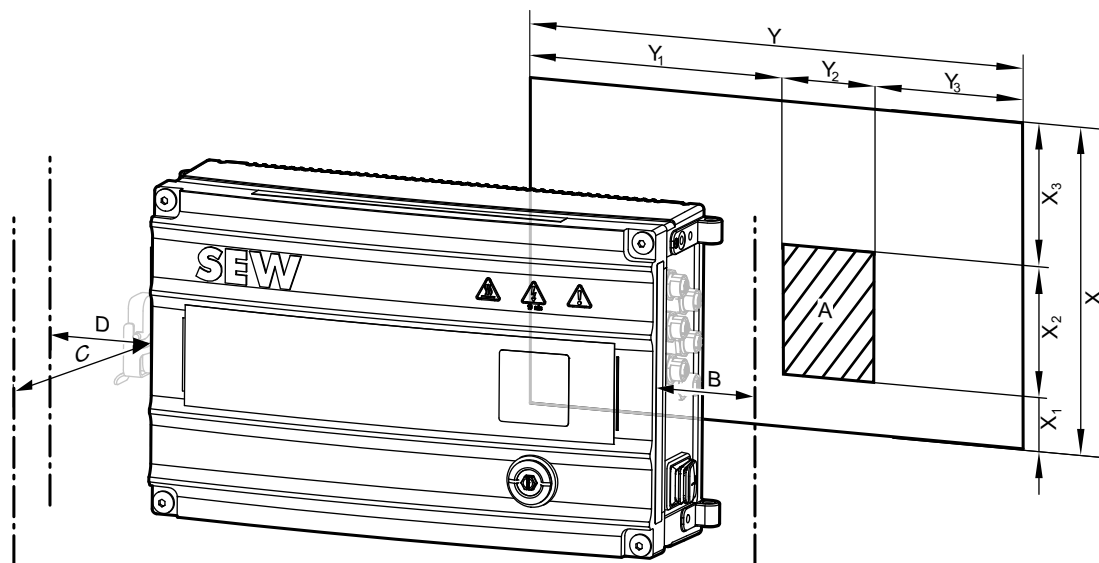
- [1] Permitted vertical mounting position
[2] Mounting positions that are not permitted

4.3 Minimum clearance

INFORMATION



- Observe the following minimum clearances during installation:
 - For connection of the cables and plug connectors
 - For handling the display, diagnostics and operating elements
 - For heat convection at the cooling fins if the device has cooling fins
- For more information on the required minimum clearances, refer to the dimension drawings in chapter "Technical data" (→ 68).



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The following table lists the minimum clearances. Housing dimensions are listed in chapter "Technical data" (→ 68).

Clearance	Function	Size
A: Back of the housing	Cut-out for contacts of the conductor rail	$X_1 = 19.5 \text{ mm}$, $X_2 = 81 \text{ mm}$, $X_3 = 102.5 \text{ mm}$ $Y_1 = 175 \text{ mm}$, $Y_2 = 57 \text{ mm}$, $Y_3 = 91 \text{ mm}$
B: to the side on the right	Room for connection cables, plug connectors, mounted elements and actuator elements, e.g. maintenance switch	> 120 mm
C: Housing cover	Space for display elements, diagnostics elements and actuator elements, e.g. service unit	See dimension drawings in chapter "Technical data" (→ 68)
D: to the side on the left	Room for connection cables, plug connectors, mounted elements and actuator elements, e.g. maintenance switch	> 120 mm

4.4 Cooling

Observe the following:

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

4.5 Installation



⚠ WARNING

Electric shock from live connections.

Severe or fatal injuries.

- Avoid contact with the signal feed connector X1261 at the rear of the device using constructive measures. For further information, refer to chapter "X1261: AC 400 V contact conductor connection" (→ 36).



NOTICE

Excessive external force.

Damage to the thread or the screw.

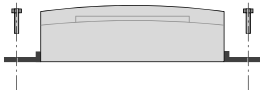
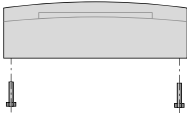
- Do not exceed the maximum tightening torque of 3.1 to 3.5 Nm.

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

- "Mounting kit with EMS angle brackets", part number 28218248

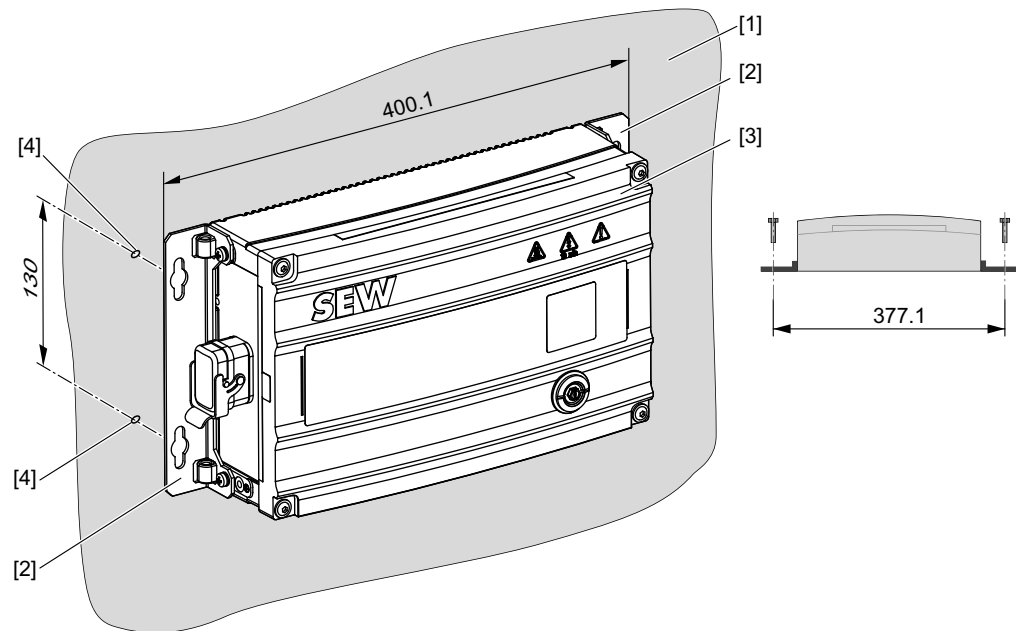
The included brackets are mounted to the narrow sides of the device.

Use one of the following mechanical mounting options:

Variant		Fastening
1		Fixed angle brackets • 4 × screwed
2		Tapped holes on the back of the device See chapter "Technical data" (→ 68) • 4 × screwed

4.5.1 Fixed angle brackets

The following figure shows the main mounting elements and dimensions:



9007211191020939

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

Mounting angle bracket

To mount the angle brackets, use the EMS mounting kit (part number 28218248) with:

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

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

Mounting the device

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

4.5.2 Tapped holes on the rear of the device

The device has 4 tapped holes on the rear of the device. Refer to the dimension drawing in chapter "Technical data" (→ 68) for information on the dimensions for mounting using tapped holes.

5 Electrical installation

5.1 Installation notes

Observe the following points for electrical installation:

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

5.2 Motor types

NOTICE

Unsuitable motor monitoring can lead to a malfunction.

Damage to property.

- Only connect motors with thermostat (TH) to the device.

The device supports the following global motors from SEW-EURODRIVE. Observe the possible brake voltage in chapter "output data" (→ 71).

- DRS71M4 with TH
- DRS71S4 with TH
- DRE80M4 with TH
- DRE80S4 with TH
- DRE90M4 with TH (star connection only)
- DRE90L4 with TH (star connection only)
- DRN80M4 with TH
- DRN90S4 with TH
- DRN90L4 with TH (star connection only)

5.3 Low-voltage supply systems

The device is only suitable and approved for operation on the following systems:

- TN and TT systems with directly grounded star point

5.4 Electromagnetic compatibility (EMC)

INFORMATION



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

The device is a drive system of the category C3 (see EN 61800-3).

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

5.4.1 EMC-compliant installation

Ensure that there is a HF-capable equipotential bonding for all drive components.

Use low-impedance, HF-capable connectors such as HF litz wire or ground straps. Standard PE does not achieve sufficient equipotential bonding regarding HF and EMC.

For further information, refer to chapter "Installing ground connection or equipotential bonding" (→ 25).

5.5 Cable routing

Observe the following when routing the cables:

- Use suitable cables to connect power supply and communication. For more information on connection descriptions, refer to the chapter "Electrical connections" (→ 34).
- Route power cables and signal cables in separate cable ducts.
- Maintain the greatest possible distance between power cables and signal cables.
- Avoid using long cables running parallel to one another.

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

5.5.1 Shielding

Observe the following when shielding:

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

5.6 Protective measures against electrical hazards

5.6.1 Connection points for mobile applications

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

Direct power supply

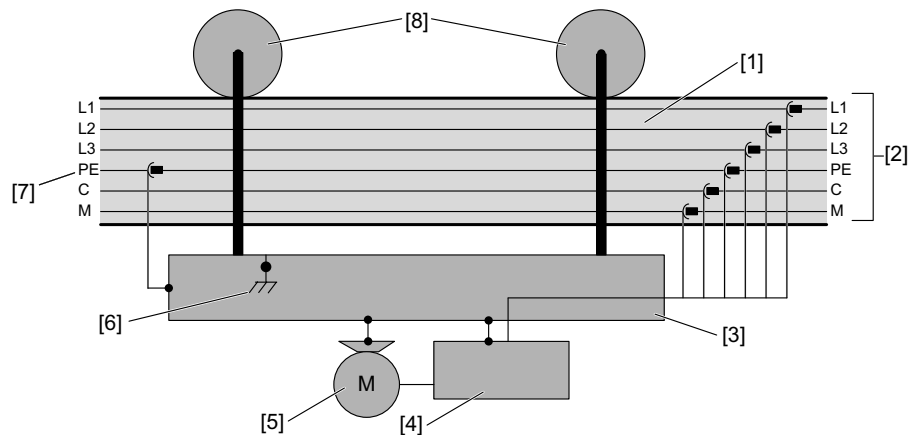
The ground connection protects mobile systems with direct power supply against electrical hazard according to IEC 60364-4-41.

Comply with the following rules:

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

The ground connection must be ensured via 2 mobile contact outlets, also known as sliding contacts.

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



9721963531

- [1] Stationary system section
- [2] Power supply
- [3] Vehicle frame
- [4] Application control
- [5] Motor
- [6] Vehicle GND
- [7] PE
- [8] Wheels

5.6.2 Installing ground connection or equipotential bonding

⚠ WARNING



Electric shock due to faulty ground connection or equipotential bonding.

Severe or fatal injuries.

- Make sure to install the ground connection and equipotential bonding correctly.

You have to protect all electrical operating resources such as the device or the motor using ground connection or equipotential bonding.

Required material

- Short low-impedance HF-compatible cables with M5 crimp cable lug
- Grounding kit (included in the delivery):
 - 2 pan head screws, 5 × 14 (self-tapping)
 - 4 serrated lock washers
 - 2 terminal clips

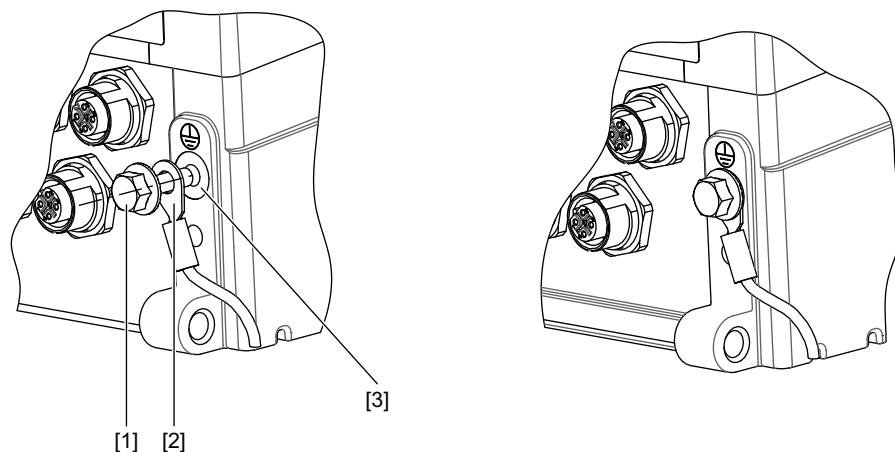
Tools required

Socket wrench with wrench size 8 mm

Procedure*Device without braking resistor*

Always ground the device using the shortest possible route.

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



9007211207752203

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

Note the different cable cross section of the supply line during installation. For further information, refer to chapter "Required cable cross section" (→ 28).

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

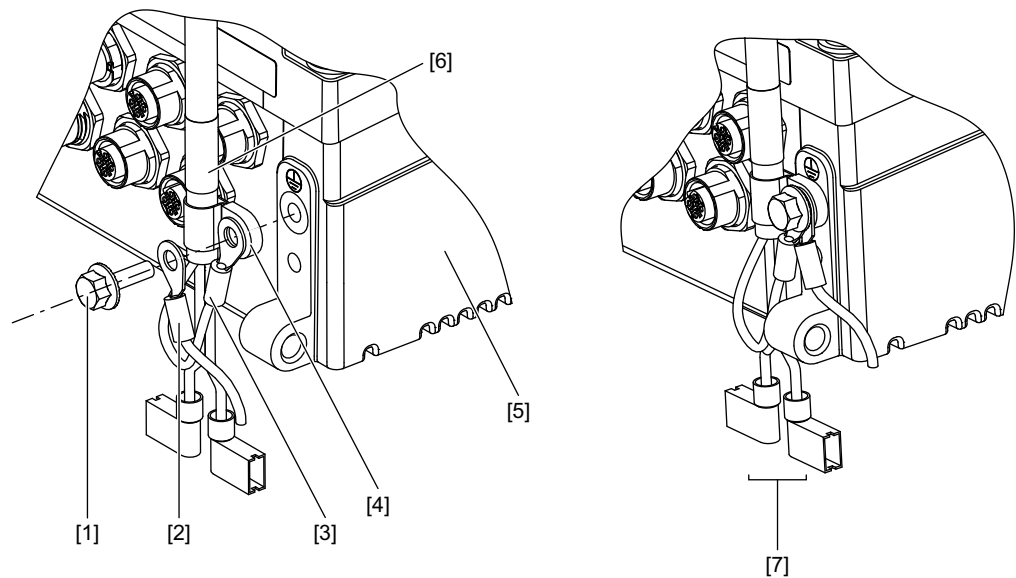
Device with braking resistor

Preparing the braking resistor cable

Proceed as follows to install the braking resistor cable:

1. Remove the plastic sheath of the braking resistor cable [6] over a length of at least 260 mm.
2. Remove the shield of the braking resistor cable [6] over a length of at least 30 mm.
3. Fold back the braided shield over the plastic sheath of the braking resistor cable [6].
4. Fix the braided shield in position with heat shrink tubing. Make sure that at least 20 mm of the braided shield remain blank.
5. Shorten the PE connection cable of the braking resistor [3] to at least 85 mm.
6. Crimp the ring cable lug for M5 to the PE connection cable of the braking resistor [3].
7. Crimp a suitable female push-on connector (6.3 mm) to each of the remaining conductors of the braking resistor [7].


Installing the PE



11951066763

- [1] M5 × 10 screw
- [2] Crimp cable lug for M5 (PE connection cable of the device)
- [3] Crimp cable lug for M5 (PE connection cable of the braking resistor)
- [4] Shield terminal
- [5] Housing
- [6] Braking resistor cable
- [7] Female push-on connector

1. Guide the shield terminal [4] over the braking resistor cable [6].
2. Place the shield terminal [4] onto the braided shield. Ensure that the braided shield of the braking resistor cable is completely surrounded by the shield terminal.
3. Take a screw [1] and push the crimp cable lug [2], the crimp cable lug [3] and the shield terminal [4] onto it.
4. Tighten the screw [1] with a maximum tightening torque of 2.5 Nm.

5. Note the different cable cross section of the supply line during installation. For further information, refer to chapter "Required cable cross section" (→  28).
6. Plug the brown conductor of the braking resistor into the push-on connector +R of the stationary converter X1261.
7. Plug the white conductor of the braking resistor into the push-on connector -R of the stationary converter X1261.

Required cable cross section

Leakage currents \geq AC 3.5 A/DC 10 mA may occur during normal operation. Note that the required cable cross section of the PE conductor depends on the cable cross section of the supply cable. Select the cable cross section of the PE conductor according to the following requirements.

Supply cable $< 10 \text{ mm}^2$:

Install two PE conductors with a cable cross section corresponding to the supply cable. Both PE have to be connected to different connection points and routed in parallel.

Alternatively, use a copper PE conductor with a cable cross section of 10 mm^2 .

Supply cable 10 mm^2 :

Route a copper PE conductor with a cable cross section corresponding to the supply cable.

5.7 Using prefabricated cables

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

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

5.7.1 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 device properties or that the device will function correctly.

When using third-party cables to connect the device and/or device components, make sure to comply with all applicable national regulations. Note that the technical features of the device or system of devices 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 device, 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

5.8 Line components

5.8.1 Residual current device



⚠ WARNING

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

Severe or fatal injuries.

- The product can cause direct current in the PE conductor. If a residual current device (RCD) or a residual current monitoring device (RCM) is used for protection in the event of a direct or indirect contact, only a type B RCD or RCM is permitted on the supply end of the product.
- If the use of a residual current device is not mandatory according to the standards, SEWEURODRIVE recommends not to use a residual current device.

5.8.2 Line fuses, fuse types

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

Design the fuses according to the current carrying capacity of the conductor rail in use.

The following applies when using fuses on the vehicles:

Miniature circuit breakers in utilization category gL, gG:

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

Miniature circuit breaker with characteristics B, C:

- Nominal circuit breaker voltage \geq nominal line voltage
- The rated voltage of the power circuit breaker must be 10% above the frequency inverter current.

5.9 Terminal strips



⚠ WARNING

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

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



⚠ WARNING

Electric shock due to live contacts and conductors.
The operating switch only switches off the internal 24 V supply for the inverter.

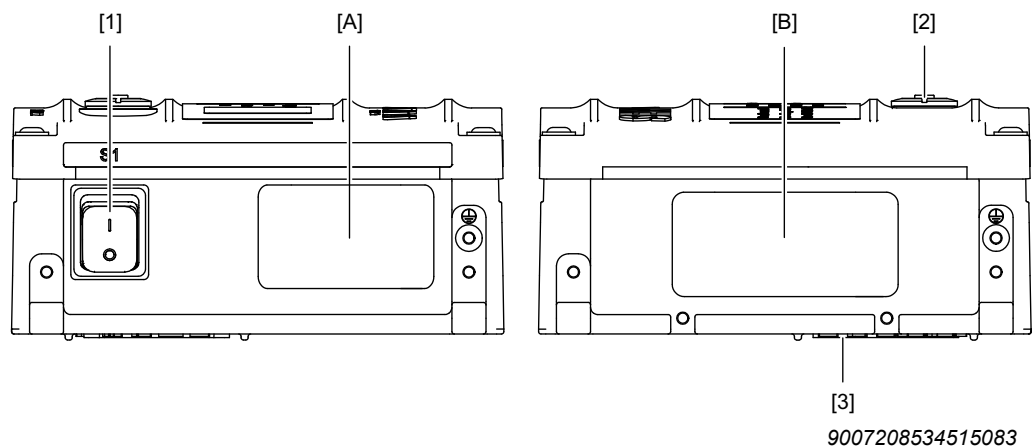
- Only use the operating switch to stop the drive during operation.
- Do not use the operating switch for work on live parts.



⚠ WARNING

Unintentional start-up of the motor.
The operating switch switches off the internal 24 V supply for the inverter only at one pole.

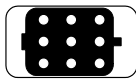
- Only use the operating switch to stop the drive during operation.
- Do not use the operating switch for safety-related stopping of the drive.



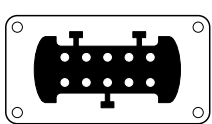
- | | | |
|-----|-------|--|
| [1] | S1 | Operating switch |
| [2] | X4022 | RS485 interface – service (→ 46) |
| [3] | X1261 | AC 400 V contact conductor connection (→ 36) |
| [A] | | Connection of signal interfaces (→ 32) |
| [B] | | Connection site for motor connection (→ 32) |

5.9.1 Connection site for motor connection

Motor connection HAN® Q8/0







Connection	Function	Type designation
<div style="text-align: center;">[1]</div> 	<div style="text-align: center;">[1] X2011</div>	<div style="text-align: center;">Motor with brake control</div> <div style="text-align: center;">PHE1.B-...-...-...</div>

Motor connection HAN® 10E

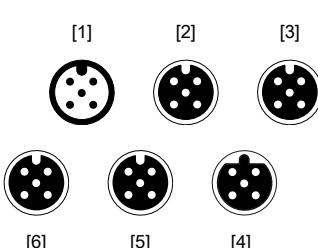
Connection	Function	Type designation
<div style="text-align: center;">[1]</div> 	<div style="text-align: center;">[1] X2013</div>	<div style="text-align: center;">Motor with brake control</div> <div style="text-align: center;">PHE2.B-...-...-...</div>

5.9.2 Connection of signal interfaces

Communication package 1

Connection	Function	Type designation
<div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="text-align: center;">[1] </div> <div style="text-align: center;">[2] </div> <div style="text-align: center;">[3] </div> <div style="text-align: center;">[6] </div> <div style="text-align: center;">[5] </div> <div style="text-align: center;">[4] </div> </div>	<div style="text-align: center;">[1] X4441</div>	M12 parameter memory
	<div style="text-align: center;">[2] X5002_2</div>	Digital input – communication and control unit
	<div style="text-align: center;">[3] X5002_1</div>	Digital inputs/outputs – communication and control unit
	<div style="text-align: center;">[4] X4011</div>	RS485 interface – external (with DC 24 V)
	<div style="text-align: center;">[5] X1551</div>	DC 24 V connection for external operating switches
	<div style="text-align: center;">[6] X5003</div>	Digital input – communication and control unit
		PHE.1B-...-...-...

Communication package 2

Connection		Function	Type designation
	[1]	X4441	M12 parameter memory
	[2]	X5002_2	Digital input – communication and control unit
	[3]	X5002_1	Digital inputs/outputs – communication and control unit
	[4]	X4011	RS485 interface – external (with DC 24 V)
	[5]	X5002_3	Digital input – communication and control unit
	[6]	X5002_4	Digital input – communication and control unit
			PHE.2B-...-...-...

5.10 Electrical connections

5.10.1 Representation of connections

The wiring diagrams show the contact end of the connections.

5.10.2 Connection cables





Connection cables are not included in the delivery.

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

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

Cable types

The table below shows the depiction and what they mean:

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

5.10.3 Cable structure

Diagram

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

Depiction	Meaning
(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
0.25	Core cross section in mm ²
)	Cable shield
+	A plus sign is added to cores with other features.
...	

Examples

The following examples illustrate the cable designation:

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

5.10.4 X1261: AC 400 V contact conductor connection

**▲ WARNING**

Electric shock from blank live connections.

Severe or fatal injuries.

- Use safe, insulated female push-on connectors for installation.
- To avoid coming into contact with unused male push-on connectors, you have to install the touch guard on unused male push-on connectors.

**▲ WARNING**

Electric shock from live connections.

Severe or fatal injuries.

- Note the following points for selecting suitable female push-on connectors:
- Use safe, insulated female push-on connectors for installation.
- The installed female push-on connectors must comply with the standard DIN 46 245 part 3, DIN 46 247 part 3 or DIN 46 346 part 3.
- Use the female push-on connector only with the insulating housing specified by the manufacturer.
- Make sure that each female push-on connector is plugged in correctly and latched.
- The latching function of the female push-on connector cannot be guaranteed for multiple use. Therefore, use a new female push-on connector after single use.

NOTICE

Damage caused by corrosion.

Damage of connection X1261.

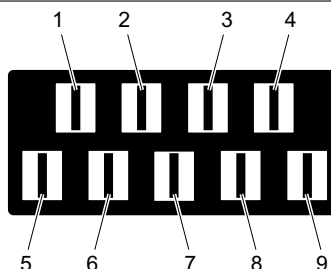
- The push-on contacts of connection X1261 are accessible from the outside. Ensure that the push-on contacts do not come into contact with water or other corrosive substances.

Function

AC 400 V connection for units with half-wave control supplied by the conductor rail

Connection type

Male push-on connectors 6.3

Connection image

No.	Name	Function
1	+R	Brake resistor (+)
2	-R	Brake resistor (-)
3	PE	PE connection
4	M	Message rail connection
5	L _{X/M}	Line connection phase X/jumper to signal contact control This phase is used for the signal output.
6	L _Y	Line connection phase Y
7	L _Z	Line connection phase Z
8	C2/n.c.	Control input C2 (for device variant PHE..B-...1X0.2..)/ Not assigned
9	C1	Control input C1

Connection recommendation

INFORMATION

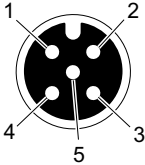


Phase L1, phase L2 or phase L3 can be connected to the control input C1 independent of phase L_{X/M}. For further information, refer to chapter "Technical data" (→ 68).

The phase that is connected to LX/M is output at the signal output. Select the connection assignment from the following recommendations depending on the desired signal phase:

L _{X/M}	L _Y	L _Z
L1	L2	L3
L2	L3	L1
L3	L1	L2

5.10.5 X1551: DC 24 V connection for external operating switches

Function		
DC 24 V connection for external operating switches		
Connection type		
M12, 5-pole, female, A-coded		
Connection image		
		
No.	Name	Function
1	+24V	DC 24 V output
2	0V24_SW	0V24 reference potential – switched
3	0V24	0V24 reference potential
4	+24V_SW	DC 24 V input – switched
5	res.	Reserved

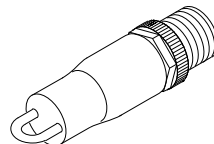
Connection component

Jumper plug

Part number: 11747099

Structure: bridged 1+4/2+3

Connection: M12



72057595186840843

5.10.6 X2011: Motor with brake control

NOTICE

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

Damage to the drive system or its environment.

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

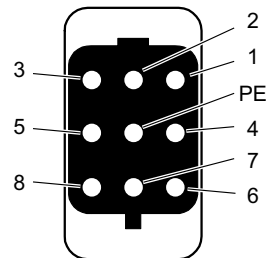
Function

Power connection for motor with brake up to 4 kW

Connection type

Han® Q 8/0, female

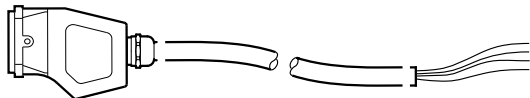
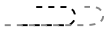
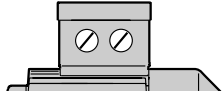
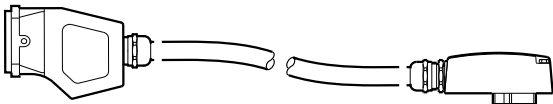
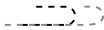
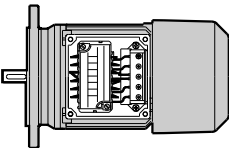
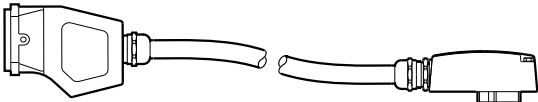

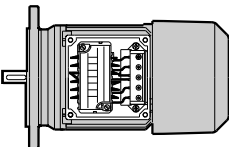
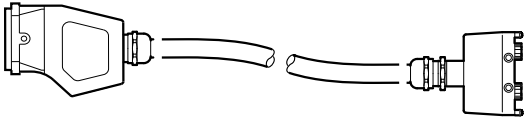

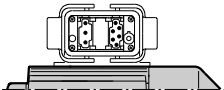
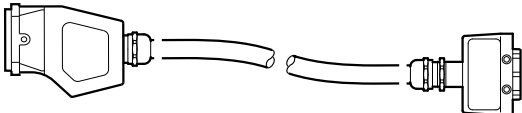
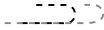
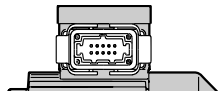
Connection diagram

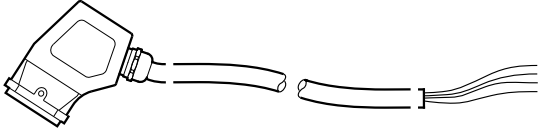

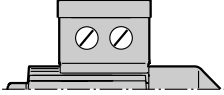
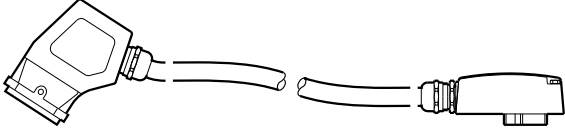
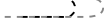
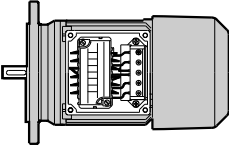
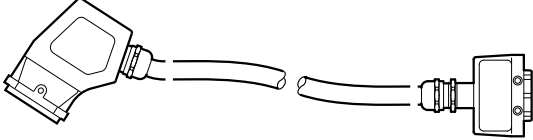

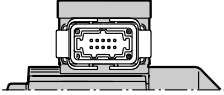
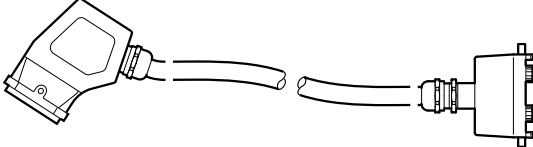

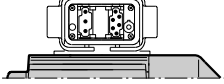
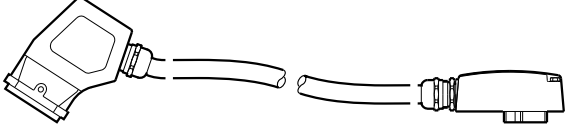

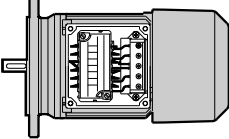


No.	Name	Function
1	U	Motor phase U output
2	14	Brake terminal 14 (white)
3	W	Motor phase W output
4	15	Brake terminal 15 (blue)
5	TH	Motor temperature sensor (+)
6	13	Brake terminal 13 (red)
7	V	Motor phase V output
8	TH	Motor temperature sensor (-)
PE	PE	PE connection

Connection cables

2.2 kW device power IEC

Cable	Length/installation type	Type	Component
Part number: 18125794 Cable design: 4G1.5  Han® Q 8/0 ↔ open (terminal box connection M4)	Variable length 	D/1.5	DRS71 DRE80 – DRE90 DRN80 – DRN90 
Part number: 18127681 △ Cable design: 4G1.5  Han® Q 8/0 ↔ IS △	Variable length 	D/1.5	DRS71△ DRE80 – 90△ DRN80 – 90△ 
Part number: 18127703 人  Han® Q 8/0 ↔ IS 人	Variable length 	D/1.5	DRS71人 DRE80 – 90人 DRN80 – 90人 
Part number: 18127711 Cable design: 4G1.5  Han® Q 8/0 ↔ ABB8	Variable length 	D/1.5	DRS71 DRE80 – DRE90 DRN80 – DRN90 
Part number: 18127738 Cable design: 4G1.5  Han® Q 8/0 ↔ ASB8	Variable length 	D/1.5	DRS71 DRE80 – DRE90 DRN80 – DRN90 

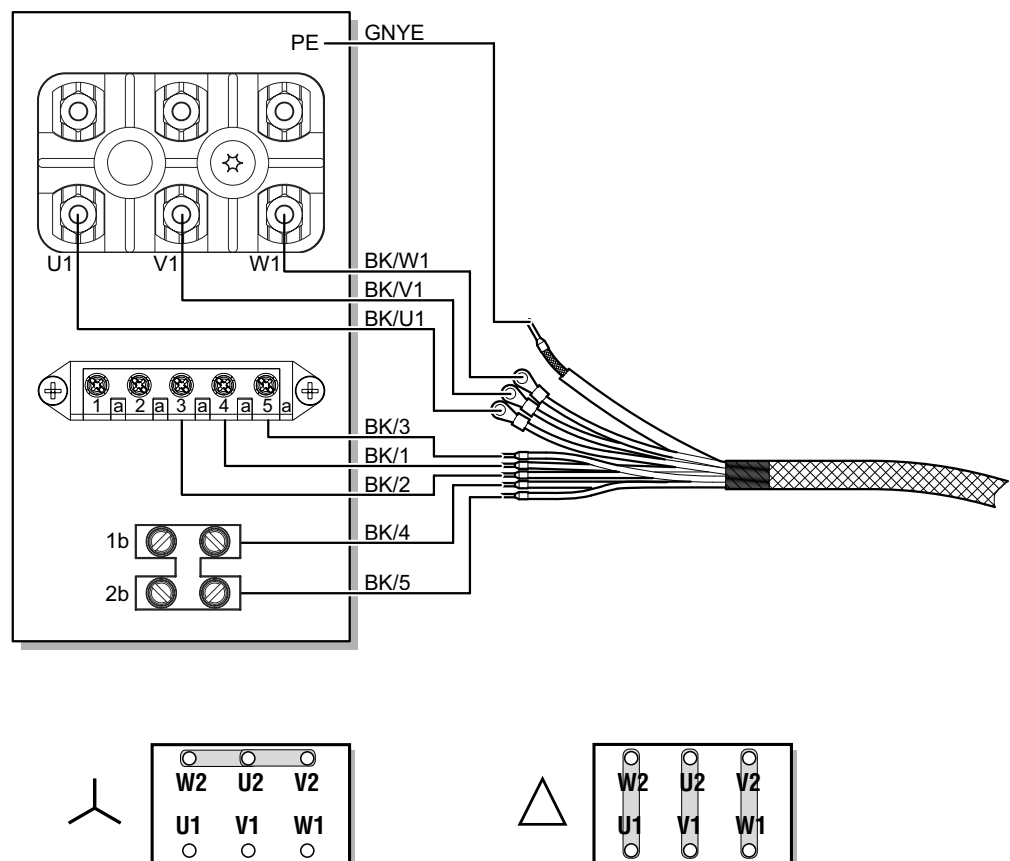
Cable	Length/installation type	Type	Component
Part number: 18164234  Han® Q 8/0 ↔ open (terminal box connection M4)	Variable length 	D/1.5	DRS71 DRE80 – DRE90 DRN80 – DRN90 
Part number: 18164250 人  Han® Q 8/0 ↔ IS 人	Variable length 	D/1.5	DRS71人 DRE80 – DRE90人 DRN80 – DRN90人 
Part number: 18164269  Han® Q 8/0 ↔ ASB8	Variable length 	D/1.5	DRS71 DRE80 – DRE90 DRN80 – DRN90 
Part number: 18164285  Han® Q 8/0 ↔ ABB8	Variable length 	D/1.5	DRS71 DRE80 – DRE90 DRN80 – DRN90 
Part number: 18164374 △  Han® Q 8/0 ↔ IS △	Variable length 	D/1.5	DRS71△ DRE80 – DRE90△ DRN80 – DRN90△ 

Conductor assignment

Part number	Signal name	Core color
18125794 (straight connector) 18164234 (angled connector)	U1	Black/U1
	V1	Black/V1
	W1	Black/W1
	4a	Black/1
	3a	Black/2
	5a	Black/3
	1b	Black/4
	2b	Black/5
	PE connection	Green-yellow + shield end (Inner shield)

Connecting the hybrid cable

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



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5.10.7 X2013: Motor with brake control

NOTICE

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

Damage to the drive system or its environment.

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

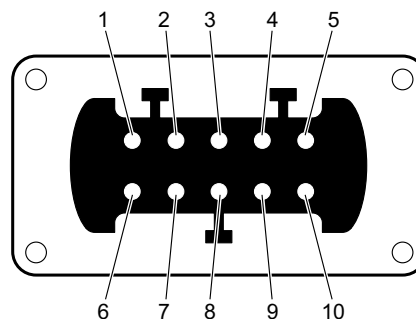
Function

Power connection for motor with brake up to 4 kW

Connection type

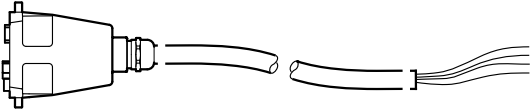
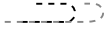
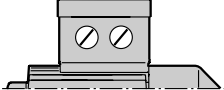
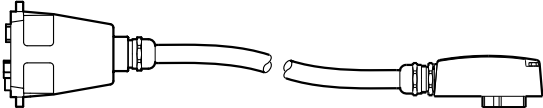
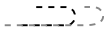
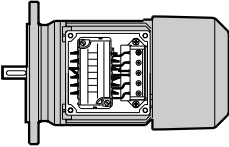
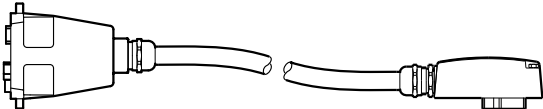
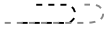
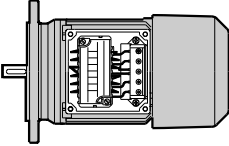
Han® 10 E

Connection diagram

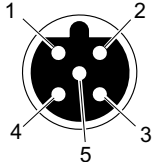


No.	Name	Function
1	U	Motor phase U output
2	V	Motor phase V output
3	W	Motor phase W output
4	13	Brake terminal 13 (red)
5	15	Brake terminal 15 (blue)
6	14	Brake terminal 14 (white)
7	res.	Reserved
8	res.	Reserved
9	TH	Motor temperature sensor (+)
10	TH	Motor temperature sensor (-)
PE	PE	PE connection


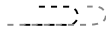
Connection cables

Cable	Length/installation type	Type	Component
Part number: 18164242  Han® 10 E ↔ open (terminal box connection M4)	Variable length 	D/1.5	DRS71 DRE80 – DRE90 DRN80 – DRN90 
Part number: 18164277 人  Han® 10 E ↔ IS 人	Variable length 	D/1.5	DRS71人 DRE80 – DRE90人 DRN80 – DRN90人 
Part number: 18164323 △  Han® 10 E ↔ IS △	Variable length 	D/1.5	DRS71△ DRE80 – DRE90△ DRN80 – DRN90△ 

5.10.8 X4011: RS485 interface – external

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

Connection cables

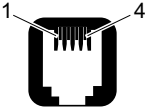
Cable	Length/installation type	Component
Part number: 18161871 Cable design: 5X0.34  M12, 5-pole, female, A-coded ↔ M12, 5-pole, male, A-coded	Variable length 	–

Conductor assignment

Part number	Pin assignment female	Pin assignment male
18161871	1	1
	2	4
	3	3
	4	2
	5	5

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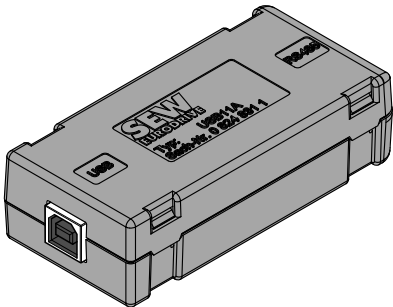
5.10.9 X4022: RS485 interface – service

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

Connection component

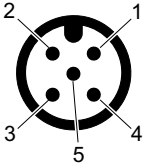
USB11A interface adapter

Part number: 08248311
Connection: RJ10



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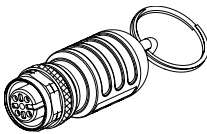
5.10.10 X4441: M12 parameter memory

Function		
Interface for connecting the M12 parameter memory		
Connection type		
M12, 5-pole, male, A-coded		
Connection image		
		
No.	Name	Function
1	GND	Reference potential
2	+5V	DC 5 V output
3	D-	Data line (-)
4	D+	Data line (+)
5	res.	Reserved

Connection component

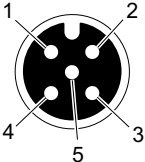
M12 parameter memory

Part number: 17976340
Connection: M12

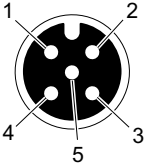


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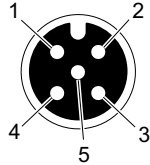
5.10.11 X5002_1: Digital inputs/outputs – communication and control unit

Function		
Digital inputs/outputs of the communication and control unit		
Connection type		
M12, 5-pole, female, A-coded		
Connection image		
		
No.	Name	Function
1	+24V	DC 24 V output
2	DIO01	Digital input/digital output 01
3	0V24	0V24 reference potential
4	DIO00	Digital input/digital output 00
5	FE	Equipotential bonding / functional earth

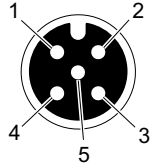
5.10.12 X5002_2: Digital input – communication and control unit

Function		
Digital input of communication and control unit		
Connection type		
M12, 5-pole, female, A-coded		
Connection image		
		
No.	Name	Function
1	+24V	DC 24 V output
2	DI03	Digital input 03
3	0V24	0V24 reference potential
4	DI02	Digital input 02
5	FE	Equipotential bonding / functional earth

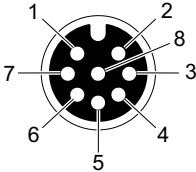
5.10.13 X5002_3: Digital input – communication and control unit

Function		
Digital input of communication and control unit		
Connection type		
M12, 5-pole, female, A-coded		
Connection image		
		
No.	Name	Function
1	+24V	DC 24 V output
2	DI05	Digital input 05
3	0V24	0V24 reference potential
4	DI04	Digital input 04
5	FE	Equipotential bonding / functional earth


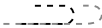
5.10.14 X5002_4: Digital input – communication and control unit

Function		
Digital input of communication and control unit		
Connection type		
M12, 5-pole, female, A-coded		
Connection image		
		
No.	Name	Function
1	+24V	DC 24 V output
2	DI07	Digital input 07
3	0V24	0V24 reference potential
4	DI06	Digital input 06
5	FE	Equipotential bonding / functional earth

5.10.15 X5003: Digital input – communication and control unit

Function		
Digital input of communication and control unit		
Connection type		
M12, 8-pole, female, A-coded		
Connection image		
		
No.	Name	Function
1	DI04	Digital input 04
2	DI05	Digital input 05
3	DI06	Digital input 06
4	DI07	Digital input 07
5	+24V	DC 24 V output
6	res.	Reserved
7	GND	Reference potential
8	res.	Reserved

Connection cables

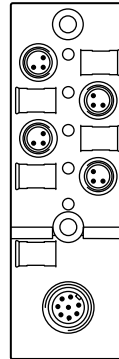
Cable	Length/installation type	Component
<p>Length 0.6 m: Part number 19185421</p> <p>Length 1.5 m: Part number 19115881</p> <p>Length 3 m: Part number 18161103</p>  <p>M12, male, straight ↔ M12, female, straight</p>	<p>Fixed length</p> 	Sensor/actuator box

Connection component

Sensor/actuator box

Part number: 19111142

Connection: M8



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6 Startup

6.1 For your safety



⚠ WARNING

Risk of injury due to uncontrolled device behavior caused by ineffective emergency switching off circuit.

Severe or fatal injuries.

- Have the installation carried out only by qualified personnel.



⚠ WARNING

Risk of injury due to device malfunction caused by incorrect device setting.

Severe or fatal injuries.

- Make sure that the installation was carried out by trained specialists.
- Check the parameters and data sets.
- Only use settings that are correct for the function.



⚠ WARNING

Risk of injury and possible damage to property if the motor starts up unintentionally.

Fatal or severe injuries and damage to property.

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



⚠ WARNING

Electric shock due to missing or defective protection covers.

Severe or fatal injuries.

- Make sure all protection covers are installed properly.
- Never start the device if the protection covers are not installed.



⚠ WARNING

Danger of electric shock due to open connections.

Severe or fatal injuries.

- Never start the device if the touch guard is not installed.



INFORMATION

Observe the safety notes in chapter "Safety notes" > "Startup/Operation".

INFORMATION



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

6.2 Requirements

The following conditions apply to startup:

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

6.2.1 Required hardware

INFORMATION



To ensure fault-free operation, the M12 parameter memory must be plugged in.

- PC or laptop with USB interface
- USB11A interface adapter

6.3 Startup note

The device is configured during startup. Use the RS485 interface – service interface (X4022) to establish the connection to the processing unit of the device.

6.4 Device configuration

6.4.1 Software

Use the latest version of the following software to make all the required settings: MOVIVISION® EMS basic.

6.4.2 Additional information

For further information, refer to the following documentation: "MOVIVISION® EMS basic" manual.

7 Operation

7.1 For your safety



⚠ WARNING

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

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

Severe or fatal injuries.

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



⚠ WARNING

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Observe the startup instructions.
- Ensure that persons are not present in the danger zone of system parts.
- Deactivate automatic restarting.
- Switch off the operating switch.
- Decouple the drive.
- Disconnect the vehicle from the supply system.



⚠ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

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



⚠ CAUTION

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

Injury.

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

INFORMATION



To ensure fault-free operation, the M12 parameter memory must be plugged in.

INFORMATION



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

7.2 Relative cyclic duration factor (cdf)

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

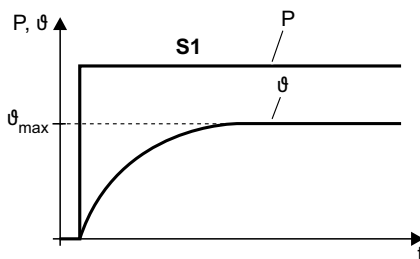
$$cdf = \frac{\text{total time of operation } (t_1 + t_2 + t_3)}{\text{cycle duration } (T)} \cdot 100\%$$

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7.3 Duty cycles

7.3.1 Duty type S1

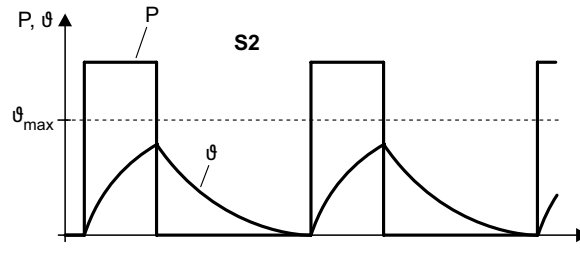
Continuous duty: Operation with a constant loading condition, the motor achieves a thermal steady state.



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7.3.2 Duty type S2

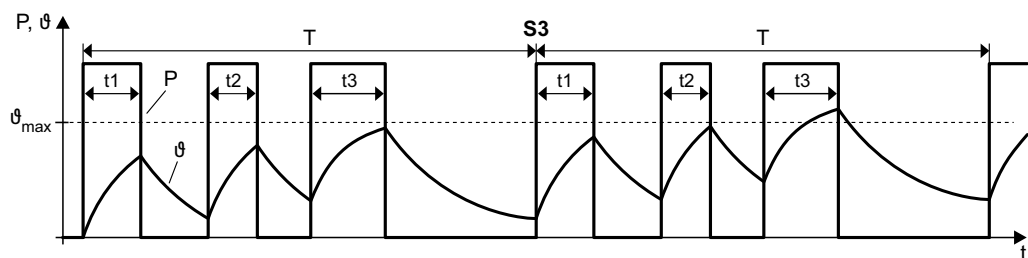
Short-time duty: Operation at constant loading condition for a limited, given time followed by a time at rest. The motor returns to ambient temperature during the rest period.



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7.3.3 Duty type S3

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



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7.3.4 Duty types S4 to S10

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

7.4 Status and fault messages

The status display of the device displays the following information depending on parameterization and operating state:

- In automatic mode:
 - Active travel command or active travel command and speed limitation
- In manual mode:
 - Active command
- In fault status:
 - ErA or ErP
 - Fault code
- When establishing a connection with the IR remote control:
 - Vehicle ID
- In all other operating states:
 - Operating state

For detailed information about possible status messages, refer to the relevant software documentation and the project description of the system solution, chapter "Operation".

7.4.1 List of faults

In case of a malfunction, the status display of the device displays the following fault codes.

Code	Meaning	Possible cause	Measure
302	Overcurrent	<ul style="list-style-type: none"> • Short circuit at frequency inverter output 	<ul style="list-style-type: none"> • Check the connection between the frequency inverter output and the motor as well as the motor winding for short circuits. • Reset the fault by switching off the 24 V supply voltage or via fault reset.
303	Thermal overload of the output stage or internal device fault	• Heat sink dirty	<ul style="list-style-type: none"> • Clean the heat sink. • Reset the fault by switching off the 24 V supply voltage or via fault reset.
		• Ambient temperature too high	<ul style="list-style-type: none"> • Lower the ambient temperature. • Reset the fault by switching off the 24 V supply voltage or via fault reset.
		• Heat build-up in frequency inverter	<ul style="list-style-type: none"> • Prevent heat from building up. • Reset the fault by switching off the operating switch.
		• Drive load too high	<ul style="list-style-type: none"> • Reduce the load on the drive. • Reset the fault by switching off the operating switch.
304	Frequency inverter offline	• Frequency inverter switched off	• Switch on the frequency inverter.
		• Fault on internal bus	• Reset the fault by switching off the operating switch.

Code	Meaning	Possible cause	Measure
307	Undervoltage in the supply system	<ul style="list-style-type: none"> Undervoltage at supply system input 	<ul style="list-style-type: none"> Inspect energy distribution.
308	Internal error	<ul style="list-style-type: none"> Error message of the frequency inverter 	<ul style="list-style-type: none"> Contact SEW-EURODRIVE.
309	Initialization error frequency inverter	<ul style="list-style-type: none"> Frequency inverter switched off 	<ul style="list-style-type: none"> Switch on operating switch.
		<ul style="list-style-type: none"> Error on internal bus 	<ul style="list-style-type: none"> Reset the error by switching off the operating switch.
		<ul style="list-style-type: none"> Incorrect frequency inverter parameters 	<ul style="list-style-type: none"> Correct parameters. Contact SEW-EURODRIVE.
312	Brake chopper	<ul style="list-style-type: none"> Overcurrent in brake output Braking resistor defective Braking resistance value too low 	<ul style="list-style-type: none"> Check braking resistor connection. Replace braking resistor.
313	DC link voltage too high	<ul style="list-style-type: none"> Faulty connection between brake coil/braking resistor 	<ul style="list-style-type: none"> Check the braking resistor/brake coil connection. Correct, if necessary. Reset error by switching the device off or via error reset function.
		<ul style="list-style-type: none"> Incorrect internal resistance of brake coil/braking resistor 	<ul style="list-style-type: none"> Check the internal resistance of the brake coil/braking resistor. Reset error by switching the device off or via error reset function.
		<ul style="list-style-type: none"> Thermal overload of braking resistor Wrong size of braking resistor selected 	<ul style="list-style-type: none"> Dimension the braking resistor correctly. Reset error by switching the device off or via error reset function.
		<ul style="list-style-type: none"> Invalid voltage range of supply input voltage 	<ul style="list-style-type: none"> Check supply input voltage for permitted voltage range. Reset error by switching the device off or via error reset function.
314	Speed monitoring	<ul style="list-style-type: none"> Speed deviation due to operation at the current limit 	<ul style="list-style-type: none"> Reduce the load on the drive. Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
317	Open output	<ul style="list-style-type: none"> 2 or all output phases interrupted Rated motor power too small in relation to nominal frequency inverter power 	<ul style="list-style-type: none"> Check connection between frequency inverter and motor.

Code	Meaning	Possible cause	Measure
318	Thermal overload of motor	• Ambient temperature too high	• Lower ambient temperature. • Reset the error by switching off the operating switch.
		• Heat build-up at the motor	• Prevent heat build-up. • Reset error by switching the device off or via error reset function.
		• Motor load too high	• Reduce the load on the motor. • Reset error by switching the device off or via error reset function.
		• Speed too low	• Increase speed. • Reset the error by switching off the operating switch.
		• The error is displayed shortly after the motor has been started.	• Check drive parameters. • Reset the error by switching off the operating switch.
		• The temperature monitoring of the motor (TH winding thermostat) has triggered.	• Reduce the load on the motor. • Reset the error by switching off the operating switch.
		• The connection to the TH winding thermostat of the motor is interrupted. • The motor connector is not plugged in.	• Check connection.
320	Phase failure	• Phase failure	• Check supply cables including conductor rail, current collectors and device connection for phase failure. • Reset the error by switching off the operating switch.
321	Thermal overload of the output stage or internal device error	• Heat sink is dirty	• Clean the heat sink. • Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
		• Ambient temperature too high	• Lower ambient temperature. • Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
		• Heat build-up in frequency inverter	• Prevent heat build-up. • Reset error by switching the device off or via error reset function.
		• Drive load too high	• Reduce the load on the drive. • Reset error by switching the device off or via error reset function.

Code	Meaning	Possible cause	Measure
322	Overcurrent	<ul style="list-style-type: none"> Short circuit at frequency inverter output 	<ul style="list-style-type: none"> Check the connection between the frequency inverter output and the motor as well as the motor winding for short circuits. Reset the error by switching off the 24 V supply voltage or via error reset.
323	Thermal brake overload	Line voltage too high	Select suitable line voltage.
		Grid very asymmetrical	Check symmetry of the grid. Eliminate unbalanced load.
		<ul style="list-style-type: none"> Braking power too high Wrong brake type selected 	Reduce braking power. Increase ramp time.
399	Other fault	–	Contact SEW-EURODRIVE.
601	Distance sensor offline	Distance sensor defective	Replace distance sensor.
		Distance sensor not connected	Check wiring.
602	Overcurrent	see fault 302	see fault 302
603	Thermal overload of the output stage or internal device fault	see fault 303	see fault 303
604	Frequency inverter offline	see fault 304	see fault 304
607	Phase failure	Error in the current supply	<ul style="list-style-type: none"> Check supply cables including conductor rail, current collectors and device connection for phase failure. Reset error by switching the device off or via error reset function.
608	Infrared connection canceled	Infrared connection to keypad physically interrupted for more than 15 s	Establish infrared connection via keypad.
OFF 609	Operating switch switched off	Operating switch switched off	Switch on operating switch.
		Interruption of external operating switch connection	Check wiring of external operating switch.
610	M12 parameter memory connection	M12 parameter memory connected or disconnected during operation	<ul style="list-style-type: none"> Ensure that the M12 parameter memory is always correctly connected during operation. Check that the union nut on the M12 parameter memory unit is positioned securely. Only remove the M12 parameter memory when the device is disconnected from the voltage. Insert the M12 parameter memory again before starting up the device. Reset the error by switching off the operating switch.

Code	Meaning	Possible cause	Measure
611	Error while reading M12 parameter memory	• M12 parameter memory not plugged in or not plugged in correctly	• Plug in the M12 parameter memory correctly.
		• Data on M12 parameter memory faulty	• Write new M12 parameter memory.
		• Incompatible M12 parameter memory connected	• Connect compatible M12 parameter memory.
		• M12 parameter memory defective	• Replace M12 parameter memory.
612	Error while writing M12 parameter memory	• M12 parameter memory not plugged in or not plugged in correctly	• Plug in the M12 parameter memory correctly.
		• Incompatible M12 parameter memory connected	• Connect compatible M12 parameter memory.
		• M12 parameter memory defective	• Replace M12 parameter memory.
613	Plausibility monitoring	• Interruptions or crossfaults in wiring to signal source	• Check signal source.
UPd 614	Transfer drive parameters	• The motor data was parameterized or changed.	• No measures required. Code does not indicate an error. The new motor parameters are transferred. The process takes approx. 10 seconds. Then, the device starts automatic operation.
698	M12 parameter memory replaced	• M12 parameter memory replaced	• No measures required. Code does not indicate an error. The code serves to distinguish between old and new errors in the error history and is not displayed on the device.
699	Other fault	–	• Contact SEW-EURODRIVE.
LEx	Unwanted or too long applied signal combinations for speed limitation.	• Signal source	• Check signal source. x = the row in the list "Speed limitation" that caused the error. The row count starts at 0.
PSE XXX	Memory error	• Internal error	• Contact SEW-EURODRIVE.

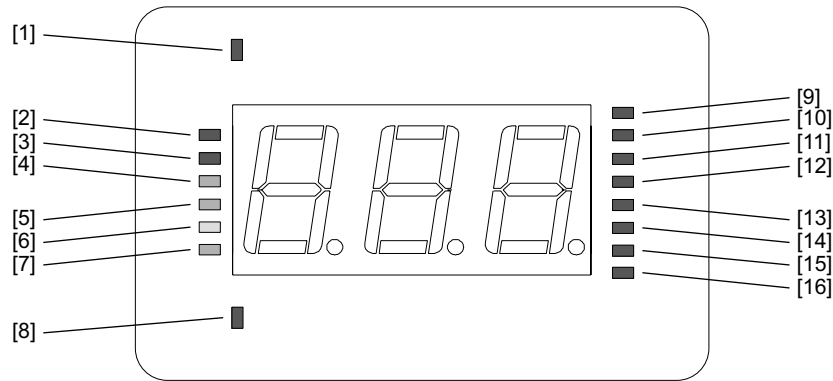
Depending on the parameterization, the errors of the table above are displayed as error number (detailed error display) or error group (compressed error display). See chapter 'Special functions' tab.

The error groups have the following meaning:

Error group	Meaning	Code
651	Error motor connection	317, 322
652	Overloads	303, 313, 314, 318, 323
653	Frequency inverter defective	302, 312
654	Other error	304, 308, 309, 320, 321

7.4.2 Status LEDs

The device features additional LEDs for servicing. The status LEDs display additional status information. The following table is used exclusively for diagnostics by the SEW-EURODRIVE Service.



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	LED	LED status	Description
[1]	Positive half wave com- mand	lights up red	The device receives positive half waves from the command rail.
[2]	Phase failure	lights up red	There is a phase failure.
[3]	Software status	Flashes red	The device software on the control is operating.
[4]	24 V supply	lights up green	There is an internal 24 V supply.
[5]	Supply service interface	lights up green	The service interface is supplied.
[6]	Frequency inverter bus supply	Lights up yellow	The frequency inverter bus is supplied. This LED only lights up when the operating switch is switched on.
[7]	CPU supply	lights up green	The CPU is supplied.
[8]	Negative half wave command	lights up red	The device receives negative half waves from the command rail.
[9]	DIO00	lights up red	The digital input 0 or the digital output 0 is set.
[10]	DIO01	lights up red	The digital input 1 or the digital output 1 is set.
[11]	DI02	lights up red	The digital input is set.
[12]	DI03		
[13]	DI04		
[14]	DI05		
[15]	DI06		
[16]	DI07		

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7.5 Fault information



▲ WARNING

Risk of injury and possible damage to property due to automatic restart of the drive after fault elimination or after a reset.

Fatal or severe injuries and damage to property.

- Disconnect the device from the power supply before rectifying a fault if automatic restart of the driven machine is not permitted for safety reasons.
- After a reset, make sure that the drive can start up automatically depending on the setting.

7.5.1 Fault memory

The fault memory stores the 10 most recent fault messages.

The following information is stored when a malfunction occurs:

- Time stamp
- Current command (positive/negative half-wave or full wave)
- Device status
- Fault that has occurred (fault code)
- Fault counter (1 - 10)

For further information, refer to the following documentation: "MOVIVISION® EMS basic" manual.

7.5.2 Acknowledging faults



▲ WARNING

Risk of injury and possible damage to property if the motor starts up unintentionally.

Fatal or severe injuries and damage to property.

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

A fault message can be acknowledged by:

- Switching the voltage supply off and on again:
Always maintain a minimum switch-off time of 1 minute.
- Switching the operating switch off and on again:
Always maintain a minimum switch-off time of 1 minute.

8 Service

8.1 Inspection/maintenance

INFORMATION



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

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

- Connection cables:
If cables are damaged or fatigued, replace these immediately.
- Cooling fins (if available):
In order to ensure sufficient cooling, remove any deposits which occur.
- Fan assembly (if available):
Check whether the axial fans of the fan assembly function properly.

8.2 Device replacement

8.2.1 Notes on replacing devices

The following device data is stored on the M12 parameter memory in order to facilitate rapid device replacement:

- Application parameter
- Vehicle ID

If you connect the M12 parameter memory to a replacement device, the data is transferred automatically to the replacement device. The replacement device is therefore immediately ready for operation.

INFORMATION



Observe the following notes during device replacement:

- Connect or disconnect the M12 parameter memory only when the application control is switched off.
- Device replacement is indicated in the fault history by code 698.
- All device-specific data is stored on the M12 parameter memory. This facilitates quick and easy replacement during servicing.
- For more information, refer to the "MOVIVISION® EMS basic" manual.

8.2.2 Replacing the device

Proceed as follows to replace the device:

1. De-energize the conductor rail, disconnect the device from the power supply, and remove it from the plant.
2. Loosen the screw fitting of the M12 parameter memory and remove it from the device.
3. Plug the M12 parameter memory into the X4441 plug connector of a new device and tighten the screw.
4. Install the new device in the plant.
5. Switch the power supply back on.

For more information, refer to the "MOVIVISION® EMS basic" manual.

8.3 Cleaning

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

Clean the device only with solvent-free cleaning agent.

8.4 Status display

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

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

8.5 Fault information

INFORMATION



For more information on the fault memory and on acknowledging fault messages, refer to chapter "Fault information" (→ 63).

8.6 Shutdown



▲ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

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

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

8.7 Storage

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

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

Observe the notes on storage temperature in chapter "Technical data" (→ 68).

8.8 Extended storage

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

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

If you have not performed maintenance regularly every 2 years, SEW-EURODRIVE recommends that you increase the supply voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview:

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

8.9 Waste disposal

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

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

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

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

9 Technical data

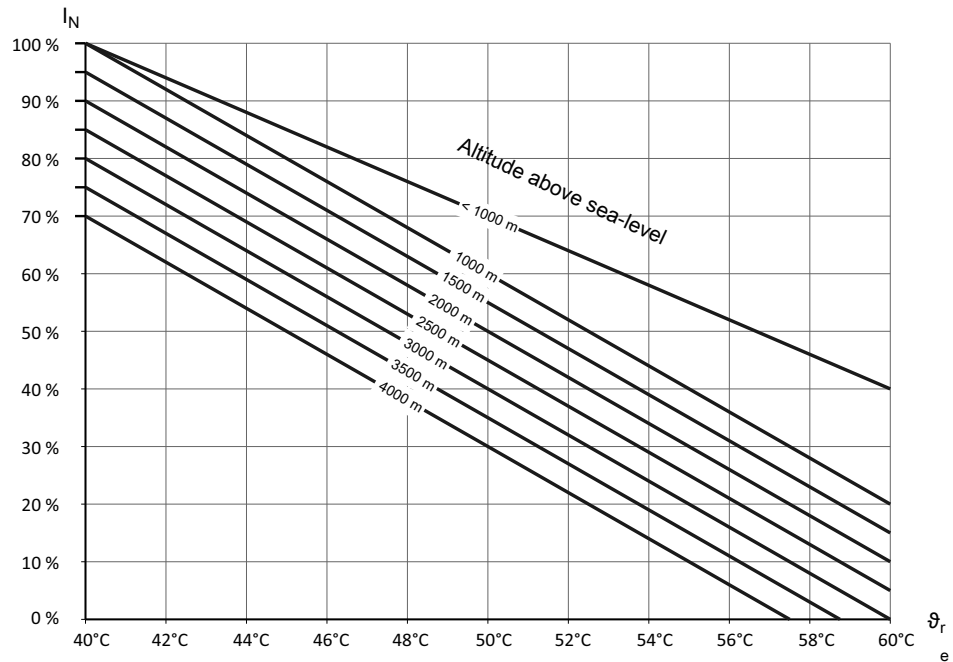
9.1 General

Basic unit	
Electromagnetic compatibility according to EN 61800-3	Interference emission: C3 Interference immunity: 2. Environment (industry)
Ambient temperature without derating	+5 – +40 °C (not condensed) The device provides intrinsic thermal safety. Once the heat sink temperature exceeds a certain level, a disconnection is triggered and an "Overtemperature" error message is generated.
Ambient temperature with derating	+40 – +60 °C h < 1000 m above sea level: I _N reduction by 3% per 100 m h > 1000 m above sea level: I _N reduction by 4% per 100 m See also chapter "Current reduction (derating)" (→ 69).
Installation altitude with derating	h > 1000 m above sea level: I _N reduction by 1% per 100 m h > 2000 m above sea level: V _{line} reduction by 6 V per 100 m Observe chapters "Current reduction (derating)" (→ 69) and "Restrictions of use" (→ 12).
Climate class according to EN 60721-3-3	Class 3K3, no condensation
Storage temperature according to EN 60721-3-3	-25 – +70 °C
Degree of protection	IP65 (excluding X1261 connection, see chapter "X1261: AC 400 V contact conductor connection" (→ 36))
Vibration resistance	2M2 (IEC 60721-3-2:1997) 3M4 (IEC 60721-3-3:1994) 5M2 (IEC 60721-3-5:1997) 7M2 (IEC 60721-3-7:1995)
Weight	4.5 kg
Dimensions W x H x D	350 x 203 x 98 mm

9.2 Current reduction (derating)

The following diagram shows how to reduce the output current in dependence of installation altitude and ambient temperature for a PWM of 4 kHz. Refer to chapter "Technical data" (→ 68) for a detailed description of the parameters.

Also observe the "Restrictions of use" (→ 12) and the V_{line} reduction by 6 V per 100 m.



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9.3 Input data

The following table shows the technical data of the inputs.

Current supply	
Supply type	3-phase AC connection, TT or TN system with directly grounded star point
Input voltage range	3 × AC 380 – 500 V
Nominal input voltage	3 × AC 400 V
Nominal input current	AC 3.5 A
Nominal input current	50 – 60 Hz
Command input	
Input voltage range (measured against the star point of the inputs L_X , L_Y , L_Z)	AC 170 – 300 V
Current consumption	3 – 6 mA ± 10%
Input frequency	50 – 60 Hz
Phase position	0 – 360°
Digital inputs	
Design	Compatible with IEC 61131-2 type 3
Current consumption	5 mA
High level	DC +11 – +30 V
Low level	DC -3 – +5 V

9.4 Output data

The device outputs have the following technical data:

General	
Duty type	S1 (IEC 60034-1)
Nominal output current I_N	AC 4 A
Minimum permitted braking resistance (4Q operation)	150 Ω
Axis data	
Nominal output power (at $f_{PWM} = 8$ kHz)	1.5 kW
Nominal output power (at $f_{PWM} = 16$ kHz)	0.9 kW
Current limiting	AC 6 A, motor mode Duration depending on the utilization
Output voltage	3 × AC 0 – 500 V
PWM frequency	Selectable: 16/8/4 kHz or 8/4 kHz or 4 kHz
Motor protection	TH
Maximum motor cable length	3 m
Possible brake voltage with 3-wire brake	120 V, 230 V (recommended), 400 V
Maximum brake holding current (of 2-wire brake variant)	DC 0.41 A
Output voltage of brake control (of 2-wire brake variant)	DC value $\pm 0.45 \times (V_{Ly} - V_{Lz})$

NOTICE

Total current of the external 24 V consumers too high

Device damage

- Ensure that the total current of all external 24 V consumers does not exceed 500 mA.

24 V voltage supply of RS485 interface

Nominal voltage	DC 24 V +20%/–15%
Nominal current	Maximum DC 500 mA

INFORMATION



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

Overload protection

Trip level	140% of the motor current
------------	---------------------------

Overload protection

Trip time	60 – 134 s ¹⁾
-----------	--------------------------

1) Depending on speed and start temperature

INFORMATION

The signal output is fed via $L_{X/M}$. For further information, refer to chapter "X1261: AC 400 V contact conductor connection" (→ 36).

Undefined levels can occur at the signal output in case of a phase failure.

Signal output

Relay contact	Maximum permitted voltage: 400 V Maximum permitted load current with half wave: 10 mA, resistive Maximum permitted load current with full wave: 15 mA, resistive
Integrated short-circuit protection	PTC

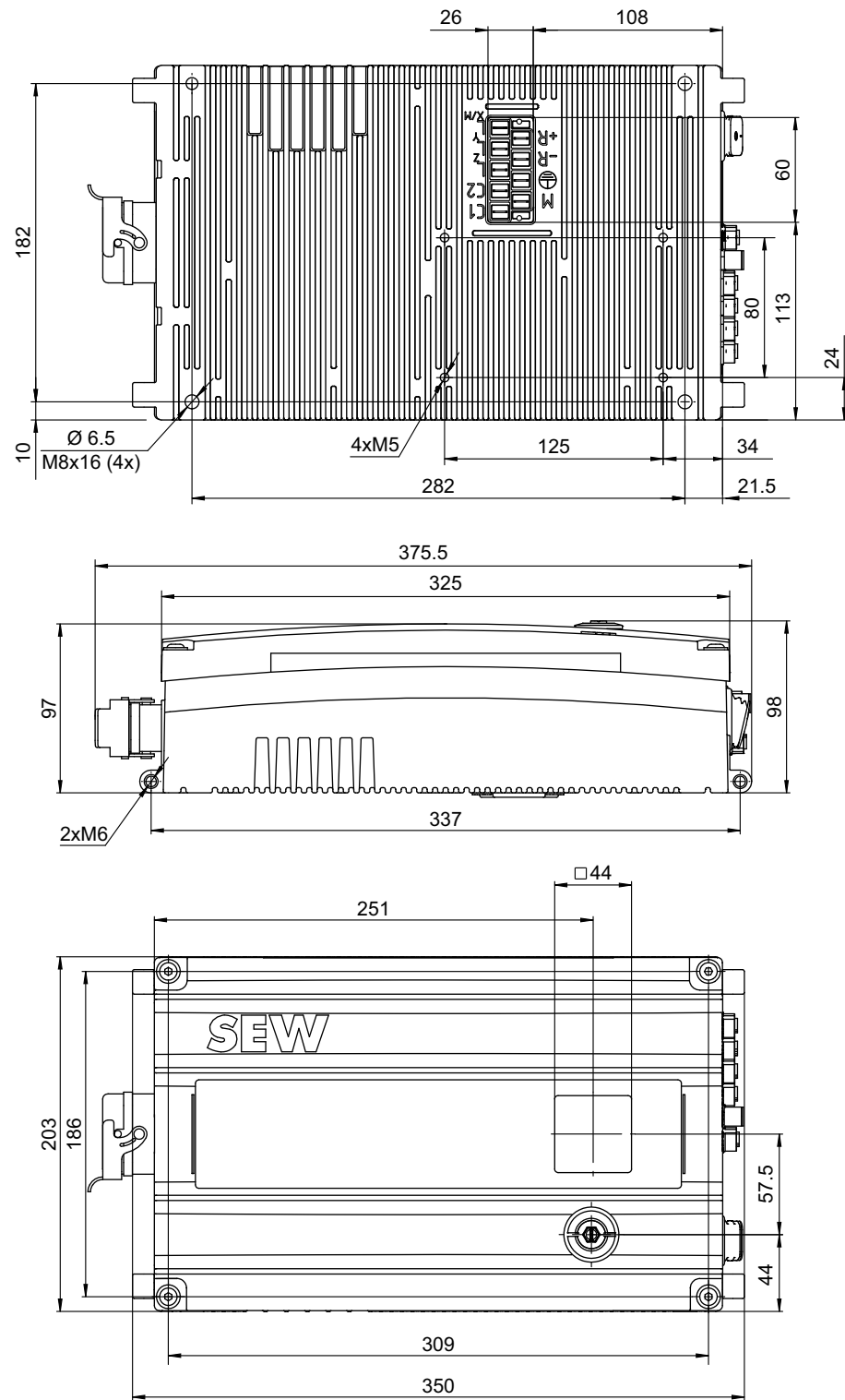
Digital outputs

Design	Short-circuit proof
Nominal output current	Max. DC 500 mA per digital output
Inductive loads	Dissipation of inductive switch-off energy up to 0.7 J per output, freewheeling diodes are not integrated
Low level	DC 0 V, $I_{LEAK} = 10 \mu A$
High level	DC 24 V + 20%/- 15%, $R_{ON} = 320 m\Omega$

9.5 Dimension drawings**9.5.1 Device with motor connection HAN® Q8/0****INFORMATION**

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

The dimension drawing shows the mechanical dimensions of the device in mm:

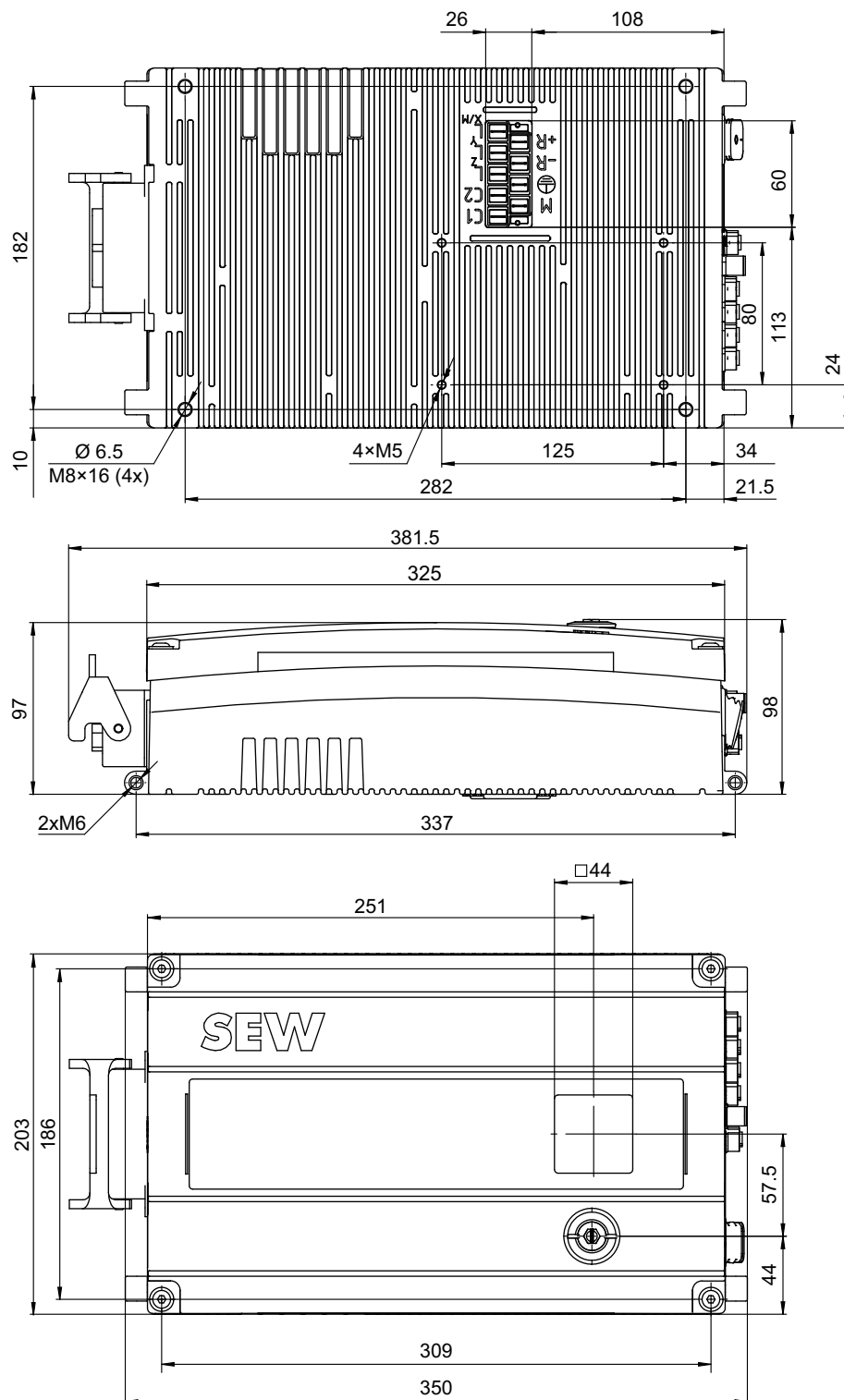


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9.5.2 Device with motor connection HAN® 10E
INFORMATION


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

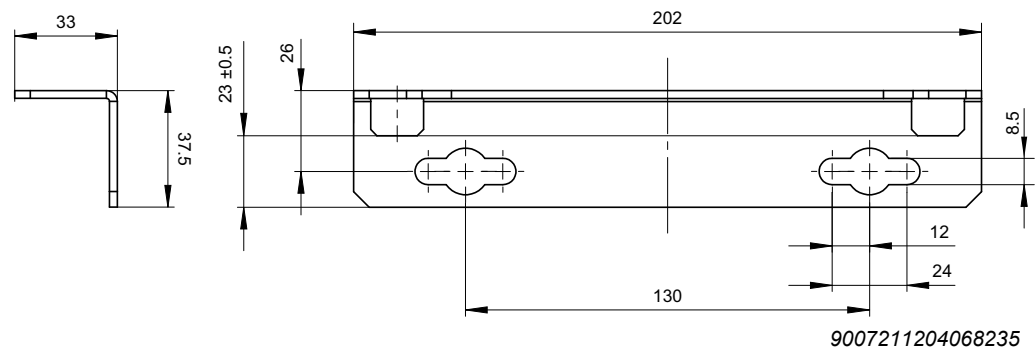
The dimension drawing shows the mechanical dimensions of the device in mm:



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9.5.3 Mounting bracket



10 MAXOLUTION® Competence Center

Germany

Bruchsal	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de maxolution@sew-eurodrive.de
Kirchheim	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 85551 Kirchheim (München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 dtc-sued@sew-eurodrive.de

Australia

Melbourne	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
-----------	--	--

Brazil

São Paulo	SEW-EURODRIVE Brasil Ltda. Estrada Municipal José Rubim, 205 – Rodovia Santos Dumont Km 49 Indaiatuba – 13347-510 – SP	Tel. +55 19 3835-8000 sew@sew.com.br
-----------	--	---

China

Tianjin	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 78, 13th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 http://www.sew-eurodrive.cn info@sew-eurodrive.cn
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France

Hagenau	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocomme.com sew@usocomme.com
---------	---	--

India

Chennai	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com
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Italy

Solaro	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini, 14 20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 79 97 81 http://www.sew-eurodrive.it sewit@sew-eurodrive.it
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Poland

Tychy	SEW-EURODRIVE Polska Sp.z.o.o. ul. Strzelecka 66 43-109 Tychy	Tel. +48 32 32 32 610 Fax +48 32 32 32 648
-------	---	---

South Africa

Johannesburg	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 248-7289 http://www.sew.co.za info@sew.co.za
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South Korea

Ansan	SEW-EURODRIVE KOREA CO., LTD. 7, Dangjaengi-ro, Danwon-gu, Ansan-si, Gyeonggi-do, Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-eurodrive.kr master.korea@sew-eurodrive.com
-------	--	--

Sweden

Jönköping	SEW-EURODRIVE AB Gnejsvägen 6-8 553 03 Jönköping Box 3100 S-550 03 Jönköping	Tel. +46 36 34 42 00 Fax +46 36 34 42 80 http://www.sew-eurodrive.se jonkoping@sew.se
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USA

Lyman	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax +1 864 439-7830 http://www.seweurodrive.com cslyman@seweurodrive.com
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SEW-EURODRIVE
Driving the world

SEW
EURODRIVE

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Str. 42
76646 BRUCHSAL
GERMANY
Tel. +49 7251 75-0
Fax +49 7251 75-1970
sew@sew-eurodrive.com
→ www.sew-eurodrive.com