



**SEW**  
**EURODRIVE**

# Operating Instructions



Application Controller  
**MOVIPRO® PHC11A-..M1-..2A-A1/..**



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## 1 General information

### 1.1 About this documentation

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

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

### 1.2 Structure of the safety notes

#### 1.2.1 Meaning of signal words

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

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

#### 1.2.2 Structure of section-related safety notes

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

Section-related safety notes are structured as follows:



##### SIGNAL WORD

Type and source of hazard.






Possible consequence(s) if disregarded.

- Measure(s) to prevent hazard.

#### Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard

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

### 1.2.3 Structure of embedded safety notes

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

Embedded safety notes are structured as follows:

- **▲ SIGNAL WORD** Type and source of hazard.  
Possible consequence(s) if disregarded.  
– Measure(s) to prevent hazard.

## 1.3 Rights to claim under limited warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Read the documentation before you start working with the product.

## 1.4 Exclusion of liability

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

## **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**

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## **2 Safety notes**

### **2.1 Preliminary information**

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

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

Also observe the additional safety notes provided in the individual chapters of this document.

### **2.2 General information**



#### **⚠ WARNING**

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

Severe or fatal injuries.

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

Unauthorized removal of covers, improper use, or incorrect installation and operation may result in severe injury to persons, or damage to machinery.

Refer to the following chapters for more information.

### 2.3 Target group

Mechanical work of any kind may be carried out only by trained specialists. Qualified personnel in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting and maintenance of the product and have the following qualifications:

- Training in mechanical engineering, e.g. as a machinist or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation.

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

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation.

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

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

### 2.4 Designated use

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

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

The device meets the requirements stipulated in the low voltage directive 2006/95/EC. The standards included in the declaration of conformity are used for the unit.

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

### 2.5 Functional safety technology

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

## 2.6 Transport

Immediately upon delivery, inspect the shipment for any damage that may have occurred in transit. Inform the shipping company immediately about any damage. You may need to suspend startup.

Observe the following notes when transporting the unit:

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

If necessary, use suitable, sufficiently dimensioned handling equipment. Remove the securing devices used for transportation prior to startup.

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

## 2.7 Installation and assembly

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

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

The following applications are prohibited unless explicitly permitted:

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

Observe the notes in the chapter "Mechanical installation".

## 2.8 Electrical connection

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

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

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

Necessary preventive measures for mobile use:

Type of energy transfer	Protective measure
Direct power supply	<ul style="list-style-type: none"> <li>• Ground connection</li> </ul>
MOVITRANS® Contactless Energy Transfer System	<ul style="list-style-type: none"> <li>• Protective separation DIN VDE 0100-410 / IEC 60364-4-41</li> <li>• ESD protection</li> </ul>

Necessary preventive measures for stationary use:

Type of energy transfer	Protective measure
Direct power supply	<ul style="list-style-type: none"> <li>• Ground connection</li> </ul>
MOVITRANS® Contactless Energy Transfer System	

## 2.9 Safe disconnection

The unit meets all requirements for reliable isolation of power and electronics connections in accordance with EN 61800-5-1. All connected circuits must also meet the requirements for reliable isolation.

## 2.10 Startup/operation



### ⚠ CAUTION

Danger of burns due to hot surfaces of the unit 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 unit and the connected options cool down before you start working on them.

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

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

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

Additional protective measures may be necessary for applications with increased potential risk. You have to check the effectiveness of protection devices each time you change the configuration.

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

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

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

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

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

## 2.11 Inspection/maintenance



### **⚠ WARNING**

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

Severe or fatal injuries.

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

## 3 Unit structure

### 3.1 Type designation

The type designation comprises the following characteristic data:

<b>P</b>	<b>Product range:</b> P = MOVIPRO®
<b>H</b>	<b>Control type:</b> H = Application controller
<b>C</b>	<b>Housing type:</b> C = Modular
<b>1</b>	<b>Housing depth:</b> 1 = 70 mm
<b>1</b>	<b>Housing height:</b> 1 = 300 mm
<b>A</b>	<b>Version</b>
-	
.	<b>Supply:</b> A = AC three-phase current T = MOVITRANS®
..	<b>Rated input power:</b> 016 = 1.6 kW 020 = 2.0 kW 022 = 2.2 kW 040 = 4.0 kW
<b>M1</b>	<b>Number of internal power sections:</b> 1 = 1 power section
-	
..	<b>Bus connection:</b> E4 = LAN, TCP + UDP W4 = WLAN, TCP + UDP
<b>2</b>	<b>Function level:</b> 2 = System
<b>A</b>	<b>Generation:</b> A = 1. Version
-	
<b>A1</b>	<b>Design:</b> A1 = Skillet
/	

<b>001</b>	<b>Option:</b> 001 = Operating switch
------------	--

### 3.2 Scope of delivery

The following components are included in the delivery:

- MOVIPRO® PHC11A-..M1-..2A-A1/..
- Grounding kit

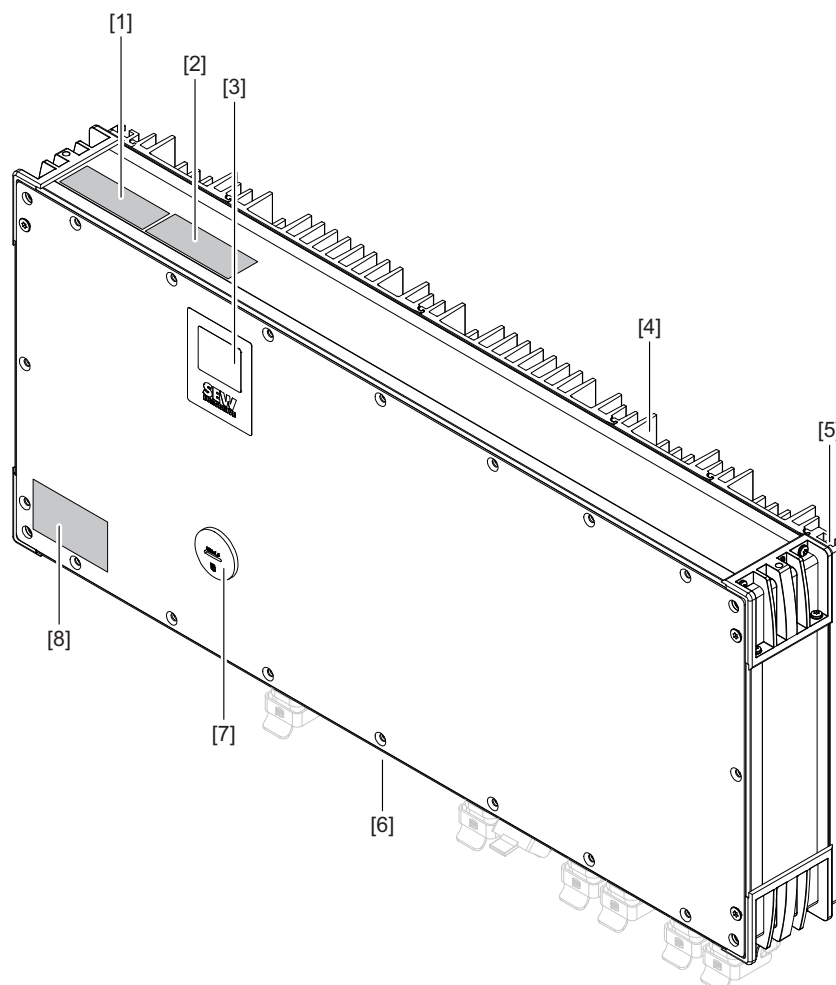
### 3.3 Short designations

The following short designations are used:

Type designation	Supply	Short designation	Power
PHC11A-A022M1-..2A-A1/..	AC 400 V	Unit	2.2 kW
PHC11A-A040M1-..2A-A1/..			4.0 kW
PHC11A-T016M1-..2A-A1/..	MOVITRANS®		1.6 kW
PHC11A-T020M1-..2A-A1/..			2.0 kW
PHC11A-T022M1-..2A-A1/..			2.2 kW
PHC11A-T022M1-..2A-A1/..			4.0 kW

### 3.4 Unit overview

The following figure gives an overview of the main parts of the unit and the location of the identifiers:



9007202514559883


- [1] Main nameplate
- [2] Function unit nameplate
- [3] Status display
- [4] Cooling fins
- [5] T-slot profile
- [6] Terminal strip
- [7] Service interface
- [8] Connection block label



### 3.5 Identification

#### 3.5.1 Main nameplate

The following figure shows an example of a nameplate:

	
<b>SEW</b> <b>EURODRIVE</b>	
D-76646 Bruchsal Made in Germany MOVIPRO	
Type: PH..	SO#: XXX.XXXXXXXXXX.XXX.XX
Part#:	
Eingang / Input	Ausgang / Output
U =	U =
I =	I =
f =	f =
T =	P = IPXX
Product-Key:	

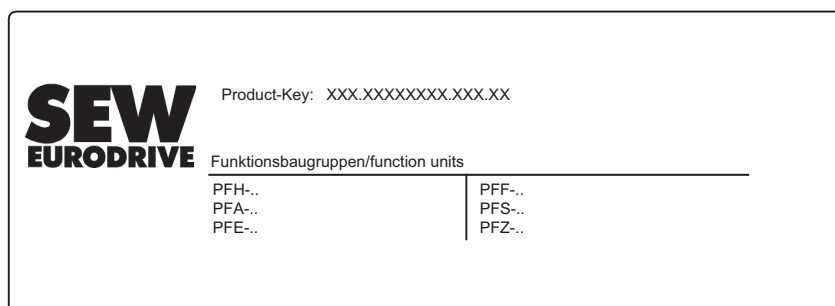
36028798225065995

The main nameplate lists the following information:

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

## 3.5.2 Function modules nameplate

This nameplate describes the unit's internal function modules. The following figure shows an example of a nameplate for the function modules:



18014401506207371

Designation	Function
PFA-..	Internal axis
PFE-..	Power supply
PFH-..	Communication and control unit
PFS-..	Safety device
PFZ-..	Actuator module

**Power section**

<b>P</b>	MOVIPRO® product range
<b>F</b>	Internal function
<b>A</b>	Internal axis
-	
<b>MD</b>	Frequency inverter on MOVIDRIVE® basis
..	Frequency inverter power rating: 022 = 2.2 kW 040 = 4.0 kW
<b>B</b>	Generation B
-	
<b>G</b>	Encoder evaluation
0	Motor encoder type: 0 = Without motor encoder
0	Distance encoder type: 0 = Without distance encoder
-	
<b>B</b>	Brake control
..	Brake control type: S23 = Safety-related brake module (230 V) S40 = Safety-related brake module (400 V) S46 = Safety-related brake module (460 V)
-	
..	Axis interfaces: 10 = 1 motor connection + STO 30 = 1 motor connection + STO + 1 digital output
/	
..	Option 1: C01 = Without fan subassembly C11 = Smaller heat sink without fan
/	
..	Option 2: 000 = Motor connections dependent on the power rating (BG0 = HANQ8, BG1 = HAN6B, BG2 = HAN10B) 010 = Motor connections dependent on the power rating (HANQ8)

**INFORMATION**

Option 1 design: C11 is the nominal output power in S1 operation, thermally reduced to the value specified in the technical data.

## Communication and control unit

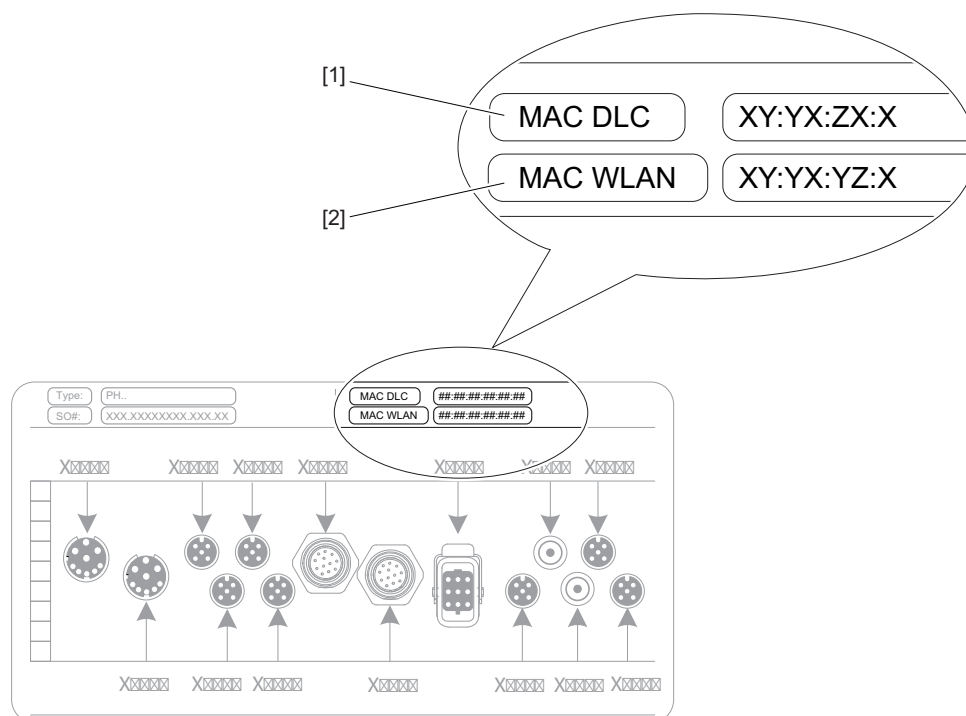
<b>P</b>	MOVIPRO® product range
<b>F</b>	Internal function
<b>H</b>	Control and communication
-	
..	E4 = LAN, TCP + UDP W4 = WLAN, TCP + UDP
<b>2</b>	SEWOS function level
<b>A</b>	Version 1
<b>I</b>	ID module storage medium
<b>0</b>	Standard ID module with M12 connector
-	
<b>B</b>	Fieldbus interface
..	00 = No bus connection 83 = 1 x Ethernet M12, copper
-	
<b>I</b>	Local interfaces
<b>3</b>	3 = 6 digital inputs, 2 digital outputs, 8 digital inputs/outputs
..	7 = Interfaces for SBus, CAN bus and RS485, each with a DC 24 V supply 8 = Interfaces for RS485 system bus, CAN bus and RS485, each with a DC 24 V supply
-	
<b>21</b>	Micro DLC control card
/	
<b>000</b>	Without option 1
/	
..	000 = Without option 2 W = With WLAN
<b>1</b>	Single-client modem, 2.4 / 5.0 GHz, 2 coupler connections
.	WLAN region: 1 = Europa 2 = China 3 = U.S. / Canada 4 = Brazil 5 = Mexico 6 = India

**Power supply**

<b>P</b>	MOVIPRO® product range
<b>F</b>	Internal function
<b>E</b>	Power supply
<b>-</b>	
<b>..</b>	Supply type: AC = Power supply TR = MOVITRANS®
<b>..</b>	Rated input power: 016 = 1.6 kW 020 = 2.0 kW 040 = 4.0 kW 080 = 8.0 kW
<b>A</b>	Version A
<b>-</b>	
<b>..</b>	Unit supply: 001 = Connection for plug connectors 31x = 1 or 2 connections for THM20C pick-up 34x = 1 or 2 connections for THM20E pick-up
<b>-</b>	
<b>..</b>	Supply option type: 00 = Without supply option 03 = DC 24 V supply, 3.5 A 07 = DC 24 V supply, 7.0 A
<b>..</b>	Supply option design: 0A = Without external interface 01 = External Han® Q 7/0 interface 02 = External Han® Q 5/0 interface
<b>-</b>	
<b>00</b>	Series
<b>/</b>	
<b>000</b>	Energy management: 000 = Without energy management
<b>/</b>	
<b>000</b>	Option 1: 000 = Without option 1

### 3.5.3 Connection block label

The following figure shows an example of a connection block label:



45036001100885771

- [1] MAC address of processing unit
- [2] MAC address of radio modem

The connection block sticker lists the following information depending on the unit configuration:

- Designation of the individual unit connections
- MAC address of radio modem
- MAC address of processing unit

## 3.6 Accessories

### INFORMATION



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

For detailed information on accessories, refer to the addendum to the operating instructions "MOVIPRO® – Accessories".

The following accessories are available for the unit.

#### 3.6.1 Connection cables

Refer to the corresponding connections in chapter "Electrical connections" (→ 52) for information on connection cables for motors, encoders, braking resistor, etc.

**3.6.2 Optional connector**

	Part number
Jumper plug	11747099
ID module	17974186
For additional information, refer to the addendum to the operating instructions "MOVIPRO® – Accessories".	

**3.6.3 Sensor/actuator boxes**

Designation	Part number
Sensor/actuator box 1.0 m	13309269
Sensor/actuator box 2.0 m	13309277
Sensor/actuator box 3.0 m	13309285
Sensor/actuator box 5.0 m	13309293
Sensor/actuator box 10.0 m	13309307

**3.6.4 Braking resistors**

Designation	Part number
BW100-004-00 (including installed connection cable)	17962188
BW050-008-01	17962242
BW033-012-01	17962196
BW017-024-02	17962218
Bracket mounting set	18229689

**3.6.5 Mounting accessories**

Designation	Part number
Handle option 270	18222781
Large bracket mounting set	12708305

**3.6.6 Display unit**

Designation	Part number
PZO00A-SAZIR0-C000-02 indicator unit	28214072
For additional information, refer to the addendum to the operating instructions "MOVIPRO® - Accessories for PZO00A-SAZIR0-C000-02 display unit".	

### 3.7 Function modules

#### 3.7.1 Internal axis PFA..

The function module consists of the following internal elements.

##### Drive inverter with MOVIDRIVE® platform

The frequency inverter on a MOVIDRIVE® basis is use to control asynchronous motors.

For detailed information about motor assignment and system properties, refer to the "MOVIDRIVE® MDX60B/61B" system manual.

##### Brake control

The brake control system is responsible for the power supply and control of the SEW disk brakes of the connected motors.

##### Motor types

The unit supports the following SEW motor types:

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

##### S1 operating switch



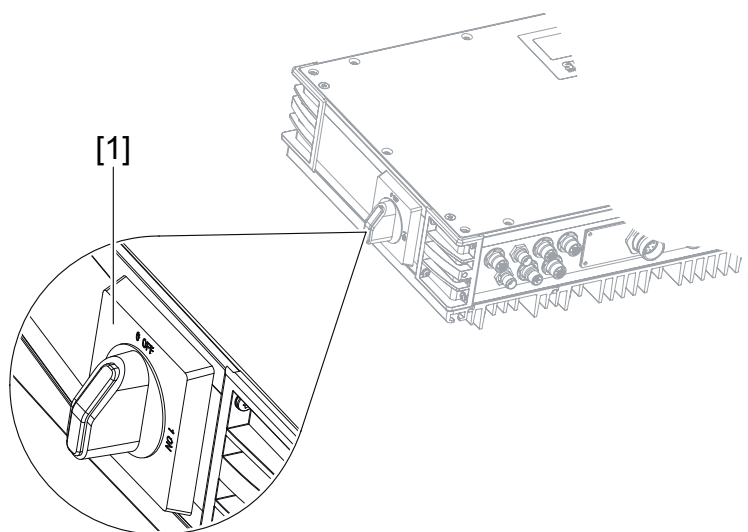
#### NOTICE

Damage caused by actuating the operating switch while it is energized.  
Increased wear on the contacts.

- Always actuate the operating switch in a de-energized state.
-



The S1 operating switch disconnects the motor phases (U, V, W) at the unit's output and sets the controller inhibit of the inverter via auxiliary contact.



9007199587528075

[1] Operating switch

## 3.7.2 PFH.. communication and control unit

The function module consists of the following internal elements.

### Fieldbus interface

Depending on the design, the unit offers one of the following communication options:

Communication	Function module
LAN, TCP / UDP	PFH-E4..
WLAN, TCP / UDP	PFH-W4..

#### LAN, TCP / UDP

The unit has an Ethernet interface for connecting to the fieldbus. The bus is physically connected via a plug connection as described in the "Electrical connections" chapter.

#### WLAN, TCP / UDP

### NOTICE



Damage to the radio modem due to missing terminating resistors.

Damage to the radio modem.

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

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

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

For more information, technical data and approvals, refer to the latest edition of the addendum to the "MOVIPRO® Drive and Application Controller – REC5 Radio Modem" operating instructions.

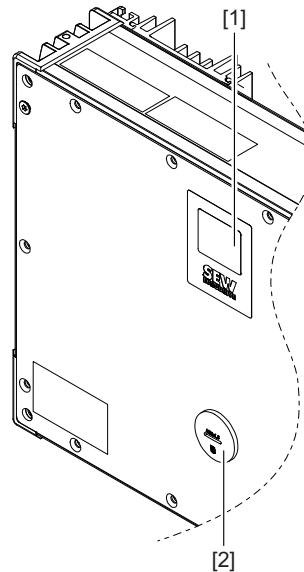
### Processor unit

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

For detailed information, refer to the "MOVIVISION® Operating and Display Software" manual.

## Service unit

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



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

### Status display

The status display is used to display status messages and in this way allows for quickly evaluating the current status of the application software.

For further information, refer to chapters “Status messages” (→ 91) and “Display” (→ 93).

### Service interface

For configuration of the communication and control unit, the unit is equipped with an Ethernet service interface that connects the unit to an engineering PC.

For detailed information, refer to chapters “X4223: Ethernet service interface” (→ 76) and “Using the service interface”.

### Infrared interface

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

For detailed information, refer to the relevant operating instructions.

### 3.7.3 PFE... power supply

#### 24 V power supply unit for internal components

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

#### 24 V power supply unit for external supply

An integrated power supply unit uses the DC link voltage to generate a DC 24 V supply for externally connected components.

#### MOVITRANS® TPM30 passive mobile converter

Voltage is supplied to the mobile machine component via the MOVITRANS® system, which enables contactless energy transfer. Energy is supplied inductively using the MOVITRANS® components that contactlessly transfer and supply energy.

A line cable must be routed for the appropriate distance. The energy provided is then absorbed by pick-ups. They are located on the vehicle and move along a permanently installed line cable at a distance of several millimeters. The current flow of the line cable has an average frequency current of 25 kHz at 60/85 A. It creates current in the pick-up units with a frequency of 25 kHz by magnetic coupling.

The TPM30 passive mobile converter supplies the DC link and the drive inverter directly. It converts the currents in the pick-ups to a DC voltage of around DC 400 – 800 V. A compensation capacitor at the input of the passive mobile converter forms a parallel resonance with the inductance of the pick-up. The pick-up acts as a constant current source.

If several pick-ups are used, each circuit is established individually. They are only combined after rectification. In this way, the pick-ups operate independently of each other.

#### Supply system rectifier

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

## 4 Integrated safety technology



### ▲ WARNING

Failure of the safety components because of incorrect startup.

Severe or fatal injuries.

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

### 4.1 Standards

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

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

### 4.2 Safety functions

You can use the following drive-related safety functions:

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

### 4.3 Safety concept

The following safety concepts can be realized with this unit:

- Axis module with safe torque off
- Safety-related brake module

### 4.4 Additional information

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

## 5 Mechanical installation

### 5.1 Requirements



#### ⚠ WARNING

Risk of crushing if the load falls.

Severe or fatal injuries.

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



#### NOTICE

Risk of collision.

Damage to plant and unit components.

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

The following preconditions must be fulfilled for the mechanical installation:

- Trained specialists perform the installation.
- The information provided in the technical data and the permitted conditions for the operating location of the unit are observed.
- The minimum clearance and distance and the required gaps for using a mounting plate are complied with; see the "Minimum clearance" section.
- The unit is only mounted using the intended mounting options.
- The selection and dimensioning of the mounting and locking elements are in line with the applicable standards, the technical data of the units and the local requirements.
- The bore dimensions are calculated in line with the respective type of fastening. See the following sections.
- 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.

### 5.1.1 Mounting position

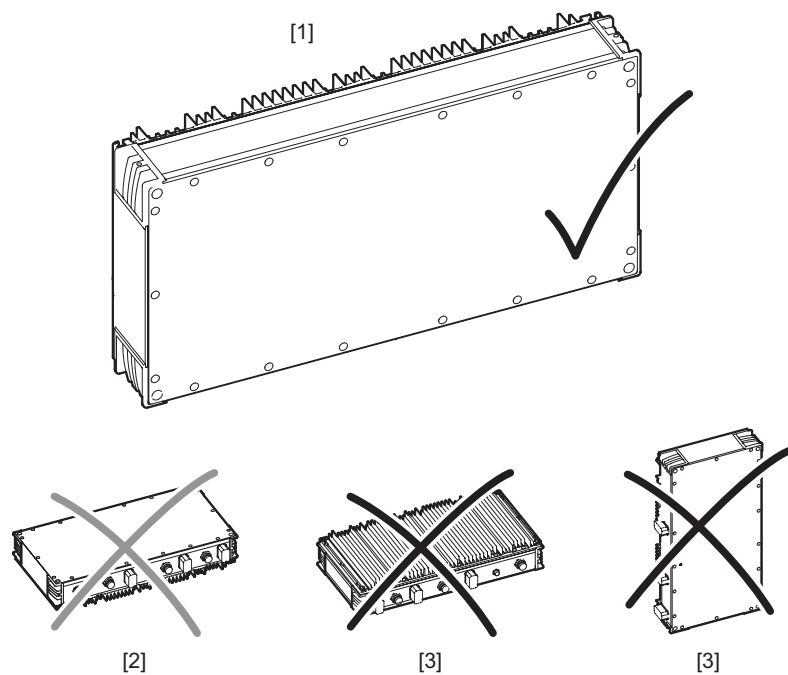
The mounting position for units with cooling fins depends on the application:

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

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

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

The following figure shows permissible and impermissible mounting positions:



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

### 5.1.2 Minimum clearance

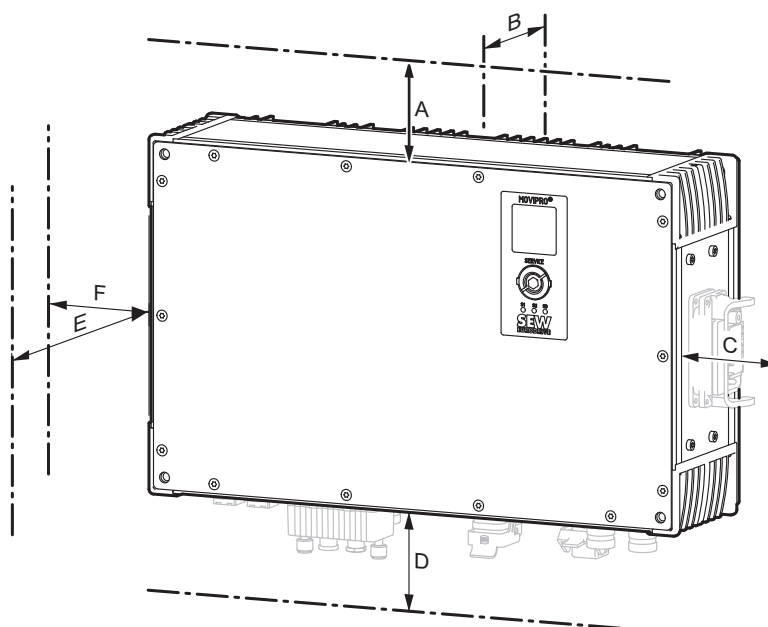
#### INFORMATION



- Observe the required minimum clearance for:
  - The connection of the cables and plug connectors
  - Handling of the display, diagnostics and operating elements
  - Heat convection at the level of the cooling fins, if installed
- Refer to the dimension drawing in the chapter "Technical data" for information on the required space.

#### Vertical installation

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



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

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

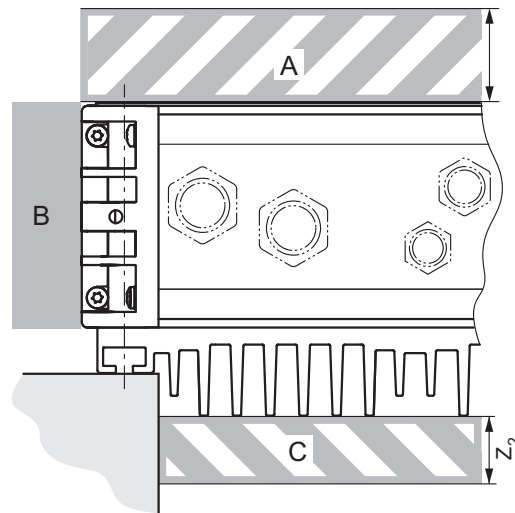
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Clearance	Function	Size
<b>F: On the side (optional)</b>	Space for connection cables, plug connectors, add-on elements and elements for operation, e.g. maintenance switch	See dimension drawing

### Horizontal installation

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



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- [A] Housing cover clearance
- [B] Clearance on the side
- [C] Clearance below the cooling fins
- [Z<sub>1</sub>] Housing cover clearance height
- [Z<sub>2</sub>] Cooling fins clearance height

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

Clearance	Function	Size
<b>A: Housing cover</b> Height Z <sub>1</sub>	Space for display elements, diagnostics elements and actuator elements, e.g. service unit	Z <sub>1</sub> = min. 150 mm (5.91 in)
<b>B: On the side (optional)</b>	Space for connection cables, plug connectors, add-on elements and elements for operation, e.g. maintenance switch	See dimension drawing
<b>B: Behind the cooling fins</b> Height Z <sub>2</sub>	Space for optimum heat convection: The cooling fins may not be located in a closed hollow space.	Z <sub>2</sub> ≥ 15 mm (0.59 in)

### 5.1.3 Waste heat

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

Observe the following notes to ensure optimum heat convection:

- Use SEW mounting systems or suitable spacers, e.g.:
  - Spacers
  - Profiles
  - Square pipes
  - Mounting plates
  - T-beams
  - Rails
- Ensure that the cooling fins are not located in a closed hollow space.
- It is essential that a minimum distance of 15 mm (0.59 in) between the highest cooling fin and the next surface, e.g. a mounting plate, is maintained.
- Avoid heat sources in the immediate proximity of the unit.

## 5.2 Assembly

Use one of the following mechanical fastening options:

- Mounting with mounting brackets
- Mounting using the through bores

### 5.2.1 Mounting with mounting brackets



#### ⚠ CAUTION

Risk of injury due to protruding parts.

Minor injuries.

- Wear suitable protective gloves.



#### NOTICE

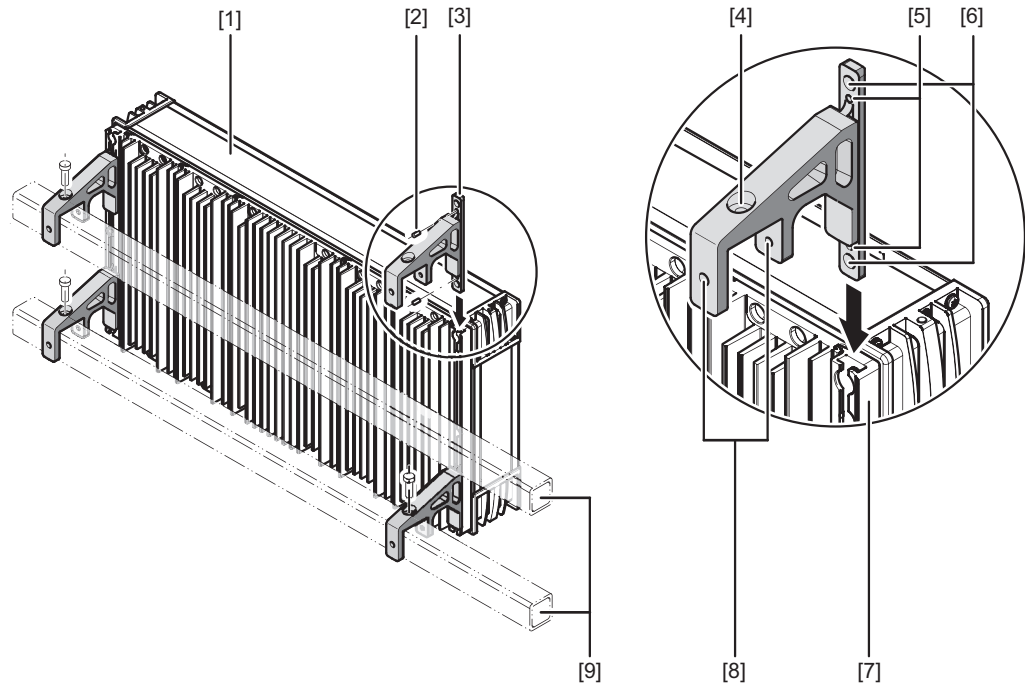
External force too high.

Damage to the thread or the screw.

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

#### Required material

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



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

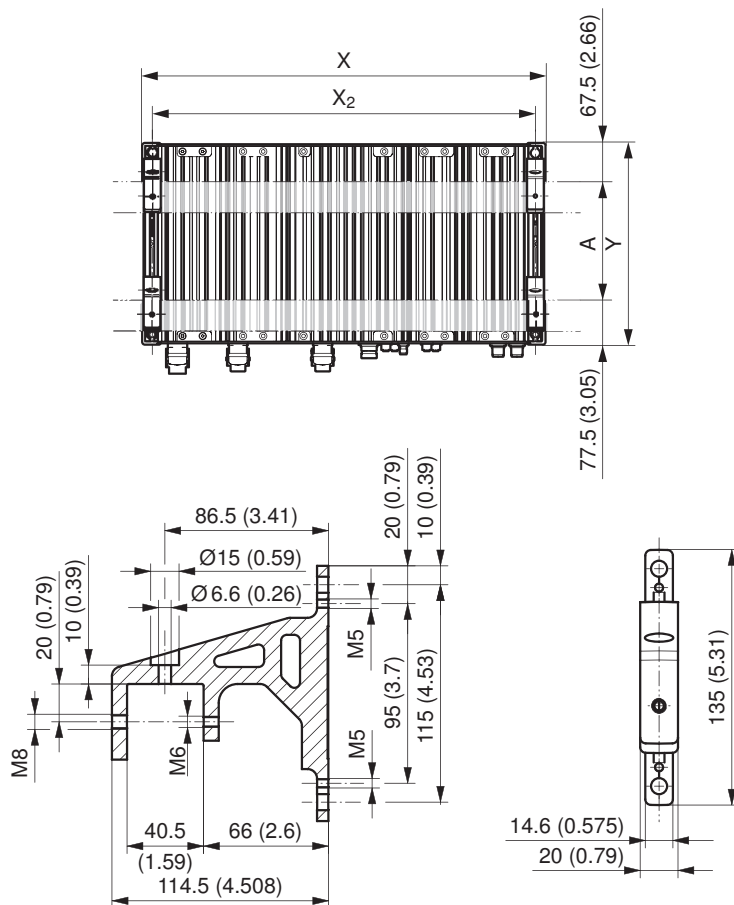
### Fastening the mounting plates

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

### Preparing the fixture

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

The following figure shows the required dimensions:



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X, Y Housing dimensions, see chapter "Technical data"  
 $X_2$  Bore dimension  
 A Distance

### Procedure

1. Refer to the dimension drawing in chapter "Technical data" (→ 98) for the housing dimensions X and Y.
2. Refer to the following table for dimensions of the tapped holes in the holding fixture:

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

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

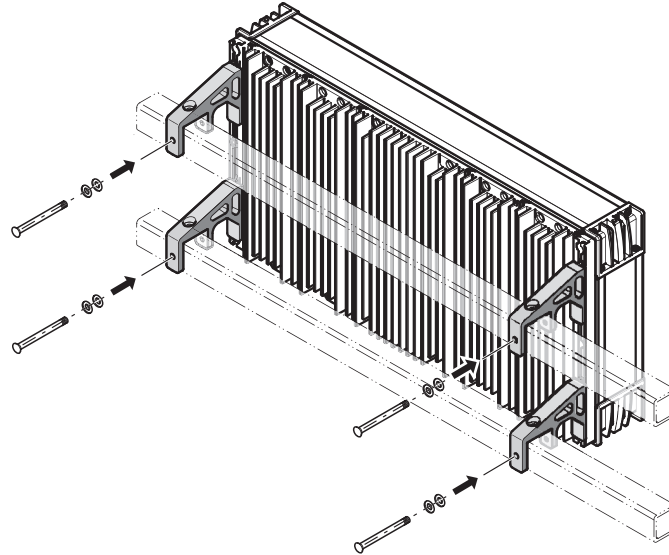
Distance	Value
A	Housing dimension Y – 145 mm (5.71 in)

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

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## Mounting the unit

1. Use the mounting brackets to hang the unit on the fixture.
2. Securely fasten the mounting bracket via the bores on the holding fixture using M6 screws.



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### 5.2.2 Mounting using the through bores



#### ⚠ CAUTION

Risk of injury due to protruding parts.

Minor injuries.

- Wear suitable protective gloves.



#### NOTICE

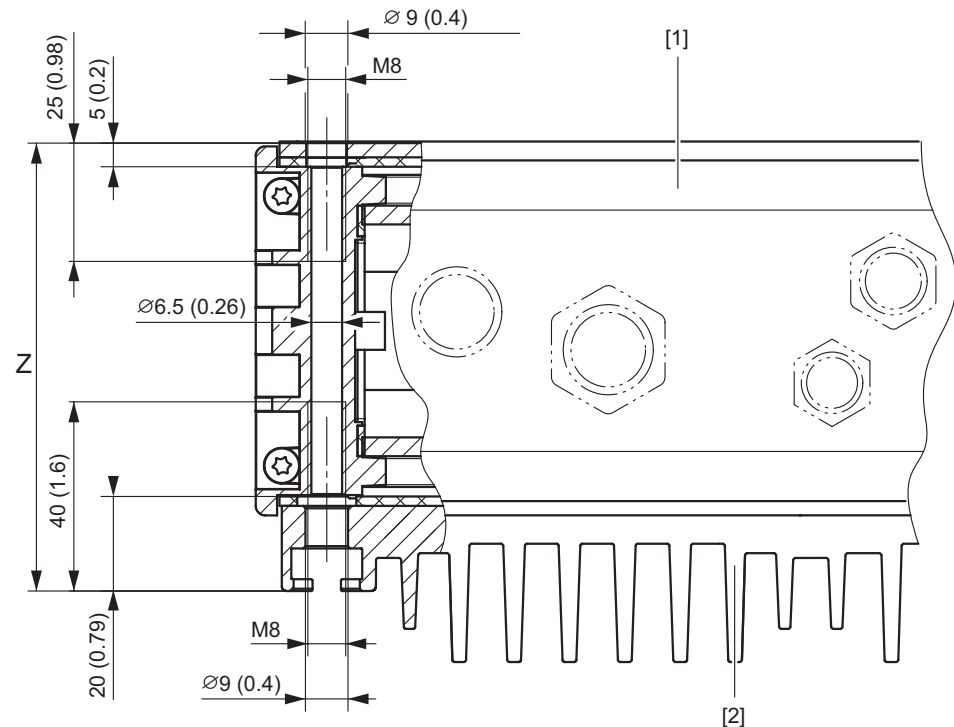
External force too high.

Damage to the thread or the screw.

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

The unit is equipped with 4 through bores in the corner profiles with a diameter of 6.5 mm (0.26 in) and M8 threads on both sides for installation.

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



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- [1] Unit  
 [2] Cooling fins  
 Z Height of the through bore + T-slot (see the dimension drawing in chapter "Technical data" (→ 98))

### Fastening the unit from the front

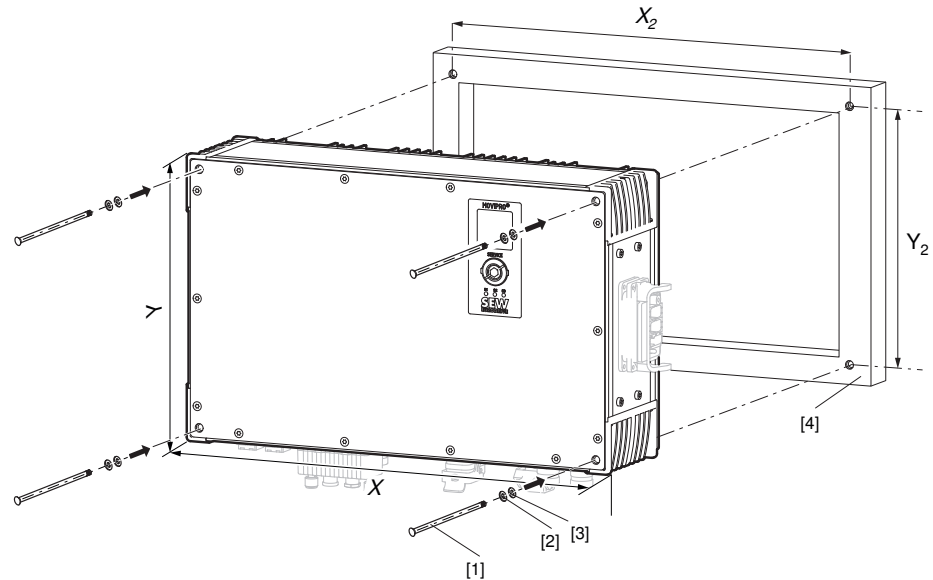
## INFORMATION



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

### Required material

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



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

#### Procedure

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

Bore dimension	Value
$X_2$	Housing dimension X – 30 mm (1.2 in), see the following dimension drawing
$Y_2$	Housing dimension Y – 30 mm (1.2 in), see the following dimension drawing

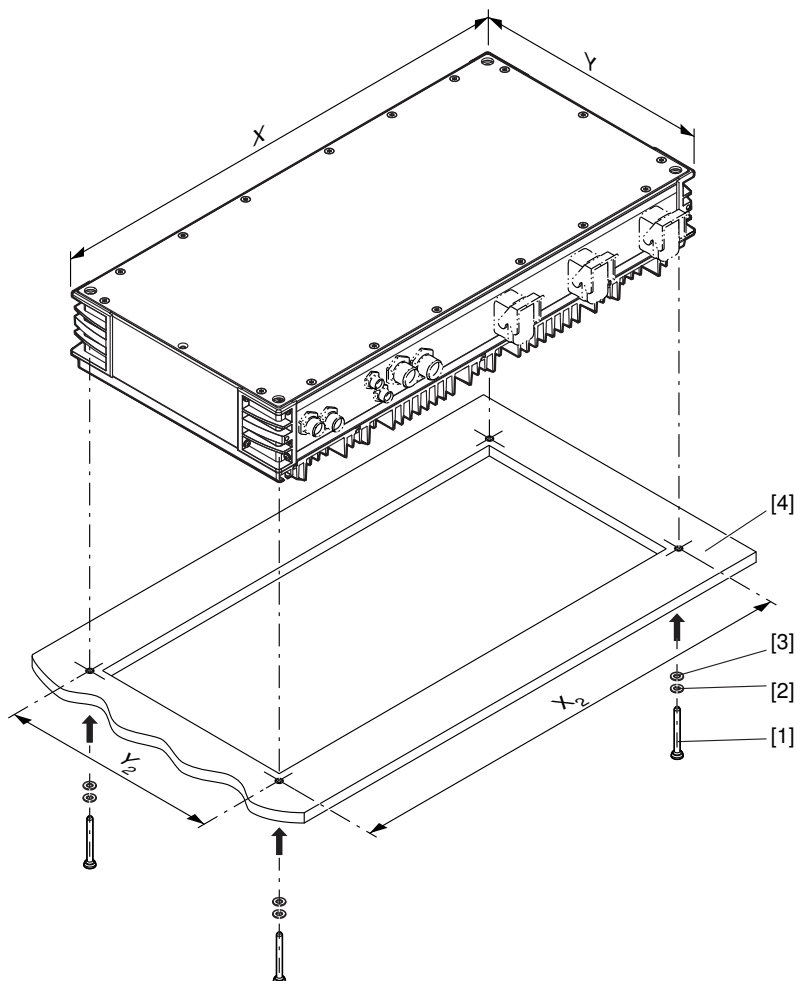
3. Mark the tapped holes on the mounting surface [4].
4. Drill the bores at the marked points.
5. Firmly screw the unit on the mounting surface [4] from the front via the through bores. Use suitable mounting and locking elements, e.g.:
  - M6 screws [1]
  - Lock washers [2]
  - Washers [3]

#### Fastening the unit from the back

Required material:

- Observe the required minimum distances and clearances by using one of the following mounting elements:

- Suitable spacers
- Mounting plate (with an appropriate cut-out for long cooling fins)
- Suitable mounting and safety elements, e.g. M8 screws of an appropriate length with washers
- Suitable locking devices, e.g. lock washers



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- [1] Mounting elements, e.g. M8 screws
- [2] Locking elements, e.g. lock washers
- [3] Mounting elements, e.g. washers
- [4] Mounting surface, e.g. mounting plate
- X, Y Housing dimensions
- X<sub>2</sub>, Y<sub>2</sub> Bore dimensions

Proceed as follows to mount the unit:

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

Bore dimension	Value
X <sub>2</sub>	Housing dimension X – 30 mm (1.2 in), see the following dimension drawing

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Bore dimension	Value
Y <sub>2</sub>	Housing dimension Y – 30 mm (1.2 in), see the following dimension drawing

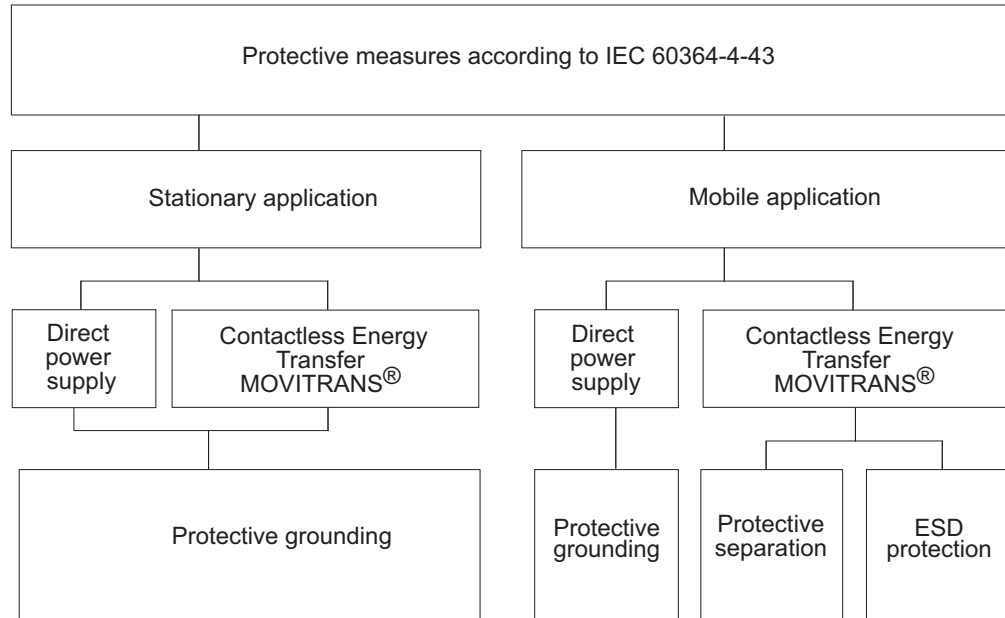
3. Mark the tapped holes on the mounting surface [4].
4. Drill the bores at the marked points.
5. Firmly screw the unit on the mounting surface [4] from the back via the through bores. Use suitable mounting and locking elements, e.g.:
  - M6 screws [1]
  - Lock washers [2]
  - Washers [3]

## 6 Electrical installation

### 6.1 Protective measures against electrical hazards

#### 6.1.1 Overview

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



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#### 6.1.2 PE connection



#### ▲ WARNING

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

Severe or fatal injuries

- Observe the installation instructions.

It is mandatory to ground the stationary units.

Observe the following rules when grounding the unit:

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

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

- **Supply system cable  $< 10 \text{ mm}^2$  (AWG 7):**  
Route a **second PE conductor with the same cable cross section as the supply system lead** in parallel to the PE via separate terminals. Alternatively, use a **copper protective earth conductor with a cross section of  $10 \text{ mm}^2$  (AWG 7)**.
- **Supply system lead  $10 \text{ mm}^2 - 16 \text{ mm}^2$  (AWG 7 – AWG 6):**  
Route a **copper PE conductor with the cross section of the supply system lead**.

- **Supply system lead 16 mm<sup>2</sup> - 35 mm<sup>2</sup> (AWG 6 – AWG 2):**

Route a **copper protective earth conductor with a cable cross section of 16 mm<sup>2</sup>**.

- **Supply system cable > 35 mm<sup>2</sup> (AWG 2):**

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

### 6.1.3 PE connection for mobile use

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

The following energy transfer types can be used:

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

#### Direct power supply

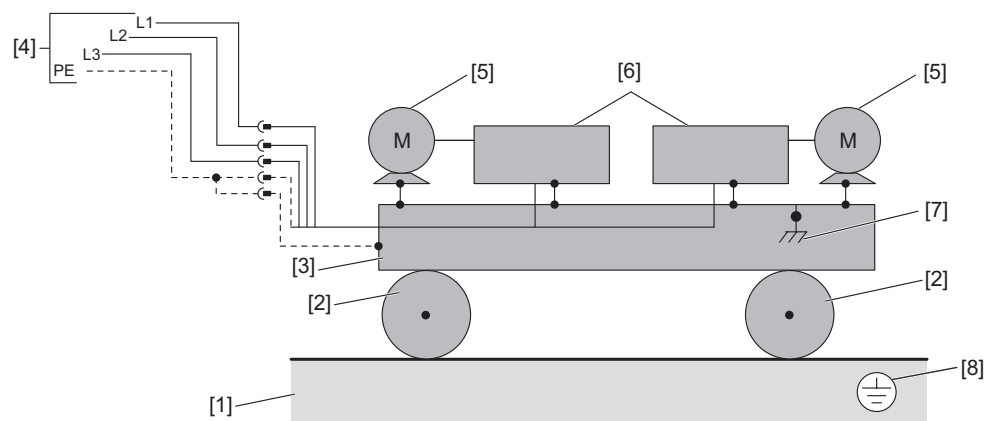
In mobile systems with direct power supply, all electrical equipment such as motor, application controller, etc., must be equipped with a ground connection (PE).

Comply with the following rules:

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

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

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



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

### Contactless energy transfer

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

- Protective separation
- ESD protection

#### Protective separation

Compliance with "preventive separation" in line with VDE 0100 part 410 nominal voltage  $\leq 500$  V is ensured by the following measures.

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

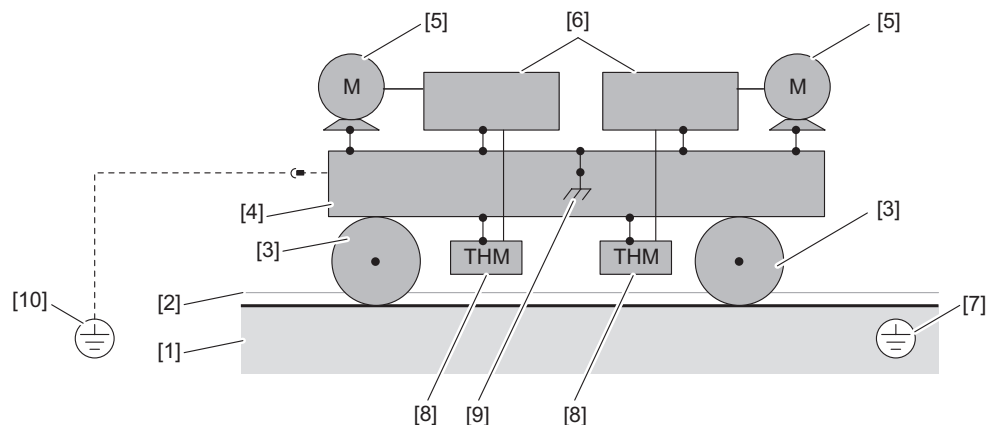
Comply with the following rules:

- Use the vehicle support frame (vehicle GND) for the equipotential bonding.
- Use only gray or black cables for equipotential bonding.

Cable color for equipotential bonding

This cable is for equipotential bonding and is not a PE connection. Therefore, you should not use the yellow/green lead for the equipotential bonding cable as this color is reserved for PE.

The following figure shows an example of a mobile system with contactless energy transfer with MOVITRANS®:



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- [1] Stationary system component
- [2] Line cable
- [3] Wheels
- [4] Vehicle support frame
- [5] Motor
- [6] Application controller
- [7] Ground
- [8] Pick-ups
- [9] Vehicle GND
- [10] Temporary ground connection

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

All cables must have double basic insulation. Double insulation is also required for the incoming cable of the pick-up. These requirements are always met when using MOVITRANS® components.

Additional information for operation

Dissipation of electrical charges between vehicle support frames (vehicle mass) and a ground potential (ESD protection) is permitted.

Grounding mobile MOVITRANS® systems in zones with a protective grounding measure does not cause an increased risk potential and is consequently permitted.

The insulation capacity of the equipment and the effectiveness of the equipotential bonding are to be confirmed within the context of the cyclic system checks at mobile parts and at the complete system for operations at IT networks.

Rule out possible potential transfers on the mobile parts, for example on individual vehicles, by external equipment when planning and operating the systems.

### ESD protection

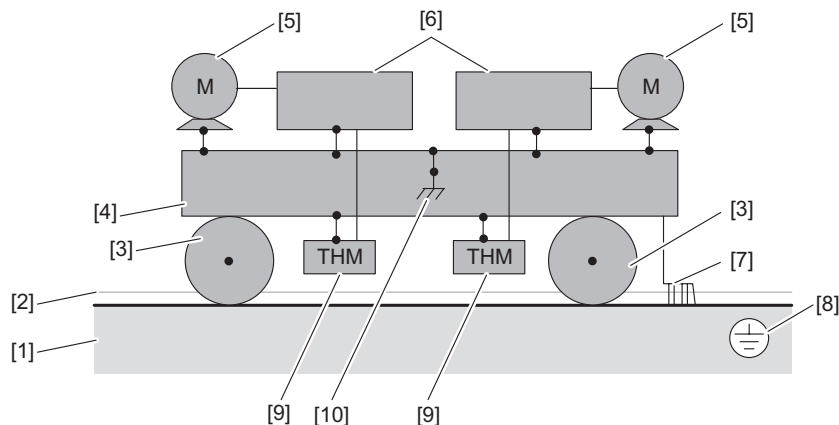
In order to ensure optimal protection against electrostatic discharge (ESD), measures must be taken for all places where non-conductive surfaces rub against one another to ensure that charges are dissipated.

This is particularly important for mobile systems such as lifting gears, floor conveyor vehicles, floor conveyor systems, etc.

You can dissipate charges as follows:

- Via conductive component parts, such as:
  - Combs
  - Brushes
  - Springs
  - Sliders
- With conductive track rollers or wheels
- With conductive floor coverings or work areas

The following figure shows the potential methods for ESD protection:



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- [1] Conductive floor coverings or work areas
- [2] Line cable
- [3] Conductive track rollers or wheels
- [4] Vehicle support frame
- [5] Motor
- [6] Application controllers
- [7] Conductive component part
- [8] Ground
- [9] Pick-ups
- [10] Vehicle GND

### 6.1.4 Unit connection points for grounding or equipotential bonding

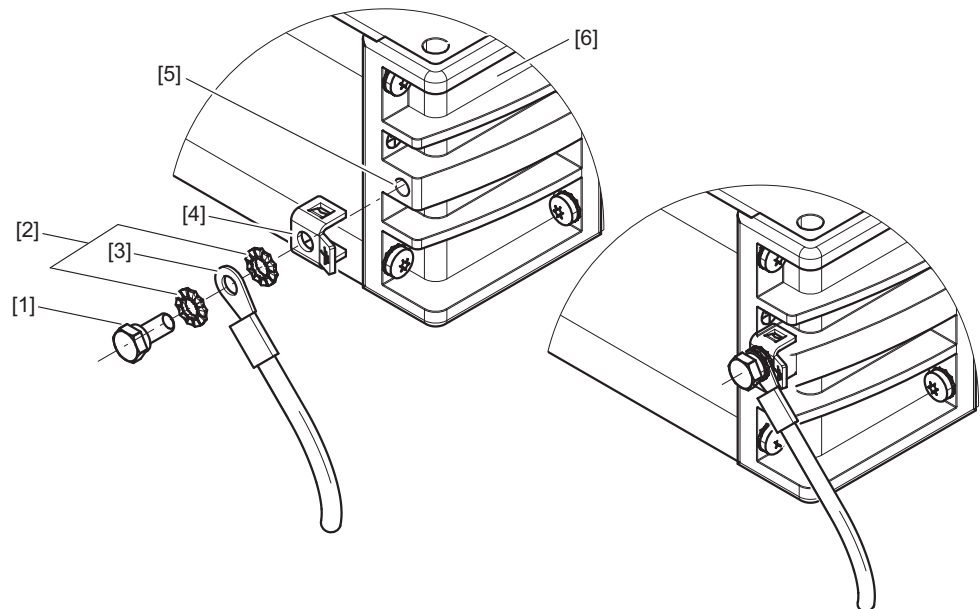
The connection points for grounding or equipotential bonding are marked on the housing corners of the units with the symbol  $\perp$ .

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

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

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

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



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

### 6.1.5 Fuses and residual current devices



#### **▲ WARNING**

Risk of injury due to use of the wrong earth-leakage circuit breaker (ELCB).

Severe or fatal injuries.

- The unit can cause direct current in the protective earth. If you are using a residual current device (RCD) for protection against direct or indirect contact, only an RCD of type B on the current supply side of the unit is permitted.

SEW-EURODRIVE recommends that you do not use residual current devices (RCD). However, if a residual current device (RCD) is stipulated for direct or indirect protection against contact, observe the above warning note.

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

#### **Line fuse types**

Line protection types in operation classes gL, gG:

- Rated fusing voltage  $\geq$  rated line voltage
- Depending on the frequency inverter utilization, the rated fusing current must be designed for 100% of the frequency rated inverter current.

Line protection switches with characteristics B, C:

- Power circuit breaker rated voltage  $\geq$  rated mains voltage
- The rated voltage of the line protection switch must be 10% above the frequency inverter current.

## **6.2 Line connection energy supply**

### **6.2.1 General information**

Observe the following notes on electrical installation:

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

### **6.2.2 Low-voltage supply systems**

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

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

In such a case, SEW-EURODRIVE recommends that you use insulation monitors employing pulse-code measurement. Use of such devices prevents the insulation monitor mis-tripping due to the earth capacitance of the unit.

The EMC limit values are not specified for interference emission in IT systems.

### 6.2.3 Contactors

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

### 6.2.4 Electromagnetic compatibility (EMC)

#### INFORMATION



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

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

For detailed information on EMC-compliant installation, refer to the publication "Drive Engineering – Practical Implementation: EMC in Drive Engineering".

### 6.2.5 Cable routing

Observe the following when routing the cables:

- Use suitable cables to connect power supply and communication. Refer to chapter "Electrical connections" for descriptions of connections.
- 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 detailed information on EMC-compliant installation, refer to the publication "Drive Engineering – Practical Implementation: EMC in Drive Engineering".

### 6.2.6 Installation altitude higher than 1000 m above sea level

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

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



### 6.2.7 Shielding

#### Required material

Use shielded power supply and electronics cables.

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

#### Required documents

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

### 6.2.8 Unit output



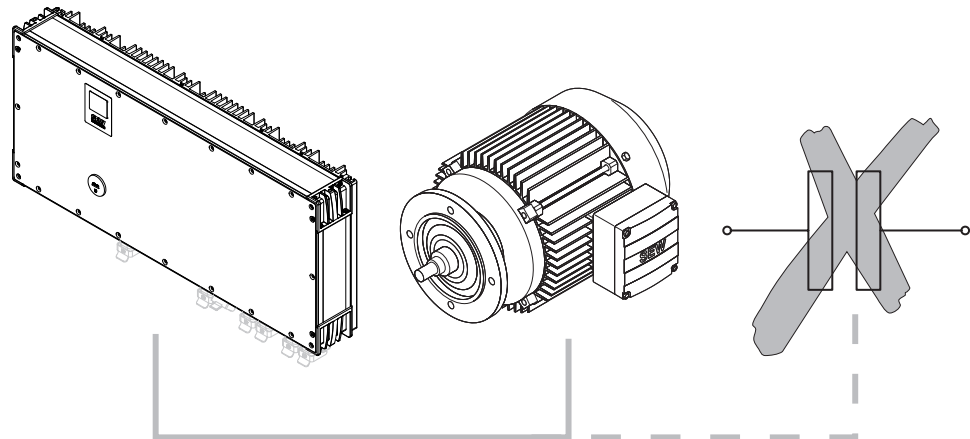
#### NOTICE

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

Damage to the units.

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

You may not connect capacitive loads to the unit output. A capacitive load occurs, for example, when very long cables are used to connect the motor. For this reason, the incoming motor cable may not exceed 30 m (98 ft).



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## 6.2.9 Braking resistor

**⚠ WARNING**

Danger of electric shock due to high DC voltage in the supply lines (about DC 900 V).

Severe or fatal injuries.

- Only use cables provided by SEW-EURODRIVE.
- Install the cables according to the instructions.

**⚠ WARNING**

Burns caused by hot surfaces. Break resistors reach a temperature of up to 250 °C under load.

Serious injuries.

- Choose a suitable installation location and maintain the minimum clearance distances.
- Secure hot surfaces by covering them.
- Install the protection devices according to the regulations.
- Check the protection device at regular intervals.

The resistor is connected via plug connectors. For further information, refer to the sections “Electrical installation” > “Terminal strip” and “Electrical installation” > “Electrical connections”.

## 6.2.10 Using prefabricated cables

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

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

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

**Use of third-party cables**

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

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

- Mechanical properties (such as IP degree of protection, cable carrier suitability)
- Chemical properties (such as the absence of silicone and halogen, resistance against substances)

- Thermal properties (e.g. temperature stability, heating of the unit, flammability class)
- EMC behavior (such as interference emission limit values, compliance with interference immunity values stipulated in standards)
- Functional safety (approvals according to EN ISO 13849-1)

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

- IEC 60309
- IEC 61984
- IEC 60204

### 6.3 MOVITRANS® energy supply

Also observe the information in the following chapters:

- Low-voltage supply systems (→ 47)
- Contactors (→ 48)
- Cable routing (→ 48)
- Installation altitude higher than 1000 m above sea level (→ 48)
- Shielding (→ 49)
- Unit output (→ 49)
- Braking resistor (→ 50)
- Using prefabricated cables (→ 50)

#### 6.3.1 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 unit is operated.

#### 6.3.2 Electromagnetic compatibility (EMC)

### INFORMATION



MOVIPRO® units can cause EMC interference within the permitted limit range according to EN 61800-3.

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

## 7 Electrical connections

### 7.1 Terminal strip

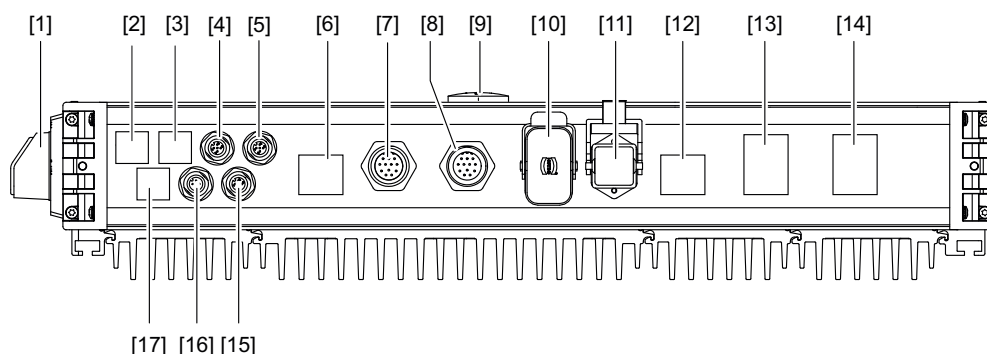


#### ▲ WARNING

Risk of electric shock due to connecting or disconnecting plug connectors when voltage is applied.

Severe or fatal injuries.

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



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- [1] Operating switch (optional)
- [2] X4001, RS485 interface– system bus / X4101, CAN bus – system bus
- [3] X4261, WLAN antenna (aux) / X4233, Ethernet fieldbus
- [4] X4011, RS485 interface – external
- [5] X5502, Safe disconnection – input
- [6] X2292, Brake control (optional)
- [7] X5001\_2, Digital inputs/outputs – communication and control unit
- [8] X5001\_1, Digital inputs/outputs – communication and control unit
- [9] X4223, Ethernet service interface
- [10] X2011, Motor with brake control
- [11] X2301, Braking resistor
- [12] X2311, DC 24 V output / X2551, DC 24 V output for 2 voltage potentials
- [13] X1011, MOVITRANS® THM20E pick-up / X1021, MOVITRANS® THM20C pick-up (optional)
- [14] X1011, MOVITRANS® THM20E pick-up / X1021, MOVITRANS® THM20C pick-up / X1201, AC 400 V input
- [15] X4111, CAN bus – external
- [16] X4401, ID module
- [17] X4211, WLAN antenna (main) (optional)

The following connections depend on the function modules installed in the unit:

- Braking resistors
- DC 24 V outputs
- Field communication
- Motors
- Supply

- Brake control
- Communication package

You can find more information on the function modules in chapter "Function modules nameplate" (→ 18).

## 7.2 Representation of connections

The following wiring diagrams show the contact end of the connections.

## 7.3 Designation key

The designations of the connections are based on the following structure: *Xabbc<sub>mn</sub>*.  
The individual positions represent the following information:

<b>X</b>	<b>Terminal</b>
<b>a</b>	<b>Group</b> 1 = Power input 2 = Power output 3 = Encoder 4 = Bus 5 = Inputs and outputs
<b>bb</b>	<b>Function</b> Function of the connection within a group
<b>c</b>	<b>Type</b> Wiring diagram of the connection within a function
–	
<b>m</b>	<b>Group number (optional)</b> Groups connections with the same signal
<b>n</b>	<b>Sequence number (optional)</b> For several connections in one group

### 7.4 Connection cables



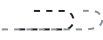

Connection cables are not included in the delivery.

Prefabricated cables for connection between SEW components can be ordered from SEW-EURODRIVE. 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 unit variant 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
	Fixed length
	Variable length
	Suitable for cable carriers
	Not suitable for cable carriers

### INFORMATION



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

### 7.5 Cable structure

#### 7.5.1 Designation

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

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

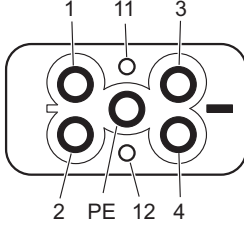
## 7.5.2 Examples

The following examples illustrate the cable structure:

- **3G1.5:**  
Cable with 3 cores of 1.5 mm<sup>2</sup> each, one green-yellow cable
- **((2X2X0.25)+4G2.5):**  
Shielded hybrid cable with
  - 4 twisted-pair cables of 0.25 mm<sup>2</sup> each, shielded, and
  - 4 power cores of 2.5 mm<sup>2</sup> each, one green-yellow cable.

## 7.6 X1011: MOVITRANS® THM20E pick-up

The following table shows information about this connection:

Function		
Unit supply with MOVITRANS® THM20E pick-up		
Connection type		
Han® Q 4/2, female		
Wiring diagram		
 <p style="text-align: right;">9007201698869771</p>		
Assignment		
No.	Name	Function
1	THM Pole 1	MOVITRANS® pick-up pole 1
2	n.c.	Not connected
3	THM Pole 2	MOVITRANS® pick-up pole 2
4	n.c.	Not connected
11	n.c.	Not connected
12	n.c.	Not connected
PE	PE	PE connection

### 7.6.1 Connection components

For information about the components available for this connection, refer to the "MOVITRANS® THM20C / THM20E Pick-Ups" operating instructions.

7.7 X1021: MOVITRANS® THM20C pick-up

The following table displays information about this connection:

Function		
Unit supply with MOVITRANS® THM20C pick-up		
Connection type		
Han® Q 4/2, female		
Wiring diagram		
9007201698869771		
Assignment		
No.	Name	Function
1	THM Pole 1	MOVITRANS® pick-up pole 1
2	n.c.	Not connected
3	THM Pole 2	MOVITRANS® pick-up pole 2
4	n.c.	Not connected
11	n.c.	Not connected
12	n.c.	Not connected
PE	PE	PE connection

7.7.1 THM20C pick-up

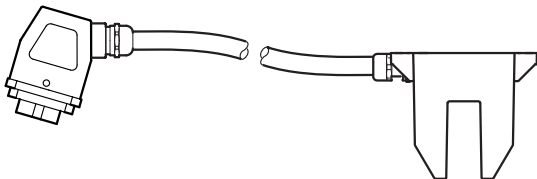
Designation	Part number
THM20C008-490-008-1	13000748
THM20C008-490-008-2	13001272

Part number: 13000749

Cable length: max. 6 m, suitable for cable carriers

Design: 3G1.5

Connection: Han® Q 4/2



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## 7.8 X1201: AC 400 V input

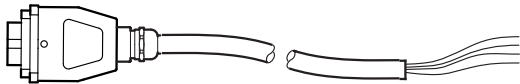

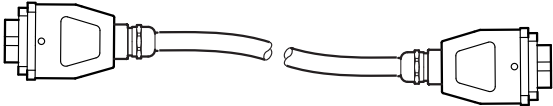

The following table shows information about this connection:

Function		
AC 400 V input to supply units up to 16.0 kW		
Connection type		
Han® Q 4/2, male		
Wiring diagram		
2444131083		
Assignment		
No.	Name	Function
1	L1	Supply system phase 1
2	L2	Supply system phase 2
3	L3	Supply system phase 3
4	n.c.	Not connected
11	n.c.	Not connected
12	n.c.	Not connected
PE	PE	PE connection

### 7.8.1 Connection cables

The following table shows the cables available for this connection:

Cable	Length / Installation type	Component
<b>Part number: 11723815</b> Cable design: 4G2.5  Han® Q 4/2 ↔ female push-on connectors 6.3	Fixed length 	Sliding contacts

Cable	Length / Installation type	Component
<b>Part number: 11745614</b> Cable design: (4G4)  Han® Q 4/2 ↔ open with conductor end sleeves	Variable length 	—
<b>Part number: 18150306</b> Cable design: (4G2.5)  Han® Q 4/2 ↔ Han® Q 4/2 male	Variable length 	—

## Conductor assignment

The following tables shows the conductor assignment in cables with the following part number and the corresponding motor terminals:

11745614

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

## 7.9 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.

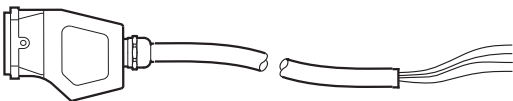

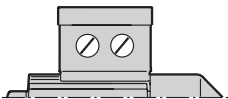
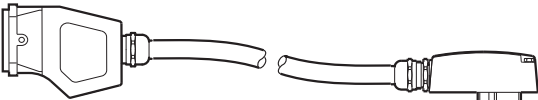

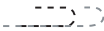



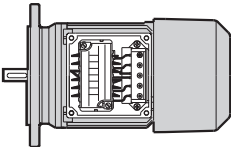
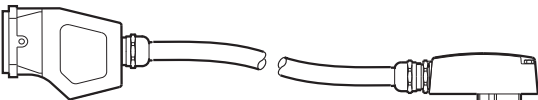





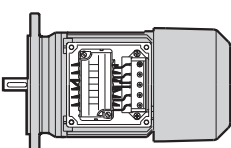
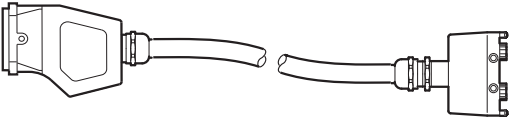

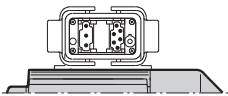
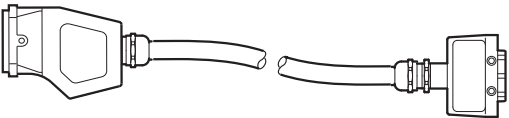

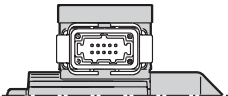
- You must not use motors with built-in brake rectifiers in conjunction with MOVIPRO® units.

The following table displays information about this connection:

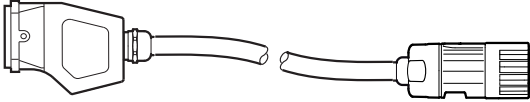

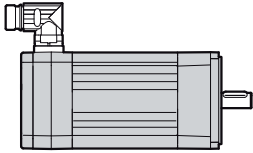
Function		
Power connection for motor with brake up to 4.0 kW		
Connection type		
Han® Q 8/0, female		
Wiring diagram		
Assignment		
No.	Name	Function
1	U	Motor phase U output
2	14	SEW brake terminal 14 (white)
3	W	Motor phase W output
4	15	SEW brake terminal 15 (blue)
5	TF/TH/KTY+	Motor temperature sensor (+)
6	13	SEW brake terminal 13 (red)
7	V	Motor phase V output
8	TF/TH/KTY-	Motor temperature sensor (-)
PE	PE	PE connection

## 7.9.1 Connection cables

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

Cable	Length/ Installation type	Component
<b>Part number: 18125794</b>  Han®Q 8/0 ↔ terminal box connection M4	Variable length 	DRS71 – 100 DRE80 – 100 DRP90 – 100 
<b>Part number: 18127703</b>  Han®Q 8/0 ↔ IS 	Variable length 	DRS71 – 90  DRE80 – 100M  DRP90 – 100  
<b>Part number: 18127681</b>  Han®Q 8/0 ↔ IS 	Variable length 	DRS71 – 80M  DRE80 – 90M  DRP90  
<b>Part number: 18127711</b>  Han® Q 8/0 ↔ ABB8	Variable length 	DRS71 – 90 DRE80 – 100M DRP90 – 100 
<b>Part number: 18127738</b>  Han® Q 8/0 ↔ ASB8	Variable length 	DRS71 – 90 DRE80 – 100M DRP90 – 100 

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Cable	Length/ Installation type	Component
<p><b>Part number: 18125859</b></p>  <p>Han® Q 8/0 ↔ SB11</p>	<p>Variable length</p> 	<p>CMP63 – 80</p> 

### Conductor assignment

The following tables shows the conductor assignment in cables with the following part number and the corresponding motor terminals of the motor:

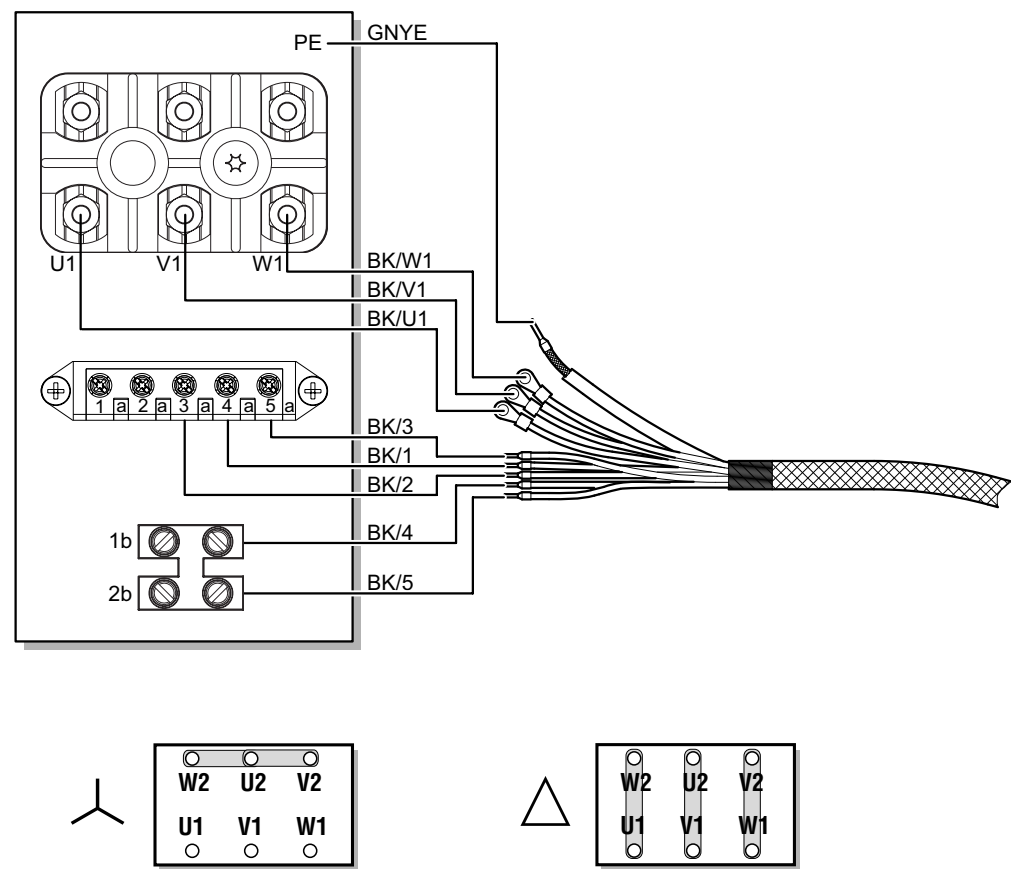
18125794

Motor terminal	Wire color/hybrid cable designation
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)

# 7 Electrical connections

X2011: Motor with brake control

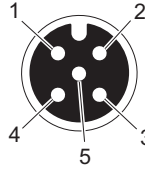
The following figure shows the connection of the hybrid cable to the terminal box of the motor. However, also observe the wiring diagram of the respective motor.



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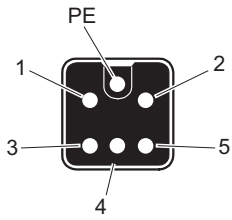
## 7.10 X2292: Brake control

The following table shows information about this connection:

Function		
Connection for SEW brake		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
 <p style="text-align: right;">9007201519557259</p>		
Assignment		
No.	Name	Function
1	res.	Reserved
2	14	SEW brake terminal 14 (white)
3	15	SEW brake terminal 15 (blue)
4	13	SEW brake terminal 13 (red)
5	res.	Reserved

### 7.11 X2301: Braking resistor

The following table shows information about this connection:

Function		
Power connection for external braking resistor		
Connection type		
Han® Q 5/0, female		
Wiring diagram		
		
Assignment		
No.	Name	Function
1	n.c.	Not connected
2	n.c.	Not connected
3	+R	Braking resistor (+)
4	n.c.	Not connected
5	-R	Braking resistor (-)
PE	PE	PE connection

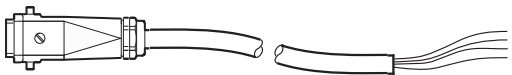

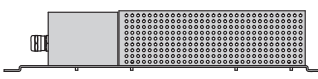
#### 7.11.1 Connection cables

### INFORMATION



For the **braking resistor BW100-004-00**, you do **not** have to order an additional cable! The brake resistor is delivered with mounted connection cable and plug connector.

The following table shows the cables available for this connection:

Cable	Length/ Installation type	Component
<b>Part number: 11722916</b> Cable design: (3G2.5) Cable cross section: 2.5 mm <sup>2</sup>  Han®Q 5/0 ↔ open with conductor end sleeves	Variable length 	External braking resistor  Terminal cross section 6 mm <sup>2</sup>



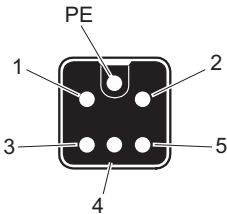
**Conductor assignment**

The following table shows the conductor assignment of the cable with part number 11722916:

Signal name	Color coding
+R	Black / 1
-R	Black / 2
PE connection	Green/yellow

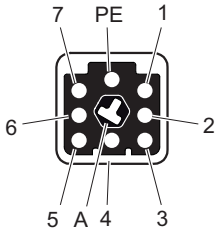
7.12 X2311: DC 24 V output

The following table displays information about this connection:

Function		
DC 24 V output to supply external components		
Connection type		
Han® Q 5/0, female		
Wiring diagram		
		
Assignment		
No.	Name	Function
1	+24V	DC 24 V output
2	0V24	0V24 reference potential
3	n.c.	Not connected
4	n.c.	Not connected
5	n.c.	Not connected
PE	PE	PE connection

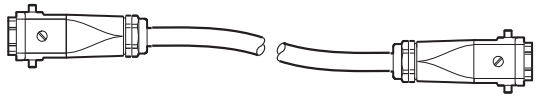
### 7.13 X2551: DC 24 V output for 2 voltage potentials

The following table displays information about this connection:

Function		
DC 24 V output for 2 voltage potentials		
Connection type		
Han® Q 7/0, female, 2-coded		
Wiring diagram		
		
5364030475		
Assignment		
No.	Name	Function
1	+24V_I	DC 24 V output 1
2	GND	Reference potential
3	+24V_II	DC 24 V output 2
4	GND	Reference potential
5	n.c.	Not connected
6	n.c.	Not connected
7	n.c.	Not connected
PE	PE	PE connection
A	–	Coding

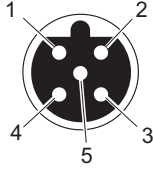
### 7.13.1 Connection cables

The following table shows the available cable for this connection:

Connection cable and component	
Encoder cable	Length / Installation type
<b>Part number 1 814 307 5</b> Cable design: 7G1.5	Variable length
 <div> <div>Han® Q7/0 male</div> <div>Han® Q7/0 female</div> </div>	

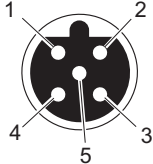
## 7.14 X4001: RS485 interface – system bus

The following table displays information about this connection:

Function		
Internal RS485 interface (system bus)		
Connection type		
M12, 5-pole, female, B-coded		
Wiring diagram		
		
9007201609172107		
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

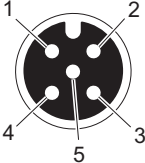
7.15 X4011: RS485 interface – external

The following table shows information about this connection:

Function		
RS485 interface for external components		
Connection type		
M12, 5-pole, female, B-coded		
Wiring diagram		
<div>  </div>		
9007201609172107		
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

7.16 X4101: CAN bus – system bus

The following table shows information about this connection:

Function		
Internal CAN bus (system bus) – output		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
<div></div> <div>9007201519557259</div>		
Assignment		
No.	Name	Function
1	CAN_SHLD	Shield/equipotential bonding
2	+24V	DC 24 V output
3	GND	Reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)



INFORMATION





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

7.16.1 Connection cables

The following table shows the cables available for this connection:

Cable	Length / Installation type
<div>Length: 5 m, part number: 13286331</div> <div>Length: 10 m, part number: 13286358</div> <div>Length: 15 m, part number: 13286366</div> <div>Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)</div> <div></div> <div>M12, male, A-coded↔ M12, female, A-coded</div>	<div>Fixed length</div> <div></div>

Cable	Length / Installation type
<p>Length: 5 m, part number: 13281402</p> <p>Length: 10 m, part number: 13281410</p> <p>Length: 15 m, part number: 13281429</p> <p>Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)</p>  <p>M12, male, A-coded ↔ open with conductor end sleeves</p>	<p>Fixed length</p> 

### Conductor assignment

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

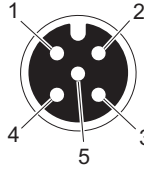
- 13281402
- 13281410
- 13281429

Signal name	Color coding
CAN_SHLD	-
+24V	Red
GND	Black
CAN_H	White
CAN_L	Blue




## 7.17 X4111: CAN bus – external


The following table shows information about this connection:

Function		
CAN bus for external components		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
		
9007201519557259		
Assignment		
No.	Name	Function
1	CAN_SHLD	Shield/equipotential bonding
2	+24V	DC 24 V output
3	GND	Reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)

### 7.17.1 Connection cables

The following table shows the cables available for this connection:

Cable	Length/ Installation type	Component
<p>Length: 5 m, part number: 13286331</p> <p>Length: 10 m, part number: 13286358</p> <p>Length: 15 m, part number: 13286366</p> <p>Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)</p>  <p>M12 ↔ M12, female</p>	fixed length	–

Cable	Length/ Installation type	Component
<p>Length: 5 m, part number: 13281402</p> <p>Length: 10 m, part number: 13281410</p> <p>Length: 15 m, part number: 13281429</p> <p>Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)</p>  <p>M12 ↔ open with conductor end sleeves</p>	fixed length	–

### Conductor assignment

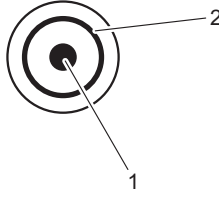
The following table shows the conductor assignment of cables with the following part numbers:

- 13281402
- 13281410
- 13281429

Signal name	Color coding
CAN_SHLD	-
+24V	Red
GND	Black
CAN_H	White
CAN_L	Blue

## 7.18 X4211: WLAN antenna (main)

The following table shows information about this connection:

Function		
Antenna connection for WLAN communication, parameterizable for send and receive functions		
Connection type		
R-TNC socket		
Wiring diagram		
 <p>36028797359150475</p>		
Assignment		
No.	Name	Function
1	inner conductor	Inner conductor
2	outer conductor	Outer conductor

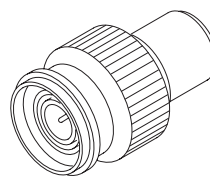
### 7.18.1 Connection component

The following component is suitable for this connection:

50 Ω terminating resistor

Part number: 19069146


Connection: R-TNC encoder



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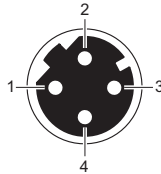
7.19 X4223: Ethernet service interface

The following table shows information about this connection:

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

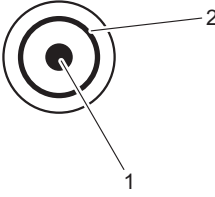
## 7.20 X4233: Ethernet fieldbus

The following table shows information about this connection:

Function		
Ethernet fieldbus interface, 4-pole		
Connection type		
M12, 4-pole, female, D-coded		
Wiring diagram		
 <p>9007201719341963</p>		
Assignment		
No.	Name	Function
1	TX+	Transmit line (+)
2	RX+	Receive line (+)
3	TX-	Transmit line (-)
4	RX-	Receive line (-)

### 7.21 X4261: WLAN antenna (aux)

The following table shows information about this connection:

Function		
Antenna connection for WLAN communication, parameterizable for send and receive functions		
Connection type		
R-TNC socket		
Wiring diagram		
 <p style="text-align: right;">36028797359150475</p>		
Assignment		
No.	Name	Function
1	inner conductor	Inner conductor
2	outer conductor	Outer conductor

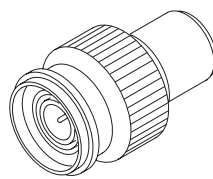
#### 7.21.1 Connection component

The following component is suitable for this connection:

50 Ω terminating resistor

Part number: 19069146

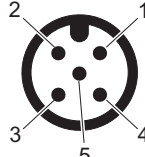
Connection: R-TNC encoder



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## 7.22 X4401: ID module

The following table shows information about this connection:

Function		
Interface for ID module from SEW-EURODRIVE		
Connection type		
M12, 5-pole, male, A-coded		
Wiring diagram		
		
9007201519559179		
Assignment		
No.	Name	Function
1	GND	Reference potential
2	IDM-Data	ID module data line
3	res.	Reserved
4	res.	Reserved
5	res.	Reserved

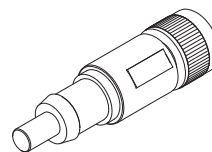
### 7.22.1 Connection component

The following component is suitable for this connection:

ID module

Part number: 17974186

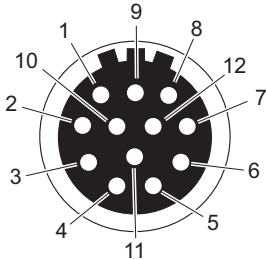
Connection: M12



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## 7.23 X5001\_1: Digital inputs/outputs

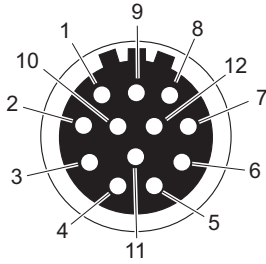
The following table shows information about this connection:

Function		
Digital inputs/outputs of the communication and control unit		
Connection type		
M23, P insert, 12-pole, female, 0°-coded		
Wiring diagram		
		
2264820107		
Assignment		
No.	Name	Function
1	DI0.0	Digital input DI0.0
2	DI0.1	Digital input DI0.1
3	DI0.2	Digital input DI0.2
4	DI0.3	Digital input DI0.3
5	DI0.4 / DO0.2	Digital input DI0.4 or Digital output DO0.2
6	DI0.5 / DO0.3	Digital input DI0.5 or Digital output DO0.3
7	DO0.0	Digital output DO0.0
8	DO0.1	Digital output DO0.1
9	0V24	0V24 reference potential
10	0V24	0V24 reference potential
11	+24V	DC 24 V output
12	FE	Equipotential bonding/functional earth



## 7.24 X5001\_2: Digital inputs/outputs

The following table shows information about this connection:

Function		
Digital inputs/outputs of the communication and control unit		
Connection type		
M23, P insert, 12-pole, female, 0°-coded		
Wiring diagram		
		
2264820107		
Assignment		
No.	Name	Function
1	DI1.0	Digital input DI1.0
2	DI1.1	Digital input DI1.1
3	DI1.2 / DO1.0	Digital input DI1.2 or Digital output DO1.0
4	DI1.3 / DO1.1	Digital input DI1.3 or Digital output DO1.1
5	DI1.4 / DO1.2	Digital input DI1.4 or Digital output DO1.2
6	DI1.5 / DO1.3	Digital input DI1.5 or Digital output DO1.3
7	DI1.6 / DO1.4	Digital input DI1.6 or Digital output DO1.4
8	DI1.7 / DO1.5	Digital input DI1.7 or Digital output DO1.5
9	0V24	0V24 reference potential
10	0V24	0V24 reference potential
11	+24V	DC 24 V output
12	FE	Equipotential bonding/functional earth

7.25 X5502: Safe disconnection – input



**⚠ WARNING**

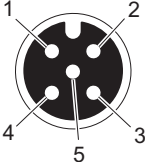
Risk of injury due to non-safety-related disconnection of the unit if the connection is jumpered

Severe or fatal injuries

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

This connection is identified with a yellow ring.

The following table shows information about this connection:

Function		
Input for safe disconnection		
Connection type		
M12, 5-pole, female, A-coded		
Wiring diagram		
<div>  </div>		
9007201519557259		
Assignment		
No.	Name	Function
1	+24V	DC 24 V output
2	STO-	0V24 reference potential for safe disconnection
3	0V24	0V24 reference potential
4	STO+	DC 24 V input for safe disconnection
5	res.	Reserved



**INFORMATION**

Use only shielded cables for this connection.

### 7.25.1 Connection component

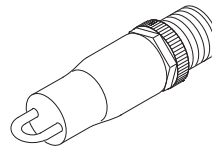
The following component is suitable for this connection:

Jumper plug

Part number 11747099

Structure: bridged 1+4 / 2+3

Connection: M12



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## 8 Startup

### 8.1 General information

#### INFORMATION



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



#### ▲ WARNING

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

Severe or fatal injuries.

- The installation must be carried out by qualified personnel only.



#### ▲ WARNING

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

Severe or fatal injuries.

- The installation must be carried out by qualified personnel only.
- Check the parameters and data sets.
- Only use settings that are suitable for operation.



#### ▲ WARNING

Danger due to unintended motor startup.

Severe or fatal injuries.

- Comply with the startup instructions.
- Set the controller inhibit.
- Switch off the output stage.
- Decouple the drive.
- Deactivate the auto-reset function for drives that start up automatically.



#### ▲ WARNING

Electric shock due to missing or defective protection covers.

Severe or fatal injuries.

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



#### ▲ WARNING

Danger of electric shock due to exposed connections.

Severe or fatal injuries.

- The installation must be carried out by qualified personnel only.
- Never start the unit if the touch guard is not installed.

**NOTICE**

Danger due to arcing.

Damage to electrical components.

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

**INFORMATION**

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

## 8.2 Prerequisites

The following conditions apply to the startup:

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

The following hardware is required for startup:

- PC or laptop with Ethernet interface

## 8.3 Hoist applications

**▲ WARNING**

Danger of fatal injury if the hoist falls.

Severe or fatal injuries.

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

## **8.4 Device configuration**

### **8.4.1 Settings**

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

- Configuration of the radio modem settings
- Configuration of the processing unit
- Parameterization of the frequency inverter

Use the X4223 (Ethernet service interface of the communication and control unit) to establish the connection to the processing unit of the unit.

In the delivery state, the communication and control unit uses the DHCP communication protocol.

### **8.4.2 Configuration software**

Use the latest version of the following software to make all the required settings:

- MOVITOOLS® MotionStudio
- FTP Software
- MOVIVISION® parameter and diagnostics tool

### 8.4.3 Additional Information

For additional information, refer to the following documentation:

- "MOVIVISION® Parameter and Diagnostics Tool" manual
- "MOVIVISION® - MOVIPRO® Software Interface" manual
- "MOVIDRIVE® MDX60B/61B" system manual

## 8.5 Main axes

The unit is delivered with the following main axis addresses: Position m of the plug connector designation is relevant for the SBus address of the respective axis.

The following table shows 2 examples:

Connection	Axis m	SBus address
X201c_1n	1	$19 + 1 = 20$
X201c_2n	2	$19 + 2 = 21$
...	...	...
X201c_mn	m	$19 + m$

## 8.6 Control of the brake modules

The safety-related BST brake module is controlled via output DB00 of the frequency inverter for single drives.

## 9 Operation



### ⚠ WARNING

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

Severe or fatal injuries from electric shock

- Do not change the switch under load.
- Before working on the unit, disconnect it from the voltage supply. Dangerous voltages may still be present at the terminals and connections for up to 10 minutes after disconnection from the power supply.
- The unit output may only be switched when the output stage of the frequency inverter is inhibited.



### ⚠ WARNING

Danger due to unintended motor startup.

Severe or fatal injuries.

- Comply with the startup instructions.
- Set the controller inhibit.
- Switch off the output stage.
- Decouple the drive.
- Deactivate the auto-reset function for drives that start up automatically.



### ⚠ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

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



### ⚠ CAUTION

Danger of burns due to hot surfaces of the unit 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 unit and the connected options cool down before you start working on them.



## INFORMATION



- For operating modes with encoder feedback, parameters must not be changed in cycles faster than 2 seconds. This ensures that the encoders are initialized.
- The maximum output frequency in the VFC operating modes without encoder feedback is 150 Hz.
- The maximum output frequency in the V/f operating mode and all operating modes with encoder feedback is 599 Hz.
- If the maximum output frequency is exceeded, error 08, "Speed monitoring," is displayed.

### 9.1 Cyclic duration factor (CDF)

The cyclic duration factor (CDF) is the ratio between the load duration and the cycle duration. The cycle duration is the sum of the switch-on times and the de-energized rest periods. A typical value for the cycle duration is 10 minutes.

$$CDF = \frac{\text{Total switch-on time } (t_1 + t_2 + t_3)}{\text{Cycle duration } (T)} \times 100\%$$

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### 9.2 Duty types

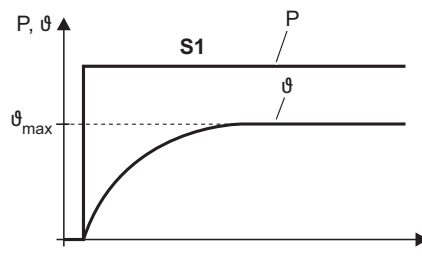
#### 9.2.1 Environmental conditions

The following ambient conditions are permitted in accordance with CDF information IEC 60034-1 (2005):

- Ambient temperature  $\vartheta_U$  [ $+5\text{ °C} - +40\text{ °C}$  ( $+41 - +104\text{ °F}$ )]  
Each further temperature increase by  $1\text{ °C}$  ( $1.8\text{ °F}$ ), results in a 4% CDF decrease.
- $I_D = 100\% I_N$  at  $f_{PWM} = 4\text{ kHz}$
- Installation sites up to 1000 m above sea level

#### 9.2.2 Duty type S1

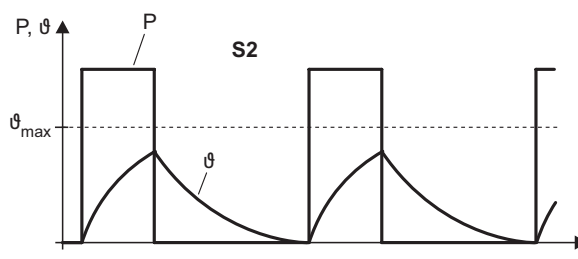
**Continuous duty:** Operation with a constant load state, the motor achieves a thermal steady state.



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### 9.2.3 Duty type S2

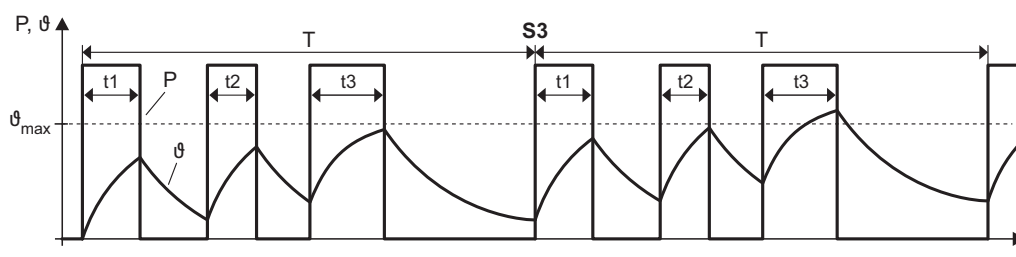
**Short-time duty:** Operation at constant load for a limited, given time followed by a time at rest. The motor returns to ambient temperature during the rest period.



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### 9.2.4 Duty type S3

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



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### 9.2.5 Duty types S4 – 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.

## 9.3 Operating the brake control



### NOTICE

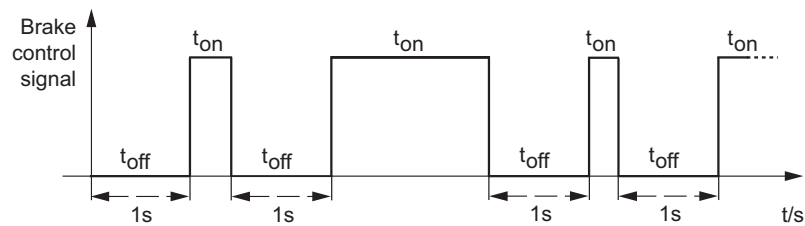
Damage to the brake controller if necessary off periods are not adhered to.

Damage to the drive system.

- Observe the required off periods for the brake controller.

### 9.3.1 Brake control under normal operating conditions, e.g. automatic operation of the plant

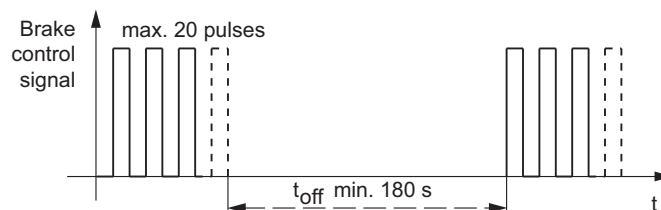
With a brake coil power of  $P \geq 70 \text{ W}$ , you must ensure a timeout of at least 1 second for brake control:



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### 9.3.2 Brake control under special operating conditions, e.g. teach or jog mode

For teach or jog mode, for example, timeouts shorter than 1 second are possible. After 20 control pulses, a timeout of minimum 3 min is mandatory in this case.



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## 9.4 Status reports



### ⚠ WARNING

Incorrect interpretation of message "STO active".

Severe or fatal injuries.

- The message "STO active" is not safety-related and must not be used as a safety function.

The unit's status display automatically displays the following operating statuses:

Message	Description
	The display is ready for operation, but has not yet received valid data from the processing unit.
	The display did not receive any more valid data from the processing unit within the specified timeout interval (factory set to 3 seconds).

Refer to the software documentation for detailed information on possible status messages.

If the monitoring function of the status display via the processing unit is deactivated, the bus is no longer monitored. In this case, in the event of an error, the status display may still display the last status before the error occurred. For this reason you should only switch the monitoring function off in exceptional cases and inform the operating personnel about this fact.

## 10 Service

### 10.1 Line connection energy supply

#### 10.1.1 Inspection/maintenance

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

- Connection cables:  
Damaged or fatigued cables must be replaced immediately.
- Cooling fins:  
To ensure sufficient cooling, remove any deposits that accumulate.
- If there is a fan subassembly, check its individual axial fans for functionality.

### INFORMATION



Repairs may only be carried out by SEW-EURODRIVE.

---

#### 10.1.2 Unit replacement

##### Notes on replacing units

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

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

### INFORMATION



Observe the following notes when replacing a unit:

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

## Replacing the unit

Proceed as follows to replace the unit:

1. Disconnect the unit and remove it from the system.
2. Loosen the connection of the ID module and remove it from the X4401.
3. Plug the ID module into connection X4401 of a new unit and tighten the screw.
4. Install the new unit in the system and connect it.
5. Switch on the new unit.

For detailed information, refer to the "Parameterizable Plant Software MOVIVISION® Version 2.0 – MOVIPRO® (Software Interface)" manual.

### 10.1.3 Display

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

### 10.1.4 Fault information of the frequency inverter



#### ⚠ WARNING

Risk of automatic restart of the drive after fault elimination or after a reset.

Fatal or severe injuries and damage to property.

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

For information on the functionality of inverters and possible errors, refer to the "MOVIDRIVE® MDX60B/61B" system manual.

### Fault memory

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

The following information is stored when a fault occurs:

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

### Switch-off responses

The following switch-off responses occur in the frequency inverter depending of the fault. In all cases, the frequency inverter of the unit remains inhibited in fault status.

#### *Immediate switch-off*

The unit can no longer decelerate the drive. In the event of a fault, the output stage goes to high-resistance and the brake is applied immediately.

#### *Rapid stop*

The drive is decelerated with the stop ramp. The brake is applied when the stop speed is reached. The output stage goes to high resistance after the brake application time has elapsed.

#### *Emergency stop*

The drive is decelerated with the emergency stop ramp. The brake is applied when the stop speed is reached. The output stage goes to high resistance after the brake application time has elapsed.

#### *STO*

Safe torque off is triggered by a safety relay. The frequency inverter no longer supplies power to the motor for generating torque. At the same time, the brake is de-energized.

## Reset



### ▲ WARNING

Danger due to unintended motor startup.

Severe or fatal injuries.

- Comply with the startup instructions.
- Set the controller inhibit.
- Switch off the output stage.
- Decouple the drive.
- Deactivate the auto-reset function for drives that start up automatically.

An error message can be acknowledged by:

- Switching the voltage supply off and then on  
Always maintain a minimum switch-off time of 1 minute.
- Reset using the parameters of the frequency inverter
- Reset via the process data interface

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

### 10.1.5 Shutdown

To shut down the unit, disconnect it using appropriate measures.



### ▲ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

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

### 10.1.6 Storage

Observe the following instructions when shutting down or storing the safety controller:

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

Observe the notes on storage temperature in chapter "Technical data".

### 10.1.7 Extended storage

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

**Procedure when maintenance has been neglected:**

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

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

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

### 10.1.8 Waste disposal

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

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



## 10.2 MOVITRANS® energy supply

Also observe the information in the following chapters:

- Inspection/maintenance (→ 92)
- Unit replacement (→ 92)
- Display (→ 93)
- Fault information of the frequency inverter (→ 93)
- Shutdown (→ 95)
- Storage (→ 95)
- Waste disposal (→ 96)

### 10.2.1 Extended storage

If the unit is stored for a long time, connect it to the supply voltage for at least 5 minutes every 4 years. Otherwise, the unit's service life may be reduced.

#### **Procedure when maintenance has been neglected:**

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

If maintenance has been neglected, SEW-EURODRIVE recommends to connect the unit to a MOVITRANS® supply with reduced line cable current. To do so, set the *nominal line cable current* parameter in the MOVITRANS® supply according to the following overview to slowly increase the internal voltage supply.

The following stages are recommended:

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

## 11 Technical data

### 11.1 Basic unit

General information				
Rated input power	2.2 kW/4.0 kW	1.6 kW	2.0 kW	2.2 kW/4.0 kW
Supply type	AC three-phase current	MOVITRANS®		
Weight	17 kg (37 lb)	-	17 kg (37 lb)	18 kg (40 lb)
Weight with optional 24 V power supply unit	18 kg (40 lb)	-	18 kg (40 lb)	-
Interference immunity	Complies with EN 61800-3 Interference suppression level A according to EN 55011			
Interference emission	Limit value class C3 according to EN 61800-3	-		
Ambient temperature	+5 – +40 °C (+41 – +104 °F) (non-condensing, no moisture condensation) The unit is intrinsically safe with respect to temperature. When the temperature of the heat sink is too high, the unit switches off and the error message “Overtemperature” is issued.			
Derating ambient temperature	EN 60721-3-3			
Climate class	Class 3K3			
Storage temperature	-25 – +70 °C (-13 – +158 °F)			
Degree of protection	IP54			
Dimensions W x H x D	570 × 300 × 115 mm (22.4 × 11.8 × 4.53 in)			

Input data				
Rated input power	2.2 kW/4.0 kW	1.6 kW	2.0 kW	2.2 kW/4.0 kW
Supply type	AC three-phase current	MOVITRANS®		
	X1201	X1021	X1011	
Input voltage range	3 × AC 380 – 500 V	AC 350 V		
Nominal input current where I <sub>E</sub> = AC 400 V	AC 5.0 A	AC 2.3 A per connection	AC 6.0 A per connection	
Nominal input frequency	50 – 60 Hz	25 kHz		

Output data				
Rated input power	2.2 kW/4.0 kW	1.6 kW	2.0 kW	2.2 kW/4.0 kW
Supply type	AC three-phase current	MOVITRANS®		
Rated output power	2.2 kW (3.0 HP)	1.6 kW (2.1 HP)	2.0 kW (2.7 HP)	2.2 kW (3.0 HP)
Operating mode	S1 (IEC 60034-1)			

## 11.2 Axis data

PFA axis type	MD022			MD040		
Rated input power	1.6 kW	2.0 kW	2.2 kW	1.6 kW	2.0 kW	4.0 kW
S1 rated output power according to EN 60034 at PWM frequency = 4 kHz	1.6 kW	2.0 kW	2.2 kW	1.6 kW	2.0 kW	2.2 kW
Nominal output current	1.6 A	2.0 A	2.2 A	4.0 A	5.0 A	5.5 A
Current limiting (motor and regenerative, duration depending on the utilization)	8.25 A			14.05 A		
Terminal designation	X2011					
Output voltage	3 × AC 0 – 500 V					
"PWM frequency"	Adjustable: 4 / 8 / 12 / 16 kHz					
Speed range	– 6000 – 0 – + 6000 rpm					
Resolution	0.2 min <sup>-1</sup> over the entire range					
Temperature sensors for single drive	TF / TH / KTY					
Maximum motor cable length	30 m (98 ft)					
Installation altitude	<ul style="list-style-type: none"><li>Up to h &lt; 1000 m (3281 ft) without restrictions</li><li>At h ≥ 1000 m (3281 ft), the following restrictions apply:<ul style="list-style-type: none"><li>From 1000 m (3281 ft) to max. 4000 m (13120 ft): I<sub>N</sub> reduction by 1% per 100 m (328 ft)</li><li>From 2000 m (6562 ft) to max. 4000 m (13120 ft): V<sub>N</sub> reduction by AC 6 V per 100 m (328 ft)</li></ul></li><li>Above 2000 m (6562 ft) for overvoltage class 2 only.</li><li>External measures are required for overvoltage class 3.</li><li>Overvoltage classes according to DIN VDE 0110-1.</li></ul>					
Braking resistor						
Connection voltage	DC link voltage U <sub>z</sub> , max DC 1000 V					
Min. permitted braking resistance (4Q operation)	68 Ω			33 Ω		
Terminal designation	X2301					

### 11.3 Brake control

Function module	PFA-..S23-..	PFA-..S40-..	PFA-..S46-..
Terminal designation	X2011		
Brake voltage	DC 96 V	DC 167 V	DC 190 V
SEW brake type	AC 230 V	AC 400 V	AC 460 V
Nominal brake current Terminals 13, 15	DC 1.2 A	DC 0.7 A	DC 0.6 A
Brake acceleration current Terminals 13, 14	4 – 8.5 times the holding current depending on the brake type		
Maximum braking power	120 W		

### 11.4 DC 24 V output

Function module	PFE-..0302..	PFE-..0702..	PFE-..0701..
Terminal designation	X2311	X2311	X2551
Nominal output voltage	DC 24 V –15% / +20% Complies with PELV according to DIN EN 61131		
Nominal output current	DC 3.5 A	DC 7.0 A	2 × DC 3.5 A
Maximum load capacity	2200 µF		

## 11.5 Processing unit

General information	
Type	Micro Dynamic Logic Controller (Micro DLC)
Engineering	Engineering is performed via the Ethernet service interface and the Chip-tool PC software or MOVIVISION®.
Digital inputs	
Compatibility	PLC-compatible according to IEC 61131-2:2008-04 "Standard operating ranges for digital inputs (current sinking)"
Internal resistance	≈ 3 kΩ
Current consumption	≈ 10 mA
High level	DC +13 V – +30 V
Low level	DC -3 V – +5 V
Switch-on delay	Typ. 250 μs
Deactivation delay	Typ. 250 μs
Digital outputs	
Compatibility	PLC-compatible according to IEC 61131-2:2008-04 "Rated values and operating ranges (DC) for current-sourcing digital DC outputs" All outputs are short-circuit proof and protected against overload and external voltages up to 30 V.
Output current	max. DC 500 mA per digital output
Inductive loads	Dissipation of inductive switch-off energy up to 0.4 J per output at X5001_1 Dissipation of inductive switch-off energy up to 1 J per output at X5001_2 Freewheeling diodes are not integrated.
Low level	DC 0 V
High level	DC 24 V
Switch-on delay	Typ. 110 μs
Deactivation delay	Typ. 110 μs
24 V voltage supply of the buses	
Nominal voltage	DC 24 V ± 10%
Nominal current	Max. DC 500 mA per connection
Output current limiting	Max. 2 A (until thermal switch-off) The continuous output current must not exceed 500 mA.

### INFORMATION



The total output power of the 24 V voltage supplies to the plug connectors for buses and digital inputs/outputs may not exceed 48 W.

## 11.6 Radio modem

For more information, technical data and approvals, refer to the latest edition of the addendum to the "MOVIPRO® Drive and Application Controller – REC5 Radio Modem" operating instructions.

## 11.7 Safety technology

### 11.7.1 General

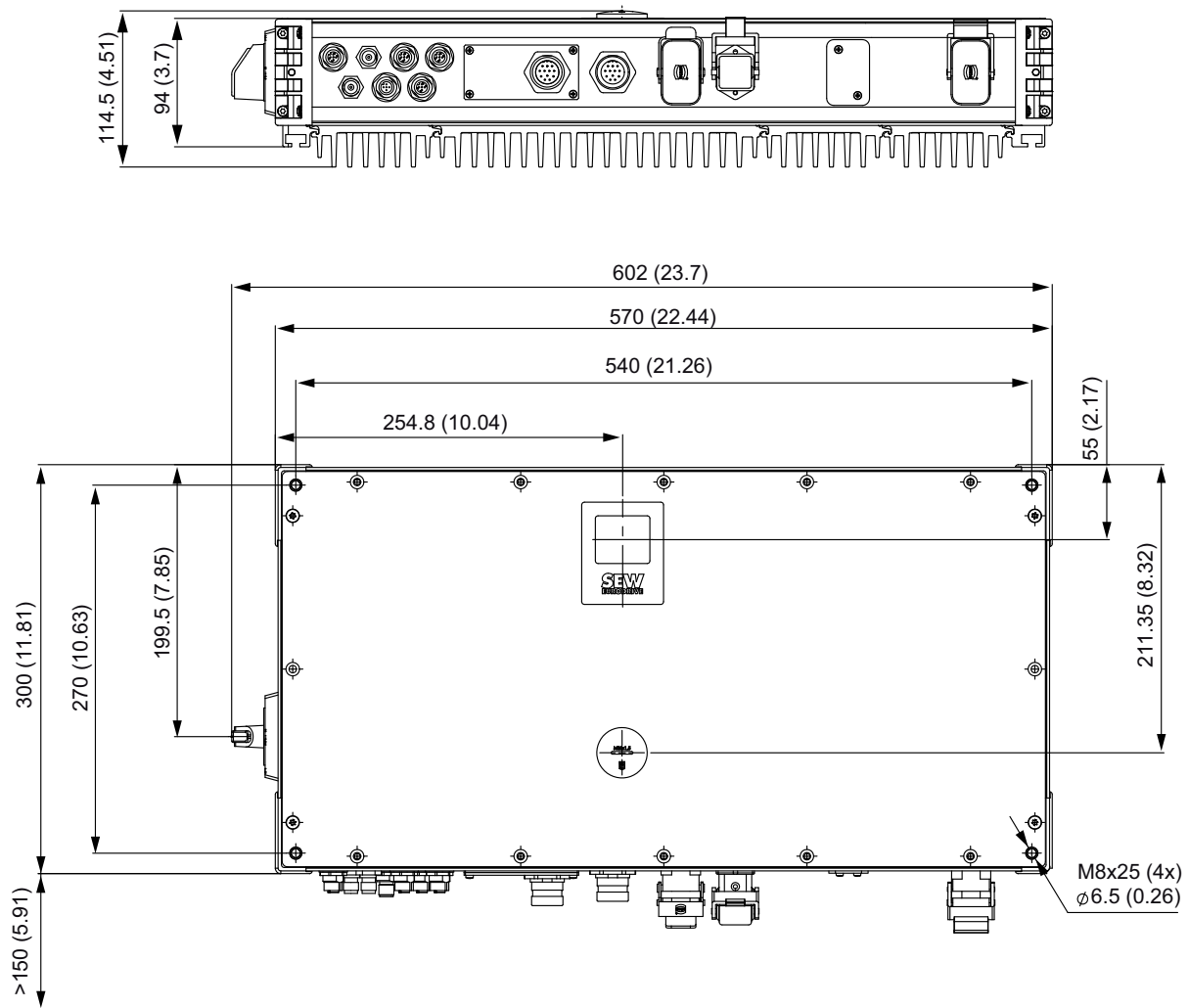
Safety characteristics	
Approved safety classes of the unit	Performance level d according to EN ISO 13849-1
Service life	20 years
Safe condition	Frequency inverter does not produce a rotating field, power to the connected brakes is turned off

### 11.7.2 STO interfaces

Input for safe disconnectionX5502	
Control voltage range according to DIN EN 61131-2	Min. 20.4 V Typ. 24.0 V Max. 28.8 V
Output current limit DC 24 V	Max. 2 A (until thermal switch-off) The continuous output current must not exceed 500 mA.
Single drive input capacitance (diode-decoupled)	32 µF

## 11.8 Dimension drawing

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



5428441099

## 12 Declaration of Conformity

## EC Declaration of Conformity

Translation of the original text

**SEW**  
**EURODRIVE**

900330014

**SEW EURODRIVE GmbH & Co KG**  
**Ernst-Blickle-Straße 42, D-76646 Bruchsal**

declares under sole responsibility that the following products

Drive systems of the series	PHC11A-..M1-..2A-A1/..	(18255493) (18258670) (18255655) (18256090) (18255663) (18258468)
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according to

Machinery Directive	2006/42/EC
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This includes the fulfillment of the protection targets for "electrical power supply" in accordance with annex I No. 1.5.1 according to the Low Voltage Directive 73/23/EEC and 2006/95/EC.

EMC Directive	2004/108/EC	4)
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Radio and telecommunications Terminal Equipment Directive	1999/5/EC	9)
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Applied non-harmonized standards:	EN ISO 13849-1:2008 EN 61800-5-1:2007 EN 61800-3:2004 + A1:2012 EN 60950-1:2006 EN 62311:2008
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- 4) According to the EMC directive, the products listed cannot be operated independently. Only if these products are integrated in a overall system can they be evaluated with reference to EMC guidelines. The evaluation only accounts for a typical system configuration and not for the individual product.
- 9) To the extent that the products are covered by this directive in the country of operation.

Bruchsal	26.09.2014
----------	------------

Place	Date	Johann Soder Managing Director for Technology a) b)
-------	------	--

a) Authorized representative for issuing this declaration on behalf of the manufacturer

b) Authorized representative for compiling the technical documents with an address identical to that of the manufacturer



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<b>Sales</b>	<b>Tallin</b>	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee
Finland			
<b>Assembly Sales Service</b>	<b>Hollola</b>	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
<b>Service</b>	<b>Hollola</b>	SEW-EURODRIVE OY Keskikankaantie 21 FIN-15860 Hollola	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
<b>Production Assembly</b>	<b>Karkkila</b>	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi
Gabon			
<b>Sales</b>	<b>Libreville</b>	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr
Great Britain			
<b>Assembly Sales Service</b>	<b>Normanton</b>	SEW-EURODRIVE Ltd. DeVilliers Way Trident Park Normanton West Yorkshire WF6 1GX	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	<b>Drive Service Hotline / 24 Hour Service</b>		Tel. 01924 896911
Greece			
<b>Sales</b>	<b>Athens</b>	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr
Hong Kong			
<b>Assembly Sales Service</b>	<b>Hong Kong</b>	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk
Hungary			
<b>Sales Service</b>	<b>Budapest</b>	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 http://www.sew-eurodrive.hu office@sew-eurodrive.hu

<b>India</b>			
<b>Registered Office Assembly Sales Service</b>	<b>Vadodara</b>	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 <a href="http://www.seweurodriveindia.com">http://www.seweurodriveindia.com</a> <a href="mailto:salesvadodara@seweurodriveindia.com">salesvadodara@seweurodriveindia.com</a>
<b>Assembly Sales Service</b>	<b>Chennai</b>	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 <a href="mailto:saleschennai@seweurodriveindia.com">saleschennai@seweurodriveindia.com</a>
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<b>Sales Service</b>	<b>Dublin</b>	Alpertor Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 <a href="mailto:info@alperton.ie">info@alperton.ie</a> <a href="http://www.alperton.ie">http://www.alperton.ie</a>
<b>Israel</b>			
<b>Sales</b>	<b>Tel-Aviv</b>	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 <a href="http://www.liraz-handasa.co.il">http://www.liraz-handasa.co.il</a> <a href="mailto:office@liraz-handasa.co.il">office@liraz-handasa.co.il</a>
<b>Italy</b>			
<b>Assembly Sales Service</b>	<b>Solaro</b>	SEW-EURODRIVE di R. Blicke & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 980 999 <a href="http://www.sew-eurodrive.it">http://www.sew-eurodrive.it</a> <a href="mailto:sewit@sew-eurodrive.it">sewit@sew-eurodrive.it</a>
<b>Ivory Coast</b>			
<b>Sales</b>	<b>Abidjan</b>	SICA Société Industrielle & Commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1173 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 <a href="mailto:sicamot@aviso.ci">sicamot@aviso.ci</a>
<b>Japan</b>			
<b>Assembly Sales Service</b>	<b>Iwata</b>	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 <a href="http://www.sew-eurodrive.co.jp">http://www.sew-eurodrive.co.jp</a> <a href="mailto:sewjapan@sew-eurodrive.co.jp">sewjapan@sew-eurodrive.co.jp</a>
<b>Kazakhstan</b>			
<b>Sales</b>	<b>Almaty</b>	TOO "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 <a href="http://www.sew-eurodrive.kz">http://www.sew-eurodrive.kz</a> <a href="mailto:sew@sew-eurodrive.kz">sew@sew-eurodrive.kz</a>
<b>Kenya</b>			
<b>Sales</b>	<b>Nairobi</b>	Barico Maintenances Ltd Kamutaga Place Commercial Street Industrial Area P.O.BOX 52217 - 00200 Nairobi	Tel. +254 20 6537094/5 Fax +254 20 6537096 <a href="mailto:info@barico.co.ke">info@barico.co.ke</a>
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<b>Sales</b>	<b>Riga</b>	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 <a href="http://www.alas-kuul.com">http://www.alas-kuul.com</a> <a href="mailto:info@alas-kuul.com">info@alas-kuul.com</a>
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<b>Sales Lebanon</b>	<b>Beirut</b>	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut After Sales Service	Tel. +961 1 510 532 Fax +961 1 494 971 <a href="mailto:ssacar@inco.com.lb">ssacar@inco.com.lb</a> <a href="mailto:service@medrives.com">service@medrives.com</a>

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<b>Lithuania</b>			
<b>Sales</b>	<b>Alytus</b>	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 irmantas@irseva.lt http://www.sew-eurodrive.lt
<b>Luxembourg</b>			
<b>Assembly Sales Service</b>	<b>Brussels</b>	<b>SEW-EURODRIVE n.v./s.a.</b> Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.lu info@sew-eurodrive.be
<b>Madagascar</b>			
<b>Sales</b>	<b>Antananarivo</b>	Ocean Trade BP21bis. Andraharo Antananarivo. 101 Madagascar	Tel. +261 20 2330303 Fax +261 20 2330330 oceantrabp@moov.mg
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<b>Assembly Sales Service</b>	<b>Quéretaro</b>	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
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<b>Sales</b>	<b>Ulan Bator</b>	SEW-EURODRIVE Representative Office Mongolia Olympic street 8, 2nd floor Juulchin corp bldg., Sukhbaatar district, Ulaanbaatar 14253	Tel. +976-70009997 Fax +976-70009997 http://www.sew-eurodrive.mn sew@sew-eurodrive.mn
<b>Morocco</b>			
<b>Sales Service</b>	<b>Mohammedia</b>	SEW-EURODRIVE SARL 2 bis, Rue Al Jahid 28810 Mohammedia	Tel. +212 523 32 27 80/81 Fax +212 523 32 27 89 sew@sew-eurodrive.ma http://www.sew-eurodrive.ma
<b>Namibia</b>			
<b>Sales</b>	<b>Swakopmund</b>	DB Mining & Industrial Services Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 sales@dbmining.in.na
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<b>Assembly Sales Service</b>	<b>Rotterdam</b>	SEW-EURODRIVE B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl

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	<b>Christchurch</b>	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 <a href="mailto:sales@sew-eurodrive.co.nz">sales@sew-eurodrive.co.nz</a>
<b>Nigeria</b>			
<b>Sales</b>	<b>Lagos</b>	EISNL Engineering Solutions and Drives Ltd Plot 9, Block A, Ikeja Industrial Estate ( Ogba Scheme) Adeniyi Jones St. End Off ACME Road, Ogba, Ikeja, Lagos Nigeria	Tel. +234 (0)1 217 4332 <a href="mailto:team.sew@eisnl.com">team.sew@eisnl.com</a> <a href="http://www.eisnl.com">http://www.eisnl.com</a>
<b>Norway</b>			
<b>Assembly Sales Service</b>	<b>Moss</b>	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 <a href="http://www.sew-eurodrive.no">http://www.sew-eurodrive.no</a> <a href="mailto:sew@sew-eurodrive.no">sew@sew-eurodrive.no</a>
<b>Pakistan</b>			
<b>Sales</b>	<b>Karachi</b>	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 <a href="mailto:seweurodrive@cyber.net.pk">seweurodrive@cyber.net.pk</a>
<b>Paraguay</b>			
<b>Sales</b>	<b>Fernando de la Mora</b>	SEW-EURODRIVE PARAGUAY S.R.L De la Victoria 112, Esquina nueva Asunción Departamento Central Fernando de la Mora, Barrio Bernardino	Tel. +595 991 519695 Fax +595 21 3285539 <a href="mailto:sew-py@sew-eurodrive.com.py">sew-py@sew-eurodrive.com.py</a>
<b>Peru</b>			
<b>Assembly Sales Service</b>	<b>Lima</b>	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 <a href="http://www.sew-eurodrive.com.pe">http://www.sew-eurodrive.com.pe</a> <a href="mailto:sewperu@sew-eurodrive.com.pe">sewperu@sew-eurodrive.com.pe</a>
<b>Poland</b>			
<b>Assembly Sales Service</b>	<b>Lodz</b>	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 49 <a href="http://www.sew-eurodrive.pl">http://www.sew-eurodrive.pl</a> <a href="mailto:sew@sew-eurodrive.pl">sew@sew-eurodrive.pl</a>
	<b>Service</b>	Tel. +48 42 6765332 / 42 6765343 Fax +48 42 6765346	Linia serwisowa Hotline 24H Tel. +48 602 739 739 (+48 602 SEW SEW) <a href="mailto:serwis@sew-eurodrive.pl">serwis@sew-eurodrive.pl</a>
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<b>Assembly Sales Service</b>	<b>Coimbra</b>	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 <a href="http://www.sew-eurodrive.pt">http://www.sew-eurodrive.pt</a> <a href="mailto:infosew@sew-eurodrive.pt">infosew@sew-eurodrive.pt</a>
<b>Romania</b>			
<b>Sales Service</b>	<b>Bucharest</b>	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 <a href="mailto:sialco@sialco.ro">sialco@sialco.ro</a>
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<b>Assembly Sales Service</b>	<b>St. Petersburg</b>	ZAO SEW-EURODRIVE P.O. Box 36 RUS-195220 St. Petersburg	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 <a href="http://www.sew-eurodrive.ru">http://www.sew-eurodrive.ru</a> <a href="mailto:sew@sew-eurodrive.ru">sew@sew-eurodrive.ru</a>



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Serbia			
<b>Sales</b>	<b>Beograd</b>	DIPAR d.o.o. Ustanicka 128a PC Košum, IV sprat SRB-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
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<b>Assembly Sales Service</b>	<b>Singapore</b>	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Slovakia			
<b>Sales</b>	<b>Bratislava</b>	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	<b>Žilina</b>	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	<b>Banská Bystrica</b>	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	<b>Košice</b>	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk
Slovenia			
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	<b>Cape Town</b>	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	<b>Durban</b>	SEW-EURODRIVE (PROPRIETARY) LIMITED 48 Prospecton Road Isipingo Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 902 3815 Fax +27 31 902 3826 cdejager@sew.co.za
	<b>Nelspruit</b>	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za



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<b>Assembly Sales Service</b>	<b>Ansan</b>	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate #1048-4, Shingil-Dong, Danwon-Gu, Ansan-City, Kyunggi-Do Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 <a href="http://www.sew-korea.co.kr">http://www.sew-korea.co.kr</a> <a href="mailto:master.korea@sew-eurodrive.com">master.korea@sew-eurodrive.com</a>
	<b>Busan</b>	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 <a href="mailto:master@sew-korea.co.kr">master@sew-korea.co.kr</a>
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<b>Swaziland</b>			
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<b>Assembly Sales Service</b>	<b>Basel</b>	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 <a href="http://www.imhof-sew.ch">http://www.imhof-sew.ch</a> <a href="mailto:info@imhof-sew.ch">info@imhof-sew.ch</a>
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<b>Thailand</b>			
<b>Assembly Sales Service</b>	<b>Chonburi</b>	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 <a href="mailto:sewthailand@sew-eurodrive.com">sewthailand@sew-eurodrive.com</a>
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<b>Turkey</b>			
<b>Assembly Sales Service</b>	<b>Kocaeli-Gebze</b>	SEW-EURODRIVE Sistemleri San. Ve TIC. Ltd. Sti Gebze Organize Sanayi Böl. 400 Sok No. 401 41480 Gebze Kocaeli	Tel. +90-262-9991000-04 Fax +90-262-9991009 <a href="http://www.sew-eurodrive.com.tr">http://www.sew-eurodrive.com.tr</a> <a href="mailto:sew@sew-eurodrive.com.tr">sew@sew-eurodrive.com.tr</a>
<b>Ukraine</b>			
<b>Assembly Sales Service</b>	<b>Dnipropetrovsk</b>	ООО «СЕВ-Евродрайв» ул.Рабочая, 23-В, офис 409 49008 Днепропетровск	Тел. +380 56 370 3211 Факс. +380 56 372 2078 <a href="http://www.sew-eurodrive.ua">http://www.sew-eurodrive.ua</a> <a href="mailto:sew@sew-eurodrive.ua">sew@sew-eurodrive.ua</a>
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<b>Sales Service</b>	<b>Sharjah</b>	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 <a href="mailto:copam_me@eim.ae">copam_me@eim.ae</a>

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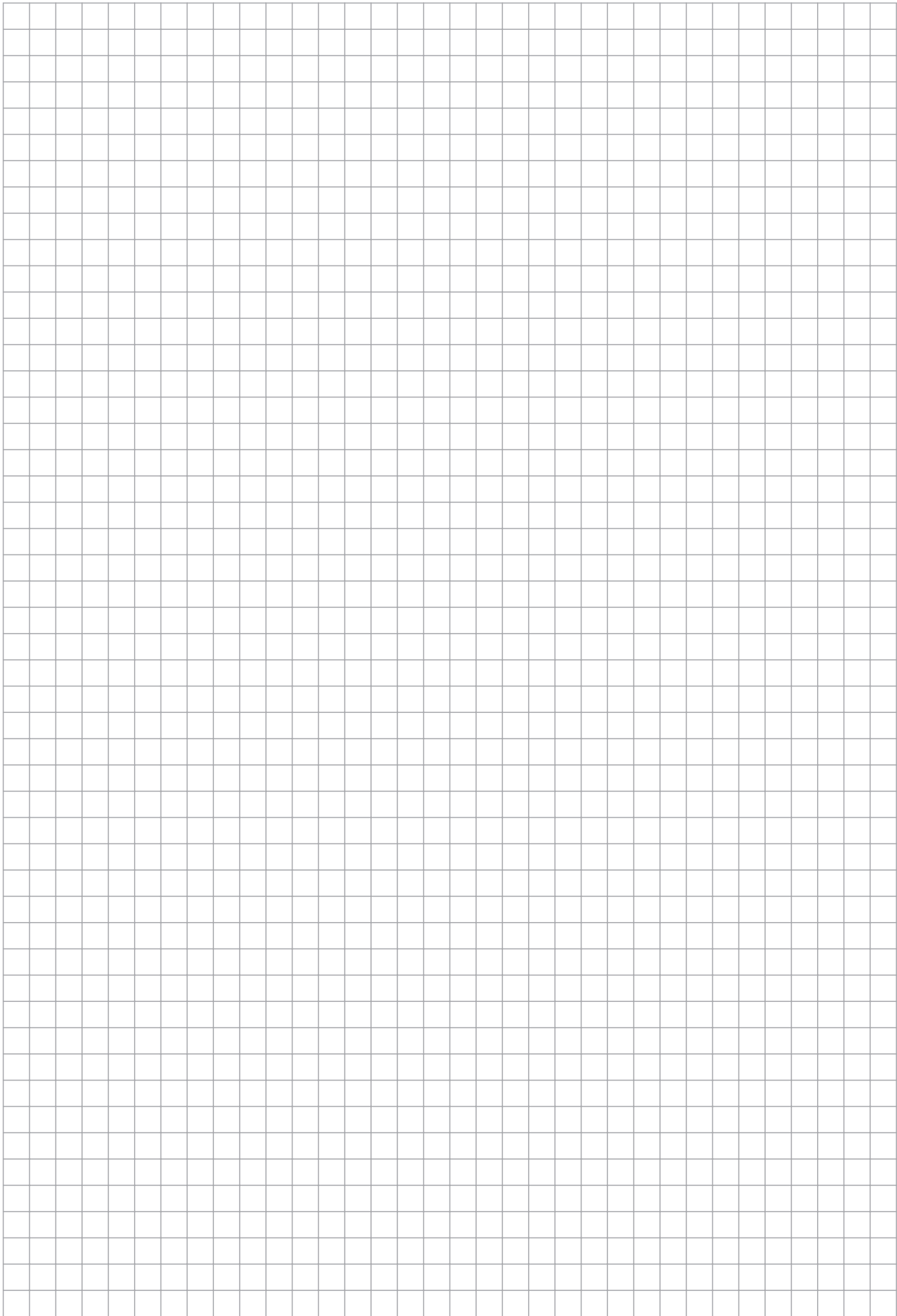
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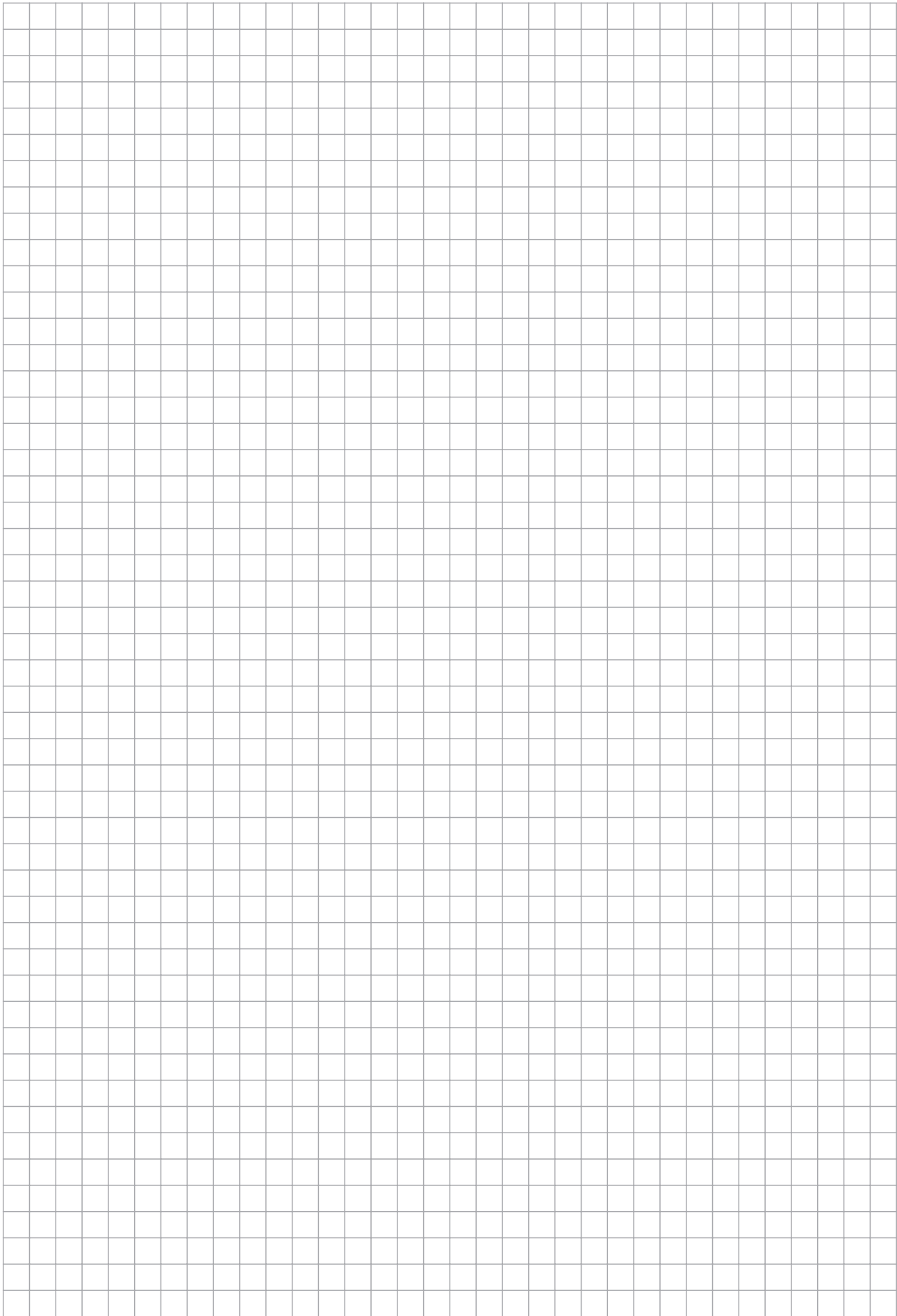
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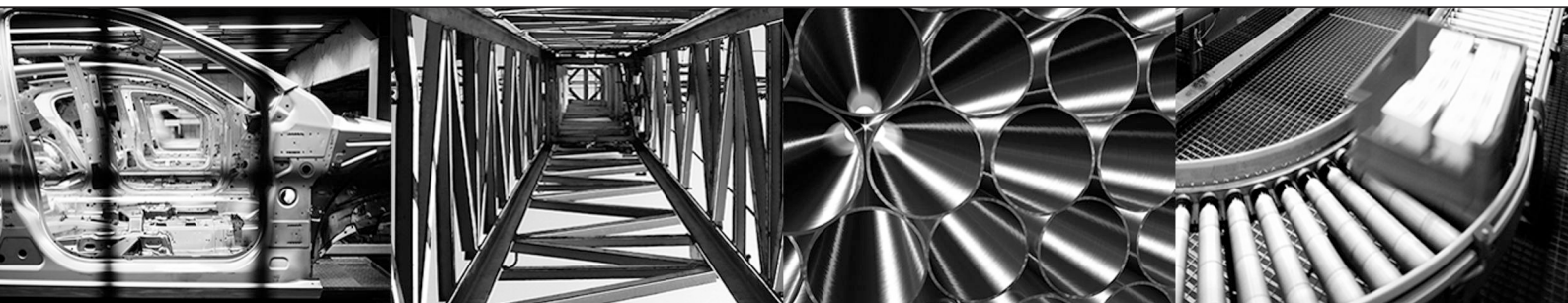














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