SEW EURODRIVE

Operating Instructions

Decentralized Drive and Application Controller
MOVIPRO® ADC

Edition 04/2016

22749055/EN

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1 General information

1.1 About this documentation

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

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

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

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

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

1.2.2 Structure of section-related safety notes

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

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

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

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Meaning of the hazard symbols

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

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

1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD** Type and source of hazard. Possible consequence(s) if disregarded. Measure(s) to prevent the hazard.

1.3 Rights to claim under limited warranty

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

1.4 Exclusion of liability

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

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1.5 Product names and trademarks

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

1.6 Copyright notice

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2 Safety notes

2.1 Preliminary information

The following basic safety notes must be read carefully to prevent injury to persons and damage to property.

The following safety notes primarily refer to the use of the devices described in this document. If you use other components from SEW-EURODRIVE, observe the safety notes specified in the documentation for the component.

Always observe the safety notes in the individual chapters of this documentation and the documentation of the other components from SEW-EURODRIVE.

2.2 Operator's duties

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 device independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

As operator, make sure that the following work is carried out only by qualified personnel:

- Transport
- Storage
- Setup and assembly
- Installation and connection
- Startup
- Maintenance and repair
- Shutdown
- Disassembly
- Waste disposal

Make sure that persons working on the device adhere to the following regulations, instructions, documents, and notes:

- National and regional safety and accident prevention regulations
- Warning and safety signs on the device
- All other associated project planning documents, installation and startup instructions, wiring and circuit diagrams
- Never install damaged products or take them into operation
- All system-specific requirements and regulations

Make sure that systems where the device is installed are equipped with additional monitoring and protection devices. Observe the applicable safety guidelines and laws governing technical equipment and accident prevention regulations.

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2.3 Target group

Specialist for mechanical work

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

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed)
- They are familiar with this documentation

Specialist for electrotechnical work

Any electronic work may only be performed by adequately skilled persons (electrically). Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and maintenance of the product, who possess the following qualifications:

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

In addition to that, they must be familiar with the applicable 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, label and ground devices, systems and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the instruction is that the persons are capable of performing the required tasks and work steps in a safe and correct manner.

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2.4 Designated use

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

In case of installation in electrical systems or machines, startup of the device is prohibited until it is determined that the machine meets the requirements stipulated in the Machinery Directive 2006/42/EC. Observe EN 60204-1 (Safety of machinery - electrical equipment of machines). Startup is only permitted under observance of the EMC Directive 2014/30/EU.

The device meets the requirements stipulated in the Low Voltage Directive 2014/35/EU. The standards included in the declaration of conformity are used for the device.

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

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

The systems can be mobile or stationary. The motors must be suitable for operation with frequency inverters. Do not connect any other loads to the device. Never connect capacitive loads to the device. The device can take on control and communication tasks.

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

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

2.4.1 Hoist applications

If the device is approved for designated use in lifting application, observe the requirements and restrictions to avoid the danger of fatal injury due to a falling hoist:

- Lifting applications can only be implemented with the device under the following conditions:
  - A hoist startup must be performed.
- The device is not designed for use as a safety device in lifting applications.

  Use monitoring systems or mechanical protection devices to ensure safety.

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2.5 Functional safety technology

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

2.6 Transport

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

Observe the following notes when transporting the device:

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

If necessary, use suitable, sufficiently dimensioned handling equipment.

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

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2.7 Installation/assembly

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

Protect the device from excessive mechanical 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.

Observe the notes in the chapter "Mechanical installation".

2.7.1 Restrictions of use

The following applications are prohibited unless explicitly permitted:

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

Devices 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 asl, the air and creeping distances are only sufficient for overvoltage class II according to EN 60664. If the installation requires overvoltage category III according to EN 60664 you have to reduce the overvoltages on the system side from category III to II using additional external overvoltage protection.
- If a protective electrical separation is required, then implement this outside the device at altitudes of more than 2000 m above sea level (protective separation in accordance with EN 61800-5-1 and EN 60204-1)

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2.8 Electrical connection

Make yourself familiar with the applicable national accident prevention guidelines before you work on a live device.

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

Make sure that all required covers are installed correctly after electrical installation.

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

2.8.1 Stationary application

Necessary protective measures for the device are:

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

2.9 Protective separation

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

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2.10 Startup/operation

Observe the safety notes in the chapters "Startup" and "Operation".

Make sure that the transport protection is removed.

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

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

When in doubt, switch off the device whenever changes occur in relation to normal operation. Possible changes are e.g. increased temperatures, noise, or oscillation. Determine the cause. Contact SEW-EURODRIVE if necessary.

Additional preventive measures may be required for applications with increased hazard potential. You have to check the protection devices each time you change the configuration.

Cover unused connections with the supplied protection caps during operation.

If you disconnect the device from the voltage supply, do not touch any live components or power connections because capacitors might still be charged. Adhere to a minimum switch-off time of 10 minutes. Observe the corresponding labels on the device.

When the device 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 device 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 device has been disconnected from the supply system and no longer carries any voltage.

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

2.11 Inspection/maintenance

It is essential that you observe the safety notes in chapter "Service".

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

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3 Device structure

3.1 Type designation

The type designation of the drive and application controller MOVIPRO® ADC **PHC2.A-A...M1-..1A-00/...** includes the following data:

PHC2.A	MOVIPRO® ADC drive and application controller	
-		
A	Energy supply: 3-phase current	
...	Rated input power:	
	022	2.2 kW
	040	4 kW
	075	7.5 kW
	110	11 kW
	150	15 kW
	220	22 kW
M1	1 integrated power section	
-		
..	Fieldbus:	
	P1	PROFIBUS DP V1
	D1	DeviceNet™
	E2	PROFINET IO
	E3	EtherNet/IP™, Modbus/TCP
1A	Control type: ADC	
-		
00/...	Device option:	
	00/S11	PROFIsafe option S11

3.2 Short designations

The following short designations are used in this documentation:

Type designation	Power rating	Short designation
PHC21A-A022M1-..1A-00/...	2.2 kW	Device
PHC21A-A040M1-..1A-00/...	4 kW	
PHC21A-A075M1-..1A-00/...	7.5 kW	
PHC22A-A110M1-..1A-00/...	11 kW	
PHC22A-A150M1-..1A-00/...	15 kW	
PHC22A-A220M1-..1A-00/...	22 kW	

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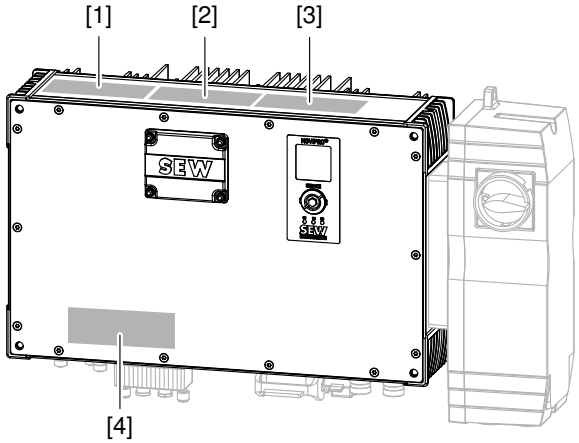
3.3 Scope of delivery

The following components are included in the delivery:

Component	Part number
MOVIPRO® PHC2.A-A...M1-..1A-00/... drive and application controller	–
Grounding kit	12704628
Jumper plug (**not** for devices with PROFIsafe option S11)	11747099
Installed fan assembly (**only** for 15 and 22 kW devices)	12709700

3.4 Overview of labels on the device

There are several labels attached to one device:



9789695243

[1] Main nameplate
[2] Nameplate of function units
[3] SEW-EURODRIVE service information
[4] Connection block label

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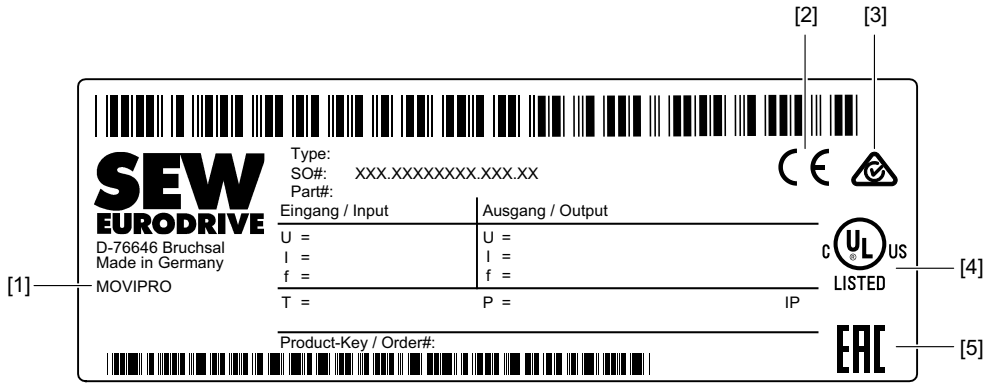
3.4.1 Main nameplate

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



99079193008252939

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

Depending on device design the following information are listed on the main nameplate:

Value	Specification
Type	Type designation
SO#	Production number
Part#	Part number (for customer-specific devices)
U	Voltage
I	Current
f	Frequency
T	Ambient temperature
P	Rated output power
IP	Degree of protection
Product key	Product key (optional)
Order#	Purchase order number for country variant (for customer-specific devices)

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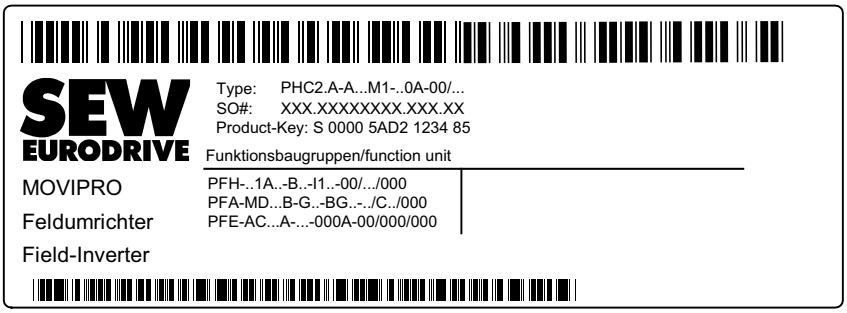
3.4.2 Nameplate of function units

The nameplate contains information on the device's function units. For more information on function units, refer to chapters "Type designations of the function units" (→ 🗎 22) and "Function units" (→ 🗎 32). The following figure shows an example of a nameplate of function units:



2816336907

Type designation of the function unit	Designation
PFH-...	Communication and control unit
PFA-MD...	Power section
PFE-AC...	Energy supply

3.5 Type designations of the function units

3.5.1 Power section

The type designation **PFA-MD...B-G..-B..-../C../000** of the power section contains the following data:

PFA-MD	Internal axis on MOVIDRIVE® basis	
...B	Axis type:	
	022B	2.2 kW
	040B	4 kW
	075B	7.5 kW
	110B	11 kW
	150B	15 kW
	220B	22 kW
-		

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G..	Encoder interface:	
	G00	Without encoder interface
	G10	Motor encoder resolver Without distance encoder
	G20	Motor encoder HIPERFACE®, sin/cos, HTL, TTL, RS422 Without distance encoder
	G21	Motor encoder HIPERFACE®, sin/cos, HTL, TTL, RS422 Distance encoder CANopen
	G22	Motor encoder HIPERFACE®, sin/cos, HTL, TTL, RS422 Distance encoder SSI, HIPERFACE®, sin/cos, HTL, TTL, RS422
-		
B.	Brake control:	
	BG	Standard brake control
	BS	Brake control with safety-related brake module
..	Brake voltage:	
	02	DC 24 V
	23	AC 230 V
	40	AC 400 V
	46	AC 460 V
-		
..	Axis connections:	
	11	1 standard motor output with STO interface and 4 axis inputs to 2 × M12
	15	1 standard motor output with STO interface, 2 axis inputs and 1 analog input to 2 × M12
/		
C../000	Cooling:	
	C01/000	Standard without fan subassembly
	C02/000	Standard with fan subassembly

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3.5.2 Communication and control unit

The type designation **PFH-..1A..-B..-I1..-00/.../000** of the communication and control unit contains the following data:

PFH	Control/communication	
-		
..	Fieldbus:	
	P1	PROFIBUS DP V1
	D1	DeviceNet™
	E2	PROFINET IO
	E3	EtherNet/IP™/Modbus/TCP
1A	Control type: ADC	
H	SD memory card OMH for parameterizable and programmable functions	
.	Technology level	
	0	OMH41B-T0
	1	OMH41B-T1
	2	OMH41B-T2
	3	OMH41B-T3
	4	OMH41B-T4
-		
B..	Fieldbus interface:	
	B11	PROFIBUS, bus module 2 × M12
	B12	DeviceNet™, bus module 2 × M12
	B53	Ethernet, 2 × M12
	B63	Ethernet, 2 × Push-Pull RJ45
	B64	Ethernet, 2 × Push-Pull SCRJ
-		
I1	12 digital inputs and 4 digital inputs/outputs	

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..	Communication package:	
	00	Without communication package
	01	SBus^{PLUS} interface CAN interface – external (electrically isolated) RS485 interface – external (electrically isolated)
	02	SBus^{PLUS} interface CAN interface – external (electrically isolated) S485 interface – external (with DC 24 V)
	03	SBus^{PLUS} interface CAN interface – external (with DC 24 V) RS485 interface – external (with DC 24 V)
	04	SBus^{PLUS} interface CAN interface – external (with DC 24 V) RS485 interface – external (electrically isolated)
	06	Ethernet engineering interface CAN interface – external (with DC 24 V) RS485 interface – external (with DC 24 V)
	10	MOVISAFE® safety bus interface CAN interface – external (electrically isolated) CAN interface – system bus (with DC 24 V)
	11	MOVISAFE® safety bus interface RS485 interface – external (electrically isolated) CAN interface – system bus (with DC 24 V)
	12	Ethernet engineering interface CAN interface – external (electrically isolated) RS485 interface – external (electrically isolated)
-		
00/.../000	Option:	
	00/000/000	Without option 1
	00/ S11/000	PROFIsafe option S11

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3.5.3 Energy supply

The type designation **PFE-AC...A-...-000A-00/...000** of the energy supply includes the following data:

PFE	Energy	
-		
AC...A	3-phase alternating current with the following maximum input power:	
	080	8 kW for 2.2 kW, 4 kW, 7.5 kW devices
	160	16 kW for 11 kW, 15 kW devices
	300	30 kW only 22 kW devices
-		
...	Supply connection:	
	001	Connection cable 2.2 kW, 4 kW, 7.5 kW
	002	Connection cable 11 kW, 15 kW, 22 kW
	101	Interface box 2.2 kW, 4 kW, 7.5 kW
	102	Interface box 11 kW, 15 kW, 22 kW
-		
000A	Without extra-low-voltage supply for external components	
-		
00/...	Energy management:	
	00/000	Without energy management
	00/ R15	Regenerative power supply module
	00/ E42	Connection for external energy management components
000	Without option	

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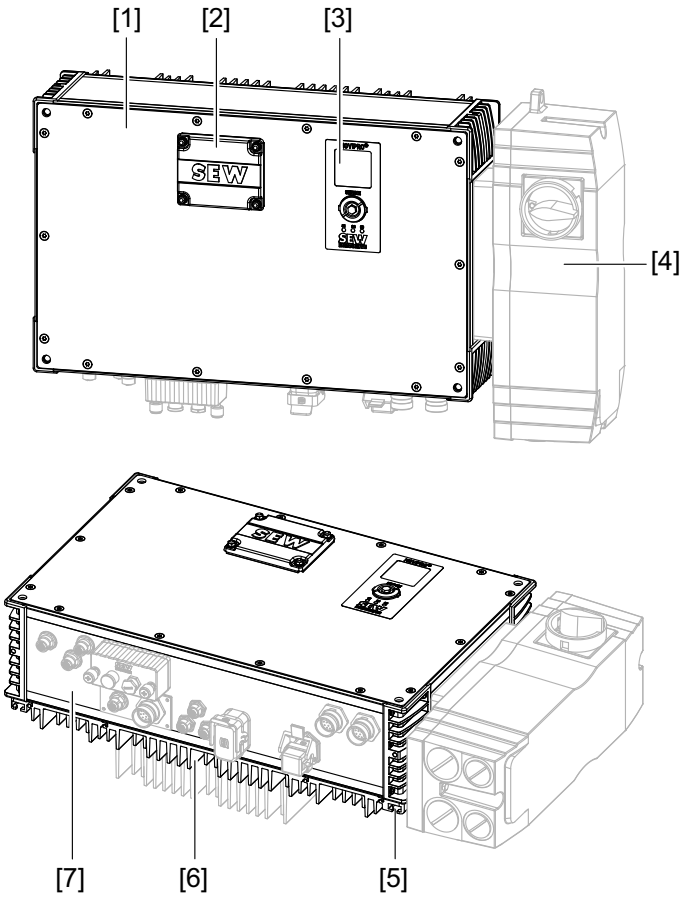
3.6 Device overview

3.6.1 2.2 kW, 4 kW, 7.5 kW

The following figures show the device structure:



9007201903278475

[1] Device cover
[2] Memory card cover
[3] Service unit
[4] Interface box (optional)
[5] T-slot profile
[6] Cooling fins
[7] Connection block (connections depend on the device design)

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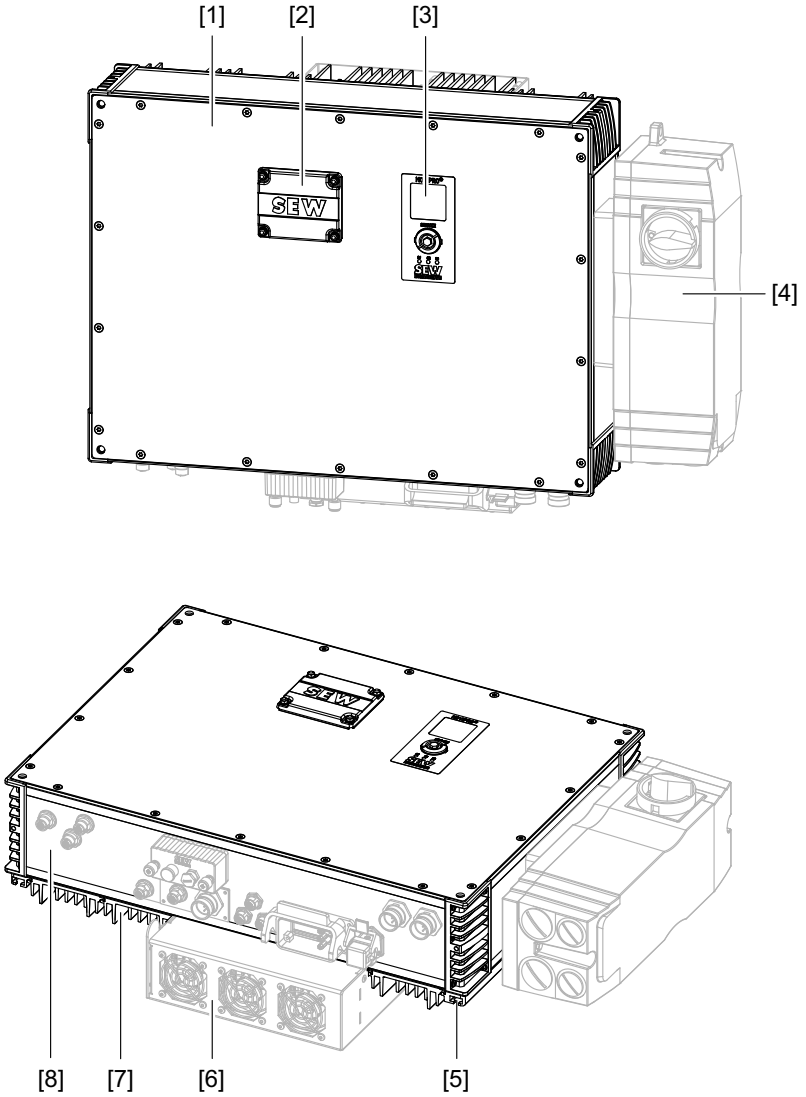
3.6.2 11 kW, 15 kW, 22 kW

The following figures show the device structure:



9007201915563659

[1] Device cover
[2] Memory card cover
[3] Service unit
[4] Interface box (optional)
[5] T-slot profile
[6] Fan subassembly (optional for 11 kW, mandatory for 15 kW and 22 kW)
[7] Cooling fins
[8] Connection block (connections depend on the device design)

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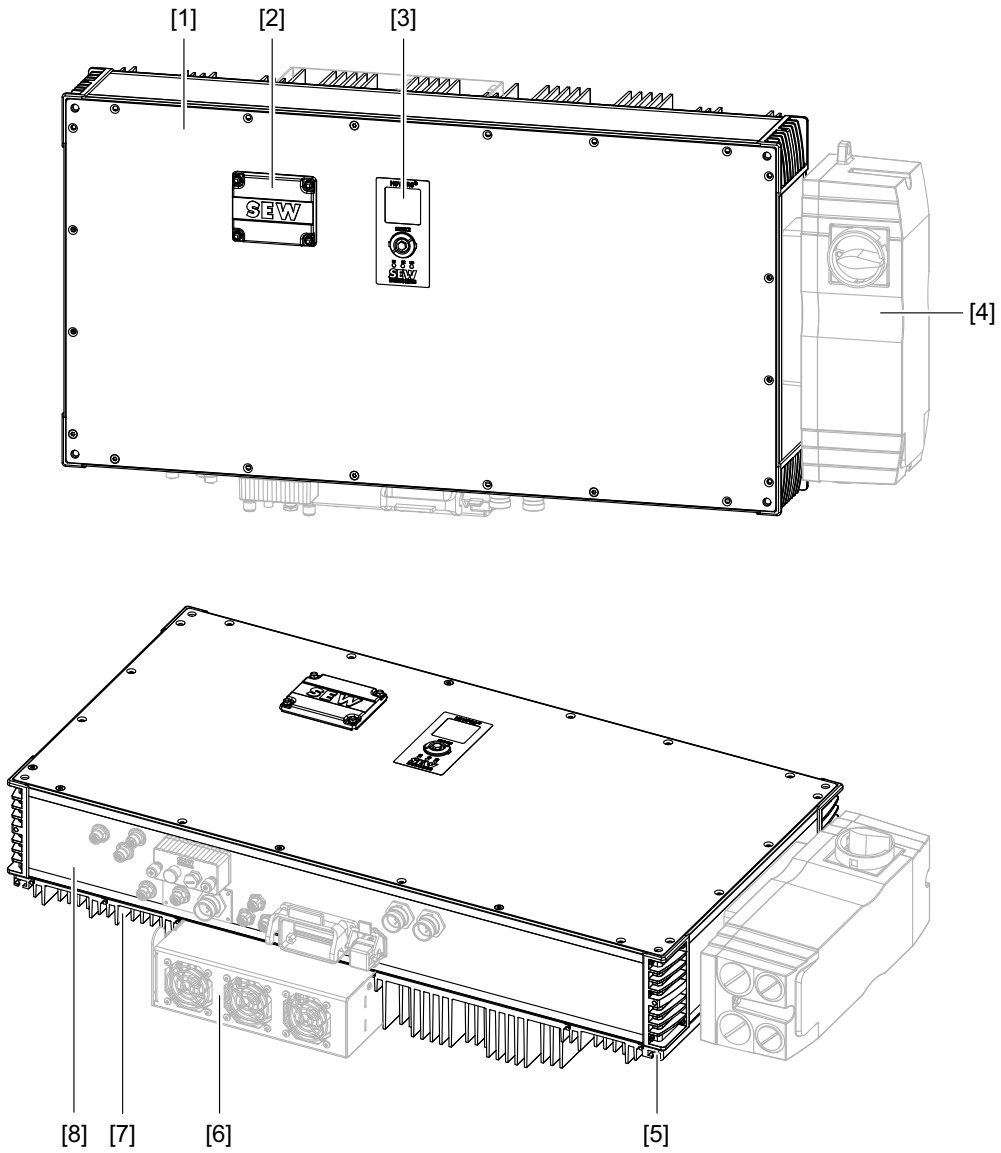
11 kW, 15 kW with R15 regenerative power supply module

The following figure shows the structure of device with R15 regenerative power supply module:



18014402037488011

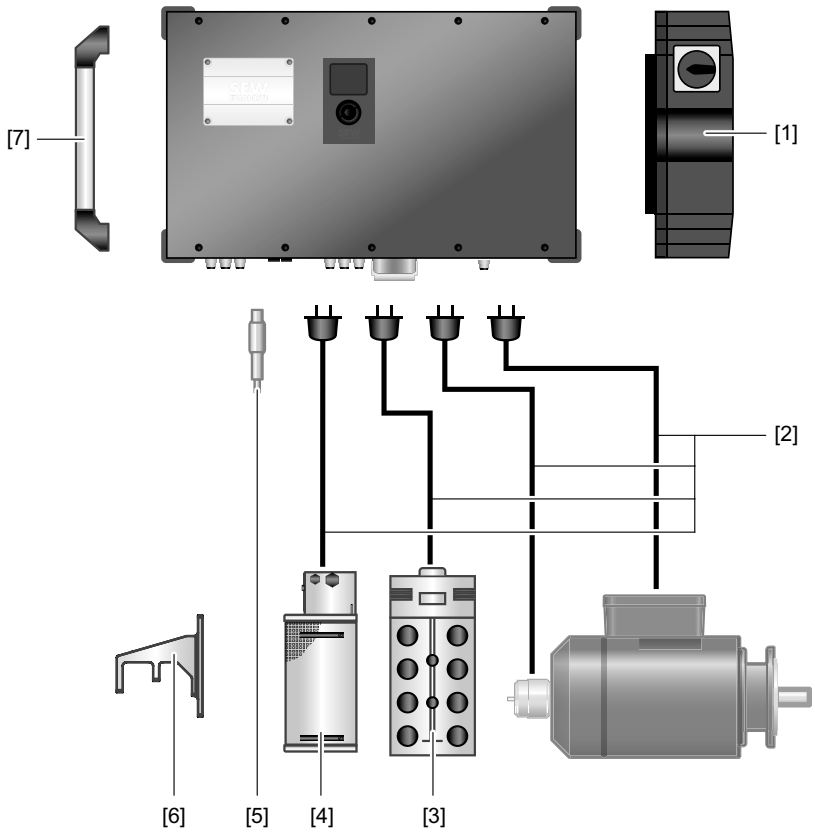
[1] Device cover
[2] Memory card cover
[3] Service unit
[4] Interface box (optional)
[5] T-slot profile
[6] Fan subassembly
[7] Cooling fins
[8] Connection block (connections depend on the device design)

3.7 Accessories

INFORMATION

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

3.7.1 Overview



27021598963130763

[1] Interface box
[2] Connection cable
[3] Sensor/actuator box
[4] Braking resistor
[5] Jumper plug
[6] Mounting brackets
[7] Handles

3.7.2 Accessory components

The following accessories are available depending on the device design. For further information, refer to the following documentation: "MOVIPRO® Accessories" addendum to the operating instructions. If you are not sure which accessories you need, the SEW-EURODRIVE staff will be glad to help you with your selection.

	Part number
Interface boxes For further information, refer to chapter "Electrical connections" (→ 🗎 75).	

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	Part number
PZM2xA-A075-D02-00	18250149
PZM2xA-A150-D03-00	18250157
PZM2xA-A022-M13-00	18250238
PZM2xA-A040-M14-00	18250165
PZM2xA-A075-M16-00	18250173
Connection cable Refer to the corresponding connections in the "Electrical connections" (→ 🗎 75) chapter for information on connection cables for motors, encoders, braking resistors, etc.	
Sensor/actuator boxes For further information, refer to chapter "Electrical connections" (→ 🗎 75).	
Sensor/actuator box 1 m (4 connections)	18255477
Sensor/actuator box 3 m (4 connections)	18255485
Sensor/actuator box 1 m (8 connections)	13309269
Sensor/actuator box 2 m (8 connections)	13309277
Sensor/actuator box 3 m (8 connections)	13309285
Sensor/actuator box 5 m (8 connections)	13309293
Sensor/actuator box 10 m (8 connections)	13309307
Braking resistors For further information, refer to chapter "Technical data" (→ 🗎 205).	
BW100-004-00 (including mounted connection cable 1.5 m) size 0	17962188
BW050-008-01 size 1	17962242
BW033-012-01 size 1	17962196
BW017-024-02 size 2	17962218
BW014-028-02 size 2	17962226
Mounting accessories For further information, refer to chapter "Mechanical installation" (→ 🗎 48).	
Mounting accessories for braking resistors	
Mounting bracket kit, BW only in sizes 1 and 2	18229689
STO jumper plug	11747099
Mounting kit with large mounting brackets (4 pieces)	12708305
Handle option 270	18222781
Handle option 390	18222803
Fan subassembly	
Fan subassembly	12709700

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3.8 Function units

3.8.1 Power section

The function module consists of the following internal elements.

Frequency inverter on MOVIDRIVE® basis

The basic design of the frequency inverter controls asynchronous motors. Option cards for the frequency inverter allow for controlling various motor types.

The following power ratings are available:

Power rating	Function unit
2.2 kW	PFA-MD022B-G..-B...-../C../000
4 kW	PFA-MD040B-G..-B...-../C../000
7.5 kW	PFA-MD075B-G..-B...-../C../000
11 kW	PFA-MD110B-G..-B...-../C../000
15 kW	PFA-MD150B-G..-B...-../C../000
22 kW	PFA-MD220B-G..-B...-../C../000

Encoder evaluation option

Encoder evaluation enables the drive inverter to control different motor types, such as synchronous servomotors.

The following encoder combinations are possible:

Encoder		Function unit
Motor	Track	
None	None	PFA-MD...B-G00-B...-../C../000
Resolver	None	PFA-MD...B-G10-B...-../C../000
HIPERFACE®, sin/cos, HTL, TTL, RS422	None	PFA-MD...B-G20-B...-../C../000
	CANopen	PFA-MD...B-G21-B...-../C../000
	SSI, HIPERFACE®	PFA-MD...B-G22-B...-../C../000

Supported encoders

Motor encoder

You can use the following motor encoders with this device:

Resolver

		Company
RH1M	Built-in encoder, resolver	SEW-EURODRIVE
RH1L		

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Incremental encoder

		Company
EG7S	Add-on encoder, sin/cos	SEW-EURODRIVE
EG7R	Add-on encoder, RS422	
EG7C	Add-on encoder, TTL to HTL	
EH1C	Add-on encoder, HTL	
EH1S	Add-on encoder, sin/cos	
EH1R	Add-on encoder, TTL (RS422)	
EI7S	Built-in encoder, sin/cos	
EI7C / EI71 / EI72 / EI76	Built-in encoder, HTL	
ES7S	Add-on encoder, sin/cos	
ES7R	Add-on encoder, TTL (RS422)	
ES7C	Add-on encoder, TTL to HTL	
ES1S/ES2S	Add-on encoder, sin/cos	
ES1R/ES2R	Add-on encoder, TTL (RS422)	
ES1C/ES2C	Add-on encoder, HTL	
EV1S	Add-on encoder, sin/cos	
EV1R	Add-on encoder, TTL (RS422)	
EV1C	Add-on encoder, HTL	

Depending on the device design, the device also supports incremental encoders with resolver, TTL, HTL, RS422 and sin/cos signals.

Absolute encoder

Asynchronous motors		**Company**
AS3H/AS4H	Add-on encoder, sin/cos	SEW-EURODRIVE
AS7W	Add-on encoder, RS422	
AG7W	Add-on encoder, TTL to HTL	
AS7Y	Add-on encoder, HTL	
AG7Y	Add-on encoder, sin/cos	
AV1H	Add-on encoder, TTL (RS422)	
AV6H	Built-in encoder, sin/cos	

Synchronous motors		**Company**
AK0H	Built-in encoder, (HIPERFACE®, multi-turn), sin/cos	SEW-EURODRIVE
AK1H		
AS1H		
EK0H	Built-in encoder, (HIPERFACE®, single-turn), sin/cos	
EK1H		
ES1H		

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Distance encoder

Depending on the device design, the device also supports incremental encoders with resolver, TTL, HTL, RS422 and sin/cos signals.

You can use the following distance encoders with this device:

SSI

		Company
AH7Y	Rotary encoder	SEW-EURODRIVE
AG7Y		
AS7Y		
AV1Y		
AV2Y		
DME3000-x11	Laser distance measuring device	Sick/Stegmann
DME4000-x11 0,1 mm		
DME4000-x11 1 mm		
DME5000-x11 0,1 mm		
DME5000-x11 1 mm		
AG100 MSSI	Rotary encoder	
AG626		
ARS60		
ATM60		
ATM90		
POMUX KH53	Linear distance sensor	
BPS37	Barcode measuring system	Leuze-electronic
OMS1 0.1 mm	Laser distance measuring device	
OMS1 1 mm		
OMS2 0.1 mm		
AMS200		
BTL5-S112-M1500-P-S32	Linear distance sensor	Balluff
BTL5-S112-M1500-P-S32		
TR CE58M	Rotary encoder	TR-Electronic
TR CE65M		
TR LA41K	Linear distance sensor	
TR LE100 0.1 mm	Laser distance measuring device	
TR LE100 1 mm		
TR LE200 0.1 mm		

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		Company
WCS2A-LS311	Barcode distance sensor	Pepperl & Fuchs
WCS2A-LS311		
WCS3B-LS311		
EDM	Laser distance measuring device	
VDM100-150 0.1 mm		
VDM100-150 1 mm		
GM 401	Rotary encoder	IVO
Kueb 9081xxxx2003	Rotary encoder	Fritz Kübler
Kueb 9081xxxx2004		
LIMAX2	Linear distance sensor	Elgo
RP 0,005 mm	Linear distance sensor	MTS Sensors
RH 0,005 mm		
RF 0,005 mm		
RD4 0,005 mm		
MSA1000	Linear distance sensor	SIKO

SSI combination encoder

		Company
AVM58X-1212	Rotary encoder	Pepperl & Fuchs
HMG161 S24 H2048	Rotary encoder	Hübner
AMG73 S24 S2048		
AMG83 S24 S2048		
ROQ424	Rotary encoder	Heidenhain

HIPERFACE®

		Company
DME4000-x17	Laser distance measuring device	Sick / Stegmann
DME5000-x17		
SKM36	Rotary encoder	
SKS36		
SRM50		
SRM60		
SRM64		
SRS50		
SRS64		
LinCoder L230	Linear distance sensor	

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CANopen

		Company
DME4000-x19 0.1 mm	Laser distance measuring device	Sick
DME4000-x19 1 mm		
TR CE58M	Rotary encoder	TR-Electronic
TR LE200	Laser distance measuring device	
WCS3B-LS410	Barcode distance sensor	Pepperl & Fuchs

EnDaT

		Company
ECN113	Rotary encoder	Heidenhain
ECN1313		
EQN1125		
EQN1325		
EQN425		

Brake control

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

Brake voltages	Function unit
DC 24 V	PFA-MD...B-G..-B**G02**-../C../000
AC 230 V	PFA-MD...B-G..-B**G23**-../C../000
AC 400 V	PFA-MD...B-G..-B**G40**-../C../000
AC 460 V	PFA-MD...B-G..-B**G46**-../C../000

Safety-related brake module

The safety-related brake module offers the safety function Safe Brake Control (SBC). SBC is possible for the following brake voltages:

Brake voltages	Function unit
AC 230 V	PFA-MD...B-G..-B**S23**-../C../000
AC 400 V	PFA-MD...B-G..-B**S40**-../C../000
AC 460 V	PFA-MD...B-G..-B**S46**-../C../000

INFORMATION

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

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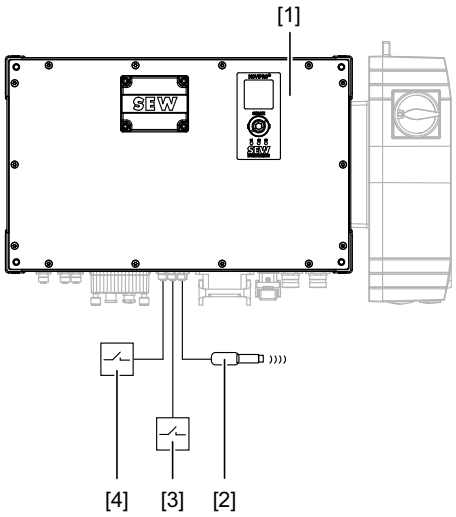
Axis inputs

The axis inputs can be used to connect sensors and actuators.

Depending on the device design, the device has the following axis inputs:

Inputs	Function unit
4 digital axis inputs	PFA-MD...B-G..-B...-**11**/C../000
2 digital axis inputs and 1 analog axis input	PFA-MD...B-G..-B...-**15**/C../000

The following figure shows an example of a connection of sensors and actuators to the axis inputs:



15144664459

[1] Device
[2] Inductive sensor
[3]+[4] Switch

Motor types

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

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

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3.8.2 Communication and control unit

The function module consists of the following internal elements.

Controller type

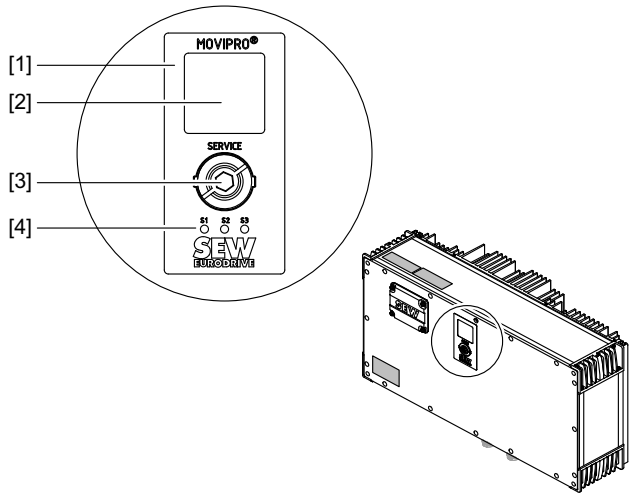
The engineering of the communication and control unit comprises the following activities:

- Configuration
- Parameterization
- Programming with application solutions from SEW-EURODRIVE

These activities are carried out using the MOVITOOLS® MotionStudio engineering software. The software enables startup and fault diagnostics for all devices from SEW-EURODRIVE. The device is connected to the engineering computer via the Ethernet service interface.

Service unit

The service unit is used for startup, diagnostics and maintenance of the device. It is equipped with a status display and an Ethernet service interface. The following figure shows the service unit:



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[1] Service unit
[2] Status display
[3] Ethernet service interface (Ethernet RJ45)
[4] Status LEDs

INFORMATION

SEW-EURODRIVE recommends using an Ethernet cable with extended locking device (e.g. from Harting).

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Status display and status LED

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

For further information, refer to sections "Operation" > "Status and error messages" (→ 🗎 169) and "Service" > "Status LEDs" (→ 🗎 173) and the following documentation: "MOVIPRO® ADC with PROFINET Interface" manual.

Ethernet service interface

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

Tools required

Wrench with wrench size 8

Required material

Ethernet cables with RJ45 plug connectors

Connecting the engineering PC with the Ethernet service interface

1. Remove the screw plug using the wrench.
2. Plug an RJ45 plug connector of the Ethernet cable into the Ethernet service interface.
3. Plug the other RJ45 plug connector of the Ethernet cable into the Ethernet service interface of the engineering PC.

Addresses

- Standard IP address: 192.168.10.4
- Subnet mask: 255.255.255.0

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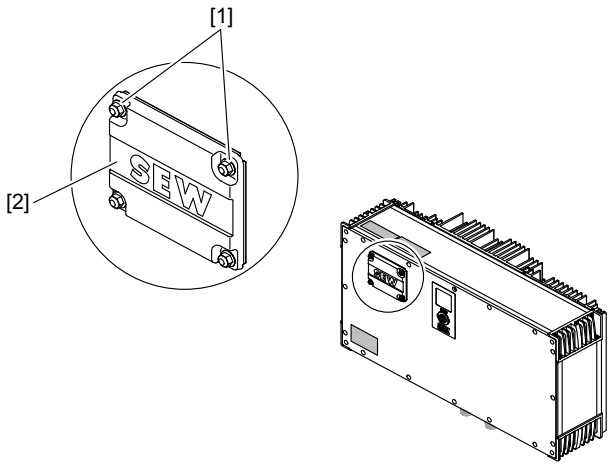
SD memory card

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

The following figure shows the memory card cover:



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

Tools required

Wrench with wrench size 7

Removing the memory card cover

1. Loosen the 4 retaining nuts using a wrench.
2. Remove the memory card cover.

Fieldbus interface

Depending on the design, one of the following fieldbus interfaces is available:

Fieldbus	Function unit
PROFIBUS	PFH-P11A..-B11-I10.-00/.../000
PROFINET	PFH-E21A..-B53-I10.-00/.../000
	PFH-E21A..-B63-I10.-00/.../000
	PFH-E21A..-B64-I10.-00/.../000
EtherNet/IP™, Modbus/TCP	PFH-E31A..-B53-I10.-00/.../000
	PFH-E31A..-B63-I10.-00/.../000
DeviceNet™	PFH-D11A..-B12-I10.-00/.../000

The fieldbus interfaces have plug connectors. For more information on the plug connectors, refer to the chapter "Electrical connections" (→ 🗎 75).

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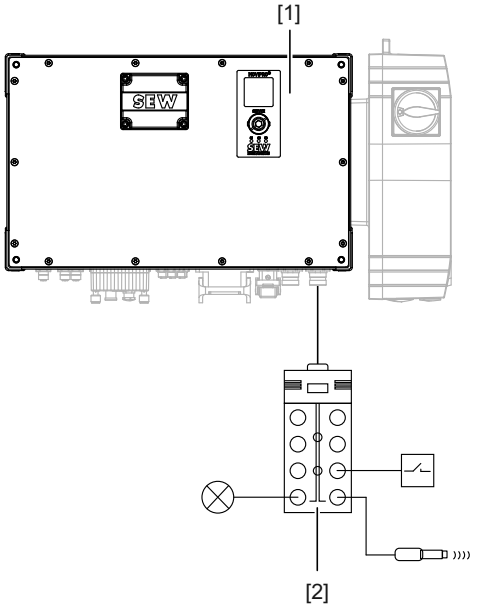
Digital inputs and outputs

The device has connections for digital inputs or outputs. You connect the sensors and actuators required for your application to the digital inputs and outputs.

To connect several sensors and actuators to the device at the same time, use the sensor/actuator box which is available as an accessory. Further information can be found in the chapter "Accessories" (→ 🗎 30).

The following figure shows an example of an sensor/actuator box connection:



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[1] Device
[2] Sensor/actuator box with M23 connector and M12 connections, e.g. for:

- Switch
- Inductive sensors
- Light barriers
- Indicator lights etc.

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Communication packages

The additional communication packages let you integrate external components into your overall application.

The device includes the following communication packages depending on the design:

Packages	Interfaces		
Package 0	Without additional interfaces		
Package 1	SBus[PLUS] interface	CAN interface – external (electrically isolated)	RS485 interface – external (electrically isolated)
Package 2	SBus[PLUS] interface	CAN interface – external (electrically isolated)	RS485 interface – external (with DC 24 V)
Package 3	SBus[PLUS] interface	CAN interface – external (with DC 24 V)	RS485 interface – external (with DC 24 V)
Package 4	SBus[PLUS] interface	CAN interface – external (with DC 24 V)	RS485 interface – external (electrically isolated)
Package 6	Ethernet engineering interface	CAN interface – external (with DC 24 V)	RS485 interface – external (with DC 24 V)
Package 10	MOVISAFE® safety bus interface	CAN interface – external (electrically isolated)	CAN interface – system bus (with DC 24 V)
Package 11	MOVISAFE® safety bus interface	RS485 interface (electrically isolated)	CAN interface – system bus (with DC 24 V)
Package 12	Ethernet engineering interface	CAN interface – external (electrically isolated)	RS485 interface (electrically isolated)

CAN interface types

Depending on the device design, one of the following CAN interfaces is available:

CAN interface – external	
Variant 1	• Electrically isolated • Without DC 24 V • For communication connection of SEW components (slave, such as MOVIGEAR®)
Variant 2	• Electrically coupled • With DC 24 V • For connecting sensors (e.g. RFID readers, barcode scanners)

CAN interface – system bus
• Electrically coupled • With DC 24 V • To connect system bus components

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RS485 interface types

Depending on the device design, one of the following RS485 interfaces is available:

RS485 interface – external	
Variant 1	• Electrically isolated • Without DC 24 V • For communication connection of SEW components (Slave, such as MOVIMOT®)
Variant 2	• Electrically coupled • With DC 24 V • For connecting sensors (e.g. RFID readers, barcode scanners)

Ethernet engineering interface

Depending on the device type, it comes equipped with an Ethernet engineering interface for connection to an Ethernet node, e.g. DOP or an engineering PC. The Ethernet engineering interface corresponds to the Ethernet service interface of the service unit. However, the Ethernet engineering interface can be used for permanent IP65 connection of Ethernet nodes.

MOVISAFE® safety bus interface

Depending on the device design, it comes equipped with a MOVISAFE® safety bus interface for connection to a MOVISAFE® safety module UCS..B.

3.8.3 Energy supply

The function unit consists of the following internal elements.

Line filter

Energy is supplied to the device via a three-phase alternating current supply system and a line filter. The line filter supplies the DC link voltage. The line filter on the supply system end complies with limit class C2 to EN 61800-3 without further measures.

Regenerative power supply module

The regenerative power supply module allows for regenerative energy to be fed back into the grid.

For further information, refer to chapter "Project planning for devices with R15 regenerative power supply module" (→ 🗎 46).

Energy management interface

Components e.g. for energy storage can be connected using the energy management interface. For further information, refer to the following documentation: "Addendum to the Operating Instructions – Decentralized MOVIPRO® ADC Drive and Application Controller with Energy Management Interface".

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4 Integrated safety technology

⚠ WARNING

Incorrect startup of the device.

Severe or fatal injuries if the safety components fail.

- Only use the device in combination with functional safety technology if you have read the "MOVIPRO® Functional Safety" manual and you all requirements for operation are fulfilled.

4.1 Standards

The safety technology of the device 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 with the basic device:

- STO (Safe Torque Off):

  Safe Torque Off according to EN 61800-5-2:2007
- SS1(c) (Safe Stop 1):

  Safe Stop 1, function variant c according to EN 61800-5-2:2007

4.2.1 Additional safety function

Depending on the device configuration, additional drive-related safety functions can be used:

- SBC (Safe Brake Control):

  Safe brake control according to EN 61800-5-2:2007

Refer to the type designation of the "power section" function unit to find out if your device is configured for this:

Type designation "power section" function unit	Device configured
PFA-MD...B-G..-**BS**.-../C../000	Yes
PFA-MD...B-G..-**BG**-.../C../000	No

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4.3 Safety concept

You can realize the safety concept "Axis module with safe torque off" with the basic device.

4.3.1 Additional safety concepts

Depending on the device configuration, additional safety concepts can be realized.

Safety-related brake module

Refer to the type designation of the "power section" function unit to find out if your device is configured for this:

Type designation "power section" function unit	Device configured
PFA-MD...B-G..-**BS**.-../C../000	Yes
PFA-MD...B-G..-**BG**-.../C../000	No

PROFIsafe option S11

Refer to the type designation of the device to find out if your device is configured for this:

Type designation	Device configured
PHC2.A-A...M1-...A-00/**S11**	Yes
PHC2.A-A...M1-...A-00/**000**	No

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5 Project planning for devices with R15 regenerative power supply module

5.1 Supply system requirements

Devices with regenerative power supply modules require a stable supply system with sufficient capacity. The following tables describe the requirements regarding the supply system (required transformer power) based on the cable length from the transformer to the device.

- We presume a short-circuit voltage (U_k) of the transformer of 6%.
- Observe the following if you use several devices with regenerative power supply module at one transformer:

  For dimensioning the required transformer power, consider the number of simultaneously enabled devices.

  Example:

  – 5 devices with regenerative power supply module and 50 m supply system cable each

  – A maximum of 3 regenerative power supply modules are enabled at the same time

  – 3 × 45 kVA = 135 kVA required transformer power
- Choose the cable cross sections according to the device power and not according to the mean expected power. Note that smaller cable cross sections and long supply cables can cause increased voltage for other supply system participants.

5.2 Installation

A star-type wiring from the power supply to the devices is ideal for installation of devices with regenerative power supply module.

Line topology is also possible. In this case, no more than 3 devices should be connected in series.

The transformer power is calculated as follows:

Transformer power = Supply system cable length$_{max}$ device × Number of enabled devices

Required transformer power (kVA)			
Line length in m	**400 V/50 Hz**	**480 V/60 Hz**	**500 V/50 Hz**
50	45	45	45
100	45	45	45
150	45	45	45
200	45	45	45
250	50	45	45
300	50	45	45
500	55	50	45

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5.3 System configuration

The following table shows the restrictions for different system configurations:

System configuration	Restrictions
TT/TN networks	None
IT systems	Prohibited

5.4 Notes on operation

Observe the following notes for the operation of the device with R15 regenerative power supply module:

- To avoid reactive power in the supply system, enable the R15 regenerative power supply module only when the drives connected to the device are active.
- While the regenerative power supply module is inhibited, the device must not be operated in regenerative mode; otherwise, error "U_Z overvoltage" is tripped.
- Wait until all drives connected to the device have come to a standstill before you inhibit the regenerative power supply module. Otherwise, the regenerative power supply module cannot feed back any regenerative energy to the supply system.

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6 Mechanical installation

6.1 Requirements

⚠ WARNING

Risk of crushing if the load falls.

Severe or fatal injuries.

- Do not sit or stand underneath the load.
- Secure the area where loads can fall down.

NOTICE

Danger of collision.

Damage to plant and device components.

- Always position the device so that it will not collide with other components or elements for operation along the travel distance.

Comply with the following prerequisites:

- Trained specialists perform the installation.
- The information provided in the technical data and the permitted conditions for the operating location of the device are observed.
- The minimum clearance and the required gaps for using a mounting plate are complied with. For further information, refer to chapter "Minimum clearance" (→ 🗎 49).
- The device is only mounted using the intended mounting options.
- The selection and dimensioning of the mounting and locking elements are in line with the applicable standards, the technical data of the devices and the local requirements.
- The bore dimensions are calculated in line with the respective type of fixture. For further information, refer to chapter "Assembly" (→ 🗎 52).
- The mounting and locking elements fit into the existing bores, threads and countersinks.
- All display and actuator elements are visible and accessible after installation.

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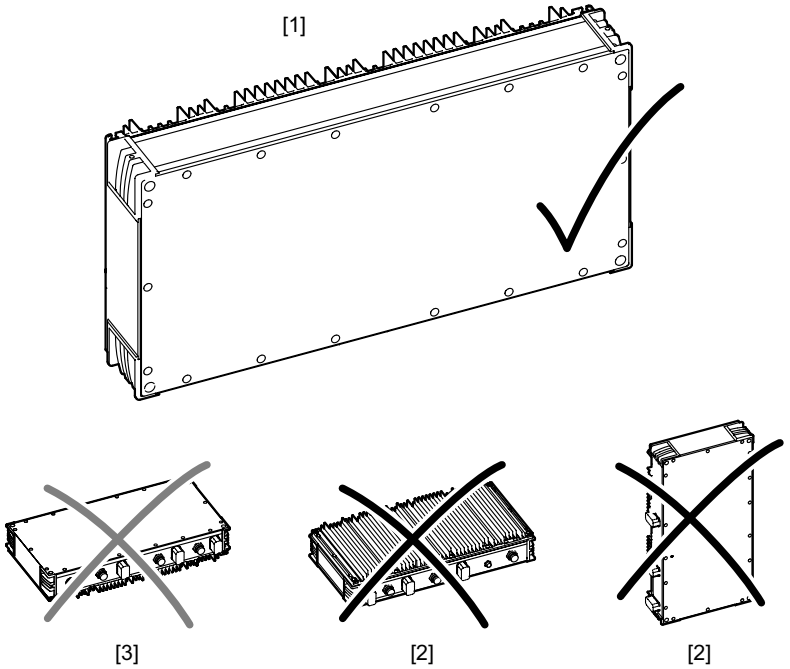
6.2 Mounting position

The following figure shows permitted and not permitted mounting positions:



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[1] Permitted vertical mounting position
[2] Mounting positions that are not permitted
[3] Conditionally permitted horizontal mounting positions

INFORMATION

When using the horizontal mounting position [3], power is reduced by 50% because of reduced heat convection.

6.3 Minimum clearance

INFORMATION

- Observe the following minimum clearances during installation:
  - For connection of the cables and plug connectors
  - For handling the display, diagnostics and operating elements
  - For heat convection at the cooling fins if the device has cooling fins
- For more information on the required minimum clearances, refer to the dimension drawings in chapter "Technical data" (→ 🗎 205).

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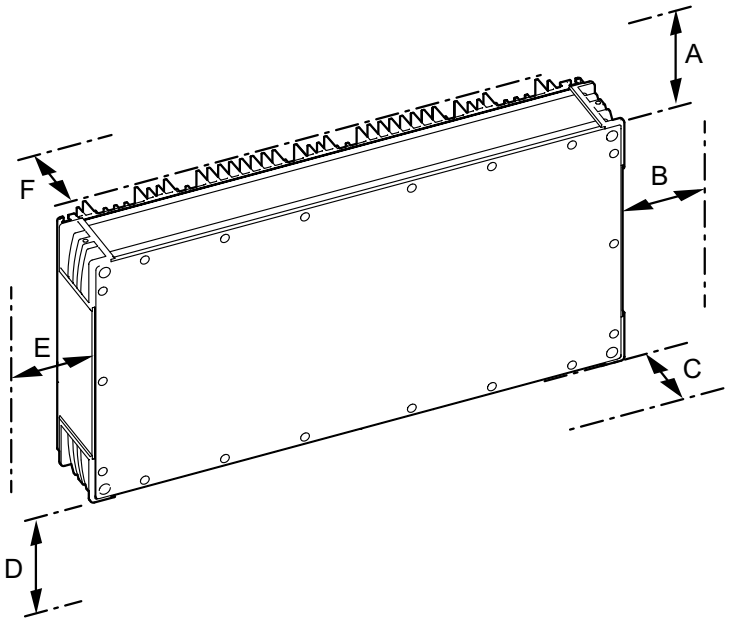
6.3.1 Vertical installation

The following figure shows the required minimum clearance of the device:



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The following table lists the minimum clearances:

Clearance	Function	Size
A: Above	Space for optimum heat convection The cooling fins must not be located in a closed hollow space.	≥ 200 mm
B: To the side on the right	Space for connection cables, plug connectors, mounted elements and actuator elements, e.g. maintenance switch	See dimension drawings in chapter "Technical data" (→ 🗎 205) • Without connection cable or mounting elements: ≥ 30 mm • With interface box: ≥ 200 mm • With connection for device supply: ≥ 250 mm
C: Device cover	Space for display elements, diagnostics elements and actuator elements, such as service unit	≥ 150 mm
D: Below	Space for connection cables, plug connectors	See dimension drawings in chapter "Technical data" (→ 🗎 205)
E: To the side on the left	Space for optimum heat convection	≥ 30 mm
F: Behind the cooling fins	Space for optimum heat convection	≥ 15 mm

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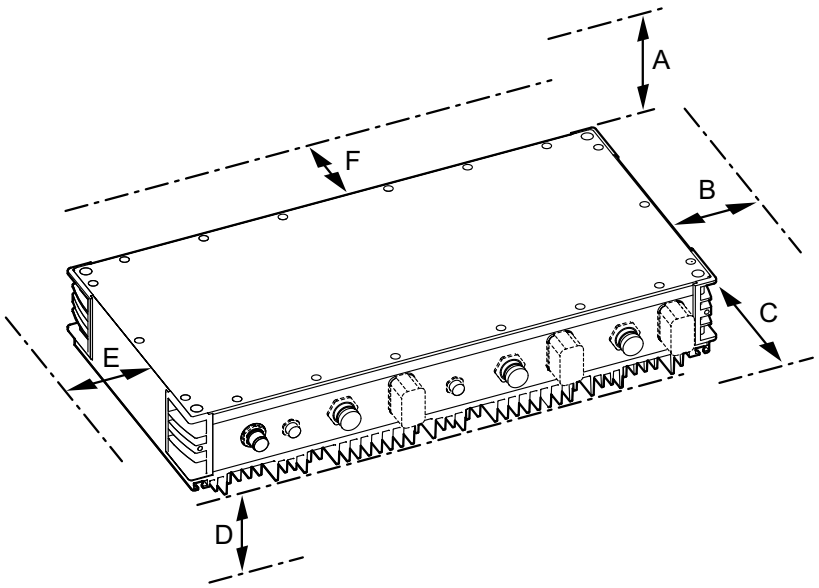
6.3.2 Horizontal installation

The following figure shows the minimum clearance of the device:



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The following table lists the minimum clearances:

Clearance	Function	Size
A: Device cover	Space for display elements, diagnostics elements and actuator elements, such as service unit	≥ 150 mm
B: To the side on the right	Space for connection cables, plug connectors, mounted elements and actuator elements, e.g. maintenance switch	See dimension drawings in chapter "Technical data" (→ 🗎 205) • Without connection cable or mounting elements: ≥ 30 mm • With interface box: ≥ 200 mm • With connection for device supply: ≥ 250 mm
C: To the front	Space for connection cables, plug connectors	See dimension drawings in chapter "Technical data" (→ 🗎 205)
D: Below the cooling fins	Space for optimum heat convection The cooling fins must not be located in a closed hollow space.	≥ 15 mm
E: To the side on the left	Space for optimum heat convection	≥ 30 mm
F: To the back	Space for optimum heat convection	≥ 30 mm

6.4 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-EURODRIVE 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 between the highest cooling fin and the next surface, e.g. mounting plate, is maintained.
- Avoid heat sources in the immediate proximity of the device.

6.5 Assembly

Use one of the following mechanical mounting options:

- Mounting with mounting brackets
- Mount using the through bores

6.5.1 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.

Required material

- "Large bracket mounting set" accessories (part number 12708305):
  - 4 mounting brackets
  - 8 studs M5 × 8
- Holding fixture, e.g. square pipe with an edge length ≤ 32 mm
- Suitable mounting and safety elements
  - For mounting at device: Studs M5 × 8 (included in mounting kit), M8 × 30

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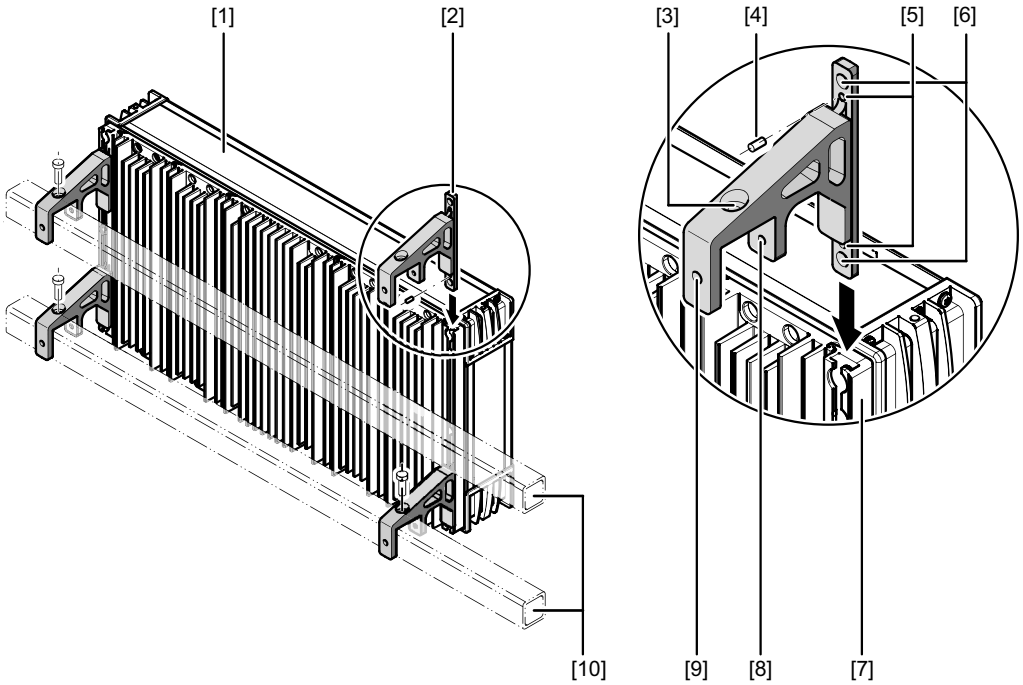
– For mounting at the holding fixture: M6 screws of suitable length with washers

Fastening the mounting plates

The following figure provides an overview on mounting with mounting brackets:



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[1] Device
[2] Large mounting bracket
[3] Through bore Ø 6.6 mm
[4] M5 × 8 stud
[5] Tapped hole for stud M5 × 8
[6] Bore for screw M8 × 30
[7] T-slot
[8] Tapped hole for M6 screw
[9] Tapped hole for M8 screw
[10] Holding fixture, e.g. square pipe with an edge length ≤ 32 mm

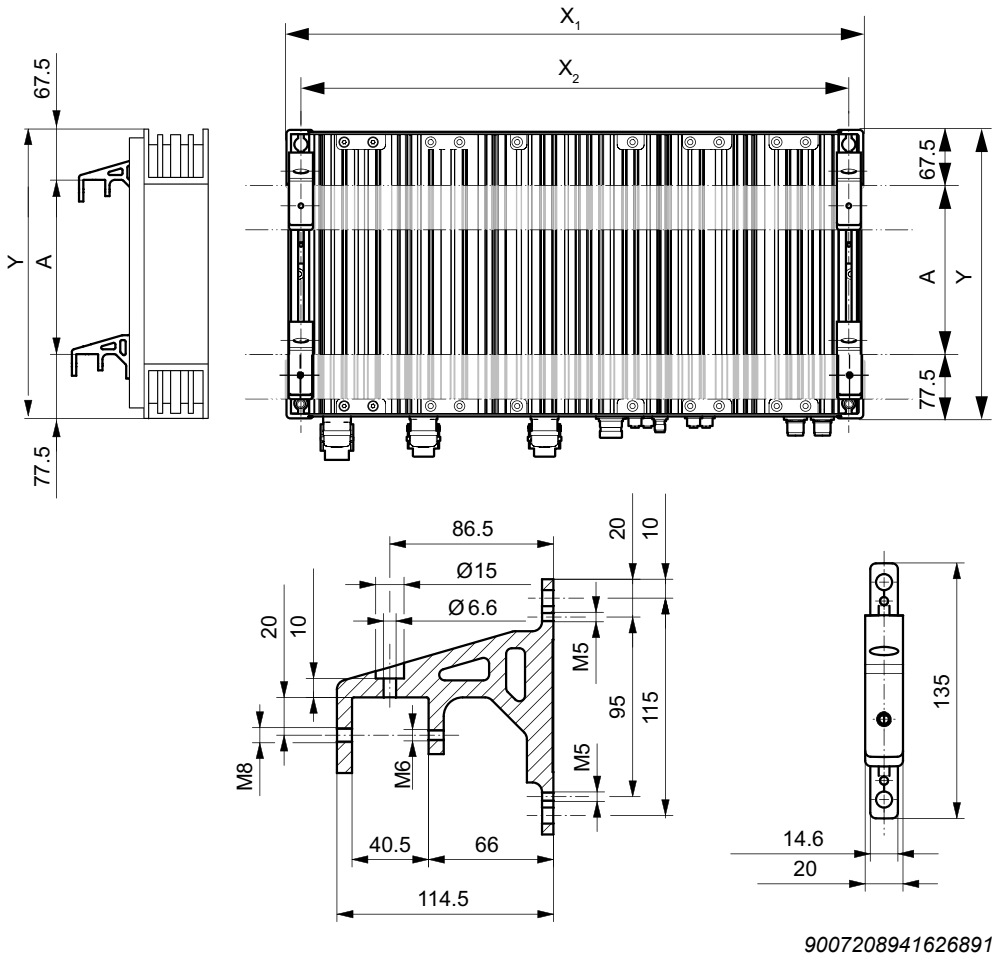
Procedure

1. Insert the mounting brackets [2] into the T-slots [7] of the device [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 [2] from slipping out of position in the T-slot [7], fix the mounting bracket with M8 × 30 screws [6] in the through holes of the device.
3. Screw the supplied M5 × 8 studs [4] into the T-slot [7].
4. Repeat the steps for the other mounting brackets [2].

Preparing the holding fixture

Square pipes can be used as a holding fixture for the device. To prevent mechanical overlapping, use square pipes with an edge length of ≤ 32 mm.

The following figure shows the required dimensions in mm:



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X_1, Y Housing dimensions
X_2 Bore dimension
A Distance

Procedure

- ✓ For the housing dimensions X_1 and Y, refer to the dimension drawings in chapter "Technical data" (→ 🗎 205).
- ✓ The bore dimension X_2 for the holding fixture bores can be derived from the housing dimension X_1 - 30 mm.
- ✓ The clearance dimension A of the holding fixtures can be derived from the housing dimension Y - 145 mm. Note that the distances are asymmetrical.

1. Mark the bore dimension X_2 for the holding fixture bores.
2. Mark the dimension A at the installation location.
3. Mount the holding fixture at the installation location at the calculated distance.

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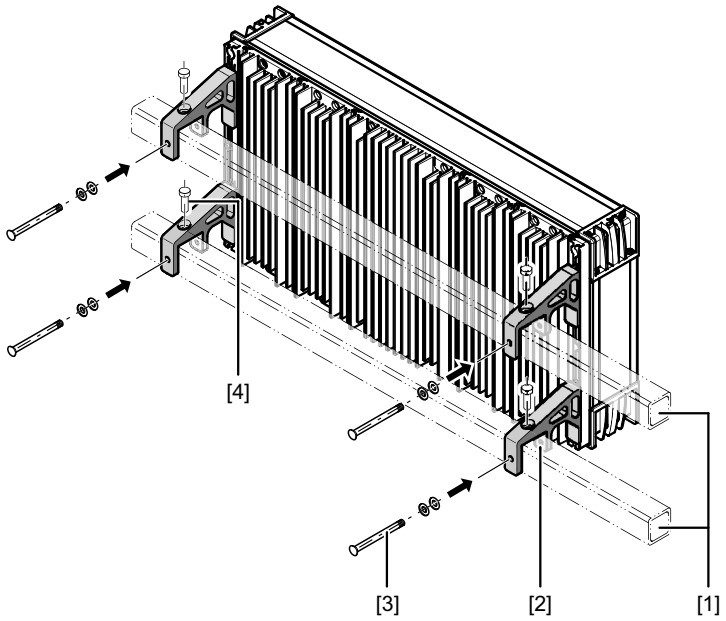
Mounting the device

The following figure provides an overview on the mounting of the device:



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[1] Holding fixture, e.g. square pipe with an edge length ≤ 32 mm
[2] Bore for M6 screw
[3] M6 screw of an appropriate length with washer
[4] M6 screw of an appropriate length with washer

Procedure

1. Use the mounting brackets to hang the device on the holding fixture [1].
2. Attach the mounting brackets to the holding fixture [1] with M6 screws [3] in appropriate length.
3. As an alternative you can attach the mounting brackets from above using M6 screws [4].

6.5.2 Mounting using the through bores

⚠ CAUTION

Risk of injury due to protruding parts.

Minor injuries.

- Wear suitable protective gloves.

NOTICE

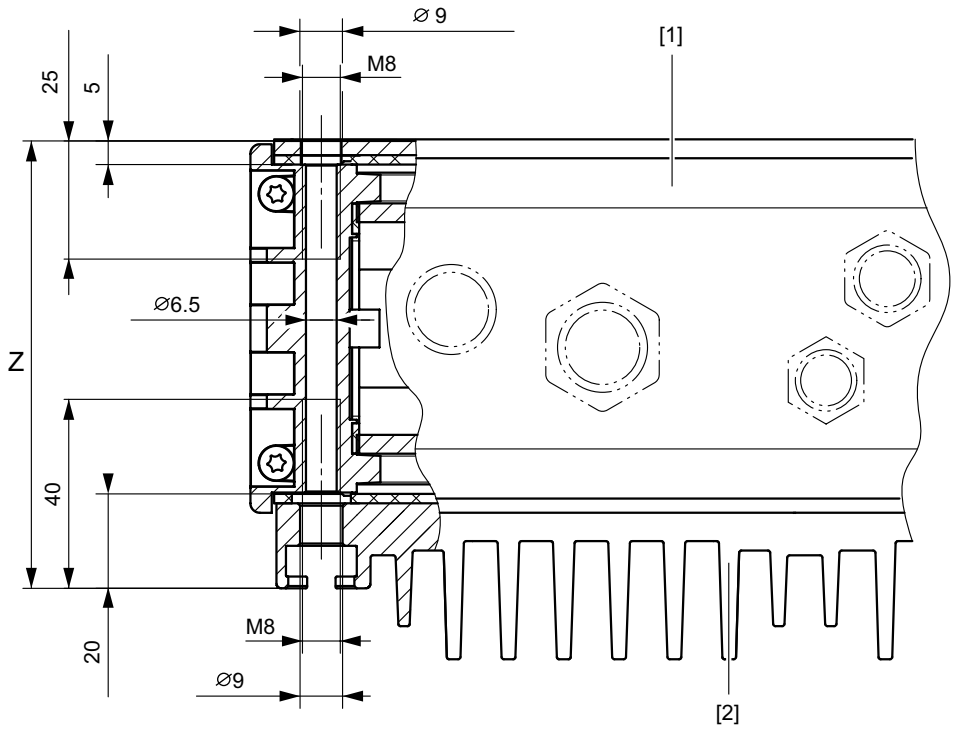
External force too high.

Damage to the thread or the screw.

- Do not exceed the maximum tightening torque of 3.2 Nm.

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

The following figure shows the structure of the through bores in mm:



45035996737806603

[1] Device
[2] Cooling fins
Z Height of through bore + T-slot
(see dimension drawings in chapter "Technical data" (→ 🗎 205))

Required material

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

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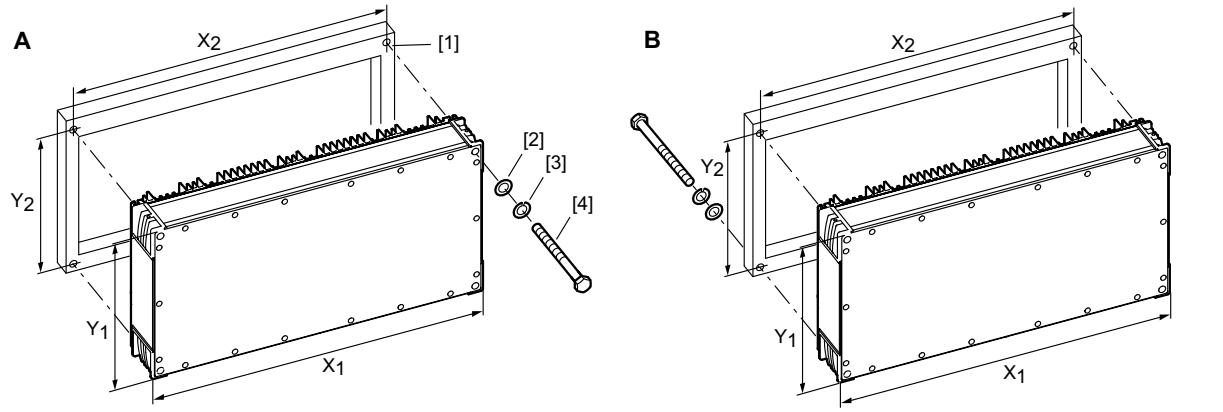
– For mounting from the front (**A**): M6 screws of an appropriate length with washers
– For mounting from the back (**B**): M8 screws of an appropriate length with washers
– Suitable locking devices, e.g. lock washers

Mounting the device

INFORMATION

The mounting type (**A**) is not possible if you use the handles.

You can attach the device to the mounting surface from the front (**A**) or from the back (**B**). The following figure provides an overview on the mounting of the device:



16131094539

[1] Mounting surface, e.g. mounting plate
[2] Mounting elements, e.g. washers
[3] Locking elements, e.g. lock washers
[4] Mounting elements, M6 or M8 screws
X_1, Y_1 Housing dimensions
X_2, Y_2 Bore dimensions

Procedure

✓ For the housing dimensions X_1 and Y_2, refer to the dimension drawings in chapter "Technical data" (→ 🗎 205).

✓ The bore dimension X_2 for the tapped holes and through bores in the holding fixture can be derived from the housing dimension X_1 - 30 mm.

✓ The bore dimension Y_2 for the tapped holes and through bores in the holding fixture can be derived from the housing dimension Y_1 - 30 mm.

1. Mark the bores on the mounting surface [1].
2. Drill the tapped holes (**A**) and the through bores (**B**).
3. Screw the device onto the mounting surface [1] using either M6 screws (**A**) or M8 screws (**B**).

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7 Electrical installation

7.1 Installation notes

Observe the following points for electrical installation:

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

7.2 Motor types

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

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

7.3 Low-voltage supply systems

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

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

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

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

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7.4 UL-compliant installation

INFORMATION

Due to UL requirements, the following chapter is always printed in English independent of the language of the documentation.

7.4.1 Power terminals

Use 75 °C copper wire only.

7.4.2 Short circuit current rating

- MOVIPRO® is suitable for use on a circuit capable of delivering not more than 200,000 rms symmetrical amperes when protected by fuses and circuit breakers as described in the tables below.
- MOVIPRO® is suitable for use on a circuit capable of delivering not more than 65,000 rms symmetrical amperes when protected by ABB and Rockwell Type E Combination Motor controllers as described in the tables below.

Max. voltage is limited to 500 V.

7.4.3 Branch circuit protection

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

For MOVIPRO® use branch circuit protection as follows:

Three Phase 380 V – 500 V Voltage Range				
	SCCR: 200 kA/500 V When protected by:	**SCCR: 200 kA/500 V When protected by:**	**SCCR: 65 kA/480 V When protected by:[1)]**	**SCCR: 65 kA/460 V When protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combinationen Motor Controller**	
PHC21A-A022M1-...A-00/..	40 A/600 V	50 A max/500 V min	ABB, Model MS132-6.3 Rated 480 V, 3 HP	Rockwell Automation, Model 140M-C2E-B63 Rated 460 V, 5 HP
PHC21A-A040M1-...A-00/..	40 A/600 V	50 A max/500 V min	ABB, Model MS132-10 Rated 480 V, 5 HP	Rockwell Automation, Model 140M-C2E-C10 Rated 460 V, 7.5 HP
PHC21A-A075M1-...A-00/..	40 A/600 V	50 A max/500 V min	ABB, Model MS132-16 Rated 480 V, 10 HP	Rockwell Automation, Model 140M-D8E-C16 Rated 460 V, 10 HP

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Three Phase 380 V – 500 V Voltage Range				
	SCCR: 200 kA/500 V When protected by:	SCCR: 200 kA/500 V When protected by:	SCCR: 65 kA/480 V When protected by:[1)]	SCCR: 65 kA/460 V When protected by:
Model	Non Semiconductor Fuses (currents are maximum values)	Inverse-Time Circuit Breaker	Type E Combinationen Motor Controller	
PHC22A-A110M1-...A-00/..	40 A/600 V	50 A max/500 V min	ABB, Model MS132-25 Rated 480 V, 15 HP	Rockwell Automation, Model 140M-F8E-C25 Rated 460 V, 20 HP
PHC22A-A150M1-...A-00/..	40 A/600 V	50 A max/500 V min	ABB, Model MS132-32 Rated 480 V, 20 HP	Rockwell Automation, Model 140M-F8E-C32 Rated 460 V, 25 HP

1) Drives employing Type E Combination Motor Controller model MS132-16, -25, -32 must be installed with Current Limiter Series S803W-SCLxxx-SR manufactured by ABB, otherwise SCCR rated 30 kA/480 Vrms.

For the Connecting Box devices Type PZM use branch circuit protection as follows:

Three Phase 380 V – 500 V Voltage Range				
	SCCR: 200 kA/500 V When protected by:	SCCR: 200 kA/500 V When protected by:	SCCR: 65 kA/480 V When protected by:[1)]	SCCR: 65 kA/460 V When protected by:
Model	Non Semiconductor Fuses (currents are maximum values)	Inverse-Time Circuit Breaker	Type E Combinationen Motor Controller	
PZM2XA-A022-M13-00	60 A/600 V	50 A max/500 V min	–	–
PZM2XA-A040-M14-00	60 A/600 V	50 A max/500 V min	–	–
PZM2XA-A075-M16-00	60 A/600 V	50 A max/500 V min	–	–
PZM2XA-A075-D02-00 – When installed with PHC21A-A022M1-...A-00/..	35 A/600 V	35 A max/500 V min	ABB, Model MS132-6.3 Rated 480 V, 3 HP	Rockwell Automation, Model 140M-C2E-B63 Rated 460 V, 5 HP
PZM2XA-A075-D02-00 – When installed with PHC21A-A040M1-...A-00/..			ABB, Model MS132-10 Rated 480 V, 5 HP	Rockwell Automation, Model 140M-C2E-C10 Rated 460 V, 7.5 HP
PZM2XA-A075-D02-00 – When installed with PHC21A-A075M1-...A-00/..			ABB, Model MS132-16 Rated 480 V, 10 HP	Rockwell Automation, Model 140M-D8E-C16 Rated 460 V, 10 HP

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Three Phase 380 V – 500 V Voltage Range				
	SCCR: 200 kA/500 V When protected by:	**SCCR: 200 kA/500 V When protected by:**	**SCCR: 65 kA/480 V When protected by:[1)]**	**SCCR: 65 kA/460 V When protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combinationen Motor Controller**	
PZM2XA-A150-D03-00 – When installed with PHC22A-A110M1-...A-00/..	50 A/600 V	50 A max/500 V min	ABB, Model MS132-25 Rated 480 V, 15 HP	Rockwell Automation, Model 140M-F8E-C25 Rated 460 V, 20 HP
PZM2XA-A150-D03-00 – When installed with PHC22A-A150M1-...A-00/..			ABB, Model MS132-32 Rated 480 V, 20 HP	Rockwell Automation, Model 140M-F8E-C32 Rated 460 V, 25 HP

1) Drives employing Type E Combination Motor Controller model MS132-16, -25, -32 must be installed with Current Limiter Series S803W-SCLxxx-SR manufactured by ABB, otherwise SCCR rated 30 kA/480 Vrms.

7.4.4 Motor overload protection

The units are provided with load and speed-sensitive overload protection and thermal memory retention upon shutdown or power loss. The trip current is adjusted to 150 % of the rated motor current.

7.4.5 Ambient temperature

The units are suitable for an ambient temperature of 40 °C, max. 60 °C with derated output current. To determine the output current rating at temperatures higher than 40 °C, the output current should be derated 3% per °C between 40 °C and 60 °C.

INFORMATION

- Use only tested units with a limited output voltage (V_{max} = DC 30 V) and limited output current (I_{max} = 8 A) as an external DC 24 V voltage source.
- UL certification does not apply to operation in voltage supply systems with a non-grounded star point (IT systems).

7.4.6 Wiring diagrams

For wiring diagrams, refer to the MOVIPRO® operating instructions, chapter "Electrical installation".

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7.5 Electromagnetic compatibility (EMC)

INFORMATION

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

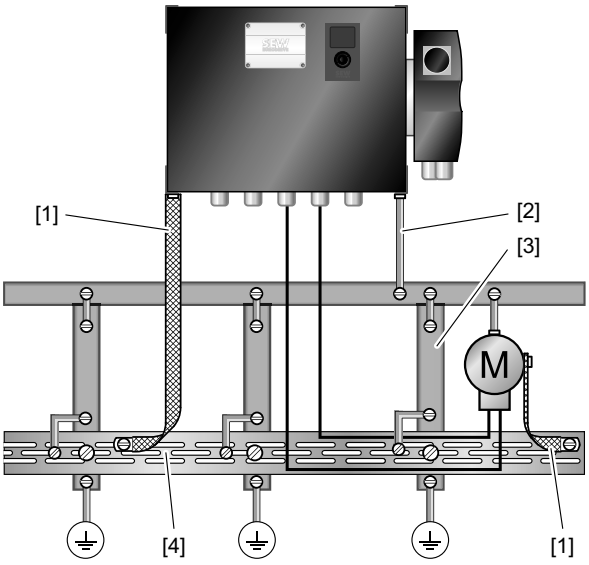
The device is a drive system of the category C2 (see EN 61800-3).

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

7.5.1 EMC-compliant installation

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

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



18005439243

[1] HF litz wire (ground strap)
[2] PE conductor
[3] Machine base
[4] Cable duct

For further information, refer to chapter "Installing ground connection or equipotential bonding" (→ 🗎 63).

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7.6 Cable routing

Observe the following when routing the cables:

- Use suitable cables to connect power supply and communication. For more information on connection descriptions, refer to the chapter "Electrical connections" (→ 🗎 75).
- Route power cables and signal cables in separate cable ducts.
- Maintain the greatest possible distance between power cables and signal cables.
- Avoid using long cables running parallel to one another.

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

7.7 Shielding

Observe the following when shielding:

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

7.8 Protective measures against electrical hazards

7.8.1 Installing ground connection or equipotential bonding

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

⚠ WARNING

Electric shock due to faulty ground connection or equipotential bonding.

Severe or fatal injuries.

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

Required material

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

Tools required

Wrench with TX25

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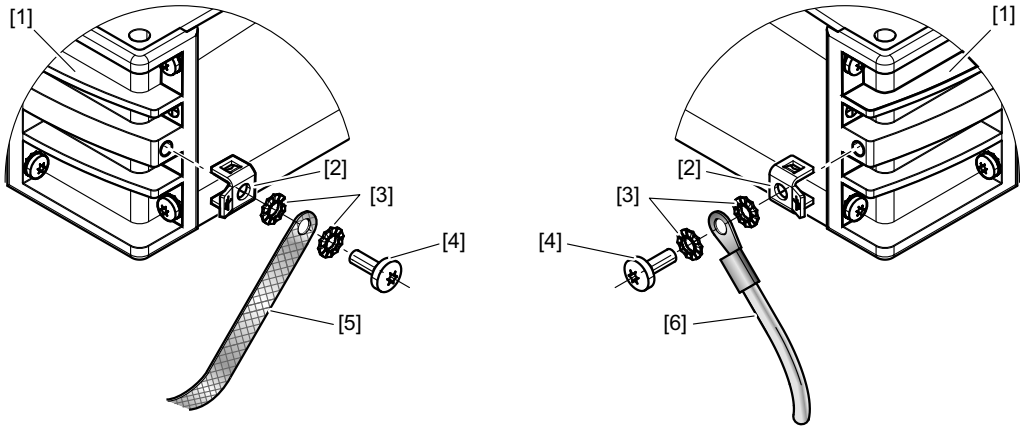
Procedure

Always ground the device using the shortest possible route.



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[1] Housing corner
[2] Terminal clip
[3] Serrated lock washer
[4] Screw, self-tapping
[5] HF litz wire (ground strap)
[6] PE conductor

The connection points for ground connection or equipotential bonding are on the housing corners [1] of the device. They are marked with a "ground" icon ⏚.

Note the different cable cross section of the supply system cable of devices with three-phase current during installation. Refer to the "Supply system cable" chapter for more information.

1. Push the terminal clip [2] onto the connection point.
2. Take a screw [4] and push a serrated lock washer [3], the crimp cable lug for the PE [6] or the HF litz wire [5] and another serrated lock washer [3] onto it.
3. Tighten the screw [4] with a maximum tightening torque of 5 Nm using a wrench.

Supply system cable

Leakage currents ≥ AC 3.5 A/DC 10 mA may occur during normal operation. Proceed as follows depending on the cable cross section of the supply system cable:

Supply system cable < 10 mm²:

Perform the installation steps again and route a **second PE with the same cable cross section as the supply system cable** in parallel to the PE via separate terminals. Alternatively, use a **copper PE conductor with a cable cross section of 10 mm²**.

Supply system cable 10 mm²:

Route a **copper PE conductor with the cable cross section of the supply system cable**.

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7.9 Using prefabricated cables

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

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

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

7.9.1 Use of third-party cables

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

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

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

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

- IEC 60309
- IEC 61984
- IEC 60204

7.10 Line components

7.10.1 Residual current device

⚠ WARNING

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

Severe or fatal injuries.

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

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

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

7.10.2 Line fuse types

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

Line protection types in operation classes gL, gG:

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

Miniature circuit breaker with characteristics B, C:

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

7.10.3 Contactors

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

7.11 Connection blocks

⚠ WARNING

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 device is de-energized.
- Never plug or unplug the plug connectors while they are energized.

The design of the connection block depends on the device design.

The connection designation of your device is specified on the connection block label on the front of device.

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

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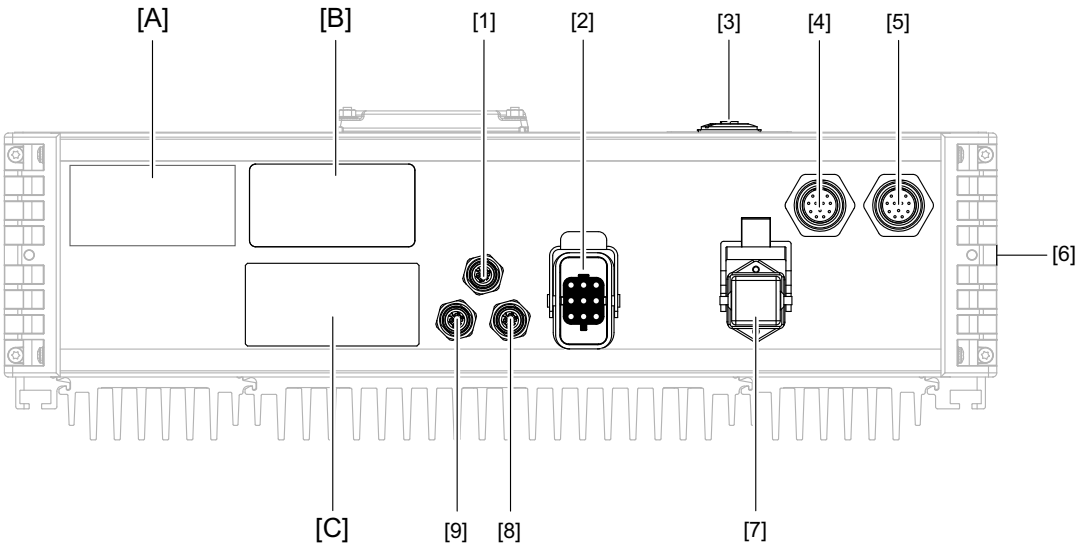
7.11.1 2.2 kW



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[A]	→	"Communication package connections" (→ 🗎 70)	
[B]	→	"Fieldbus connections" (→ 🗎 72)	
[C]	→	"Encoder option connections" (→ 🗎 74)	
[1]	X5502	Safe disconnection – input	(→ 🗎 155)
[2]	X2011	Motor with brake control	(→ 🗎 89)
[3]	→	"PC/laptop connection" (→ 🗎 164)	
[4]	X5001_1	Digital inputs/outputs – communication and control unit	(→ 🗎 144)
[5]	X5001_2	Digital inputs/outputs – communication and control unit	(→ 🗎 147)
[6]	X1213	AC 400 V input/DC 24 V supply for interface box (up to 22 kW - coded)	(→ 🗎 77)
		or	
	X1214	AC 400 V input/DC 24 V supply for supply cable (up to 22 kW - coded)	(→ 🗎 83)
[7]	X2301	Braking resistor	(→ 🗎 110)
[8]	X5102_1	Digital inputs/outputs – power section	(→ 🗎 150)
[9]	X5102_2	Digital inputs/outputs – power section	(→ 🗎 150)
		or	
	X5201	Analog inputs/outputs – power section	(→ 🗎 154)

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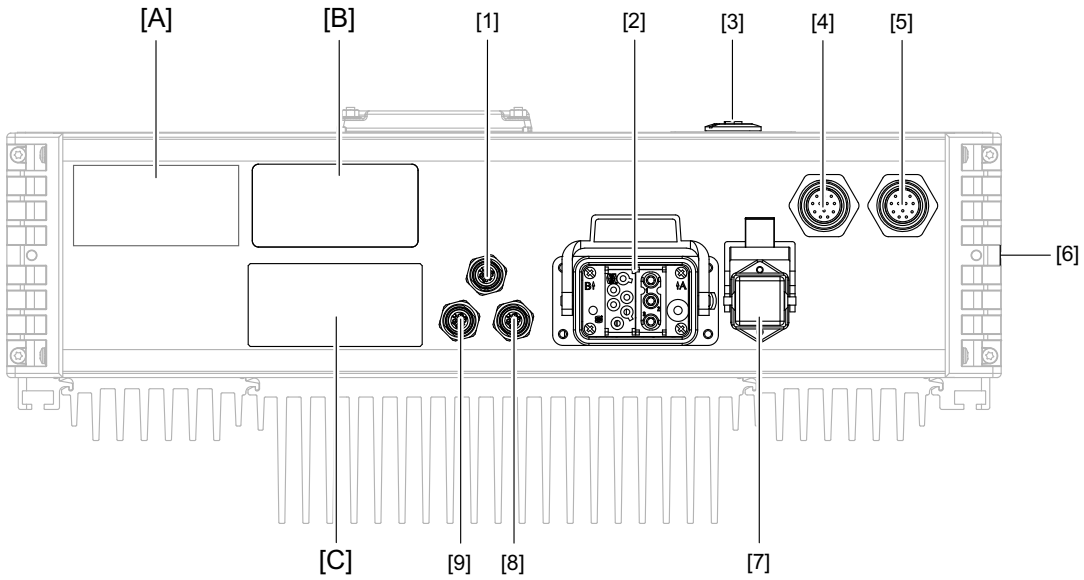
7.11.2 4 kW, 7.5 kW



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[A]	→	"Communication package connections" (→ 🗎 70)	
[B]	→	"Fieldbus connections" (→ 🗎 72)	
[C]	→	"Encoder option connections" (→ 🗎 74)	
[1]	X5502	Safe disconnection – input	(→ 🗎 155)
[2]	X2012	Motor with brake control	(→ 🗎 95)
[3]	→	"PC/laptop connection" (→ 🗎 164)	
[4]	X5001_1	Digital inputs/outputs – communication and control unit	(→ 🗎 144)
[5]	X5001_2	Digital inputs/outputs – communication and control unit	(→ 🗎 147)
[6]	X1213	AC 400 V input/DC 24 V supply for interface box (up to 22 kW - coded)	(→ 🗎 77)
		or	
	X1214	AC 400 V input/DC 24 V supply for supply cable (up to 22 kW - coded)	(→ 🗎 83)
[7]	X2301	Braking resistor	(→ 🗎 110)
[8]	X5102_1	Digital inputs/outputs – power section	(→ 🗎 150)
[9]	X5102_2	Digital inputs/outputs – power section	(→ 🗎 150)
		or	
	X5201	Analog inputs/outputs – power section	(→ 🗎 154)

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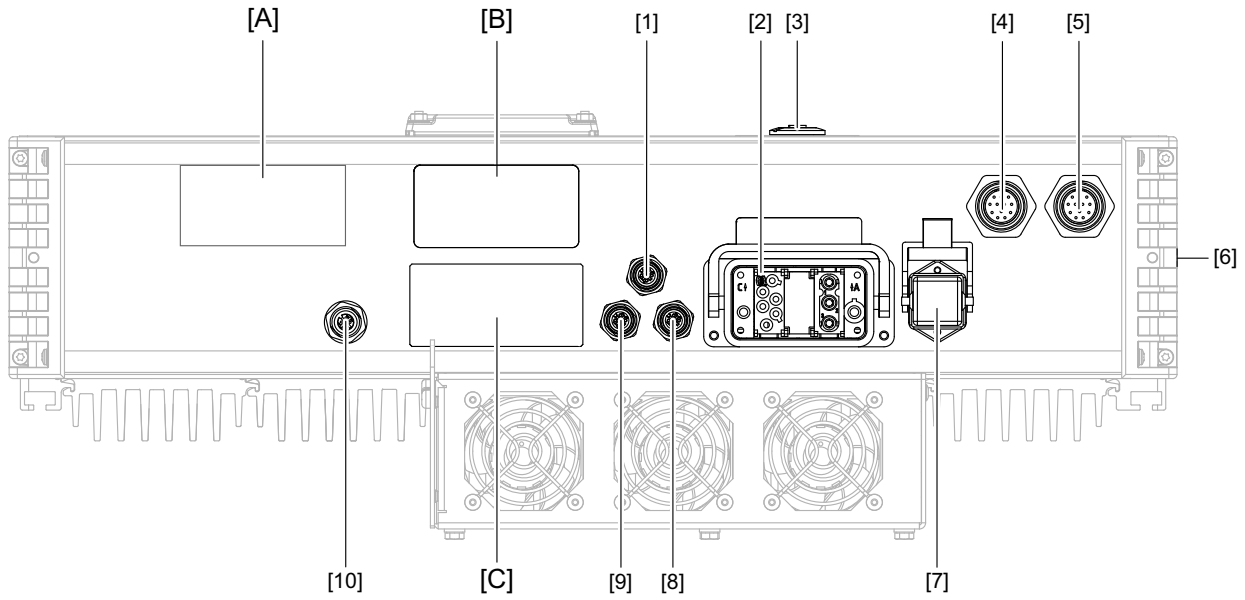
7.11.3 11 kW, 15 kW, 22 kW



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[A]	→	"Communication package connections" (→ 🗎 70)	
[B]	→	"Fieldbus connections" (→ 🗎 72)	
[C]	→	"Encoder option connections" (→ 🗎 74)	
[1]	X5502	Safe disconnection – input	(→ 🗎 155)
[2]	X2016	Motor with brake control	(→ 🗎 105)
[3]		"PC/laptop connection" (→ 🗎 164)	
[4]	X5001_1	Digital inputs/outputs – communication and control unit	(→ 🗎 144)
[5]	X5001_2	Digital inputs/outputs – communication and control unit	(→ 🗎 147)
[6]	X1213	AC 400 V input/DC 24 V supply for interface box (up to 22 kW - coded)	(→ 🗎 77)
		or	
	X1214	AC 400 V input/DC 24 V supply for supply cable (up to 22 kW - coded)	(→ 🗎 83)
[7]	X2303	Braking resistor	(→ 🗎 113)
[8]	X5102_1	Digital inputs/outputs – power section	(→ 🗎 150)
[9]	X5102_2	Digital inputs/outputs – power section	(→ 🗎 150)
		or	
	X5201	Analog inputs/outputs – power section	(→ 🗎 154)
[10]	X5111	Fan subassembly	(→ 🗎 153)

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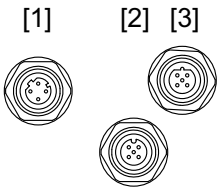
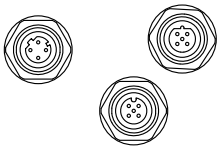
7.11.4 Communication package connections

Depending on the design of your device, it comes equipped with none or one of the following communication packages.

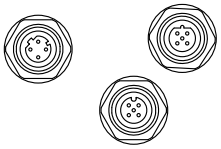
Communication package 1

Connections			Communication interfaces	Function unit
	[1]	X4251	SBus^{PLUS} interface	PFH-..1A..-B..-I1.**1**
	[2]	X4112	CAN interface – external (electrically isolated)	
	[3]	X4012	RS485 interface – external (electrically isolated)	

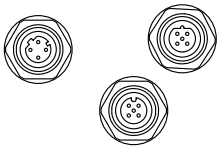
Communication package 2

Connections			Communication interfaces	Function unit
	[1]	X4251	SBus^{PLUS} interface	PFH-..1A..-B..-I1.**2**
	[2]	X4112	CAN interface – external (electrically isolated)	
	[3]	X4011	RS485 interface – external (with DC 24 V)	

Communication package 3

Connections			Communication interfaces	Function unit
	[1]	X4251	SBus^{PLUS} interface	PFH-..1A..-B..-I1.**3**
	[2]	X4111	CAN interface – external (with DC 24 V)	
	[3]	X4011	RS485 interface – external (with DC 24 V)	

Communication package 4

Connections			Communication interfaces	Function unit
	[1]	X4251	SBus^{PLUS} interface	PFH-..1A..-B..-I1.**4**
	[2]	X4111	CAN interface – external (with DC 24 V)	
	[3]	X4012	RS485 interface – external (electrically isolated)	

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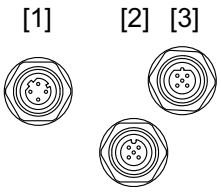
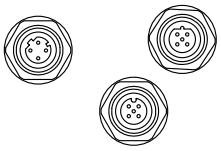
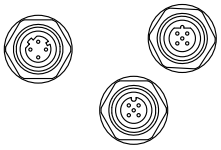
Communication package 6

Connections			Communication interfaces	Function unit
	[1]	X4224	Ethernet engineering interface	PFH-..1A..-B..-I1.**6**
	[2]	X4111	CAN interface – external (with DC 24 V)	
	[3]	X4011	RS485 interface – external (with DC 24 V)	

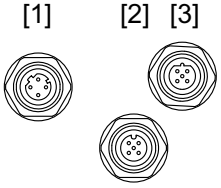
Communication package 10

Connections			Communication interfaces	Function unit
	[1]	X4121	MOVISAFE® safety bus interface	PFH-..1A..-B..-I1.**10**
	[2]	X4112	CAN interface – external (electrically isolated)	
	[3]	X4101	CAN interface – system bus (with DC 24 V)	

Communication package 11

Connections			Communication interfaces	Function unit
	[1]	X4121	MOVISAFE® safety bus interface	PFH-..1A..-B..-I1.**11**
	[2]	X4012	RS485 interface – external (electrically isolated)	
	[3]	X4101	CAN interface – system bus (with DC 24 V)	

Communication package 12

Connections			Communication interfaces	Function unit
	[1]	X4224	Ethernet engineering interface	PFH-..1A..-B..-I1.**12**
	[2]	X4112	CAN interface – external (electrically isolated)	
	[3]	X4012	RS485 interface – external (electrically isolated)	

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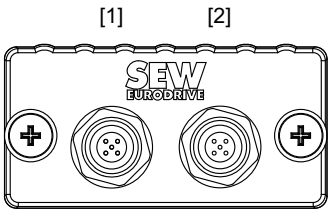
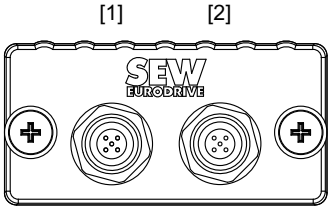
7.11.5 Fieldbus connections

Depending on the design, the device has the following fieldbus connections:

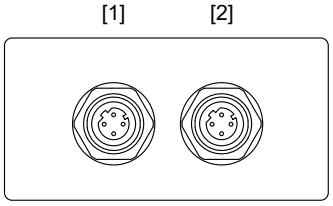
PROFIBUS

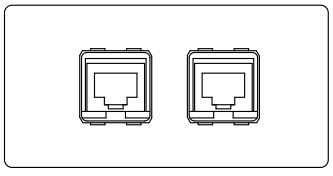
Connections			Fieldbus	Function unit
	[1]	X4201 – input	PROFIBUS	PFH-**P1**.A..-**B11**-I1..
	[2]	X4202 – output		

DeviceNet™

Connections			Fieldbus	Function unit
	[1]	X4241 – input	DeviceNet™	PFH-**D1**.A..-**B12**-I1..
	[2]	X4242 – output		

PROFINET

M12				
Connections			**Fieldbus**	**Function unit**
	[1]	X4233_11	Ethernet fieldbus, M12	PFH-**E2**.A..-**B53**-I1..
	[2]	X4233_12		

Push-pull RJ45				
Connections			**Fieldbus**	**Function unit**
	[1]	X4232_11	Ethernet fieldbus, Push-pull RJ45	PFH-**E2**.A..-**B63**-I1..
	[2]	X4232_12		

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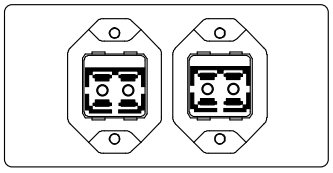
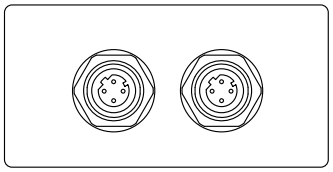
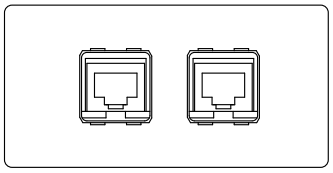
Push-pull SCRJ				
Connections			**Fieldbus**	**Function unit**
[1] [2] 	[1]	X4234_11	Ethernet fieldbus, Push-pull SCRJ	PFH-**E2**.A..-**B64**-I1..
	[2]	X4234_12		

EtherNet/IP™, Modbus/TCP

M12				
Connections			**Fieldbus**	**Function unit**
[1] [2] 	[1]	X4233_11	Ethernet fieldbus, M12	PFH-**E3**.A..-**B53**-I1..
	[2]	X4233_12		

Push-pull RJ45				
Connections			**Fieldbus**	**Function unit**
[1] [2] 	[1]	X4232_11	Ethernet fieldbus, Push-pull RJ45	PFH-**E3**.A..-**B63**-I1..
	[2]	X4232_12		

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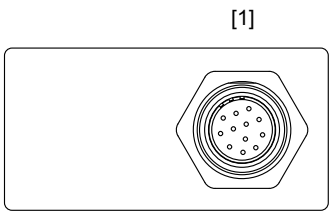
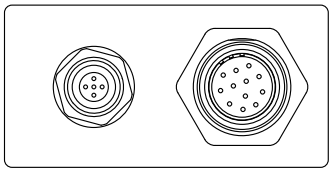
7.11.6 Encoder option connections

Depending on the design, the device is equipped with none or one of the following encoder options:

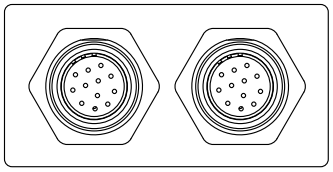
Motor encoder

Connection			Encoder type	Function module
	[1]	X3001	Resolver	PFA-MD...B-**G10**-B...-../C../000
	or		or	
	[1]	X3011	Motor encoder: HIPERFACE®, sin/cos, TTL, HTL, RS422	PFA-MD...B-**G20**-B...-../C../000

CANopen distance encoder and motor encoder

Connections			Encoder type	Function module
	[1]	X3211	Distance encoder: CANopen	PFA-MD...B-**G21**-B...-../C../000
	[2]	X3011	Motor encoder: HIPERFACE®, sin/cos, TTL, HTL, RS422	

Multi distance encoder and motor encoder

Connections			Encoder type	Function module
	[1]	X3222	Multi distance encoder: HIPERFACE®, SSI, Sin/Cos, HTL	PFA-MD...B-**G22**-B...-../C../000
	[2]	X3011	Motor encoder: HIPERFACE®, sin/cos, TTL, HTL, RS422	

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7.12 Electrical connections

7.12.1 Representation of connections

The wiring diagrams show the contact end of the connections.

7.12.2 Connection cables

INFORMATION

For more information on cable types, refer to the chapter "Technical data" (→ 🗎 205).

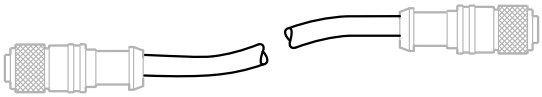
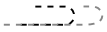
Connection cables are not included in the delivery.

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

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

Cable types

The table below shows the depiction and what they mean:

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

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7.12.3 Cable structure

Diagram

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

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

Examples

The following examples illustrate the cable designation:

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

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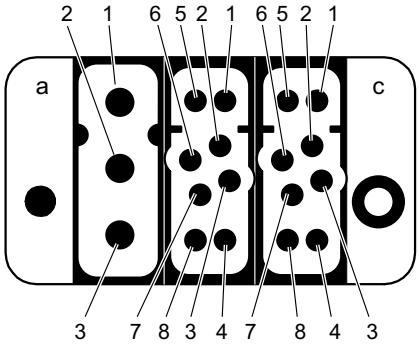
7.12.4 X1213: AC 400 V input/DC 24 V supply for interface box

Function
• AC 400 V input to supply devices up to 22 kW • DC 24 V output and input • Signal contact for external maintenance switch • For connecting an interface box (PZM)

Connection type
Han-Modular® 10 B, male, 1 locking latch

Wiring diagram



[a] Han® C module, male		
No.	**Name**	**Function**
1	L1	Line connection phase 1
2	L2	Line connection phase 2
3	L3	Line connection phase 3

[b] Han® EE module, male
Coding of the device power, see chapter "Coding" (→ 🗎 78)

[c] Han® EE module, male		
No.	**Name**	**Function**
1	+24V_C	DC 24 V input – backup voltage
2	SC	Signal contact for external maintenance switch
3	VO24	DC 24 V output
4	n.c.	Not connected
5	0V24_C	0V24 reference potential – backup voltage
6	n.c.	Not connected
7	GND	Reference potential
8	n.c.	Not connected

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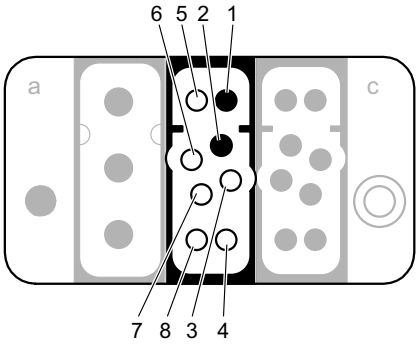
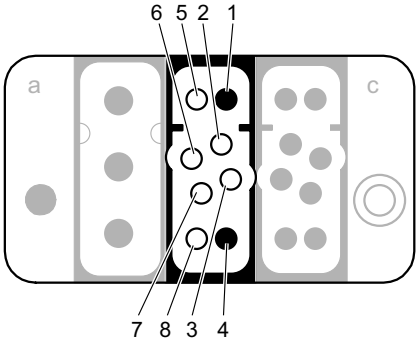
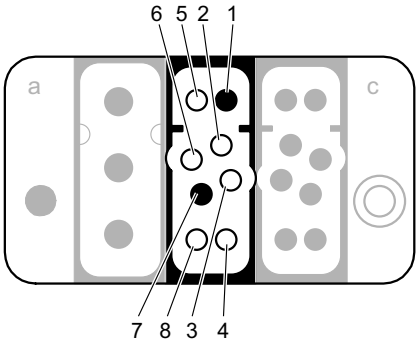
Hinged frame		
No.	**Name**	**Function**
–	PE	PE connection

Coding

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

Device power	Coding of the connections	Interface box
2.2 kW		PZM2xA-A022-M13-00 PZM2xA-A075-D02-00 PZM2xA-A150-D03-00 PZM2xA-A220-D04-00
4 kW		PZM2xA-A040-M14-00 PZM2xA-A075-D02-00 PZM2xA-A150-D03-00 PZM2xA-A220-D04-00
7.5 kW		PZM2xA-A075-M16-00 PZM2xA-A075-D02-00 PZM2xA-A150-D03-00 PZM2xA-A220-D04-00

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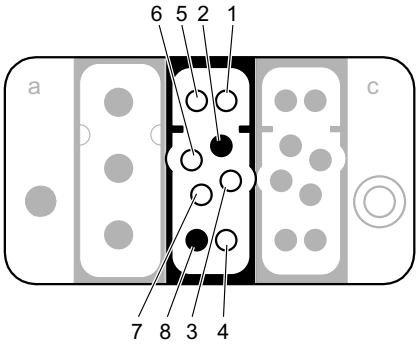
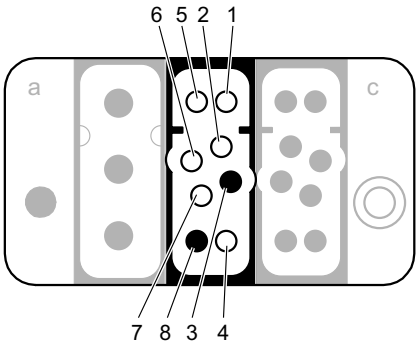
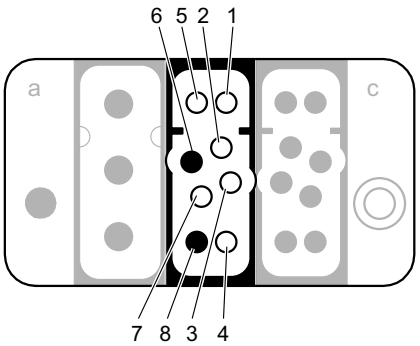
Device power	Coding of the connections	Interface box
11 kW		PZM2xA-A150-D03-00 PZM2xA-A220-D04-00
15 kW		PZM2xA-A150-D03-00 PZM2xA-A220-D04-00
22 kW		PZM2xA-A220-D04-00

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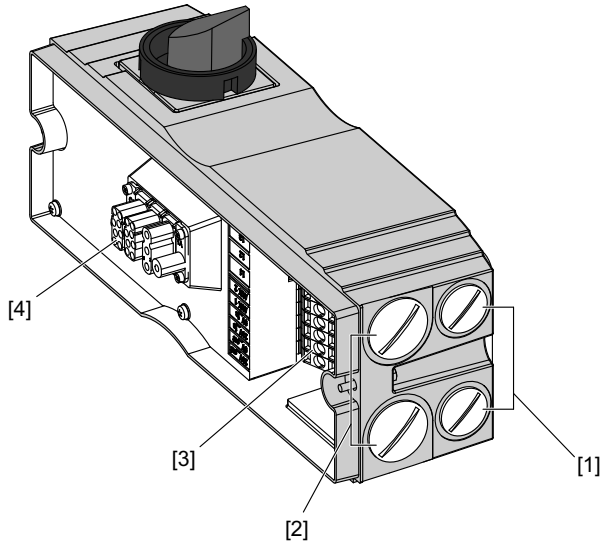
Interface box connections



36028798973867915

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

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

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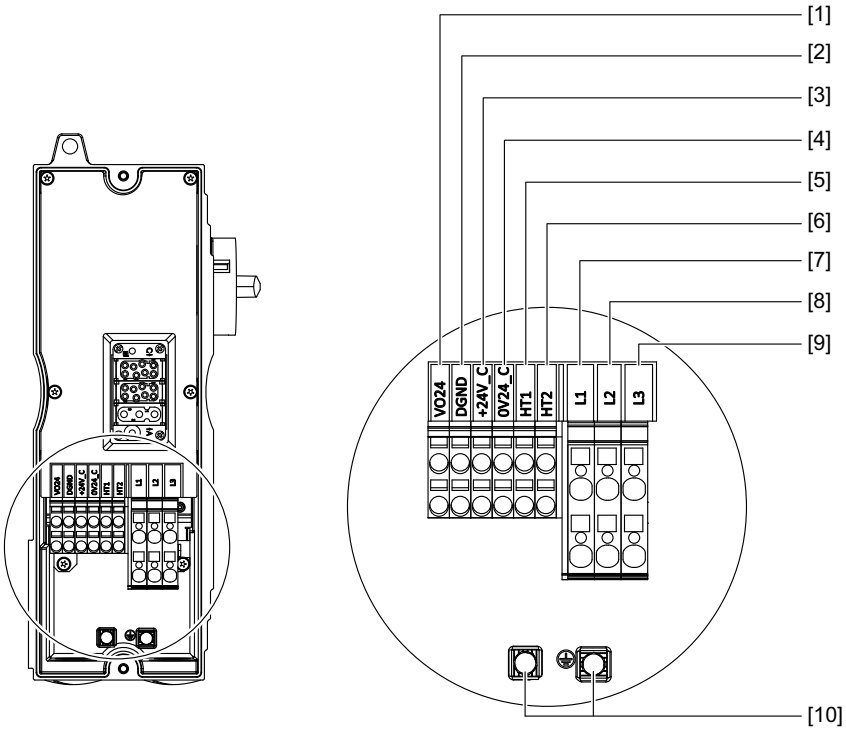
X1 terminal strip of the interface box



27021599719541387

Terminal strip X1 (power input terminal strip)			Terminal cross section
	Name	**Function**	
[1]	VO24	DC 24 V output	0.2 – 6 mm²
[2]	GND	Reference potential/DC 24 V output	
[3]	+24V_C	DC 24 V input	
[4]	0V24_C	0V24 reference potential – input	
[5]	HT1	Auxiliary terminal for additional voltage levels (without internal function)	
[6]	HT2	Auxiliary terminal for additional voltage levels (without internal function)	
[7]	L1	Line connection phase 1	0.2 – 10 mm²
[8]	L2	Line connection phase 2	
[9]	L3	Line connection phase 3	
[10]	PE	PE connection	

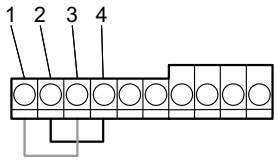
DC 24 V supply

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

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

- 1 with 3
- 2 with 4

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



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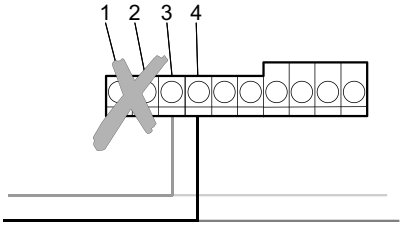
INFORMATION

If you use an external DC 24 V backup voltage, do not connect terminals 1 and 2.

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

- 3
- 4

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



18014400675412875

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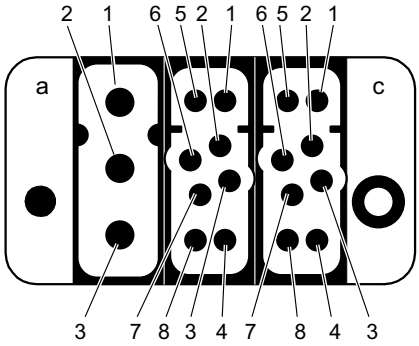
7.12.5 X1214: AC 400 V input/DC 24 V supply for supply cable

Function
• AC 400 V input to supply devices up to 22 kW • Output and input for DC 24 V • Signal contact for external maintenance switch • For connecting the connection cable

Connection type
Han-Modular® 10 B, male, 1 locking latch

Wiring diagram



[a] Han® C module, male		
No.	**Name**	**Function**
1	L1	Line connection phase 1
2	L2	Line connection phase 2
3	L3	Line connection phase 3

[b] Han® EE module, male
Coding of the device power, see chapter "Coding" (→ 🗎 85)

[c] Han® EE module, male		
No.	**Name**	**Function**
1	+24V_C	DC 24 V input – backup voltage
2	SC	Signal contact for external maintenance switch
3	VO24	DC 24 V output
4	n.c.	Not connected
5	0V24_C	0V24 reference potential – backup voltage
6	n.c.	Not connected
7	GND	Reference potential
8	n.c.	Not connected

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Hinged frame		
No.	**Name**	**Function**
–	PE	PE connection

Important information about the DC 24 V supply

The internal components can be supplied with DC 24 V either from the device or via an external DC 24 V backup voltage.

To use the **internal** DC 24 V supply, you must jumper the following contacts:

- [c].1 and [c].3
- [c].5 and [c].7

INFORMATION

If you use an external DC 24 V backup voltage, do not connect contacts [c].3 and [c].7.

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

- [c].1
- [c].5

Signal contact for external maintenance switch

The device has a signal contact for an external maintenance switch.

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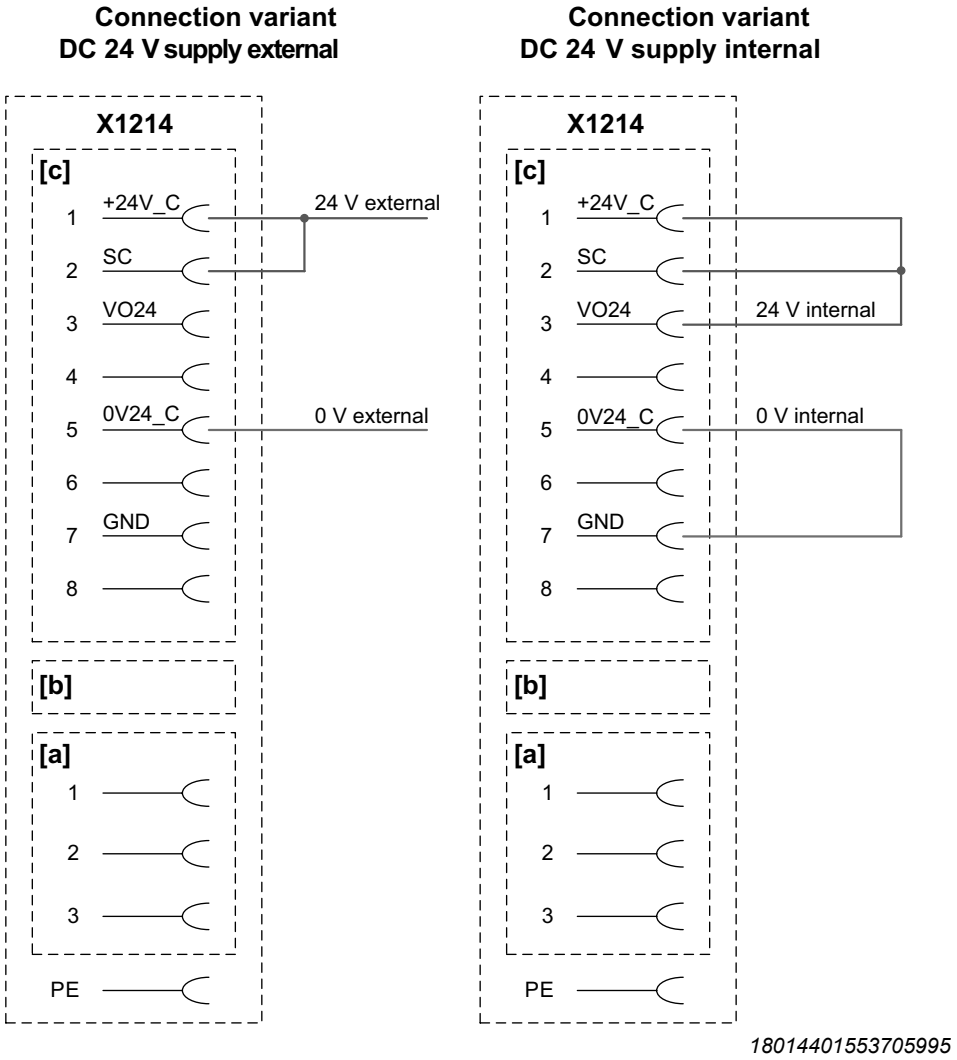
If you do not use an external maintenance switch, you must jumper the DC 24 V to the signal contact (SC).



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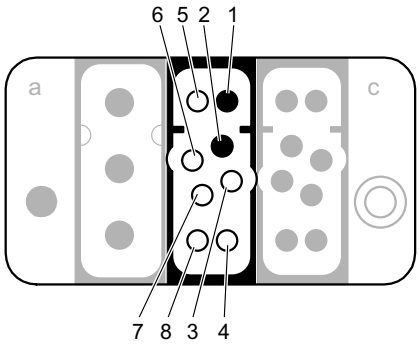
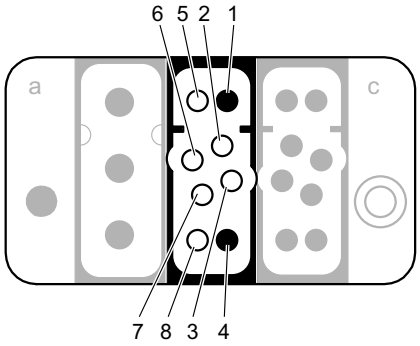
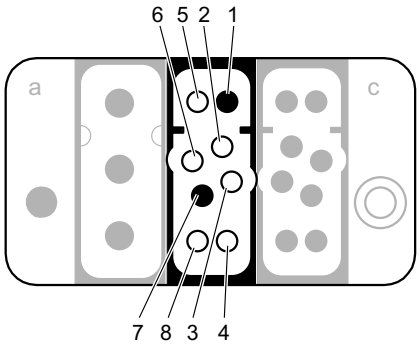
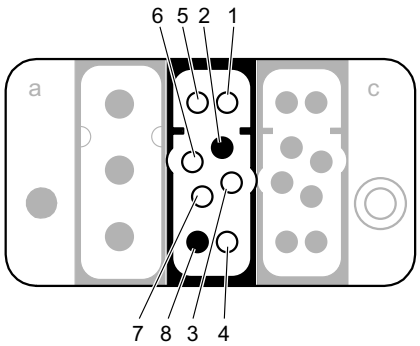
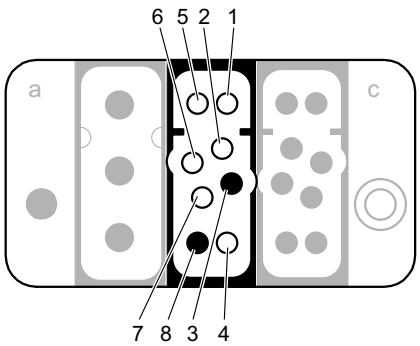
Coding

The following table shows the assignment of the individual coding to the respective device power rating:

Device power	Coding of the connections
2.2 kW	

Device power	Coding of the connections
4 kW	
7.5 kW	
11 kW	
15 kW	

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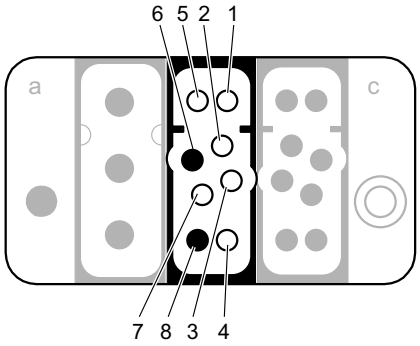
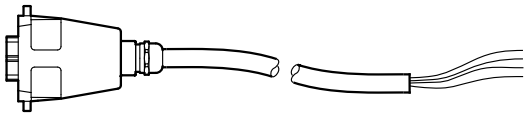
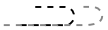
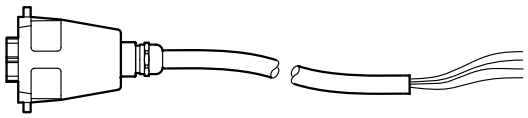
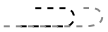
Device power	Coding of the connections
22 kW	

Connection cable

Up to 7.5 kW (IEC/UL)

Cable	Length/installation type	Component
Part number: 18131433 Cable design: 4G2.5  Han® 10 B ↔ Open with conductor end sleeves	Variable length 	–

11 kW up to 15 kW (IEC/UL)

Cable	Length/installation type	Component
Part number: 18131468 Cable design: 4G6.0  Han® 10 B ↔ Open with conductor end sleeves	Variable length 	–

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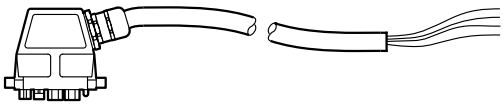
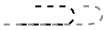
Cable	Length/installation type	Component
Part number: 18174183 Cable design: 4G6.0  Han® 10 B ↔ Open with conductor end sleeves	Variable length 	–

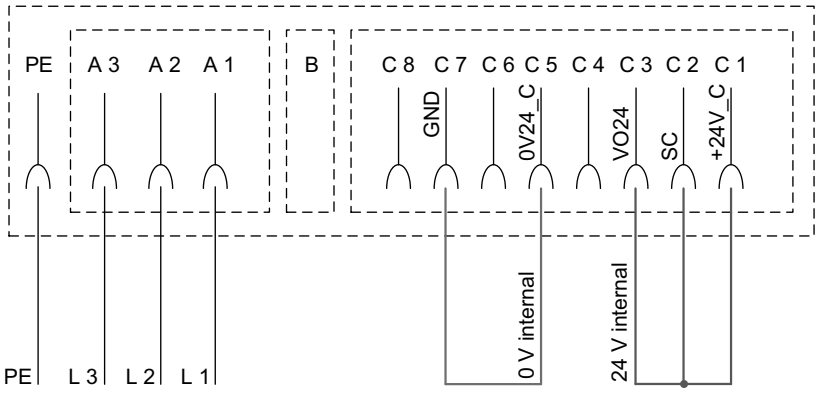
Conductor assignment

Part number	Signal name	Color coding
18131433 18131468 18174183	L1	Black/1
	L2	Black/2
	L3	Black/3
	PE	Green/yellow

Wiring diagram

The following figure shows the wiring diagram of the connection cables with the following part numbers:

- 18131433
- 18311468
- 18174183



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7.12.6 X2011: Motor with brake control

NOTICE

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

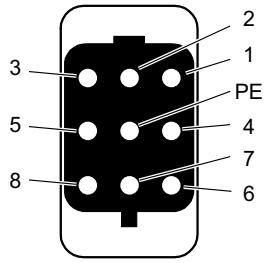
Damage to the drive system or its environment.

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

Function
Power connection for motor with brake up to 4 kW

Connection type
Han® Q 8/0, female

Wiring diagram



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

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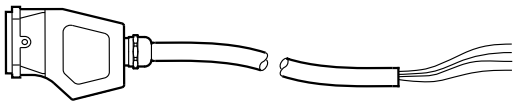
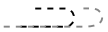
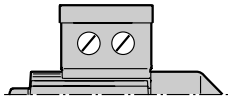
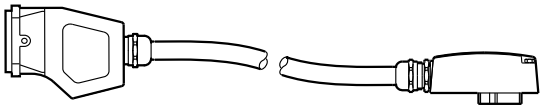
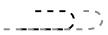
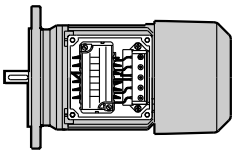
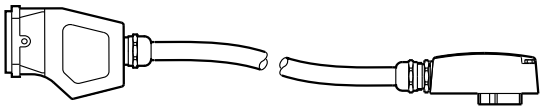
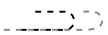
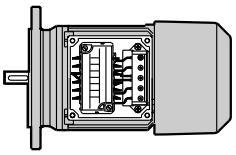
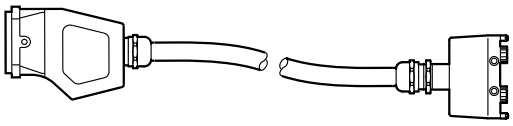
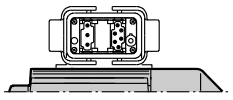
Connection cable

Up to 2.2 kW (IEC)

Cable	Length/installation type	Type	Component
Part number: 18125794  Han®Q 8/0 ↔ open (terminal box connection M4)	Variable length 	D/1.5	DRS71 – 90L DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 80 
Part number: 18127703 ⅄  Han® Q 8/0 ↔ IS ⅄	Variable length 	D/1.5	DRS71 – 90⅄ DRE80 – 100⅄ DRP90 – 100⅄ DRN80 – 100⅄ DRL71 – 80⅄ 
Part number: 18127681 △  Han® Q 8/0 ↔ IS △	Variable length 	D/1.5	DRS71 – 90△ DRE80 – 100△ DRP90 – 100△ DRN80 – 100△ DRL71 – 80△ 
Part number: 18127711  Han® Q 8/0 ↔ ABB8	Variable length 	D/1.5	DRS71 – 90 DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 80 

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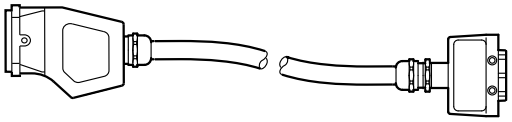
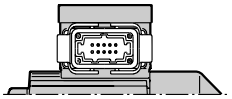
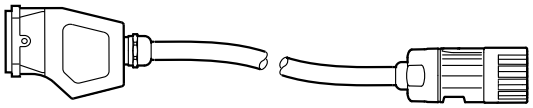
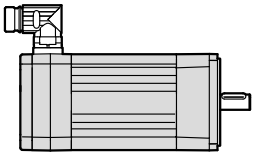
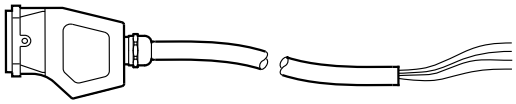
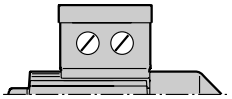
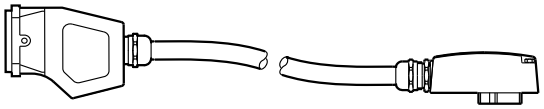
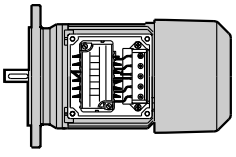
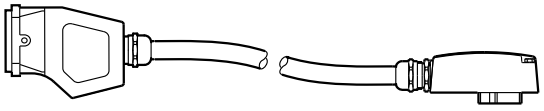
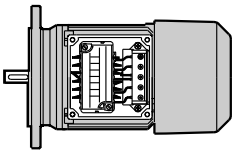
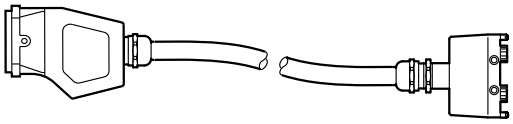
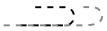
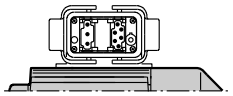
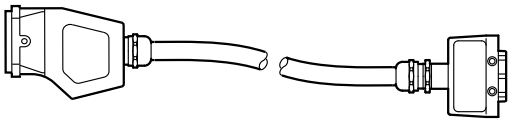
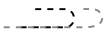
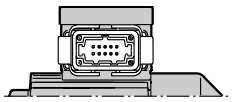
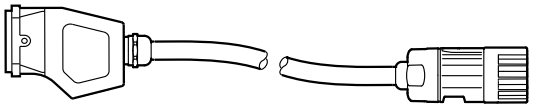
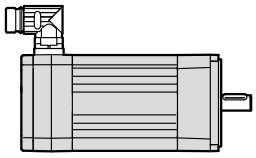
Cable	Length/installation type	Type	Component
Part number: 18127738  Han® Q 8/0 ↔ ASB8	Variable length	D/1.5	DRS71 – 90 DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 80 
Part number: 18125859  Han® Q 8/0 ↔ SB11	Variable length	E/1.5	CMP63 – 80 

Up to 2.2 KW (IEC / UL)

Cable	Length/installation type	Type	Component
Part number: 18143776  Han®Q 8/0 ↔ open (terminal box connection M4)	Variable length	D/2.5	DRS71 – 90 DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 80 
Part number: 18145949 人  Han® Q 8/0 ↔ IS 人	Variable length	D/2.5	DRS71 – 90人 DRE80 – 100人 DRP90 – 100人 DRN80 – 100人 DRL71 – 80人 

Cable	Length/installation type	Type	Component
Part number: 18144284 △  Han® Q 8/0 ↔ IS △	Variable length 	D/2.5	DRS71 – 90△ DRE80 – 100△ DRP90△ DRN80 – 100△ DRL71 – 80△ 
Part number: 18174442  Han® Q 8/0 ↔ ABB8	Variable length 	D/2.5	DRS71 – 90 DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 80 
Part number: 18174434  Han® Q 8/0 ↔ ASB8	Variable length 	D/2.5	DRS71 – 90 DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 80 
Part number: 18174450  Han® Q 8/0 ↔ SB11	Variable length 	E/2.5	CMP63 – 80 

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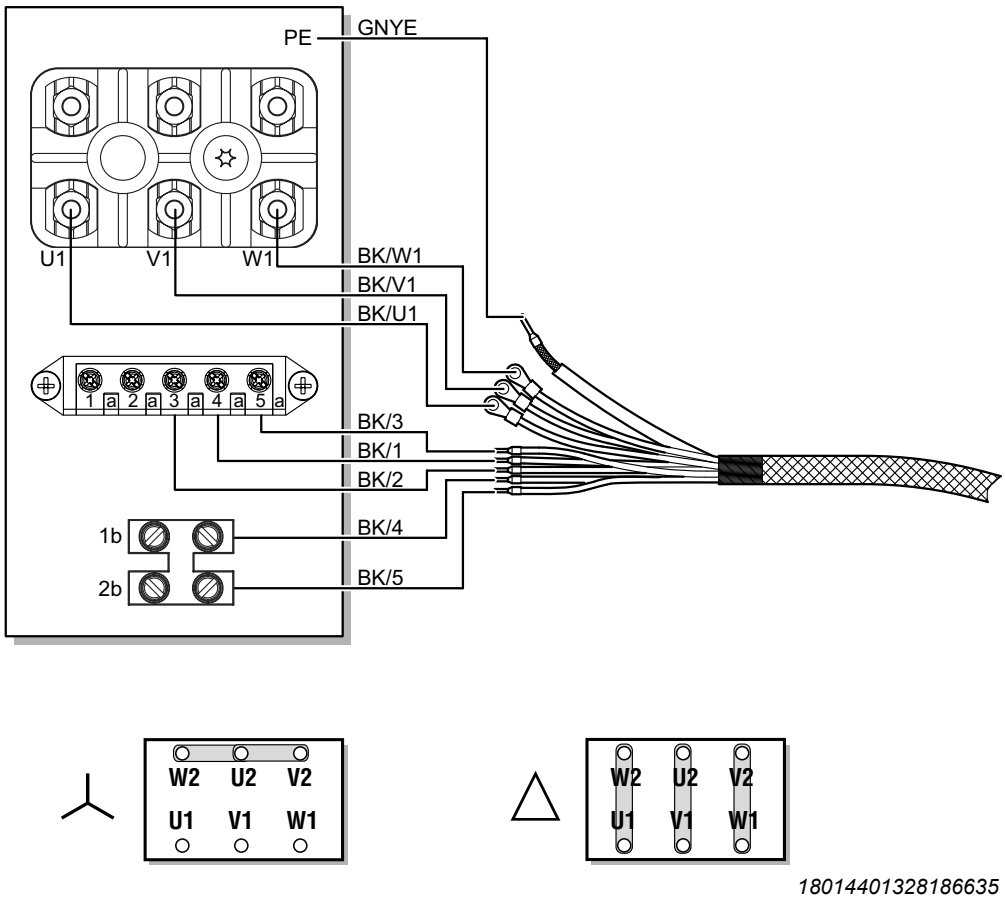
Conductor assignment

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

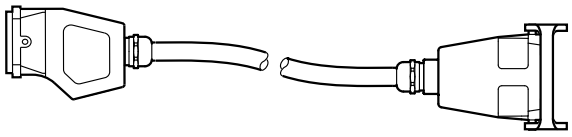
Connecting the hybrid cable

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



18014401328186635

Adapter cable

Cable	Length/installation type	Type	Component
Part number: 18161243  Han® Q 8/0 ↔ Han® 6 B	Variable length	D/2.5	All connection cables with Han® 6B Note the motor assignments to the device (2.2 kW).

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7.12.7 X2012: Motor with brake control

NOTICE

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

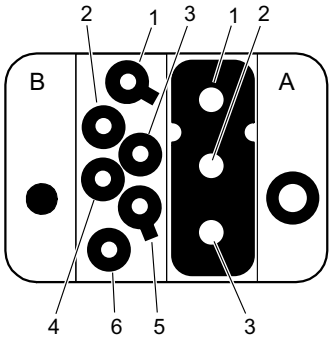
Damage to the drive system or its environment.

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

Function
Power connection for motor with brake up to 7.5 kW

Connection type
Han-Modular® 6 B, female, 1 locking latch

Wiring diagram



[A] Han® C module, female		
No.	**Name**	**Function**
1	U	Motor phase U output
2	V	Motor phase V output
3	W	Motor phase W output

[B] Han® E protected Module, female		
No.	**Name**	**Function**
1	TF/TH/KTY+	Motor temperature sensor (+)
2	15	Brake from SEW-EURODRIVE terminal 15 (blue)
3	13	Brake from SEW-EURODRIVE terminal 13 (red)
4	14	Brake from SEW-EURODRIVE terminal 14 (white)
5	n.c.	Not connected
6	TF/TH/KTY-	Motor temperature sensor (-)

Hinged frame		
No.	**Name**	**Function**
–	PE	PE connection

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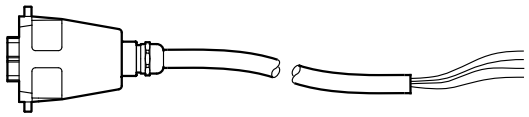
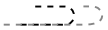
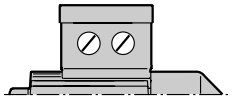
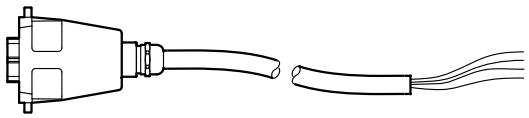
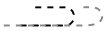
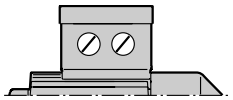
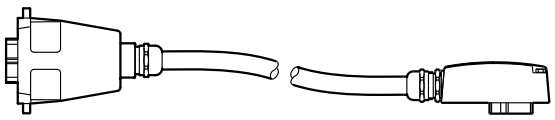
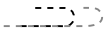
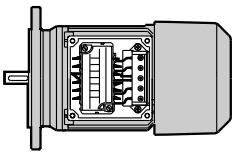
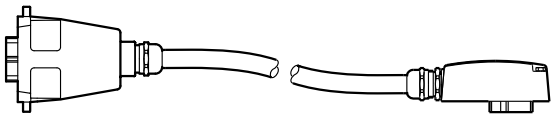
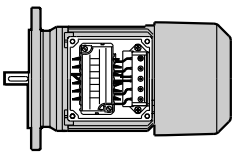
Connection cable

4,0 kW (IEC)

Cable	Length/installation type	Type	Component
Part number: 18118135  Han® 6 B ↔ Open (terminal box connection M4)	Variable length 	D/1.5	DRS71 – 100 DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 100 
Part number: 18118143  Han® 6 B ↔ Open (terminal box connection M5)	Variable length 	D/1.5	DRS112 DRE112 – 132 DRP112 – 132 DRN112 DRL112 – 132 
Part number: 18118178 ⅄  Han® 6 B ↔ IS ⅄	Variable length 	D/1.5	DRS71 – 112 ⅄ DRE80 – 132 ⅄ DRP90 – 132 ⅄ DRN80 – 132 ⅄ DRL71 – 132 ⅄ 
Part number: 18118151 △  Han® 6 B ↔ IS △	Variable length 	D/1.5	DRS71 – 132 △ DRE80 – 132 △ DRP90 – 132 △ DRN80 – 132 △ DRL71 – 132 △ 

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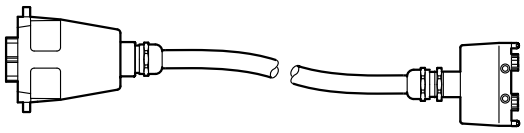
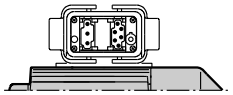
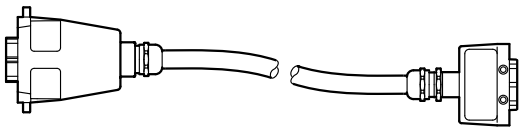
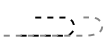
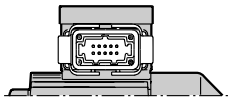
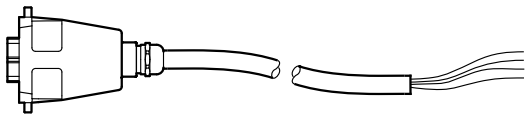
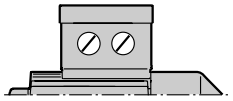
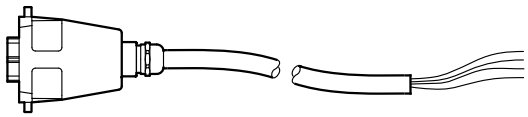
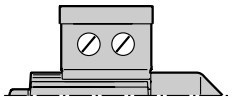
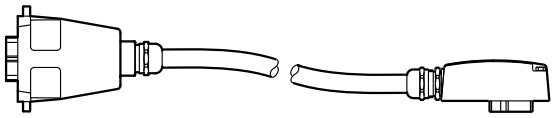
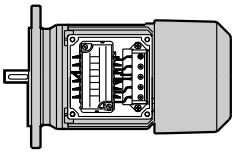
Cable	Length/installation type	Type	Component
Part number: 18118186  Han® 6 B ↔ ABB8	Variable length 	D/1.5	DRS71 – 112 DRE80 – 132 DRP90 – 132 DRN80 – 112 DRL71 – 132 
Part number: 18118194  Han® 6 B ↔ ASB8	Variable length 	D/1.5	DRS71 – 112 DRE80 – 132 DRP90 – 132 DRN80 – 112 DRL71 – 132 

4.0 kW (IEC/UL) – 7.5 kW (IEC)

Cable	Length/installation type	Type	Component
Part number: 18108334  Han® 6 B ↔ Open (terminal box connection M4)	Variable length 	D/2.5	4.0 kW (IEC/UL): DRS71 – 100 DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 100 7.5 kW (IEC): DRS71 – 100 DRE80 – 100 DRP90 – 100 DRN80 – 100 DRL71 – 90 

Cable	Length/installation type	Type	Component
Part number: 18108342  Han® 6 B ↔ Open (terminal box connection M5)	Variable length	D/2.5	4.0 kW (IEC/UL): DRS112 DRE112 – 132 DRP112 – 132 DRN112 DRL71 – 100
			7.5 kW (IEC/UL): DRS71 – 132 DRE80 – 132 DRP90 – 132 DRN80 – 132 DRL71 – 90 
Part number: 18108326 ⅄  Han® 6 B ↔ IS ⅄	Variable length	D/2.5	4.0 kW (IEC/UL): DRS71 – 112 ⅄ DRE80 – 132 ⅄ DRP90 – 132 ⅄ DRN80 – 112 ⅄ DRL71 – 100 ⅄
			7.5 kW (IEC): DRS71 – 132 ⅄ DRE80 – 160 ⅄ DRP90 – 160 ⅄ DRN80 – 132 ⅄ DRL71 – 90 ⅄ 

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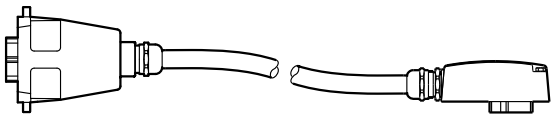
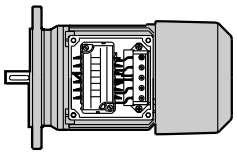
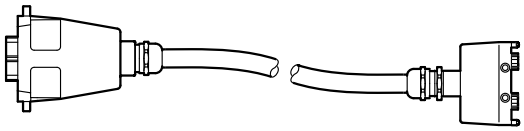
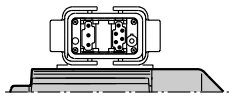
Cable	Length/installation type	Type	Component
Part number: 18108318 △  Han® 6 B ↔ IS △	Variable length	D/2.5	4.0 kW (IEC/UL): DRS71 – 112 △ DRE80 – 132 △ DRP90 – 132 △ DRN80 – 112 △ DRL71 – 100 △ 7.5 kW (IEC): DRS71 – 132 △ DRE80 – 160 △ DRP90 – 160 △ DRN80 – 132 △ DRL71 – 90 △ 
Part number: 18108245  Han® 6 B ↔ ABB8	Variable length	D/2.5	4.0 kW (IEC/UL): DRS71 – 112 DRE80 – 132 DRP90 – 132 DRN80 – 112 DRL71 – 100 7.5 kW (IEC): DRS71 – 132 DRE80 – 160 DRP90 – 160 DRN80 – 132 DRL71 – 90 

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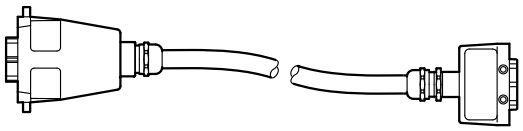
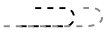
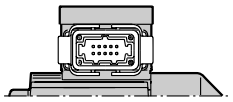
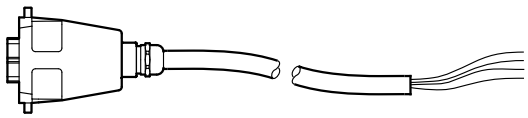
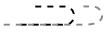
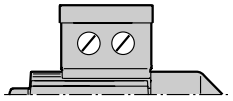
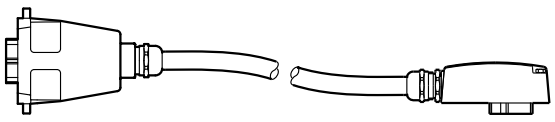
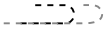
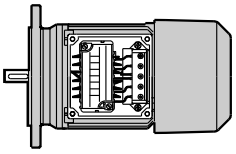
Cable	Length/installation type	Type	Component
Part number: 18108202  Han® 6 B ↔ ASB8	Variable length 	D/2.5	4.0 kW (IEC/UL): DRS71 – 112 DRE80 – 132 DRP90 – 132 DRN80 – 112 DRL71 – 100 7.5 kW (IEC): DRS71 – 132 DRE80 – 160 DRP90 – 160 DRN80 – 132 DRL71 – 90 

7.5 kW (IEC/UL)

Cable	Length/installation type	Type	Component
Part number: 18120601  Han® 6 B ↔ Open (terminal box connection M5)	Variable length 	D/4.0	DRS112 – 132 DRE112 – 132 DRP112 – 132 DRN112 – 132 DRL112 – 132 
Part number: 18121284 ⅄  Han® 6 B ↔ IS ⅄	Variable length 	D/4.0	DRS71 – 132 ⅄ DRE80 – 160 ⅄ DRP90 – 160 ⅄ DRN80 – 132 ⅄ DRL71 – 90 ⅄ 

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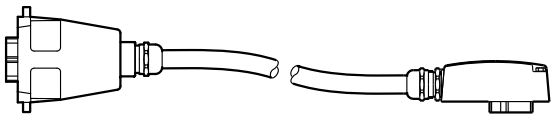
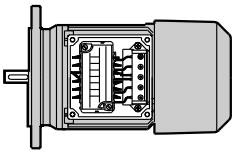
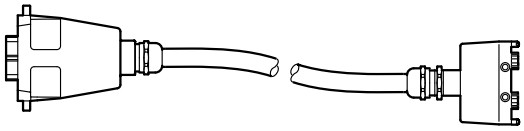
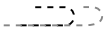
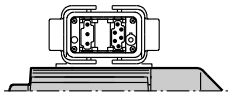
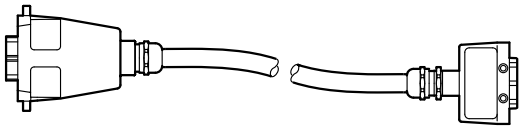
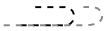
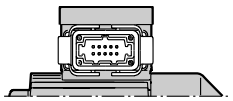
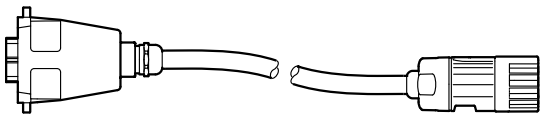
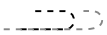
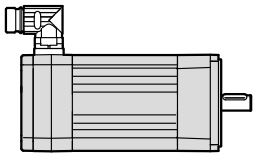
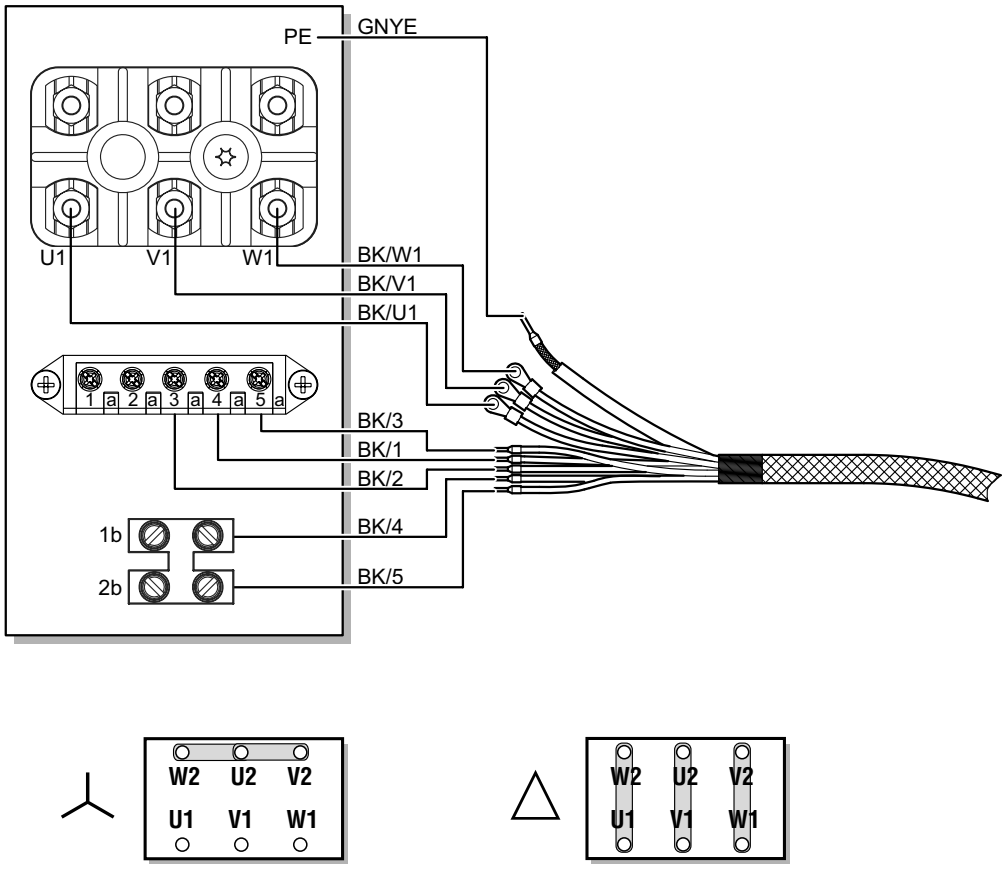
Cable	Length/installation type	Type	Component
Part number: 18121276 △  Han® 6 B ↔ IS △	Variable length 	D/4.0	DRS71 – 132 △ DRE80 – 160 △ DRP90 – 160 △ DRN80 – 132 △ DRL71 – 90 △ 
Part number: 18120628  Han® 6 B ↔ ABB8	Variable length 	D/4.0	DRS71 – 132 DRE80 – 160 DRP90 – 160M DRN80 – 132 DRL71 – 90 
Part number: 18120636  Han® 6 B ↔ ASB8	Variable length 	D/4.0	DRS71 – 132 DRE80 – 160 DRP90 – 160 DRN80 – 132 DRL71 – 90 
Part number: 18122035  Han® 6 B ↔ SB14	Variable length 	E/4.0	CMP63 – 100 

Conductor assignment

Part number	Motor terminal DR.. motor	Color coding	Hybrid cable designation	Connection device
18108334 18108342 18118135 18118143 18120601	U1	Black	U1	Motor phase U
	V1	Black	V1	Motor phase V
	W1	Black	W1	Motor phase W
	4a	Black	1	Brake 13 (red)
	3a	Black	2	Brake 14 (white)
	5a	Black	3	Brake 15 (blue)
	1b	Black	4	TF/TH +
	2b	Black	5	TF/TH -
	PE connection	Green-yellow + shield end (Inner shield)		PE

Connecting the hybrid cable

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



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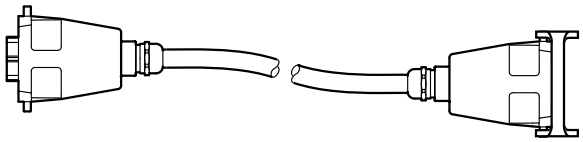
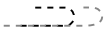
Extension cable

Cable	Length/installation type	Type	Component
Part number: 18157475  Han® 6 B ↔ Han® 6 B	Variable length 	D/6.0	Connection cables: 18108202 18108245 18108318 18108326 18108334 18108342 18110525 18118135 18118143 18118151 18118178 18118186 18118194 18120601 18120628 18120636 18121276 18121284 18122027 18122035

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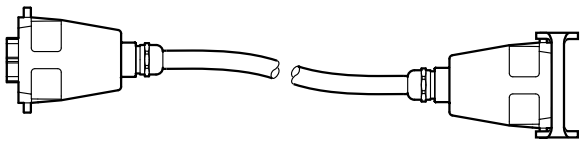
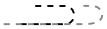
Phase reversal cable

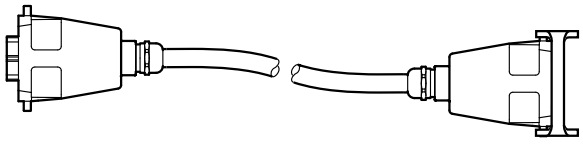
INFORMATION

If you are using an encoder, note that you also need an encoder signal reversal cable in addition to the phase reversal cable. For more information about encoder signal reversal cables, refer to the description of the encoder connection.

4 kW (IEC/UL) – 7.5 kW (IEC)

Cable	Length/installation type	Type	Wiring diagram
Part number: 18113737  Han® 6 B ↔ Han® 6 B	Fixed length 	D/2.5	**U1 – V1** **V1 – U1** W1 – W1 13 – 13 14 – 14 15 – 15 TF+ – TF+ TF- – TF-

4 kW (IEC/UL) – 7.5 kW (IEC/UL)

Cable	Length/installation type	Type	Wiring diagram
Part number: 18122000  Han® 6 B ↔ Han® 6 B	Fixed length 	D/6.0	**U1 – V1** **V1 – U1** W1 – W1 13 – 13 14 – 14 15 – 15 TF+ – TF+ TF- – TF-

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7.12.8 X2016: Motor with brake control

NOTICE

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

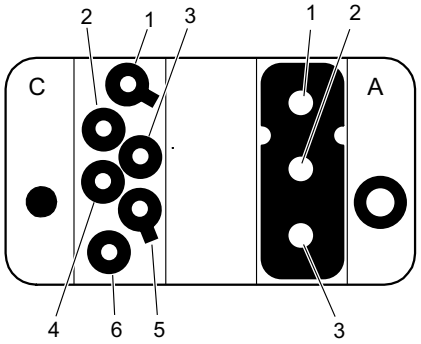
Damage to the drive system or its environment.

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

Function
Power connection for motor with brake up to 22 kW

Connection type
Han-Modular® 10 B, female, 1 single locking latch

Wiring diagram



[A] Han® C module, female		
No.	**Name**	**Function**
1	U	Motor phase U output
2	V	Motor phase V output
3	W	Motor phase W output

[C] Han® E protected module, female		
No.	**Name**	**Function**
1	TF/TH/KTY+	Motor temperature sensor (+)
2	15	Brake from SEW-EURODRIVE terminal 15 (blue)
3	13	Brake from SEW-EURODRIVE terminal 13 (red)
4	14	Brake from SEW-EURODRIVE terminal 14 (white)
5	n.c.	Not connected
6	TF/TH/KTY-	Motor temperature sensor (-)

Hinged frame		
No.	**Name**	**Function**
–	PE	PE connection

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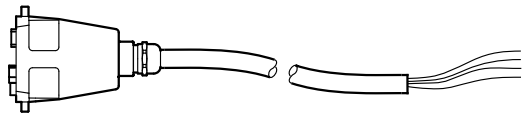
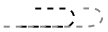
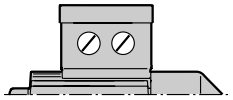
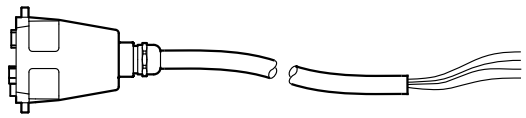
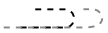
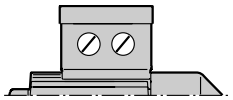
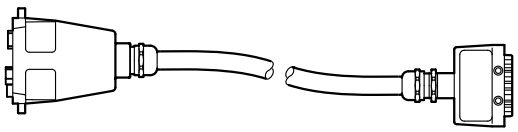
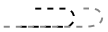
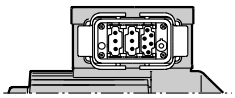
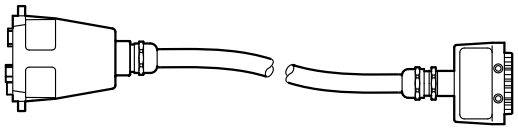
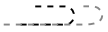
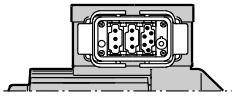
Connection cables

11.0 kW (IEC/UL)

Cable	Length/installation type	Type	Component
Part number: 18110452  Han® 10 B ↔ Open (terminal box connection M5)	Variable length 	D/6.0	DRS112 – 132 DRE112 – 132 DRP112 – 132 DRN112 – 132 DRL112 – 132 
Part number: 18110479  Han® 10 B ↔ Open (terminal box connection M6)	Variable length 	D/6.0	DRS160 DRE160 DRP160 DRN160 DRL160 
Part number: 18123562 ⅄  Han® 10 B ↔ ADB2 ⅄	Variable length 	D/6.0	DRS160⅄ DRE180⅄ DRP180⅄ DRN160⅄ DRL160⅄ 
Part number: 18123570 △  Han® 10 B ↔ ADB2 △	Variable length 	D/6.0	DRS160△ DRE180△ DRP180△ DRN160△ DRL160△ 

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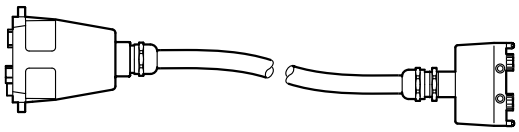
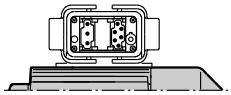
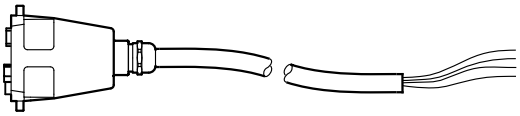
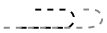
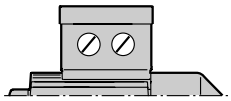
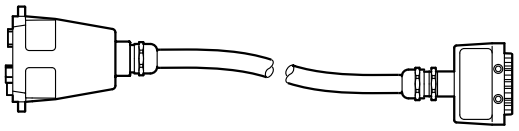
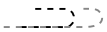
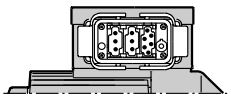
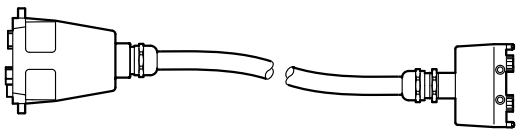
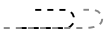
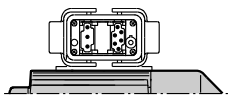
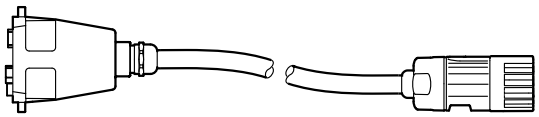
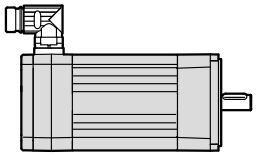
Cable	Length/installation type	Type	Component
Part number: 18110436  Han® 10 B ↔ ABB8	Variable length 	D/6.0	DRS160 DRE180 DRP180 DRN160 DRL160 

11 kW (IEC/UL) up to 22 kW (IEC/UL)

Cable	Length/installation type	Type	Component
Part number: 18121985  Han® 10 B ↔ Open (terminal box connection M6)	Variable length 	D/10.0	DRS180 DRE180 DRP200 DRN180 DRL180 
Part number: 18123589 ⅄  Han® 10 B ↔ ADB2 ⅄	Variable length 	D/10.0	DRS180⅄ DRE180⅄ DRP200⅄ DRN180⅄ DRL180⅄ 
Part number: 18118208  Han® 10 B ↔ ABB8	Variable length 	D/10.0	DRS180 DRE180 DRP200 DRN180 DRL180 

Cable	Length/installation type	Type	Component
Part number: 18110533  Han® 10 B ↔ SBB6	Variable length	E/6.0	CMP80 – 100 

Conductor assignment

Part number	Motor terminal DR.. motor	Color coding	Hybrid cable designation	Connection device
18110452 18110479 18121985	U1	Black	U1	Motor phase U
	V1	Black	V1	Motor phase V
	W1	Black	W1	Motor phase W
	4a	Black	1	Brake 13 (red)
	3a	Black	2	Brake 14 (white)
	5a	Black	3	Brake 15 (blue)
	1b	Black	4	TF/TH +
	2b	Black	5	TF/TH -
	PE connection	Green-yellow + shield end (Inner shield)		PE

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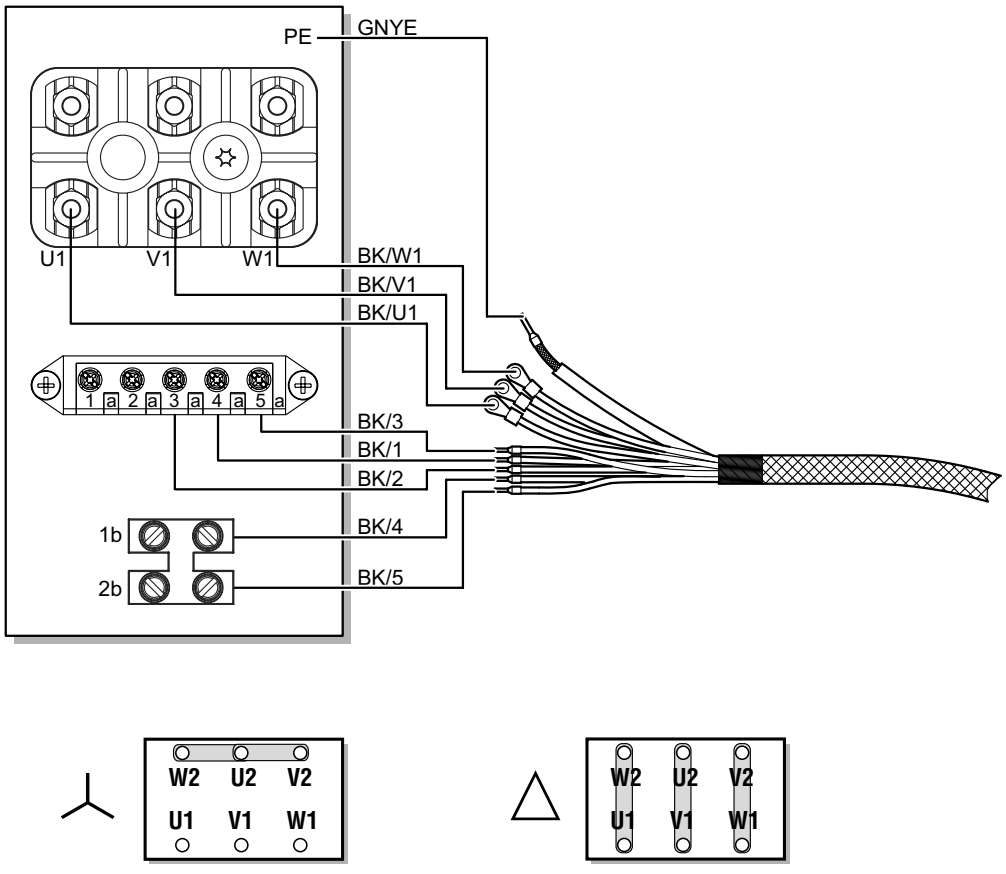
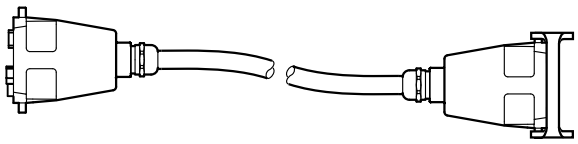
Connecting the hybrid cable

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



18014401328186635

Extension cable

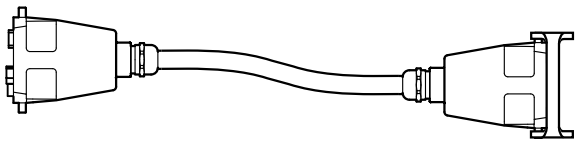
Cable	Length/installation type	Type	Component
Part number: 18164226  Han® 10 B ↔ Han® 10 B	Variable length ⋯	D/6.0	Connection cables: 18110436 18110533 18110452 18110479 18118208 18121985 18122051 18123562 18123570 18123589

Phase reversal cable

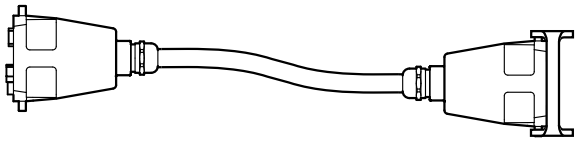
INFORMATION

If you are using an encoder, note that you also need an encoder signal reversal cable in addition to the phase reversal cable. For more information about encoder signal reversal cables, refer to the description of the encoder connection.

11 kW (IEC/UL)

Cable	Length/installation type	Type	Wiring diagram
Part number: 18119638  Han® 10 B ↔ Han® 10 B	Fixed length	D/6.0	**U1 – V1** **V1 – U1** W1 – W1 13 – 13 14 – 14 15 – 15 TF+ – TF+ TF- – TF-

15 kW, 22 kW (IEC/UL)

Cable	Length/installation type	Type	Wiring diagram
Part number: 18113745  Han® 10 B ↔ Han® 10 B	Fixed length	D/10.0	**U1 – V1** **V1 – U1** W1 – W1 13 – 13 14 – 14 15 – 15 TF+ – TF+ TF- – TF-

7.12.9 X2301: Braking resistor

Function
Power connection for external braking resistor

Connection type
Han® Q 5/0, female

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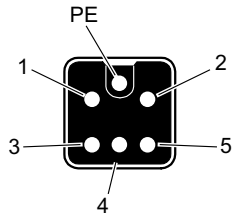
Wiring diagram


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

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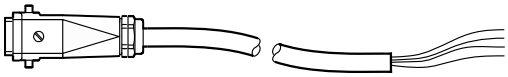
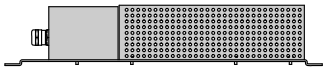
Connection cable

INFORMATION

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

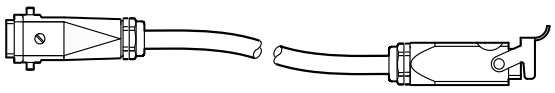
IEC/UL

Cable	Length/installation type	Component
Part number: 18166563 (replacement for 11722916) Cable design: (3G2.5) Core cross section: 2.5 mm²  Han®Q 5/0 ↔ Open with conductor end sleeves	Variable length 	External braking resistor  Terminal cross section 6 mm²

Conductor assignment

Part number	Signal name	Color coding
18166563 (replacement for 11722916)	+R	Black/1
	-R	Black/2
	PE	Green/yellow

Extension cable

Cable	Length/installation type	Component
Part number: 18121349 Cable design: (3G2.5) Core cross section: 2.5 mm²  Han® Q 5/0 ↔ Han® Q 5/0	Variable length 	Connection cable18166563

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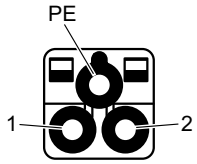
7.12.10 X2303: Braking resistor

Function
Power connection for external braking resistor

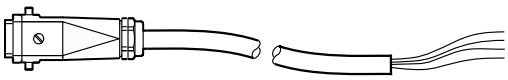
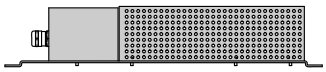
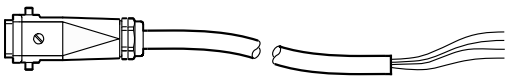
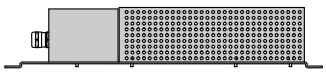
Connection type
Han® Q 2/0, female, I-coded

Wiring diagram


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

Connection cables

IEC/UL

Cable	Length/installation type	Component
Part number: 18166571 (replacement for 18121969) Cable design: (3G2.5) Core cross section: 2.5 mm²  Han®Q 2/0 ↔ Open with conductor end sleeves	Variable length 	External braking resistor  Terminal cross section: 6 mm²
Part number: 18166598 (replacement for 18121977) Cable design: (3G6.0) Core cross section: 6 mm²  Han®Q 2/0 ↔ Open with conductor end sleeves	Variable length 	External braking resistor  Terminal cross section: 6 mm²

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Conductor assignment

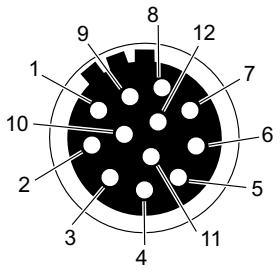
Part number	Signal name	Color coding
18166571 (replacement for 18121969)	+R	Black/1
	-R	Black/2
18166598 (replacement for 18121977)	PE	Green/yellow

7.12.11 X3001: Motor encoder

Function
Connection for resolver

Connection type
M23, insulator, P part, 12-pin, female, +20°-coded

Wiring diagram



No.	Name	Function
1	Ref+	Reference voltage (+)
2	Ref-	Reference voltage (-)
3	Cos+	Cosine track (+)
4	Cos-	Cosine track (-)
5	Sin+	Sine track (+)
6	Sin-	Sine track (-)
7	res.	Reserved
8	res.	Reserved
9	TF/TH/KTY+	Motor temperature sensor (+)
10	TF/TH/KTY-	Motor temperature sensor (-)
11	res.	Reserved
12	res.	Reserved

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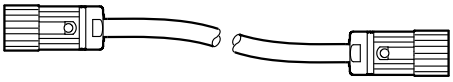
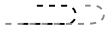
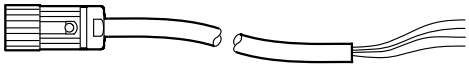
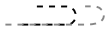
Connection cables

Cable	Length/installation type	Component
Part number: 11724927 Cable design: (4X2X0.25)  M23, 12-pin, 20°-coded ↔ M23, 12-pin, 0°-coded	Variable length 	Resolver RH1M, RH1L
Part number: 11726431 Cable design: (4X2X0.25)  M23, 12-pin, 20°-coded ↔ Open with conductor end sleeves	Variable length 	Resolver RH1M, RH1L

Conductor assignment

Part number	Signal name	Color coding
11726431	Ref+	Pink
	Ref-	Gray
	Cos+	Red
	Cos-	Blue
	Sin+	Yellow
	Sin-	Green
	TF/TH/KTY+	White
	TF/TH/KTY-	Brown

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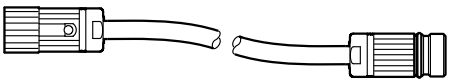
Extension cable

Cable	Length/installation type	Component
Part number: 18156851 Cable design: (6X2X0.25)  M23, 12-pin, 20°-coded ↔ M23, 12-pin, 20°-coded	Variable length 	Connection cables: 11724927 11726431 18110991 18121438 18121446 18121454 18121926 18121934 18121942 18121950

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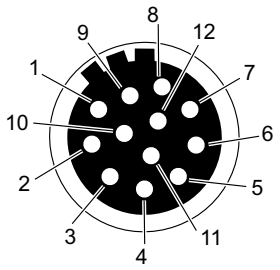
7.12.12 X3011: Motor encoder

Function
Connection for HIPERFACE®, sin/cos, TTL/HTL encoders

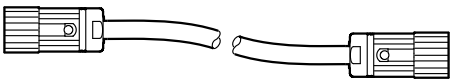
Connection type
M23, insulator, P part, 12-pin, female, +20°-coded

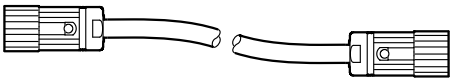
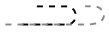
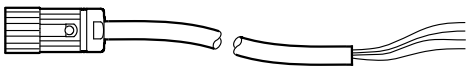
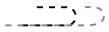
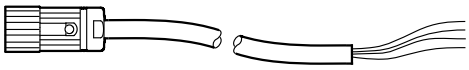
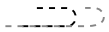
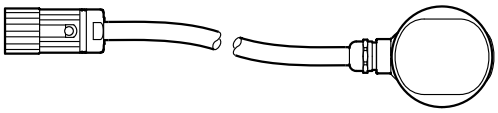
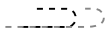
Wiring diagram



No.	Name	Function
1	C	Signal track C (K0)
2	/C	Negated signal track C (/K0)
3	A	Signal track A (K1)
4	/A	Negated signal track A (/K1)
5	B	Signal track B (K2)
6	/B	Negated signal track B (/K2)
7	Data-	Data line (-)
8	Data+	Data line (+)
9	TF/TH/KTY+	Motor temperature sensor (+)
10	TF/TH/KTY-	Motor temperature sensor (-)
11	GND	Reference potential
12	+12V	DC 12 V output

Connection cables

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

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

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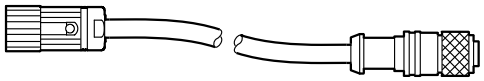
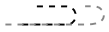
Cable	Length/installation type	Component
Part number: 18121950 (without temperature sensor) Cable design: (4X2X0.25)  M23, 12-pin, 20°-coded ↔ M12, 8-pin	Variable length 	EI7.

Conductor assignment

Part number	Signal name	Color coding
18121438	C	Brown
	/C	White
	A	Red
	/A	Blue
	B	Yellow
	/B	Green
	Data-	Purple
	Data+	Black
	GND	Gray/Pink + Pink
	+12V	Red/Blue + Gray

Part number	Signal name	Color coding
18121446	C	Pink
	/C	Gray
	A	Red
	/A	Blue
	B	Yellow
	/B	Green
	Data-	Purple
	Data+	Black
	TF/TH/KTY+	Brown
	TF/TH/KTY-	White
	GND	Gray/Pink
	+12V	Red/Blue

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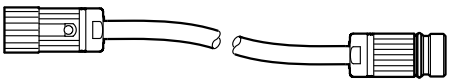
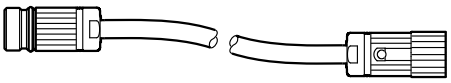
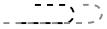
Extension cable

Cable	Length/installation type	Component
Part number: 18156851 Cable design: (6X2X0.25)  M23, 12-pin, 20°-coded ↔ M23, 12-pin, 20°-coded	Variable length 	Connection cables: 11724927 11726431 18110991 18121438 18121446 18121454 18121926 18121934 18121942 18121950

Encoder signal reversal cable

INFORMATION

An additional encoder signal reversal cable is only necessary if you are using a phase reversal cable.

Cable	Length/installation type	Component
Part number: 18114806 (not suitable for HIPERFACE® encoders) Cable design: (6X2X0.25)  M23, 12-pin, 20°-coded ↔ M23, 12-pin, 20 °-coded	Variable length 	E..T E..C E..S E..R

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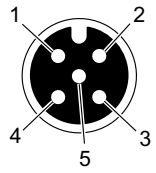
7.12.13 X3211: Distance encoder

Function
Connection for CAN bus encoder

Connection type
M12, 5-pin, female, A-coded

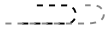
Wiring diagram



No.	Name	Function
1	CAN_SHLD	Shield/equipotential bonding
2	+24V	DC 24 V output[1)]
3	GND	Reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)

1) Total current load of DC 24 V encoder supply ≤ 400 mA

Connection cable

Cable	Length/installation type	Component
Length 1 m: Part number: 13237748 **Length 1.5 m:** Part number: 13286293 **Length 2 m:** Part number: 13287756 **Length 2.5 m:** Part number: 13286307 **Length 3 m:** Part number: 13286315 **Length 4 m:** Part number: 13286323 **Length 5 m:** Part number: 13286331 **Length 10 m:** Part number: 13286358 **Length 15 m:** Part number: 13286366 Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)  M12, male, A-coded ↔ M12, female, A-coded	Fixed length 	Sick DME4000, TR CE58M, TR LE200, WCS3(B)-LS410

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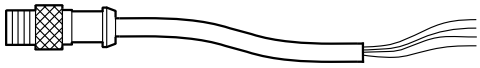
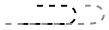
Cable	Length/installation type	Component
Length 1 m: Part number: 13281348 **Length 1.5 m:** Part number: 13281356 **Length 2 m:** Part number: 13281364 **Length 2.5 m:** Part number: 13281372 **Length 3 m:** Part number: 13281380 **Length 4 m:** Part number: 13281399 **Length 5 m:** Part number: 13281402 **Length 10 m:** Part number: 13281410 **Length 15 m:** Part number: 13281429 Cable design: ((1X2X0.2)+(1X2X0.32)+1X0.32)  M12, male, A-coded ↔ Open	Fixed length 	Sick DME4000, TR CE58M, TR LE200, WCS3(B)-LS410

Conductor assignment

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

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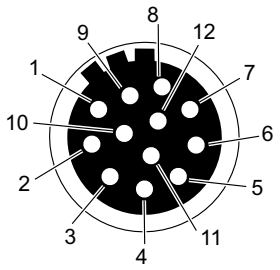
7.12.14 X3222: Multi-distance encoder

Function
Connection for HIPERFACE®, SSI, sin/cos, TTL, HTL and RS422 encoders

Connection type
M23, insulator, P part, 12-pin, female, +20°-coded

Wiring diagram



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

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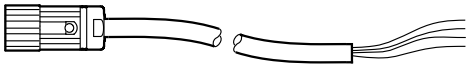
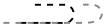
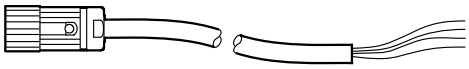
Connection cable

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

Conductor assignment

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

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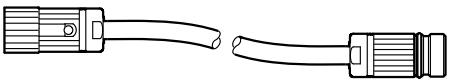
Part number	Signal name	Color coding
18121942	CLK	Brown
	/CLK	White
	A	Red
	/A	Blue
	B	Yellow
	/B	Green
	Data-	Purple
	Data+	Black
	GND	Gray/Pink + Pink
	+24V	Red/Blue + Gray

Extension cable

Cable	Length/installation type	Component
Part number: 18156851 Cable design: (6X2X0.25)  M23, 12-pin, 20°-coded ↔ M23, 12-pin, 20°-coded	Variable length 	Connection cables: 11724927 11726431 18110991 18121438 18121446 18121454 18121926 18121934 18121942 18121950

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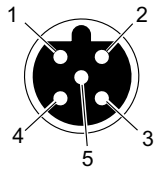
7.12.15 X4011: RS485 interface – external

Function
RS485 interface for external components

Connection type
M12, 5-pin, female, B-coded

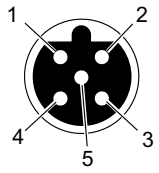
Wiring diagram


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

7.12.16 X4012: RS485 interface – external

Function
RS485 interface for external components (electrically isolated)

Connection type
M12, 5-pin, female, B-coded

Wiring diagram


No.	Name	Function
1	res.	Reserved
2	RS-	RS485 data line (-)
3	RS_GND	RS485 reference potential
4	RS+	RS485 data line (+)
5	res.	Reserved

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7.12.17 X4101: CAN bus – system bus

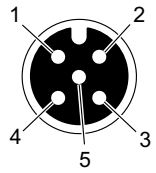
INFORMATION

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

Function
Internal CAN bus (system bus) – output

Connection type
M12, 5-pin, female, A-coded

Wiring diagram



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)

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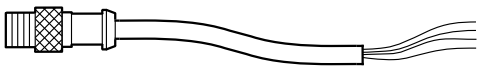
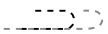
Connection cables

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

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Conductor assignment

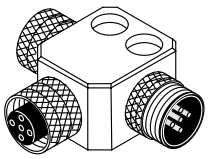
Part number	Signal name	Color coding
13281348	CAN_SHLD	–
13281356	+24V	Red
13281364	GND	Black
13281372	CAN_H	White
13281380	CAN_L	Blue
13281399		
13281402		
13281410		
13281429		

Connection components

CAN T-piece

Part number: 13290967

Connection: M12



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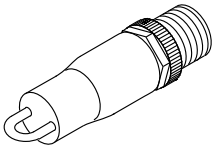
CAN terminating resistor

Part number: 13287036

Connection: M12



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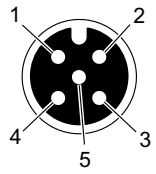
7.12.18 X4111: CAN bus – external

INFORMATION

If the connection is used the last station must be terminated at the CAN bus.

Function
CAN bus for external components

Connection type
M12, 5-pin, female, A-coded

Wiring diagram


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)

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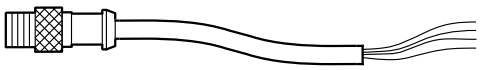
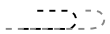
Connection cables

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

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Conductor assignment

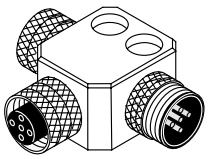
Part number	Signal name	Color coding
13281348	CAN_SHLD	–
13281356	+24V	Red
13281364	GND	Black
13281372	CAN_H	White
13281380	CAN_L	Blue
13281399		
13281402		
13281410		
13281429		

Connection components

CAN T-piece

Part number: 13290967

Connection: M12

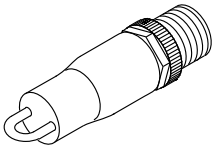


5656744075

CAN terminating resistor

Part number: 13287036

Connection: M12



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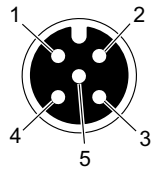
7.12.19 X4112: CAN bus – external

Function
CAN bus for external components (electrically isolated)

Connection type
M12, 5-pin, female, A-coded

Wiring diagram


No.	Name	Function
1	CAN_SHLD	Shield/equipotential bonding
2	res.	Reserved
3	CAN_GND	CAN reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)

Connection cables

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

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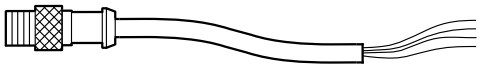
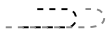
Cable	Length/installation type	Component
Standard lengths: 2 m: Part number: 13281364 5 m: Part number: 13281402 **Custom lengths:** 1 m: Part number: 13281348 1.5 m: Part number: 13281356 2.5 m: Part number: 13281372 3 m: Part number: 13281380 4 m: Part number: 13281399 10 m: Part number: 13281410 15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

Conductor assignment

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

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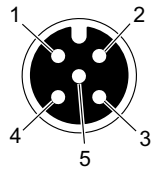
7.12.20 X4121: CAN bus – MOVISAFE® safety bus (CAN-S)

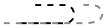
Function
CAN bus – Connection for MOVISAFE® safety bus (CAN-S)

Connection type
M12, 5-pin, female, A-coded

Wiring diagram


No.	Name	Function
1	CAN_SHLD	Shield/equipotential bonding
2	res.	Reserved
3	CAN_GND	CAN reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)

Connection cables

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

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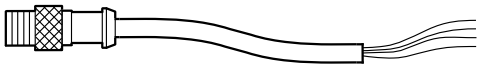
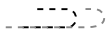
Cable	Length/installation type	Component
Standard lengths: 2 m: Part number: 13281364 5 m: Part number: 13281402 **Custom lengths:** 1 m: Part number: 13281348 1.5 m: Part number: 13281356 2.5 m: Part number: 13281372 3 m: Part number: 13281380 4 m: Part number: 13281399 10 m: Part number: 13281410 15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

Conductor assignment

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

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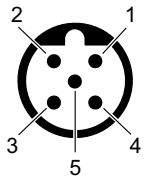
7.12.21 X4201: PROFIBUS input

Function
PROFIBUS input

Connection type
M12, 5-pin, male, B-coded

Wiring diagram



No.	Name	Function
1	res.	Reserved
2	A	PROFIBUS data line A (green)
3	res.	Reserved
4	B	PROFIBUS data line B (red)
5	res.	Reserved

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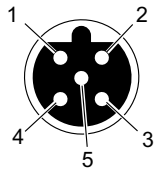
7.12.22 X4202: PROFIBUS output

INFORMATION

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

Function
PROFIBUS output

Connection type
M12, 5-pin, female, B-coded

Wiring diagram


No.	Name	Function
1	+5V	DC 5 V output
2	A	PROFIBUS data line A (green)
3	0V5	0V5 reference potential
4	B	PROFIBUS data line B (red)
5	res.	Reserved

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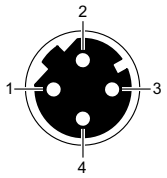
7.12.23 X4224: Ethernet engineering

Function
Ethernet engineering interface, 4-pin

Connection type
M12, 4-pin, female, D-coded

Wiring diagram


No.	Name	Function
1	TX+	Transmit line (+)
2	RX+	Receive line (+)
3	TX-	Transmit line (-)
4	RX-	Receive line (-)

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7.12.24 X4232_11 and X4232_12: Ethernet fieldbus

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

NOTICE

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

Damage to the push-pull RJ45 connection.

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

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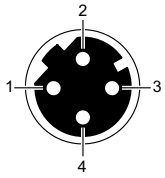
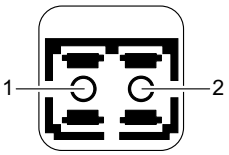
7.12.25 X4233_11 and X4233_12: Ethernet fieldbus

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

7.12.26 X4234_11 and X4234_12: Ethernet fieldbus

Function		
Ethernet fieldbus interface SCRJ/POF		
Connection type		
Push-pull SCRJ		
Wiring diagram		
		
Assignment		
No.	Name	Function
1	TX	Transmit line (POF)
2	RX	Receive line (POF)

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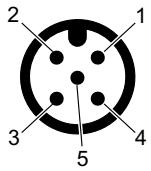
7.12.27 X4241: DeviceNet™ input

Function
DeviceNet™ input

Connection type
M12, 5-pin, male, A-coded

Wiring diagram


No.	Name	Function
1	Drain	Shield/equipotential bonding
2	V+	DC 24 V input
3	V-	Reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)

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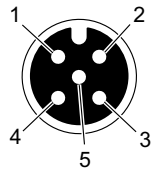
7.12.28 X4242: DeviceNet™ output

INFORMATION

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

Function
DeviceNet™ output

Connection type
M12, 5-pin, female, A-coded

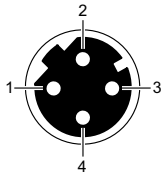
Wiring diagram


No.	Name	Function
1	Drain	Shield/equipotential bonding
2	V+	DC 24 V output
3	V-	Reference potential
4	CAN_H	CAN data line (high)
5	CAN_L	CAN data line (low)

7.12.29 X4251: SBus^{PLUS} system bus

Function
EtherCAT®-based SEW system bus SBus^{PLUS}

Connection type
M12, 4-pin, female, D-coded

Wiring diagram


No.	Name	Function
1	TX+	Transmit line (+)
2	RX+	Receive line (+)
3	TX-	Transmit line (-)
4	RX-	Receive line (-)

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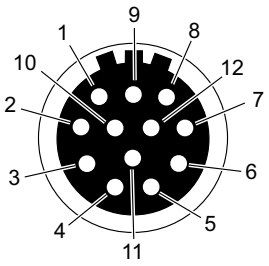
7.12.30 X5001_1: Digital inputs/outputs – communication and control unit

Function
Digital inputs/outputs of the communication and control unit

Connection type
M23, insulator, P part, 12-pin, female, 0°-coded

Wiring diagram



No.	Name	Function
1	DI00/DO00	Digital input or output DIO
2	DI01/DO01	Digital input or output DIO
3	DI02/DO02	Digital input or output DIO
4	DI03/DO03	Digital input or output DIO
5	DI04	Digital input DI
6	DI05	Digital input DI
7	DI06	Digital input DI
8	DI07	Digital input DI
9	0V24	0V24 reference potential
10	0V24	0V24 reference potential
11	+24V	DC 24 V output
12	FE	Equipotential bonding / functional earth

Connection cables

Cable	Length/installation type	Component
Length 1 m: Part number: 18255477 **Length 3 m:** Part number: 18255485 Cable design: (3X0.75+8X0.34)  M23, 12-pin, male, 0°-coded ↔ sensor/actuator box with 4 slots M12	Fixed length	–

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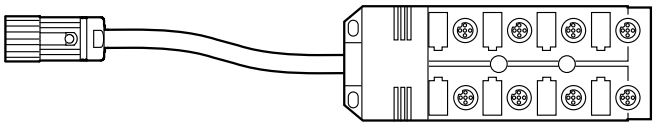
Cable	Length/installation type	Component
Length 1 m: Part number 13309269 **Length 2 m:** Part number 13309277 **Length 3 m:** Part number 13309285 **Length 5 m:** Part number 13309293 **Length 10 m:** Part number 13309307 Cable design: (3X0.75+8X0.34)  M23, 12-pin, male, 0°-coded ↔ sensor/actuator box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

Extension cable

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

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

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Conductor assignment

Conductor assignment X5001_1

Part number	Signal name	Color coding
11741457	DI00/DO00	Pink
	DI01/DO01	Gray
	DI02/DO02	Red
	DI03/DO03	Blue
	DI04	Yellow
	DI05	Green
	DI06	Purple
	DI07	Black
	0V24	Brown
	0V24	White
	+24V	Gray/Pink
	FE	Red/Blue

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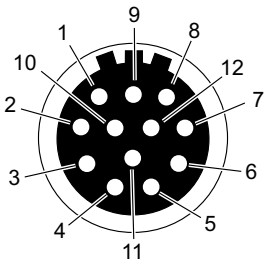
7.12.31 X5001_2: Digital inputs – communication and control unit

Function
Digital inputs of the communication and control unit

Connection type
M23, insulator, P part, 12-pin, female, 0°-coded

Wiring diagram



No.	Name	Function
1	DI08	Digital input DI
2	DI09	Digital input DI
3	DI10	Digital input DI
4	DI11	Digital input DI
5	DI12	Digital input DI
6	DI13	Digital input DI
7	DI14	Digital input DI
8	DI15	Digital input DI
9	0V24	0V24 reference potential
10	0V24	0V24 reference potential
11	+24V	DC 24 V output
12	FE	Equipotential bonding / functional earth

Connection cables

Cable	Length/installation type	Component
Length 1 m: Part number: 18255477 **Length 3 m:** Part number: 18255485 Cable design: (3X0.75+8X0.34)  M23, 12-pin, male, 0°-coded ↔ sensor/actuator box with 4 slots M12	Fixed length	–

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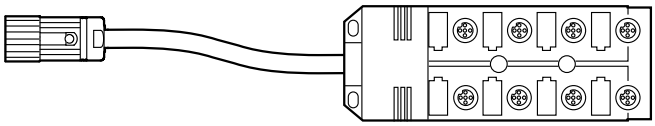
Cable	Length/installation type	Component
Length 1 m: Part number 13309269 **Length 2 m:** Part number 13309277 **Length 3 m:** Part number 13309285 **Length 5 m:** Part number 13309293 **Length 10 m:** Part number 13309307 Cable design: (3X0.75+8X0.34)  M23, 12-pin, male, 0°-coded ↔ sensor/actuator box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

Extension cable

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

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

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Conductor assignment

Conductor assignment X5001_2

Part number	Signal name	Color coding
11741457	DI08	Pink
	DI09	Gray
	DI10	Red
	DI11	Blue
	DI12	Yellow
	DI13	Green
	DI14	Purple
	DI15	Black
	0V24	Brown
	0V24	White
	+24V	Gray/Pink
	FE	Red/Blue

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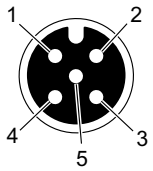
7.12.32 X5102_1: Digital inputs – Frequency inverter

Function
Digital inputs/outputs – power section

Connection type
M12, 5-pin, female, A-coded

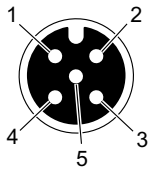
Wiring diagram


No.	Name	Function
1	+24V	DC 24 V output
2	DI03	Digital input DI03
3	0V24	0V24 reference potential
4	DI02	Digital input DI02
5	FE	Equipotential bonding / functional earth

7.12.33 X5102_2: Digital inputs – Frequency inverter

Function
Digital inputs/outputs – power section

Connection type
M12, 5-pin, female, A-coded

Wiring diagram


No.	Name	Function
1	+24V	DC 24 V output
2	DI05	Digital input DI05
3	0V24	0V24 reference potential
4	DI04	Digital input DI04
5	FE	Equipotential bonding / functional earth

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Connection components

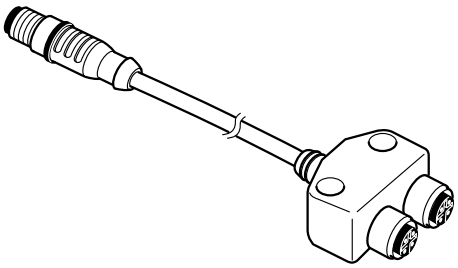
Y adapter

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

The Y adapter is available from different manufacturers:

- **Manufacturer:** Escha

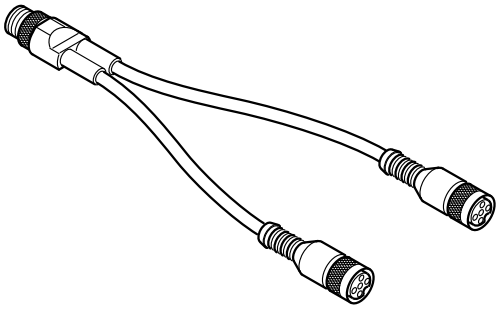
  Type: WAS4-0,3-2FKM3/..



9007200170035339

- **Manufacturer:** Binder

  Type: 79 5200..



9007200435121675

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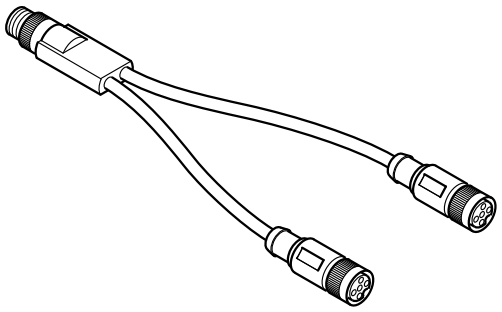
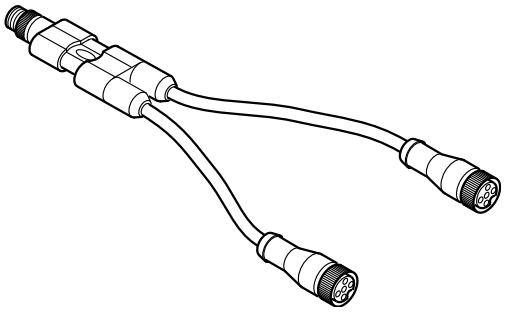
- **Manufacturer:** Phoenix Contact
  Type: SAC-3P-Y-2XFS SCO/.../...
  The cable sheath is made of PVC. Provide suitable UV protection.



1180375179

- **Manufacturer:** Murr
  Type: 7000-40721-..



1180386571

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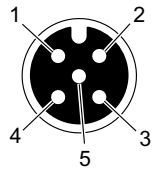
7.12.34 X5111: Fan subassembly

Function
Temperature-controlled DC 24 V switching output for additional external fan

Connection type
M12, 5-pin, female, A-coded

Wiring diagram


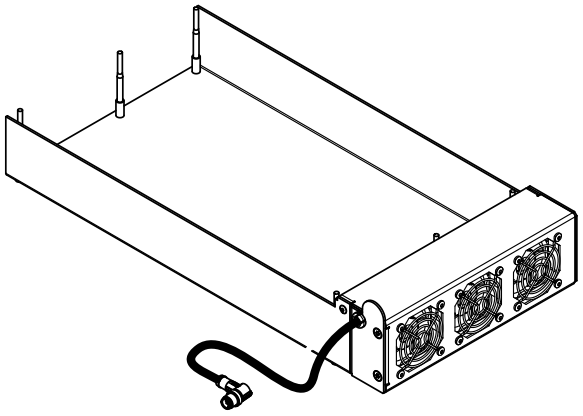
No.	Name	Function
1	res.	Reserved
2	res.	Reserved
3	0V24	0V24 reference potential
4	+24V_FAN	DC 24 V output – fan (switching signal)
5	res.	Reserved

Connection component

Fan subassembly

Part number: 12709700

Connection: M12

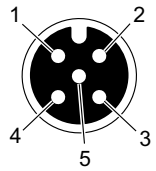


9007201865010315

7.12.35 X5201: Analog input – Frequency inverter

Function
Analog input of the power section

Connection type
M12, 5-pin, female, A-coded

Wiring diagram


No.	Name	Function
1	+24V	DC 24 V output
2	AIn+_FU	Analog input n (+) – frequency inverter
3	GND	Reference potential
4	AIn-_FU	Analog input n (-) – frequency inverter
5	FE	Equipotential bonding / functional earth

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7.12.36 X5502: Safe disconnection – input

⚠ WARNING

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

Severe or fatal injuries.

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

INFORMATION

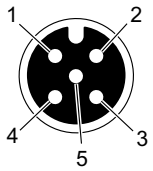
Use only shielded cables for this connection.

This connection is marked with a yellow ring.

Function
Input for safe disconnection

Connection type
M12, 5-pin, female, A-coded

Wiring diagram



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

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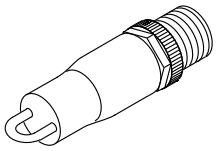
STO jumper plug

Part number: 11747099

Structure: bridged 1+4/2+3

Connection: M12



63050395932099851

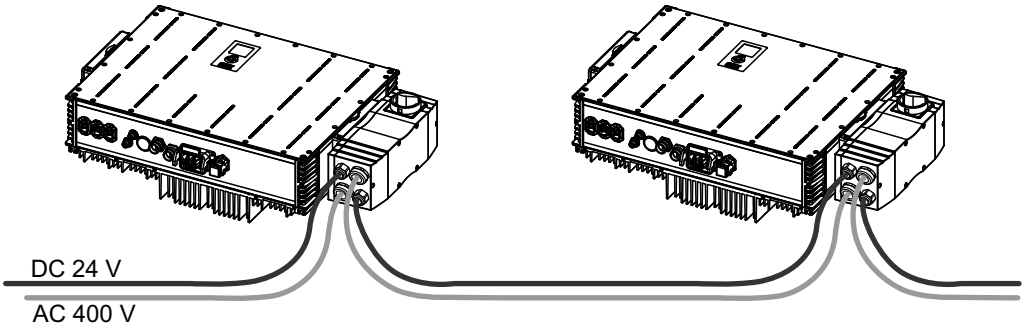
7.13 Several devices at one power supply

To distribute the energy to several devices, use the interface boxes.

The interface boxes are equipped with the following inputs and outputs for energy distribution:

- AC 400 V IN: max 10 mm²
- DC 24 V IN: max 6 mm²

The following figure shows the energy distribution with connected interface boxes:



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8 Startup

⚠ WARNING

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

Severe or fatal injuries.

- Have the installation carried out only by qualified personnel.

⚠ WARNING

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

Severe or fatal injuries.

- Make sure that the installation was carried out by trained specialists.
- Check the parameters and data sets.
- Use only settings that are appropriate for the function.

⚠ WARNING

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

Fatal or severe injuries and damage to property.

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

⚠ WARNING

Electric shock due to missing or defective protective covers.

Severe or fatal injuries.

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

⚠ WARNING

Danger of electric shock due to open connections.

Severe or fatal injuries.

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

NOTICE

Danger due to arcing.

Damage to electrical components.

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

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INFORMATION

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

INFORMATION

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

8.1 Requirements

The following conditions apply to startup:

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

Required hardware:

- PC or laptop with Ethernet interface
- Conventional Ethernet cable

INFORMATION

SEW-EURODRIVE recommends using an Ethernet cable with extended locking device (e.g. from Harting).

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8.2 Startup procedure

The following step-by-step instruction gives an overview of the device startup procedure and lists other applicable documentation:

1. Install the motor. Refer to the operating instructions of the motor for more information.
2. Perform mechanical installation again. For further information, refer to chapter "Mechanical installation" (→ 🗎 48) in the operating instructions.
3. Perform electrical installation again. For further information, refer to chapter "Electrical installation" (→ 🗎 58) in the operating instructions.
4. Switch on the device.
5. If you want to parameterize the device, refer to the following documentations for further information:
   - ⇨ "MOVIPRO® ADC with PROFINET Interface" manual
   - ⇨ "MOVIPRO® SDC with PROFIBUS Interface" manual
   - ⇨ "MOVIPRO® SDC with EtherNet/IP™ and Modbus/TCP Interface" manual
   - ⇨ "MOVIPRO® SDC with DeviceNet™ Interface" manual
6. If you want to program the device, refer to the following documentation for further information: "MOVI-PLC® Programming in the PLC Editor" manual.
7. Optimize the parameters according to your application.
8. Configure your fieldbus.
9. Save the device data onto the SD memory card. For further information, refer to the following documentation:
   - ⇨ "MOVIPRO® ADC with PROFINET Interface" manual

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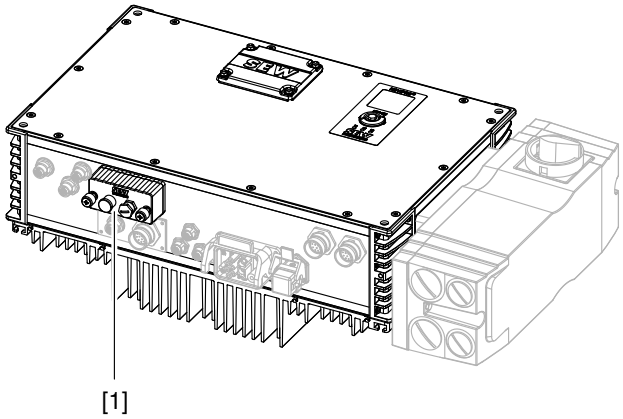
8.3 Fieldbus module PROFIBUS

The default setting for the station address is 4. Use the S2 DIP switch in the fieldbus module to set the station address of the device.

INFORMATION

Any changes to the baud rate during operation become effective after the current supply has been interrupted (DC 24 V reset).

The following figure shows the fieldbus module at the connection block of the device:



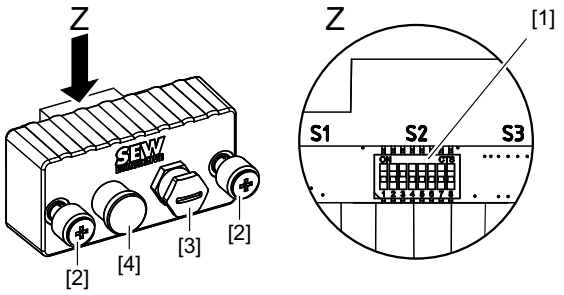
9797241739

[1] Fieldbus module

8.3.1 Setting the fieldbus module

To access the DIP switches in the fieldbus module, you have to remove the fieldbus module. This does not interrupt the fieldbus network.

The following figure shows the position of the DIP switch at the fieldbus module:



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[1] DIP switch S2
[2] Knurled screw
[3] Fieldbus output
[4] Fieldbus input

Procedure

1. Loosen the knurled-head screws [2].
2. Carefully remove the fieldbus module from the device. The DIP switch S2 [1] is located on the top of the fieldbus module.
3. Use DIP switches to set the fieldbus address.

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4. Connect the bus terminating resistor to the device at the last bus station.

INFORMATION

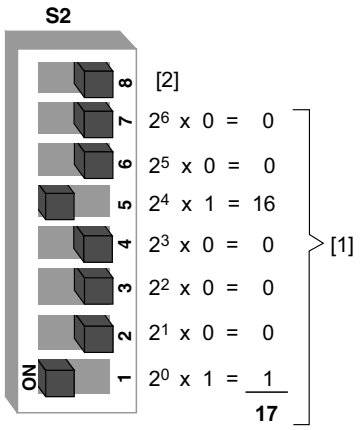
If the device is at the end of a fieldbus segment, only connect it to the fieldbus network via the incoming fieldbus cable.

To prevent malfunctions in the bus system due to reflections, for example, the fieldbus segment must be terminated using bus terminating resistors at the first and last stations.

5. Install the fieldbus module into the device.
6. Secure the fieldbus module using both knurled-head screws.

8.3.2 Setting the PROFIBUS address

The following example shows the settings of the DIP switches for PROFIBUS address 17.



1946073995

[1] Example: Address 17
[2] Switch 8: Reserved
Addresses 1 – 125: valid addresses
The addresses 0, 126, 127 are not supported.

The following table uses PROFIBUS address 17 as an example to show how to determine the DIP switch settings for any bus address:

DIP switch position	Significance
DIP 1 = ON	1
DIP 2 = OFF	2
DIP 3 = OFF	4
DIP 4 = OFF	8
DIP 5 = ON	16
DIP 6 = OFF	32

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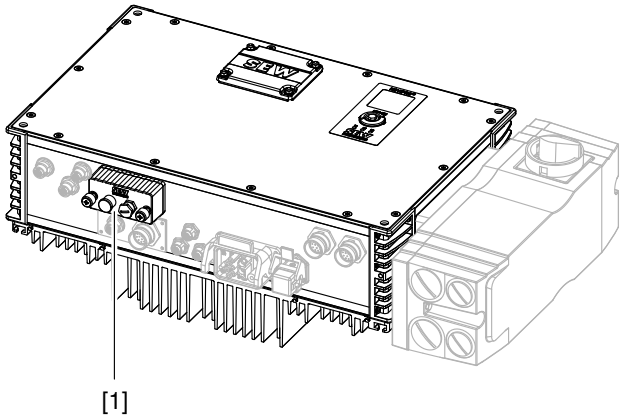
8.4 Fieldbus module DeviceNet™

The default setting for the station address is 4. Use the S2 DIP switch in the fieldbus module to set the station address of the device.

INFORMATION

Any changes to the baud rate during operation become effective after the current supply has been interrupted (DC 24 V reset).

The following figure shows the fieldbus module at the connection block of the device:



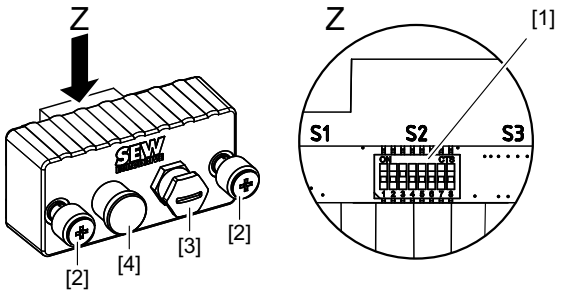
9797241739

[1] Fieldbus module

8.4.1 Setting the fieldbus module

To access the DIP switches in the fieldbus module, you have to remove the fieldbus module. This does not interrupt the fieldbus network.

The following figure shows the position of the DIP switch at the fieldbus module:



9007200897484299

[1] DIP switch S2
[2] Knurled screw
[3] Fieldbus output
[4] Fieldbus input

Procedure

1. Loosen the knurled-head screws [2].
2. Carefully remove the fieldbus module from the device. The DIP switch S2 [1] is located on the top of the fieldbus module.
3. Use DIP switches to set the fieldbus address.

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4. Connect the bus terminating resistor to the device at the last bus station.

INFORMATION

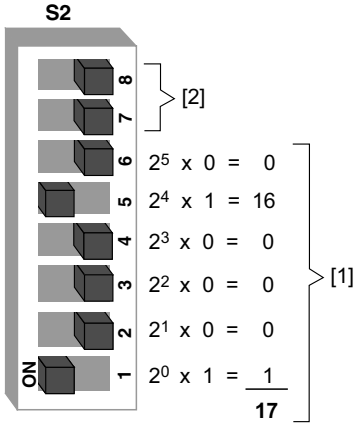
If the device is at the end of a fieldbus segment, only connect it to the fieldbus network via the incoming fieldbus cable.

To prevent malfunctions in the bus system due to reflections, for example, the fieldbus segment must be terminated using bus terminating resistors at the first and last stations.

5. Install the fieldbus module into the device.
6. Secure the fieldbus module using both knurled-head screws.

8.4.2 Setting the DeviceNet™ address

The following example shows the settings of the DIP switches for DeviceNet™ address 17.



1951510539

[1] Example: Address 17
[2] Switch 7, 8: Switch for setting the baud rate
Addresses 0 – 63: valid addresses

The following table uses DeviceNet™ address 17 as an example to show how to determine the DIP switch settings for any bus address:

DIP switch position	Significance
DIP 1 = ON	1
DIP 2 = OFF	2
DIP 3 = OFF	4
DIP 4 = OFF	8
DIP 5 = ON	16
DIP 6 = OFF	32

8.4.3 Setting the baud rate

INFORMATION

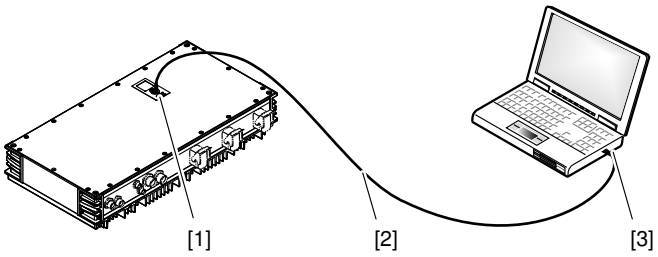
Any changes to the baud rate during operation become effective after the current supply has been interrupted (DC 24 V reset).

Use DIP switches 7 to 8 to set the baud rate:

DIP switch		Baud rate
7	8	
OFF	OFF	125 kBaud
ON	OFF	250 kBaud
OFF	ON	500 kBaud
ON	ON	Reserved

8.5 PC/laptop connection

The following figure shows the connection between a PC/laptop and the Ethernet service interface of the device:



1204936459

[1] Ethernet service interface (Ethernet RJ45) of device

[2] Conventional Ethernet cable

[3] Ethernet interface of the laptop

The following table shows the IP address and the subnet mask of the engineering interface of the device:

Ethernet service interface	
Standard IP address	**Subnet mask**
192.168.10.4	255.255.255.0

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9 Operation

⚠ WARNING

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

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

Severe or fatal injuries.

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

⚠ WARNING

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

Fatal or severe injuries and damage to property.

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

⚠ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

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

⚠ CAUTION

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

Injuries.

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

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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 Relative cyclic duration factor (cdf)

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

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

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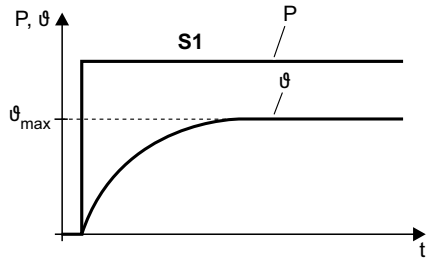
9.2 Duty cycles

9.2.1 Duty type S1

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



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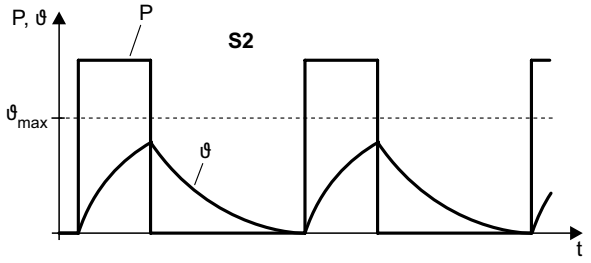
9.2.2 Duty type S2

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



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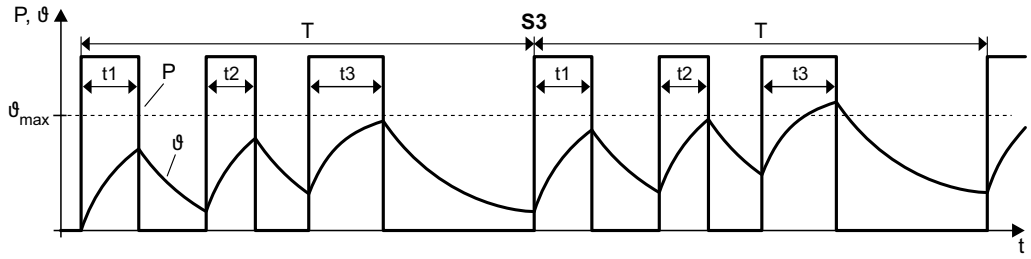
9.2.3 Duty type S3

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



2325831947

9.2.4 Duty types S4 to S10

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

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9.3 Brake control operation

NOTICE

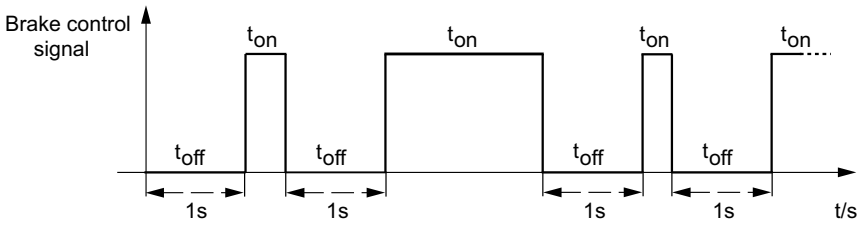
Damage to the brake controller if necessary off periods are not adhered to.

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 ≥ 70 W, you must ensure a timeout of at least 1 second for brake control:



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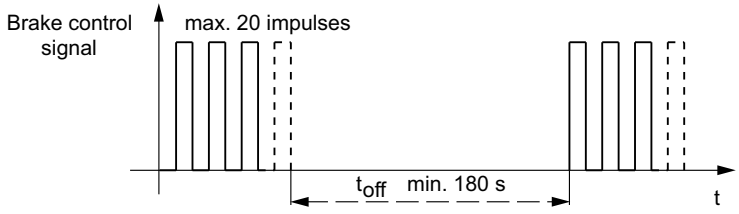
9.3.2 Brake control under special operating conditions, e.g. teach or jog mode

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 and error messages

The status display on the device cover shows the current device status. In case of repeated malfunctions, contact the SEW-EURODRIVE Service.

If several statuses or faults are active at the same time, the status display shows the status or fault with the highest priority.

The device status display takes priority over the display of the internal "PFA-..." power section. If the maintenance switch is switched off or a fieldbus fault occurs, no power section status is displayed.

9.4.1 Display examples

The following examples show how the device usually displays status and fault messages.

Example 1: "Enable" of power section 1

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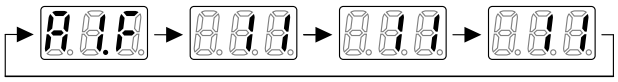
Example 2: "Overtemperature" fault of power section 1

If the display shows "A[Power section number].F", a power section fault occurred. The display switches between the number of the power section and the fault code.



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Refer to chapter "List of power section faults" (→ 🗎 177) for an overview of power section faults.

9.4.2 Libraries

For a user-defined control of the status display, use the following libraries:

- PFH_P1D1_1_A (PROFIBUS, DeviceNet™)
- PFH_E2E3_1_A (PROFINET, EtherNet/IP™, Modbus/TCP)

INFORMATION

You find the latest versions of the libraries at the SEW-EURODRIVE website at http://www.sew-eurodrive.com via "Online support" > "Data & documents" > "Software".

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9.4.3 Status messages

If you use a parameterizable device, the following status messages are possible.

Code	Meaning	Possible cause	Measure
8.8.8. **S2:** Flashing green **S3:** Off		Application module not running/not loaded	Create a configuration with the Application Configurator and load it into the device.
A1.0	DC 24 V operation, frequency inverter not ready		
A1.1	Controller inhibit active		
A1.2	No enable		
A1.3	Standstill current		
A1.4	Enable		
A1.5	n-control		
A1.6	M-control		
A1.7	Position hold control		
A1.8	Factory setting		
A1.9	Limit switch reached		
A1.A	Technology option		
A1.c	IPOS$^{plus®}$ reference travel		
A1.D	Flying start		
A1.E	Calibrate encoder		
A1.F	Fault display (→ 🗎 177)		
A1.U	"Safe torque off" active **⚠ WARNING!** Risk of injury due to incorrectly interpreted display **U = "Safe Torque Off" active** – Severe or fatal injuries. The display **U = "Safe Torque Off" active** is not safety-related. Thus it must not be used safety-related.		
Flashing dot	Application module of the "PFA-..." power section is running.		

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Code	Meaning	Possible cause	Measure
buS Err	Fieldbus error		• Check the fieldbus cabling to the higher-level controller. • Check the fieldbus parameterization of the device and the higher-level controller.
InI	Initialization: A connection is established with all internal components. This can take several minutes after a device replacement.		
oFF	The maintenance switch is switched off.		Switch on the maintenance switch. **Devices without interface box:** Check the DC 24 V cabling and the cabling of the switch feedback.
OFL	Internal communication error		**While backing up data or restoring a data backup:** Wait a few minutes until the display changes. **In normal operation:** • Disconnect the device from the AC 400 V supply and the DC 24 V supply voltage for at least 30 s. • Restart the device.
run	The connection has been established successfully. The statuses of the components or the application are displayed after 3 s.		
SF1	Communication error with the power section	• Parameter channel 2 not activated (*P889*) • Manual operation not finished • Parameter lock power section activated (*P803*) • Configuration in the Application Configurator not completed or not completely loaded	• Activate parameter channel 2 • Activate and deactivate manual mode • Disconnect the device from the AC 400 V supply and the DC 24 V supply voltage for at least 30 s. • Restart the device.

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Code	Meaning	Possible cause	Measure
SF2	Error in external periphery		Check the cabling of the digital inputs and outputs as well as the connections of the communication package.
SF3	Error while loading the application module	Non-enabled application module loaded	• Set parameter P802 "Factory setting" of the "PFA-..." power section to "Delivery state". • Load an enabled application module into the "PFA-..." power section
SF10	Error in Application Configurator communication	Configuration with Application Configurator not completed	Complete the configuration with the Application Configurator and load it into the device.
SF20	Error during data backup, data backup on SD memory card failed		Start data backup again.
SF21	Error during data backup, data backup on SD memory card failed	SD memory card is write protected	Remove write protection from SD memory card.
SF22	Error during data recovery, data recovery to device failed		Start data restoring again.
SF23	Error during data recovery, data recovery to device failed	Controller not inhibited	Set the device to one of the following states: • Controller inhibit (A1.1) • Safe torque off (A1.U)
SF99	Internal system error		
SF110	Actuator voltage overload error	Actuator voltage overload	Check the cabling of the digital inputs and outputs.
SF120	Error due to overload in sensor voltage of group 1	Overload sensor voltage group 1	Check the cabling of the digital inputs and outputs.
SF121	Error due to overload in sensor voltage of group 2	Overload sensor voltage group 2	Check the cabling of the digital inputs and outputs.

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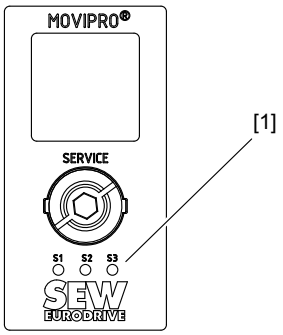
Status LEDs

The status LEDs are located on the service unit. They show the fieldbus and device status.



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[1] Status LEDs S1, S2, S3

Status LED S1 PROFINET IO

StatusLED	Possible cause	Measure
Off	• PROFINET IO device is currently exchanging data with the PROFINET IO controller (Data Exchange).	–
Flashing green Flashing green/red	• The flashing function in the PROFINET IO controller configuration is activated to visually locate the stations.	–
Lights up red	• Connection to the PROFINET IO controller has failed. • PROFINET IO device does not detect a link. • Bus interruption • PROFINET IO controller is not in operation.	• Check the PROFINET connection of the device. • Check the PROFINET IO controller. • Check the cabling of your PROFINET network.
Flashing yellow Lights up yellow	• The STEP 7 hardware configuration contains a module that is not permitted.	• Set the STEP 7 hardware configuration to ONLINE. Analyze the component status of the slots in the PROFINET IO device.

Status LED S1 PROFIBUS

Status LED	Possible cause	Measure
Off	Device is currently exchanging data with the DP master (data exchange).	–

Status LED	Possible cause	Measure
Flashing	• Device has detected the baud rate, but is not addressed by DP master. • Device was not configured in DP master or configured incorrectly.	• Check the PROFIBUS address set in the device and in the configuration software of the DP master. • Check the project planning of the DP master.
Lights up red	• Connection to the DP master has failed. • Device does not detect PROFIBUS baud rate. • Bus interruption • DP master not in operation.	• Check the PROFIBUS DP connection of the device. • Check the configuration of the DP master. • Check the cabling of your PROFIBUS network.

Status LED S1 EtherNet/IP™ and Modbus/TCP

Status LED	Meaning
Off	The device does not yet have any IP parameters.
Flashing green/red	The device performs an LED test.
Flashing green	There is no controlling IO connection.
Lights up green	There is a controlling EtherNet/IP™ IO connection.
Lights up red	Conflict detected in the assigned IP addresses. Another station in the network uses the same IP address.
Flashing red	The previously established controlling IO connection is in timeout state. The state is reset by restarting communication.

Status LED S1 DeviceNet™

Status LED	Possible cause	Measure
Off	Not switched on/offline	• Device is offline. • Device is performing a DUP MAC check. • Device is switched off.
Flashing green	Online and in operational mode	• The device is online and no connection has been established. • DUP-MAC check performed successfully. • A connection has not yet been established with a master. • Missing, incorrect or incomplete configuration.

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Status LED	Possible cause	Measure
Lights up green	Online, operational mode and connected	• Online • Connection has been established with a master. • Connection is active (established state).
Flashing red	Minor fault or connection timeout	• A correctable fault has occurred. • A device error is active. • Polled I/O and/or bit-strobe I/O connections are in timeout state.
Lights up red	Critical error or critical link failure	• A correctable fault has occurred. • BusOff status • DUP-MAC check has detected an error.

Status LED S2 PLC status

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

Status LED S3

Status LED	Possible cause	Measure
Lit green	User program is running.	–
Flashing green	• Program sequence has stopped. • Bootloader update required.	Start the user program.
Off	No program is loaded.	Load an user program into the communication and control unit.

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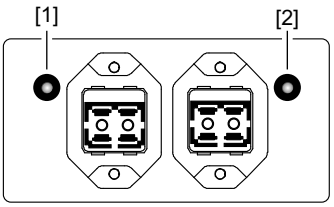
Status LEDs FO1 and FO2 Ethernet connection push-pull SCRJ

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

The LEDs are on the left and the right of both Ethernet fieldbus ports push-pull SCRJ:



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[1] FO1
[2] FO2

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

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9.4.4 List of power section faults

The factory set error response is listed in the "Response (P)" column. "(P)" means that the response can be set with parameter *P83_error response*.

Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
00	No fault					
01	Overcurrent	Immediate stop	0	Output stage	• Short circuit at output • Motor too large • Defective output stage • Ramp limit is deactivated and set ramp time is too short • Braking resistance value too low • Short circuit in the braking resistor circuit	• Eliminate short circuit • Connect a smaller motor • Contact SEW-EURODRIVE Service if the output stage is defective • Extend the ramp time • Check technical data of braking resistor • Check braking resistor supply cable
			1	V_{CE} monitoring or undervoltage monitoring of the gate driver		
			5	Inverter remains in hardware current limit		
03	Ground fault	Immediate stop	0			
04	Brake chopper	Immediate stop	0	DC link voltage too high in 4-Q operation	• Too much regenerative power • Braking resistor circuit interrupted • Short circuit in the braking resistor circuit • Braking resistance too high • Brake chopper defective	• Extend deceleration ramps • Check supply cable to braking resistor • Check technical data of braking resistor • Replace device if the brake chopper is defective
			1			
06	Line phase failure	Immediate stop	0	DC link voltage periodically too low	Phase failure	Check the supply system cable
07	DC link overvoltage	Immediate stop	0	DC link voltage too high in 2Q operation	DC link voltage too high	• Extend deceleration ramps • Check supply cable to the braking resistor • Check technical data of braking resistor
			1			

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
08	Speed monitoring	Immediate stop (P)	0	Inverter in current limiting or in slip limit	• Speed/current controller (in VFC operating mode without encoder) operating at setting limit due to mechanical overload or phase failure in the supply system or motor • Encoder not connected correctly or incorrect direction of rotation • n_{max} is exceeded during torque control. • In VFC operating mode: Output frequency > 150 Hz • In V/f operating mode: Output frequency > 600 Hz	• Reduce load • Increase delay time setting (*P501/ P503*). • Check encoder connection, swap A/A and B/B pairs if necessary • Check the voltage supply of the encoder • Check current limiting • Extend ramps if necessary • Check motor cable and motor • Check line phases
			3	"Actual speed" system limit exceeded Speed difference between ramp setpoint and actual value for 2 × ramp time higher than expected slip		
			4	Maximum rotating field speed exceeded Maximum rotating field frequency (with VFC max 150 Hz and V/f max 600 Hz) exceeded		
09	Startup	Immediate stop	0	Startup missing	The inverter has not been started up for the selected operating mode or the encoder data has not been loaded yet.	Perform the startup for the respective operating mode or start up the encoder.
			1	Wrong operating mode selected		
			2	Wrong encoder type or defective encoder card		
10	IPOS®-IL-LOP	Emergency stop	0	Invalid IPOS$^{plus®}$ command	• Incorrect command detected during running of IPOS$^{plus®}$ program • Incorrect conditions during command execution	• Check content of program memory and correct if necessary • Load the correct program into the program memory • Reload the application module
11	Overtemperature	Emergency stop (P)	0	Heat sink temperature too high or defective temperature sensor	Thermal overload of inverter	Reduce load and/or ensure adequate cooling
			3	Overtemperature switched-mode power supply		

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
14	Encoder	Immediate stop	0	Encoder not connected, defective encoder, defective encoder cable	• Encoder cable or shield not connected correctly • Short circuit/wire break in encoder cable • Encoder defective	Check encoder cable and shield for correct connection, short circuit and wire breaks.
			25	Motor encoder error – Speed range exceeded Encoder on motor encoder exceeds 6542 min^{-1}		
			26	Motor encoder error – Card is defective Error in the quadrant evaluation		
			27	Encoder error – encoder connection or encoder is defective		
			28	Motor encoder error – Communication error RS485 channel		
			29	External encoder error – Communication error RS485 channel		
			30	Unknown encoder type on the external encoder/ motor encoder		
			31	Plausibility error of HIPERFACE® on the external encoder/motor encoder Increments have been lost.		

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
14	Encoder	Immediate stop	32	HIPERFACE® encoder on motor encoder reports an error	• Encoder cable or shield not connected correctly • Short circuit/wire break in encoder cable • Encoder defective	Check encoder cable and shield for correct connection, short circuit and wire breaks.
			33	HIPERFACE® encoder on external encoder reports an error		
			34	Encoder fault motor encoder resolver Encoder connection or encoder is defective		
17	System error	Immediate stop	0	"Stack overflow" error	Inverter electronics disrupted, possibly due to EMC influences	• Check grounding and shielding and improve, if necessary • Contact SEW-EURODRIVE Service if the error reoccurs
18			0	"Stack underflow" error		
19			0	"External NMI" error		
20			0	"Undefined opcode" error		
21			0	"Protection fault" error		
22			0	"Illegal word operand access" error		
23			0	"Illegal instruction access" error		
24			0	"Illegal external bus access" error		

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
25	EEPROM	Rapid stop	0	Read or write error on EEPROM power section	Error while accessing EEPROM	• Restore factory settings, perform reset and reset parameters • Contact SEW-EURODRIVE Service if the error reoccurs
			11	NV memory read error Internal NVRAM		
			13	NV memory chip card System module defective		
			14	NV memory chip card Memory card defective		
			16	NV memory initialization error		
26	External terminal	Emergency stop (P)	0	External terminal	Read external error signal via programmable input	Eliminate respective cause; reprogram terminal if necessary
27	No limit switches	Emergency stop	0	Limit switches missing or wire break	• Open circuit/both limit switches missing • Limit switches are swapped over in relation to direction of rotation of motor	• Check wiring of limit switches • Swap limit switch connections • Reprogram terminals
			2	Limit switches reversed		
			3	Both limit switches are active simultaneously		
29	Limit switch reached	Emergency stop	0	HW limit switch reached	A limit switch has been reached in IPOS$^{plus®}$ operating mode (only with application module).	• Check travel range • Correct user program
30	Emergency stop timeout	Immediate stop	0	Timeout stop emergency stop rate	• Drive overloaded • Emergency stop ramp too short	• Check configuration • Extend emergency stop ramp

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
31	TF/TH trigger	No response (P)	0	Thermal motor protection error	• Motor too hot, TF/TH has triggered • TF/TH of the motor not connected or connected incorrectly • Device connection and TF/TH connection on motor interrupted	• Let motor cool off and reset error • Check connections/link between device and TF/TH • Set *P835* to "No response"
32	IPOS® index overflow	Emergency stop	0	IPOS$^{plus®}$ program faulty	Programming principles violated leading to system-internal stack overflow	Reload the application module
34	Ramp timeout	Immediate stop	0	Rapid stop ramp timeout	Downward ramps timeout, e.g. due to overload	• Extend the downwards ramps • Eliminate overload
35	Operating mode	Immediate stop	0	Operating mode not available	Operating mode not defined or defined incorrectly	Use *P700*/*P701* to set correct operating mode
			1	Incorrect assignment of operating mode and hardware		
37	System watchdog	Immediate stop	0	"System watchdog overflow" error	Error while executing system software	Contact SEW-EURODRIVE Service
38	System software	Immediate stop	0	"System software" error	System error	Contact SEW-EURODRIVE Service
39	Reference travel	Immediate stop (P)	0	"Reference travel" error	• The reference cam is missing or does not switch • Limit switches are connected incorrectly • Reference travel type was changed during reference travel	• Check reference cams • Check limit switch connection • Check reference travel type setting and required parameters
40	Boot synchronization	Immediate stop	0	Timeout during boot synchronization	Error during boot synchronization between inverter and option.	Contact SEW-EURODRIVE Service if the error reoccurs
41	Watchdog option	Immediate stop	0	Error – Watchdog timer from/to option.	Error in communication between system software and option software	Contact SEW-EURODRIVE Service

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
42	Lag error	Immediate stop (P)	0	Positioning lag error	• Rotary encoder connected incorrectly • Acceleration ramps too short • P component of positioning controller too small • Incorrectly set speed controller parameters • Value of lag error tolerance too small	• Check rotary encoder connection • Extend ramps • Set P component to higher value • Set speed controller parameters again • Increase lag error tolerance • Check wiring of encoder, motor and line phase • Make sure mechanical parts can move freely, check whether they are blocked
43	Manual mode timeout	Immediate stop (P)	0	Manual mode timeout	Manual mode not completed correctly.	a) Activate manual mode. ⇨ Manual mode was completed correctly.
44	Device utilization	Immediate stop	0	Device utilization error	Device utilization (IxT value) > 125%	• Decrease power output • Extend ramps • If suggested actions are not possible, use a larger inverter • Reduce load
			8	U_L monitoring error		
45	Initialization	Immediate stop	0	General error during initialization	No parameters set for EEPROM in power section, or parameters set incorrectly	Restore delivery state (*P802*) If error cannot be reset afterwards, contact SEW-EURODRIVE Service
			3	Data bus error during RAM check		
			6	CPU clock error		
			7	Error in the current detection		
			10	Error when setting flash protection		
			11	Data bus error during RAM check		

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
47	System bus 1 timeout	Rapid stop (P)	0	Timeout system bus CAN1	Error during communication via system bus 1.	Check system bus connection
57	TTL encoder	Immediate stop	1	TTL encoder: Wire break		
			512	TTL encoder: Error in amplitude control		
			541	TTL encoder: Incorrectly set numerator/denominator values		Set the correct system numerator/denominator values.
			16385	TTL distance encoder: Wire break		
			16896	TTL distance encoder: Error in amplitude control		
			16898	TTL distance encoder: Incorrectly set numerator/denominator values		Set the correct system numerator/denominator values.
58	Sin/cos encoder	Immediate stop	1	Sin/cos encoder: Wire break		
			512	Sin/cos encoder: Error in amplitude control		
			514	Sin/cos encoder: Track signal error		
			515	Sin/cos encoder: Incorrectly set numerator/denominator values		Set the correct system numerator/denominator values.
			16385	Sin/cos distance encoder: Wire break		
			16896	Sin/cos distance encoder: Error in amplitude control		
			16898	Sin/cos distance encoder: Track signal error		
			16899	Sin/cos distance encoder: Incorrectly set numerator/denominator values		Set the correct system numerator/denominator values.

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
59	Encoder communication	Rapid stop	1	Hiperface® encoder: Track signal error		
			2	Hiperface® encoder: Calibration error	Incorrect calibration of encoder	• Restore delivery state (*P802*) • Repeat encoder startup
			16	Hiperface® encoder: Communication error	Device and HIPERFACE® encoder connection interrupted	Check wiring
			64			
			128			
			192			
			256			
			320			
			384			
			448			
			512			
			576			
			1024	EnDat encoder: Communication error	Device and EnDat encoder connection interrupted	Check wiring
			1088			
			1152			
			1216			
			1280			
			1388			
			16385	HIPERFACE® distance encoder: Track signal error		
			16386	HIPERFACE® distance encoder: Calibration error	Incorrect calibration of encoder	• Restore delivery state (*P802*) • Repeat encoder startup

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
59	Encoder communication	Rapid stop	16400	HIPERFACE® distance encoder: Communication error	Device and HIPERFACE® distance encoder connection interrupted	Check wiring
			16448			
			16512			
			16576			
			16640			
			16704			
			16768			
			16832			
			17408	EnDat distance encoder: Communication error	Device and Endat distance encoder connection interrupted	Check wiring
			17472			
			17536			
			17600			
			17664			
			17772			
77	IPOS® control word	No response (P)	0	Invalid IPOS$^{plus®}$ control word	**Only in IPOS$^{plus®}$ operating mode:** • An attempt was made to set an invalid automatic mode (via external controller). • "P916 = Bus ramp" is set	• Check serial connection to external controller • Check write values of external controller • Set correct value for *P916*
78	IPOS® software limit switch	No response (P)	0	Software limit switch reached	**Only in IPOS$^{plus®}$ operating mode:** Programmed target position is outside travel range delimited by software limit switches	• Check user program • Check position of software limit switches
80	RAM test	Immediate stop	0	"RAM test" error	Internal device error, memory defective	Contact SEW-EURODRIVE Service

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
81	Start condition	Immediate stop	0	Start condition error with "VFC & hoist"	**Only in "VFC & hoist" operating mode:** The motor could not be supplied with the correct amount of current during the pre-magnetization time: • Nominal motor power too small in relation to rated inverter power • Motor cable cross section too small	• Check startup data and perform new startup, if necessary • Check connection between inverter and motor • Check cross section of motor cable and increase if necessary
82	Open output	Immediate stop	0	Output open with "VFC & hoist"	**Only in "VFC & hoist" operating mode:** • 2 or all output phases interrupted • Nominal motor power too small in relation to rated inverter power	• Check connection between inverter and motor • Check startup data and perform new startup, if necessary
84	Motor protection	Emergency stop (P)	0	"Motor temperature simulation" error	• Motor utilization too high • I_N-U_L monitoring triggered • *P530* set later to "KTY"	• Reduce load • Extend ramps • Observe longer pause times • Check *P345*/*P346* • Select a larger motor
			2	Short circuit or wire break in the temperature sensor		
			3	No thermal motor model available		
			4	U_L monitoring error		
			11	Temperature sensor short circuit		
86	Power section memory	Immediate stop	0	Error during connection with the memory	• The parameter data of the power section are inconsistent. • The memory is defective.	Restore the delivery state of the device. If this does not rectify the fault, replace the device.
88	Flying start	Immediate stop	0	"Flying start" error	**Only in "VFC n-control" mode:** Actual speed > 6000 min^{-1} when inverter enabled	Enable not unless actual speed ≤ 6000 min^{-1}

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
94	EE-ROM checksum	Immediate stop	0	Power section parameters	Inverter electronics disrupted, possibly due to effect of EMC influence or a defect.	Send the device to SEW-EURODRIVE for repair.
			5	Control unit data		
			6	Power section data		
			7	Invalid version of the configuration data set		
97	Copy error	Immediate stop	0	Parameter set upload is/was faulty	• Error during data transmission • Memory can neither be written nor read	• Repeat copying process • Restore delivery state (*P802*) and repeat copying process
			1	Parameter set download to device cancelled		
			2	Not possible to adopt parameters		
98	CRC error	Immediate stop	0	"CRC via internal flash" error	Internal device fault Flash memory defective	Send the device to SEW-EURODRIVE for repair.
99	IPOS® ramp calculation	Immediate stop	0	"Ramp calculation" error	**Only in IPOS$^{plus®}$ operating mode:** Positioning ramp is sinusoidal or square and an attempt is made to change ramp times and traveling velocities with enabled inverter.	Rewrite the IPOS$^{plus®}$ program so that ramp times and traveling velocities can only be altered when the inverter is inhibited.
100	Vibration warning	Display error (P)	0	Vibrations diagnostics warning	Vibration sensor warning (see "DUV10A" operating instructions)	• Determine cause of vibrations • Continue operation until F101 occurs
101	Vibration error	Rapid stop (P)	0	Vibration diagnostics error	Vibration sensor signals fault	SEW-EURODRIVE recommends that you remedy the cause of the vibrations immediately.
102	Oil aging warning	Display error (P)	0	Oil aging warning	Warning signal from the oil aging sensor.	Schedule oil change
103	Oil aging error	Display error (P)	0	Oil aging error	Error message from the oil aging sensor.	SEW-EURODRIVE recommends that you change the gear unit oil immediately.
104	Oil aging overtemperature	Display error (P)	0	Oil aging overtemperature	Overtemperature signal from the oil aging sensor.	• Let oil cool down • Check if the gear unit cools properly

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
105	Oil aging ready signal	Display error (P)	0	Oil aging ready signal	Oil aging sensor is not ready for operation	• Check voltage supply of oil aging sensor • Check and, if necessary, replace the oil aging sensor
106	Brake wear	Display error (P)	0	Brake wear	Brake lining worn down	Replace brake lining (see operating instructions of the motor)
110	Fault "Ex-e protection"	Emergency stop	0	Duration of operation below 5 Hz exceeded	Duration of operation below 5 Hz exceeded	• Check configuration • Shorten duration of operation below 5 Hz

Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
111	Internal "Timeout" error	Rapid stop/ warning	0	Communication error with the power section	Not able to establish a connection with the "PFA-..." power section (connection failed).	**When using the application module "Transparent 3PD"** • In MOVITOOLS® MotionStudio, right-click the device. • Choose [Application modules] > [Application Configurator]. • Choose [Open configuration from controller]. Check the following settings, and adjust them, if necessary: – Controller interface = SBUS_1 – Axis address = 20 – Device type = MOVIPRO LT **When using other application modules** • In MOVITOOLS® MotionStudio, right-click the power section of your device. • Choose [Technology Editor] > [Drive start-up for MOVI-PLC/ CCU] and start up the drive.
116					The existing connection to the "PFA-..." power section was interrupted.	

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
122	Absolute encoder	Immediate stop	1	Plausibility check		Check to cables of the sine tracks or replace the encoder.
			2	Hiperface® encoder: Unknown encoder type		
			3	Hiperface® encoder: Corrupt encoder nameplate data		
			32	HIPERFACE® encoder: internal encoder fault		Replace the encoder.
			33	Hiperface® encoder: Analog voltages not within tolerance		
122	Absolute encoder	Immediate stop	34	HIPERFACE® encoder: internal encoder fault		Replace the encoder.
			35			
			36			
			37			
			38			
			39			
			40			
122	Absolute encoder	Immediate stop	41	Hiperface® encoder: Communication error	Device and HIPERFACE® encoder connection interrupted	Check the wiring.
			42			
			43			
			44			
			45			
122	Absolute encoder	Immediate stop	46	HIPERFACE® encoder: internal encoder fault		Replace the encoder.
			47			
			48			
			49			
			50			

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
122	Absolute encoder	Immediate stop	60	Hiperface® encoder: Analog voltages not within tolerance		
			61	Hiperface® encoder: Critical transmitter current	• Dirt • Transmitter broken	Replace the encoder.
			62	Hiperface® encoder: Critical encoder temperature		Replace the encoder.
			63	Hiperface® encoder: Position error	Speed too high, position cannot be created	Reduce the speed.
122	Absolute encoder	Immediate stop	64	HIPERFACE® encoder: internal encoder fault		Replace the encoder.
			65			
			66			
			67			
122	Absolute encoder	Immediate stop	256	SSI encoder: Voltage dip	Drop in DC 12 V supply voltage	Check the supply voltage of the encoder.
			257	SSI encoder: Interrupted clock or data line		Check connection to encoder.
			258	SSI encoder: Change of position		
122	Absolute encoder	Immediate stop	259	SSI encoder: Insufficient clock frequency		Increase clock frequency.
			260	SSI encoder: Encoder signals programmable error		Check the encoder parameterization.
			261	SSI encoder: no high level available		• Replace the encoder. • Contact the SEW-EURODRIVE Service.

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
122	Absolute encoder	Immediate stop	513	EnDat encoder: Plausibility check		
			514	EnDat encoder: internal encoder error		Replace the encoder.
			515			
			516			
			544			
			576	EnDat encoder: internal encoder warning		Check the encoder parameterization.
122	Absolute encoder	Immediate stop	768	CANopen encoder: PDO timeout	No PDO data from CANopen encoder	• Check the interface. • Check the configuration.
			769	CANopen encoder: Encoder signals programmable error		Check the encoder parameterization.
			770	CANopen encoder: Change of position		
122	Absolute encoder	Immediate stop	771	CANopen encoder: Emergency signal		Check the encoder.
			772	CANopen encoder: internal encoder error		Replace the encoder.
			773			
			774			
122	Absolute encoder	Immediate stop	16385	HIPERFACE® distance encoder: Plausibility check		
			16386	HIPERFACE® distance encoder: Unknown encoder type		
122	Absolute encoder	Immediate stop	16387	HIPERFACE® distance encoder: Corrupt encoder nameplate data		
			16417	HIPERFACE® distance encoder: Analog voltages not within tolerance		

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
122	Absolute encoder	Immediate stop	16418	HIPERFACE® distance encoder: internal encoder fault		Replace the encoder.
			16419			
			16420			
			16421			
			16422			
			16423			
			16424			
122	Absolute encoder	Immediate stop	16425	HIPERFACE® distance encoder: Communication error	Device and HIPERFACE® encoder connection interrupted	Check the wiring.
			16426			
			16427			
			16428			
			16429			
122	Absolute encoder	Immediate stop	16430	HIPERFACE® distance encoder: internal encoder fault		Replace the encoder.
			16431			
			16432			
			16433			
			16434			
122	Absolute encoder	Immediate stop	16444	HIPERFACE® distance encoder: Analog voltages not within tolerance		
			16445	HIPERFACE® distance encoder: Critical transmitter current	• Dirt • Transmitter broken	Replace the encoder.
122	Absolute encoder	Immediate stop	16446	HIPERFACE® distance encoder: Critical encoder temperature		Replace the encoder.
			16447	HIPERFACE® distance encoder: Position error	Speed too high, position cannot be created	Reduce the speed.
122	Absolute encoder	Immediate stop	16448	HIPERFACE® distance encoder: internal encoder fault		Replace the encoder.
			16449			
			16450			
			16451			

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
122	Absolute encoder	Immediate stop	16640	SSI distance encoder: Error message of encoder, error bit of encoder set	Code tape or mirror dirty	Remove dirt.
					Code tape/mirror and encoder not aligned correctly	Check the alignment and orientation of the code tape/mirror to the encoder.
					EMC interference due to incorrect encoder installation	Check for EMC-compliant installation of the encoder.
					Supply voltage error	Check the supply voltage of the encoder.
					Incorrect mode set in the encoder	Set mode "24bit + err".
122	Absolute encoder	Immediate stop	16641	SSI distance encoder: Interrupted clock or data line		Check connection to SSI distance encoder.
			16642	SSI distance encoder: Change of position		
			16643	SSI distance encoder: Insufficient clock frequency		Increase clock frequency.
122	Absolute encoder	Immediate stop	16644	SSI distance encoder: Encoder signals programmable error		Check the encoder parameterization.
			16645	SSI distance encoder: No high level present		• Replace encoder • Contact SEW-EURODRIVE Service
			16897	EnDat distance encoder: Plausibility check		
122	Absolute encoder	Immediate stop	16898	EnDat distance encoder: internal encoder error		Replace the encoder.
			16899			
			16900			
			16928			

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Code	Meaning	Response (P)	Sub-code	Meaning	Possible cause	Measure
122	Absolute encoder	Immediate stop	16960	EnDat distance encoder: internal encoder warning		Check encoder parameterization
			17152	CANopen distance encoder: PDO timeout	No PDO data from CANopen distance encoder	Check interface or configuration
			17153	CANopen distance encoder: Encoder signals programmable error		Check encoder parameterization
122	Absolute encoder	Immediate stop	17154	CANopen distance encoder: Change of position		
			17155	CANopen distance encoder: Emergency signal		Check the encoder.
			17156	CANopen distance encoder: internal encoder error		Replace the encoder.
			17157			
			17158			
123	Positioning interruption	Emergency stop (P)	0	"Positioning/Positioning interruption" error	Interrupted positioning (e.g. unintentional bounce of enable) and thus exceeding the target position	Avoid bounce of the enable: Configure the application with a linear ramp instead of a non-linear ramp (→ *P916* Ramp type)

9.5 Additional information

For information on the functionality of frequency inverters and possible errors, refer to the following documentation:

- "MOVIPRO® ADC with PROFINET Interface" manual
- "MOVIPRO® SDC with PROFIBUS Interface" manual
- "MOVIPRO® SDC with EtherNet/IP™ and Modbus/TCP Interface" manual
- "MOVIPRO® SDC with DeviceNet™ Interface" manual

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10 Service

10.1 Inspection/maintenance

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

- Connection cables:

  If cables are damaged or fatigued, replace these immediately.
- Cooling fins:

  In order to ensure sufficient cooling, remove any deposits which occur.
- If a fan assembly is installed, check the individual axial fans of the fan subassembly for correct functionality.

INFORMATION

Only SEW-EURODRIVE is authorized to carry out repairs.

10.2 Device replacement

The device allows for a quick device replacement. It is equipped with a replaceable SD memory card on which all device data is stored. If the device has to be replaced, the system can be started up again quickly by simply exchanging the SD memory card.

10.2.1 Prerequisites for successful device replacement

Observe the following:

- The devices that you want to exchange must be identical. If the devices have different configurations, a successful device replacement cannot be guaranteed.
- You must save the data of the device to be replaced on the SD memory card **before** you replace the device. SEW-EURODRIVE recommends to always backup the data right after starting up a device.
- Insert or remove the SD memory card only when the device is switched off.
- With programmable devices, note that the status display depends on programming. The module for the data backup function (data management) must be integrated in the program.

10.2.2 Replacing the device

Proceed as follows:

1. Perform a data backup via MOVITOOLS® MotionStudio if you are not certain whether the current device parameterization is stored on the SD memory card.
2. Disconnect the device from the supply system.
3. Remove it from the system.
4. Remove the memory card cover from the housing cover.
5. To do so, remove the SD memory card from the device to be replaced.
6. Insert the SD memory card into the new device.

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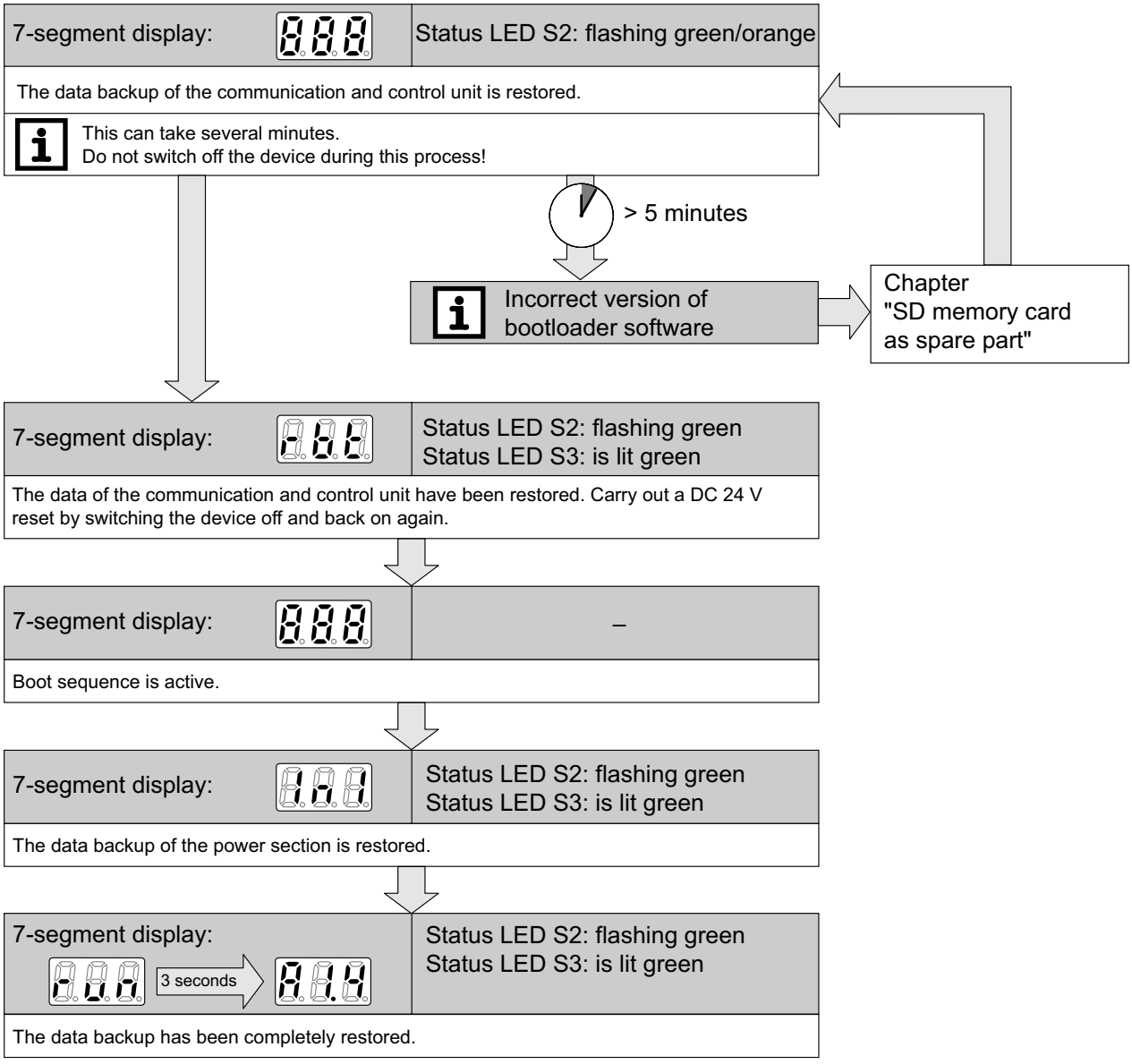
7. Install the new device in the plant. Connect it to the supply system.
8. Switch on the new device.

INFORMATION

The device performs several initialization steps. Do not switch off the device during this time.



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- The parameters saved on the SD memory card are now available again. If a different parameter set is needed for the new device, change the parameter set now. Back up the changed data on the SD memory card again after startup.
- For applications with encoders, observe the chapter "Reference travel after device or encoder replacement" (→ 🗎 199).

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10.2.3 SD memory card as spare part

If you have ordered an SD card as spare part, it is possible that the versions of the bootloader software are different for the SD memory card and your device.

In this case, the device remains in the following state **for more than 5 minutes**:

7-segment display	Status LED S2
8.8.8 flashing	Flashing green/orange

Proceed as follows:

1. Disconnect the device from the supply system.
2. Unscrew the memory card cover.
3. Remove the SD memory card.
4. Connect an SD card reader to your PC.
5. Insert the SD memory card in the SD card reader. On your PC, go to [Computer] > [SD] > [System] > "BootConfig.cfg".
6. Open the file "BootConfig.cfg" with a text editor.
7. Search the file for the following expression:

   ```
   <!-- Confirm bootloader update with reset button? -->
   <ConfirmBlUpdateWithResetBtn>true</ConfirmBlUpdateWithReset-
   Btn>
   ```

8. Change the value "`true`" to the value "`false`" for the parameter.

   The expression must now be:

   ```
   <ConfirmBlUpdateWithResetBtn>false</ConfirmBlUpdateWithReset-
   Btn>
   ```

9. Save the file.
10. In the status bar, click [Safely remove hardware]. As soon as the PC confirms this, you can remove the SD memory card from the SD card reader.
11. Insert the SD memory card into the slot of the device and screw the memory card cover back on.
12. Connect the device to the supply system.
13. Observe the instructions in chapter "Device replacement" (→ 🗎 197) from step 8 onwards.

10.3 Reference travel after device or encoder replacement

10.3.1 Incremental encoder

If incremental encoders are used for positioning, a reference travel must be performed after device startup. This way, no special measures are required.

10.3.2 Absolute encoder

The device stores the position of absolute encoders with 32 bit. This allows for representing a larger absolute area than with an encoder with typical 12 bits in the single-turn range and 12 bits in the multi-turn range.

Perform a reference travel if you replaced the encoder.

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10.3.3 Linear encoder systems

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

10.3.4 HIPERFACE® encoders

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

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10.4 Error information of the power section

10.4.1 Fault memory

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

The following information is stored when an error occurs:

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

10.4.2 Switch-off responses

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

Immediate stop

The device can no longer decelerate the drive. In the event of an error, 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.

10.4.3 Reset

⚠ WARNING

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

Fatal or severe injuries and damage to property.

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

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Manual reset

A manual reset can be performed via one of the following options:

- Disconnect the voltage supply. Adhere to a minimum switch-off time of 1 minute. Switch the supply voltage back on.
- Perform a reset via the power section parameters.
- Perform a reset via the process data interface.

Auto reset

The device has an auto reset function. Due to this function the device automatically performs up to 5 resets.

To configure the device auto reset proceed as follows:

1. Connect device with your PC or laptop via the Ethernet service interface.
2. Open MOVITOOLS® MotionStudio. Perform a device scan by clicking the [San] button.
3. Right-click on the device power section.
4. In the context menu click on the buttons [Startup] > [Parameter tree].
5. Choose [8.. Device functions] > [84. Reset behavior] in the parameter tree.
6. In the drop-down list set parameter *P841* to "On".
7. Set parameter *P842* to a time span in seconds. In case an error occurs, the device will then perform an auto reset after that set time.

A maximum of 5 auto resets are possible during an auto reset phase. If the auto reset function has reset 5 errors, no further auto reset is possible. In this case you have to reset manually. For more information, refer to chapter "Manual reset" (→ 🗎 202).

10.5 Electronics Service by SEW-EURODRIVE

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

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

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

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10.6 Shutdown

⚠ WARNING

Electric shock due to charged capacitors.

Severe or fatal injuries.

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

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

10.7 Storage

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

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

Observe the notes on storage temperature in chapter "Technical data" (→ 🗎 205).

10.8 Extended storage

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

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

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

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

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10.9 Waste disposal

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

- Electronics scrap (circuit boards)
- Plastics
- Sheet metal
- Copper
- Aluminum

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11 Technical data

11.1 Standards and certifications

11.1.1 Applicable standards and directives

The MOVIPRO® devices were developed and tested based on the following standard:

- EN 13849-1:2007
- EN 61800-3:2007
- EN 61800-5-1:2007
- EN 61800-5-2:2007

11.2 UL/cUL

c UL us LISTED

UL and cUL approvals (USA and Canada) have been granted for this MOVIPRO® device type. cUL is equivalent to the CSA approval.

11.3 UL/cUL approval

UL and cUL approval (USA) are currently not available for the 22 kW MOVIPRO® device series.

11.4 RCM

RCM approval has been granted for the documented MOVIPRO® series. RCM certifies conformity with ACMA (Australian Communications and Media Authority) standards.

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11.5 Design with operating point 400 V/50 Hz

The following table shows the technical data of the basic device:

Performance class		2.2 kW	4 kW	7.5 kW	11 kW	15 kW	22 kW
Input							
Line connection		AC connection					
Connection voltage Permitted range	V_{line}	3 × AC 380 V – 3 × AC 500 V AC 380 V -10% – AC 500 V +10%					
Line frequency	f_{line}	50 – 60 Hz ±5%					
Nominal line current 100% (For V_{line} = 3 × AC 400 V)[1]	I_{line}	AC 5 A	AC 8.6 A	AC 14.4 A	AC 21.6 A	AC 28.8 A	AC 41.4 A

1) The line and output currents must be reduced by 20% from the nominal values for V line = 3 × AC 500 V.

Performance class		2.2 kW	4 kW	7.5 kW	11 kW	15 kW	22 kW
Output							
Apparent output power (at V_{line} = 3 × AC 380 – 500 V)	S_N	3.8 kVA	6.6 kVA	11.2 kVA	16.8 kVA	22.2 kVA	31.9 kVA
Motor power S1	P_{Mot}	2.2 kW	4 kW	7.5 kW	11 kW	15 kW	22 kW
Nominal output current	I_N	AC 5.5 A	AC 9.5 A	AC 16 A	AC 24 A	AC 32 A	AC 46 A
Current limiting	I_{max}	Motoring and regenerative operation 150% I_N, duration depending on the capacity utilization					
Internal current limiting	I_{max}	0 – 150% adjustable					
External braking resistor	R_{min}	68 Ω	33 Ω		15 Ω		12 Ω
Output voltage	V_O	0 – V_{line}					
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz (factory setting: 4 kHz)					
Speed range/resolution	n_A/ Δn_A	-6 000 – +6 000 min^{-1}/0.2 min^{-1} over the entire range					
Power loss at P_N	P_{Vmax}	60 W	100 W	200 W	400 W	550 W	750 W
Motor cable length		Maximum 30 m					
Motor protection		TF, TH or KTY					
Duty type		S1 (EN 60034-1)					
Permitted length of the braking resistor cable		Maximum 15 m					

Performance class		2.2 kW	4 kW	7.5 kW	11 kW	15 kW	22 kW
General							
Degree of protection		IP54					
Interference immunity		Complies with EN 61800-3					
Interference emission		Limit value class C2 to EN 61800-3					

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Performance class		2.2 kW	4 kW	7.5 kW	11 kW	15 kW	22 kW
General							
Ambient temperature	ϑ_A	+5 – +40 °C, Non-condensing, no condensation, device is intrinsically safe					
		(P_N reduction: 3% per K up to a maximum of 60 °C or 50 °C in devices with push-pull SCRJ)					
Climate class		EN 60721-3-3, class 3K3					
Storage temperature	ϑ_S	-25 – +70 °C, EN 60721-3-3, class 3K3					
Permissible oscillation and impact load		According to EN 61800-5-1					
Overvoltage category		III according to IEC 60664-1 (VDE 0110-1)					
Pollution class		2 according to IEC 60664-1 (VDE 0110-1) within the housing					
Restrictions in use / installation altitude		• Up to h < 1 000 m without restrictions • The following restrictions apply to heights ≥ 1 000 m: – From 1 000 m to max. 4 000 m: I_N reduction by 1% per 100 m – From 2000 m to max. 4000 m: V_N reduced by AC 6 V per 100 m					
Weight		15.9 kg		18.5 kg		29.5 kg (with fan 31 kg)	
Dimensions W × H × D		480 mm × 190 mm × 300 mm			570 mm × 190 mm × 420 mm		

11.5.1 R15 regenerative power supply module

The following table shows the technical data of the R15 regenerative power supply module:

R15 regenerative power supply module		
Nominal line current 100% (with V_{line} = 3 × AC 400 V)	I_{line}	AC 28.8 A
Apparent output power (at V_{line} = 3 × AC 380 – 500 V)	S_N	25 kVA
Motor power S1	P_{Mot}	15 kW
Power loss at P_N	P_{Vmax}	550 W

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11.6 Brake control

11.6.1 AC 230 V, AC 400 V and AC 460 V

Brake control		AC 230 V	AC 400 V	AC 460 V
Brake voltage	V_B	DC 96 V	DC 167 V	DC 190 V
AC brake coil voltage		AC 230 V	AC 400 V	AC 460 V
Nominal output current	I_N	DC 1.2 A	DC 0.7 A	DC 0.6 A
Acceleration current	I_B	4 – 8.5 times the holding current depending on the brake type		
Maximum output power	P_O	$P_O \leq 120$ W		
Brake type		The data refers to the standard brake coils from SEW-EURODRIVE. (Two-coil system)		

11.6.2 DC 24 V

Brake control		DC 24 V
Brake voltage	V_B	DC 24 V
Nominal output current	I_N	DC 1.4 A
Acceleration current	I_B	–
Maximum output power	P_O	33 W
Brake type		The data apply to the brakes BP01 – BP5 from SEW-EURODRIVE. (single-coil system, no acceleration)

11.7 Encoder

11.7.1 Motor encoder

X3001	
Nominal output voltage	DC 24 V
Maximum output current	500 mA per encoder output
Permitted encoder types	RH1M, RH1L
Maximum line length	30 m
Temperature sensor	TF/TH/KTY

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11.7.2 Motor encoder

X3011	
Nominal output voltage	DC 12 V
Maximum output current	650 mA (Total load for all encoder outputs)
Permitted encoder types	• HIPERFACE® encoders • Sin/cos encoder AC 1 V_{pp} • TTL encoder with negated tracks • Encoder with signal level to RS422
Permitted pulses per revolution	128/256/512/1024/2048 increments per revolution
Maximum line length	30 m

11.7.3 Distance encoder (CANopen)

X3211	
Nominal output voltage	DC 24 V
Maximum output current	500 mA
Permitted encoder types	CANopen encoder
Internal terminating resistor	120 Ω
Maximum line length	30 m

11.7.4 Multi-distance encoder

X3222	
Nominal output voltage	DC 12 V or DC 24 V
Maximum output current	at DC 12 V: 650 mA (total load for all encoder outputs) at DC 24 V: 400 mA
Permitted encoder types	• EnDat encoder • Encoder with signal level to RS422 • HIPERFACE® encoders • HTL encoder • Sin/cos encoder AC 1 V_{pp} • SSI encoder • SSI Combi encoder • TTL encoder with negated tracks
Permitted pulses per revolution	2 – 4096 increments/revolution
Maximum line length	30 m

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11.8 Digital inputs

Digital inputs		
Number of inputs	12 – 16	
Input type	PLC-compatible according to EN 61131-2 (digital inputs type 3)	
	Signal level +15 – +30 V	"1" = contact closed
	Signal level −3 – +5 V	"0" = contact open
Potential reference	0V24_C	
The overall current consumption of the I/O periphery (including the encoder) should not exceed DC 2.5 A.		

11.9 Digital outputs

Digital outputs	
Number of outputs	0 – 4
Output type	PLC-compatible according to EN 61131-2, interference-voltage proof and short-circuit proof (up to 30 V)
Rated current	500 mA
Potential reference	0V24_C
The overall current consumption of the I/O periphery (including the encoder) should not exceed DC 2.5 A.	

11.10 Electronics data

Electronics data	
Electronics supply 24 V_C (continuous)	V_{IN} = DC 24 V -15% / +20% according to EN 61131-2 I_I ≤ 700 mA, typically 500 mA (with external DC 24 V supply without connected 400 V)
Sensor/actuator supply 24 V_C (continuous)	V_{IN} = DC 24 V -15% / +20% according to EN 61131-2 I_I ≤ 2000 mA for sensor/actuator supply (depending on the number and type of the connected sensors/actuators) 4 outputs with 500 mA each
Analog input A11	Operating mode: DC 0 – +10 V or DC -10 V – +10 V Resolution: 12 bits Sampling time: 1 ms Internal resistance: 40 kΩ

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11.11 Safety technology

11.11.1 Interface

		Safety function	2.2 kW – 7.5 kW	11 kW – 22 kW
Power consumption	W	STO	2.5	7.5
Input capacitance	µF		27	270
Power consumption	W	STO+SBC	3.7	8.7
Input capacitance	µF		32	275

X5502	
Nominal output current	DC 500 mA
Maximum output current	DC 2 A
The DC 24 V input voltage must comply with DIN EN 61131-2. The DC 24 V output voltage complies with DIN EN 61131-2.	

11.12 Communication and control unit

11.12.1 PROFIBUS interface

PROFIBUS interface	
Protocol options	PROFIBUS DP and DPV1 acc. to IEC 61158
Supported baud rates	9.6 kBaud – 1.5 MBaud / 3 – 12 MBaud (with automatic detection)
Bus termination	Not integrated. Activate bus termination with suitable PROFIBUS connector with switchable terminating resistors.
Maximum line length	
9.6 kBaud 19.2 kBaud 93.75 kBaud 187.5 kBaud 500 kBaud 1.5 MBbaud 12 MBbaud	1200 m 1200 m 1200 m 1000 m 400 m 200 m 100 m To extend the length, several segments can be coupled via repeater. For information regarding the maximum expansion/cascading depth, refer to the documentation of the DP Master or the repeater modules.
Addressing	Address 1 – 125 can be set via DIP switches 2^0 to 2^7 in the PROFIBUS module
DP ident number	$600E_{hex}$ (24590_{dec})
GSD file name	SEW_600E.GSD
Bitmap file name	SEW600EN.bmp SEW600ES.bmp

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11.12.2 PROFINET interface

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

11.12.3 EtherNet/IP™ interface

EtherNet/IP™ interface	
Supported baud rates	10/100 Mbit/s (full duplex, with automatic detection)
Connection technology	M12 (D-coded)
Integrated switch	Supports auto-crossing, auto-negotiation
Maximum line length (from switch to switch)	100 m according to IEEE 802.3
Addressing	• 4 byte IP address or MAC-ID (00-0F-69-xx-xx-xx) • Configurable via DHCP server or MOVITOOLS® MotionStudio with version 5.6 and higher • Default address: 192.168.10.4
Manufacturer ID (vendor ID)	$013B_{hex}$
EDS file name	SEW_MOVIPRO.EDS
Name of icon file	SEW_MOVIPRO.ICO

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11.12.4 Modbus/TCP interface

Modbus/TCP interface	
Supported baud rates	10/100 Mbit/s (full duplex, with automatic detection)
Connection technology	M12 (D-coded) or RJ45 (push-pull)
Integrated switch	Supports auto-crossing, auto-negotiation
Maximum line length (from switch to switch)	100 m according to IEEE 802.3
Addressing	• 4 byte IP address or MAC-ID (00-0F-69-xx-xx-xx) • Configurable via DHCP server or MOVITOOLS® MotionStudio with version 5.6 and higher • Default address: 192.168.10.4
Supported services	FC3 FC16 FC23 FC43

11.12.5 DeviceNet™ interface

DeviceNet™ interface	
Protocol variant	Master slave connection set according to DeviceNet™ specification version 2.0
Supported baud rates	125 kBaud 250 kBaud 500 kBaud
Maximum line length	See DeviceNet™ specification version 2.0
125 kBaud 250 kBaud 500 kBaud	500 m 250 m 100 m
Bus termination	120 Ω (switch on externally)
Address setting	Address (MAC ID) 0 – 63 can be set via DIP switches 2^0 to 2^5 in the DIP module
DP ident number	$600E_{hex}$ (24590_{dec})
Supported services	• Polled I/O: 1 – 10 words • Bit strobe I/O: 1 – 4 words • Explicit messages: – Get_Attribute_Single – Set_Attribute_Single – Reset – Allocate_MS_Connection_Set – Release_MS_Connection_Set
EDS file name	SEW_MOVIPRO.EDS

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DeviceNet™ interface	
Name of icon file	SEW_MOVIPRO.ICO

11.12.6 CAN interface

CAN interface	
General	• Complies with CAN specification 2.9, parts A and B, transmission technology according to ISO 11898 • Maximum of 64 stations • Max. 64 SCOM objects / 256 receive objects
Address range	0 – 63
Baud rate	125 kBaud – 1 MBaud
Protocol	In layer 2 (SCOM cyclical/acyclic) or according MOVILINK® protocol from SEW-EURODRIVE
Bus termination	The interface is equipped with a terminating resistor (120 Ω) inside the device.
DC 24 V output (for design with DC 24 V)	DC 24 V ± 10% Maximum 500 mA
The overall current consumption of the I/O periphery (including the encoder) should not exceed DC 2.5 A.	

11.12.7 RS485 interface

RS485 interface	
General	I/O standard
Baud rate	57.6/9.6 kBaud
Termination	The interface is equipped with a dynamic terminating resistor inside the device.
DC 24 V output (for design with DC 24 V)	DC 24 V ± 10% Maximum 500 mA
The overall current consumption of the I/O periphery (including the encoder) should not exceed DC 2.5 A.	

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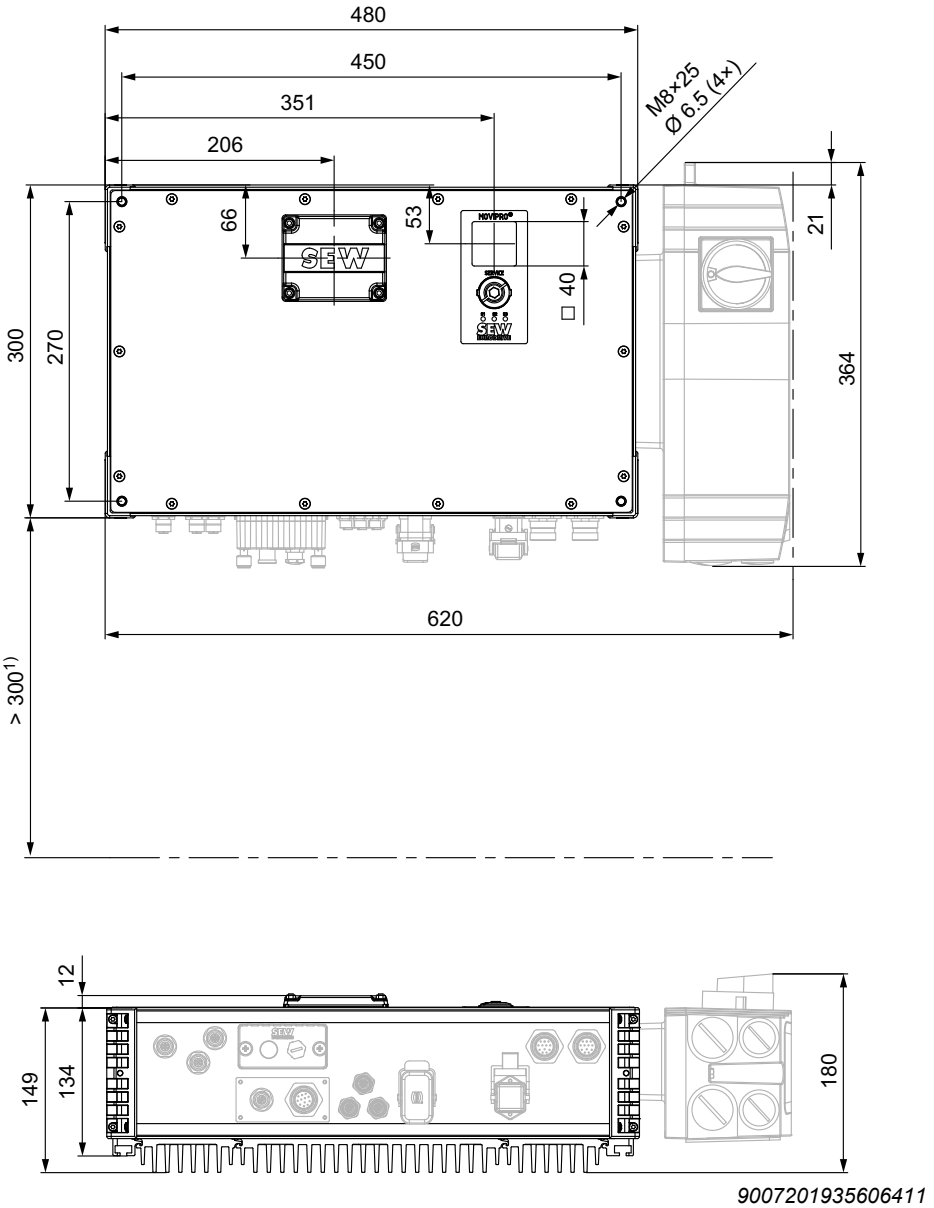
11.13 Dimension drawings

11.13.1 2.2 kW

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

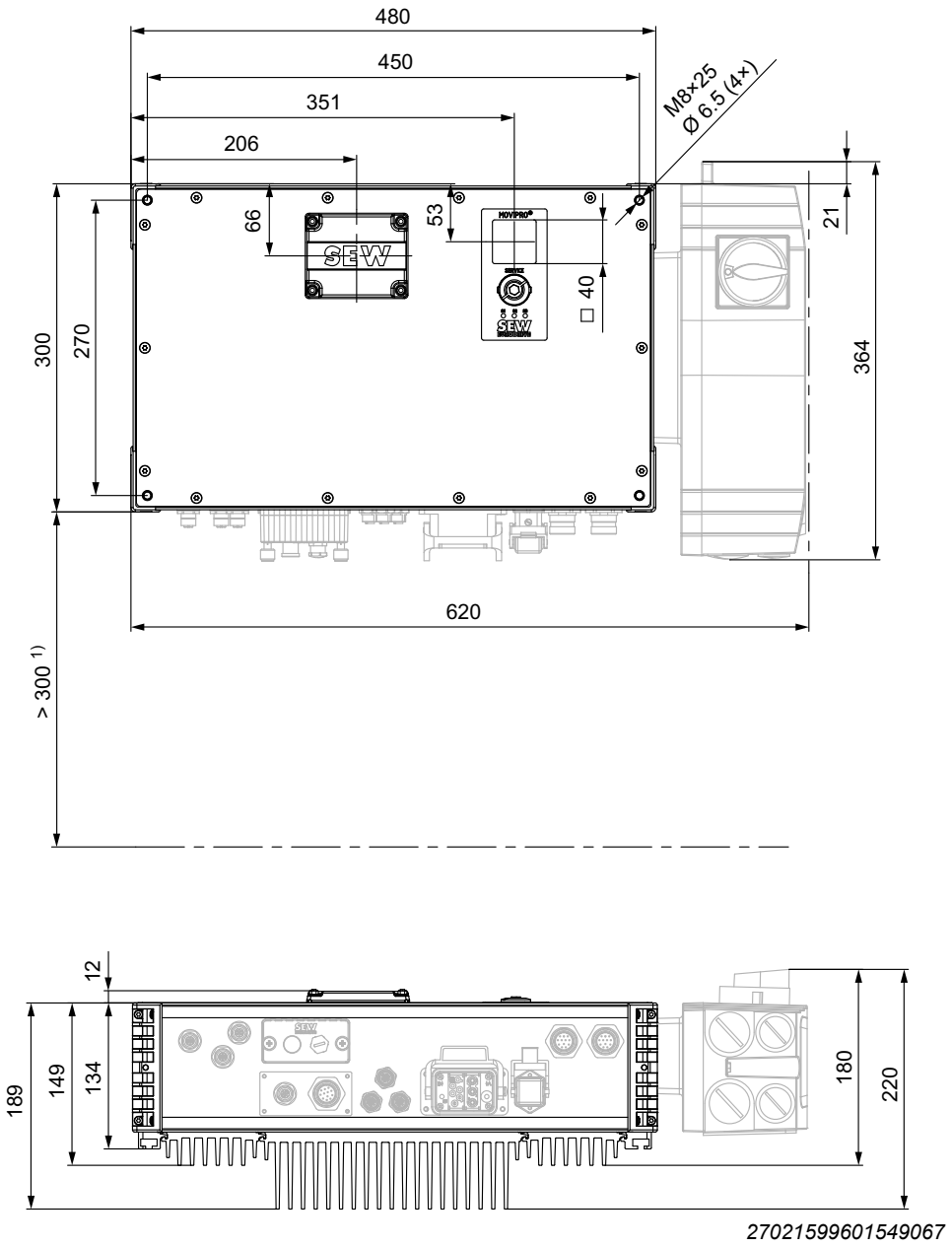


9007201935606411

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

11.13.2 4 kW, 7.5 kW

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



27021599601549067

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

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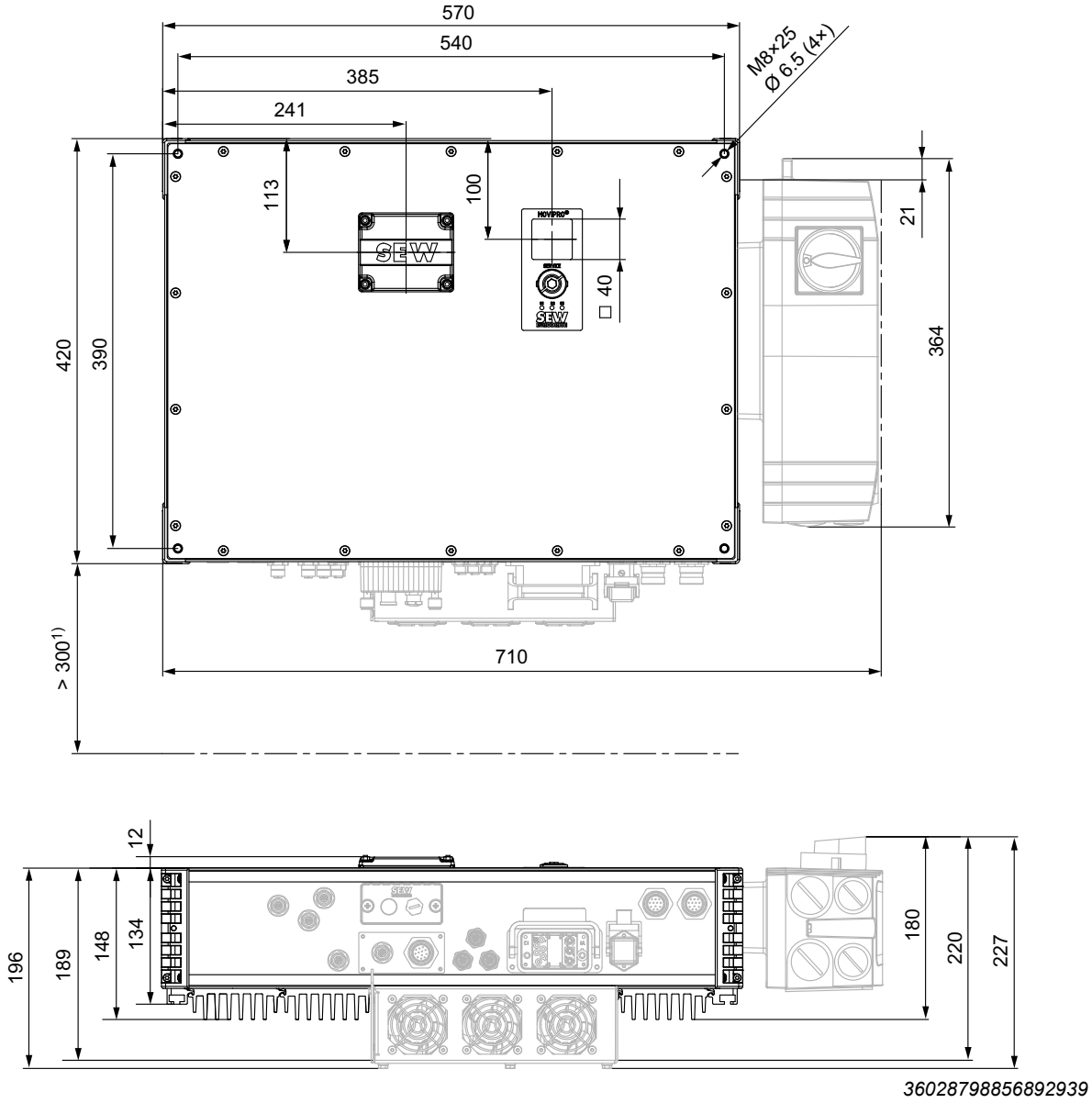
11.13.3 11 kW, 15 kW, 22 kW

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

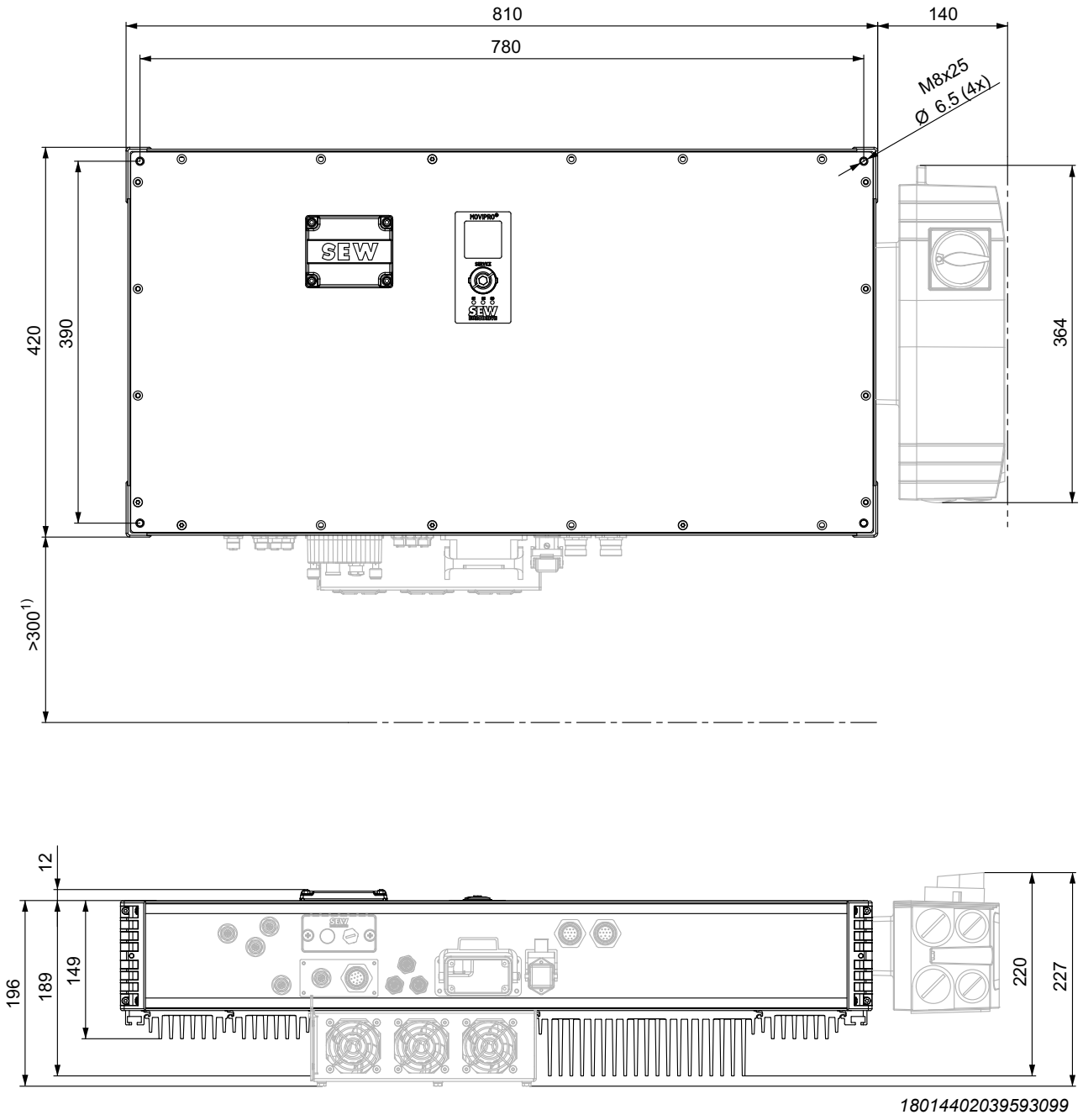


36028798856892939

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

11 kW, 15 kW with R15 regenerative power supply module

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



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

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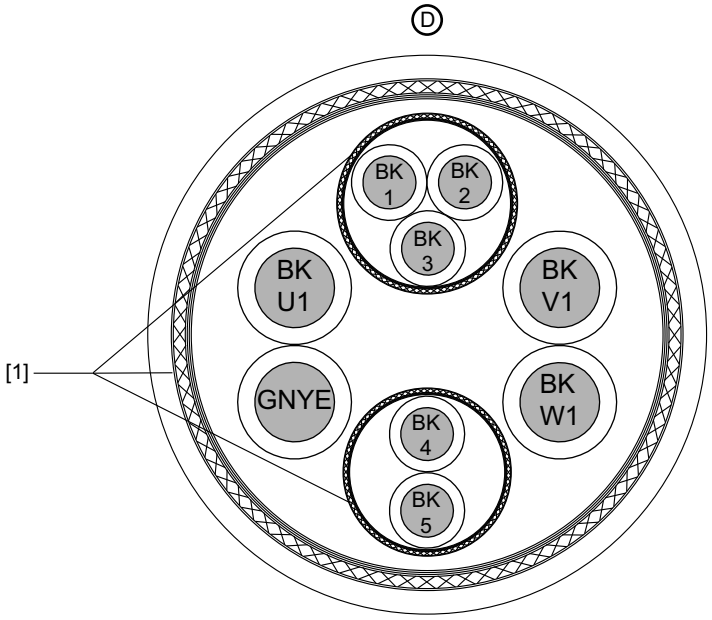
11.14 Hybrid cable type "D"

11.14.1 Mechanical structure

The following figure shows the mechanical structure of the cable:



9007201213477771

[1] Shield

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

11.14.2 Properties

All cable types have the following properties:

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

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

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

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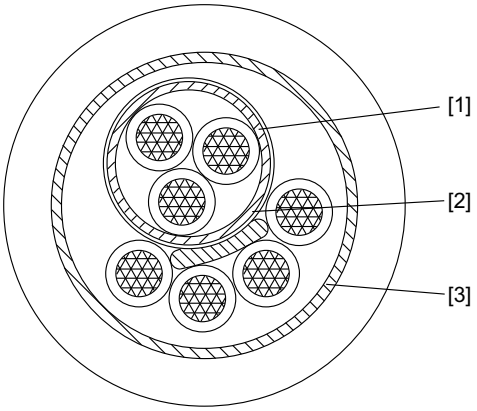
11.15 Hybrid cable type "E"

11.15.1 Mechanical structure

The following figure shows the mechanical structure of the cable:



2111423499

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

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

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11.15.2 Properties

All cable types have the following properties:

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

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12 Declaration of conformity

EU Declaration of Conformity

SEW EURODRIVE

Translation of the original text **901500016/EN**

SEW-EURODRIVE GmbH & Co. KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal
declares under sole responsibility that the following products

Drive systems of the product range	**MOVIPRO® SDC PHC2.A-A...M1-..0A-00/...** **MOVIPRO® ADC PHC2.A-A...M1-..1A-00/...**
are in conformity with	
Machinery Directive	**2006/42/EC** **(L 157, 09.06.2006, 24-86)**

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 -- Note: 2006/95/EC (until 19 Apr 2016) and 2014/35/EU (as of 20 Apr 2016) are currently valid.

EMC Directive	**2004/108/EC (valid until April 19, 2016)** **2014/30/EU (valid as of April 20, 2016)** **(L 96, 29.03.2014, 79-106)**	**4)** **4)**
Applied harmonized standards:	**EN ISO 13849-1:2008/AC:2009** **EN 61800-5-2:2007** **EN 61800-5-1:2007** **EN 61800-3:2004/A1:2012**	

4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. For the assessment, the product was installed in a typical plant configuration.

Bruchsal	**12.04.2016**		
Place	Date	Johann Soder Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

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13 Address list

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	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911
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Iceland			
Sales	Reykjavik	Varma & Vélaverk ehf. Knarrarvogi 4 104 Reykjavík	Tel. +354 585 1070 Fax +354 585)1071 http://www.varmaverk.is vov@vov.is
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Sales	Medan	PT. Serumpun Indah Lestari Jl.Pulau Solor no. 8, Kawasan Industri Medan II Medan 20252	Tel. +62 61 687 1221 Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041 sil@serumpunindah.com serumpunindah@yahoo.com http://www.serumpunindah.com
	Jakarta	PT. Cahaya Sukses Abadi Komplek Rukan Puri Mutiara Blok A no 99, Sunter Jakarta 14350	Tel. +62 21 65310599 Fax +62 21 65310600 csajkt@cbn.net.id
	Jakarta	PT. Agrindo Putra Lestari JL.Pantai Indah Selatan, Komplek Sentra Industri Terpadu, Pantai indah Kapuk Tahap III, Blok E No. 27 Jakarta 14470	Tel. +62 21 2921-8899 Fax +62 21 2921-8988 aplindo@indosat.net.id http://www.aplindo.com

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Indonesia			
	Surabaya	PT. TRIAGRI JAYA ABADI Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11 Surabaya 60111	Tel. +62 31 5990128 Fax +62 31 5962666 sales@triagri.co.id http://www.triagri.co.id
	Surabaya	CV. Multi Mas Jl. Raden Saleh 43A Kav. 18 Surabaya 60174	Tel. +62 31 5458589 Fax +62 31 5317220 sianhwa@sby.centrin.net.id http://www.cvmultimas.com
Ireland			
Sales Service	Dublin	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 http://www.alperton.ie info@alperton.ie
Israel			
Sales	Tel Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly Sales Service	Milan	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 20020 Solaro (Milano)	Tel. +39 02 96 980229 Fax +39 02 96 980 999 http://www.sew-eurodrive.it milano@sew-eurodrive.it
Ivory Coast			
Sales	Abidjan	SEW-EURODRIVE SARL Ivory Coast Rue des Pêcheurs, Zone 3 26 BP 916 Abidjan 26	Tel. +225 21 21 81 05 Fax +225 21 25 30 47 info@sew-eurodrive.ci http://www.sew-eurodrive.ci
Japan			
Assembly Sales Service	Iwata	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp hamamatsu@sew-eurodrive.co.jp
Kazakhstan			
Sales	Almaty	SEW-EURODRIVE LLP 291-291A, Tole bi street 050031, Almaty	Tel. +7 (727) 350 5156 Fax +7 (727) 350 5156 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz
	Tashkent	SEW-EURODRIVE LLP Representative office in Uzbekistan 96A, Sharaf Rashidov street, Tashkent, 100084	Tel. +998 71 2359411 Fax +998 71 2359412 http://www.sew-eurodrive.uz sew@sew-eurodrive.uz
	Ulaanbaatar	IM Trading LLC Narny zam street 62 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Fax +976-77109997 imt@imt.mn
Kenya			
Sales	Nairobi	SEW-EURODRIVE Pty Ltd Transnational Plaza, 5th Floor Mama Ngina Street P.O. Box 8998-00100 Nairobi	Tel. +254 791 398840 http://www.sew-eurodrive.co.tz info@sew.co.tz
Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C 1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.lv info@alas-kuul.com

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Lebanon			
Sales (Lebanon)	Beirut	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Sales (Jordan, Kuwait , Saudi Arabia, Syria)	Beirut	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 http://www.medrives.com info@medrives.com
Lithuania			
Sales	Alytus	UAB Irseva Statybininku 106C 63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 http://www.irseva.lt irmantas@irseva.lt
Luxembourg			
representation: Belgium			
Macedonia			
Sales	Skopje	Boznos DOOEL Dime Anicin 2A/7A 1000 Skopje	Tel. +389 23256553 Fax +389 23256554 http://www.boznos.mk
Malaysia			
Assembly Sales Service	Johor	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Mexiko			
Assembly Sales Service	Quéretaro	SEW-EURODRIVE MEXICO S.A. de C.V. SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Querétaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Sales Service	Puebla	SEW-EURODRIVE MEXICO S.A. de C.V. Calzada Zavaleta No. 3922 Piso 2 Local 6 Col. Santa Cruz Buenavista C.P. 72154 Puebla, México	Tel. +52 (222) 221 248 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Mongolia			
Technical Office	Ulaanbaatar	IM Trading LLC Narny zam street 62 Union building, Suite A-403-1 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Tel. +976-99070395 Fax +976-77109997 http://imt.mn/ imt@imt.mn
Morocco			
Sales Service	Bouskoura	SEW-EURODRIVE Morocco Parc Industriel CFCIM, Lot 55 and 59 Bouskoura	Tel. +212 522 88 85 00 Fax +212 522 88 84 50 http://www.sew-eurodrive.ma sew@sew-eurodrive.ma
Namibia			
Sales	Swakopmund	DB Mining & Industrial Services Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 anton@dbminingnam.com
Netherlands			
Assembly Sales Service	Rotterdam	SEW-EURODRIVE B.V. Industrieweg 175 3044 AS Rotterdam Postbus 10085 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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New Zealand			
Assembly Sales Service	Auckland	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 30 Lodestar Avenue, Wigram Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Nigeria			
Sales	Lagos	Greenpeg Nig. Ltd Plot 296A, Adeyemo Akapo Str. Omole GRA Ikeja Lagos-Nigeria	Tel. +234-701-821-9200-1 http://www.greenpegltd.com bolaji.adekunle@greenpegltd.com
Norway			
Assembly Sales Service	Moss	SEW-EURODRIVE A/S Solgaard skog 71 1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no
Pakistan			
Sales	Karachi	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 seweurodrive@cyber.net.pk
Paraguay			
Sales	Fernando de la Mora	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 sewpy@sew-eurodrive.com.py
Peru			
Assembly Sales Service	Lima	SEW EURODRIVE DEL PERU S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe
Philippines			
Sales	Makati	P.T. Cerna Corporation 4137 Ponte St., Brgy. Sta. Cruz Makati City 1205	Tel. +63 2 519 6214 Fax +63 2 890 2802 mech_drive_sys@ptcerna.com http://www.ptcerna.com
Poland			
Assembly Sales Service	Łódź	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 92-518 Łódź	Tel. +48 42 293 00 00 Fax +48 42 293 00 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 293 0030 Fax +48 42 293 0043	24 Hour Service Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl
Portugal			
Assembly Sales Service	Coimbra	SEW-EURODRIVE, LDA. Av. da Fonte Nova, n.º 86 3050-379 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Romania			
Sales Service	Bucharest	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro
Russia			
Assembly Sales Service	St. Petersburg	ЗАО «СЕВ-ЕВРОДРАЙФ» а. я. 36 195220 Санкт-Петербург	Tel. +7 812 3332522 / +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

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Sambia			
representation: South Africa			
Senegal			
Sales	Dakar	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 http://www.senemeca.com senemeca@senemeca.sn
Serbia			
Sales	Belgrade	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor 11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
Singapore			
Assembly Sales Service	Singapore	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			
Sales	Bratislava	SEW-Eurodrive SK s.r.o. Rybničná 40 831 06 Bratislava	Tel.+421 2 33595 202, 217, 201 Fax +421 2 33595 200 http://www.sew-eurodrive.sk sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 Mobile +421 907 671 976 sew@sew-eurodrive.sk
Slovenia			
Sales Service	Celje	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net
South Africa			
Assembly Sales Service	Johannesburg	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 248-7289 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	Durban	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
	Nelspruit	SEW-EURODRIVE (PROPRIETARY) LIMITED 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za
South Korea			
Assembly Sales Service	Ansan	SEW-EURODRIVE KOREA CO., LTD. 7, Dangjaengi-ro, Danwon-gu, Ansan-si, Gyeonggi-do, Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-eurodrive.kr master.korea@sew-eurodrive.com

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South Korea			
	Busan	SEW-EURODRIVE KOREA CO., LTD. 28, Noksansandan 262-ro 50beon-gil, Gangseo-gu, Busan, Zip 618-820	Tel. +82 51 832-0204 Fax +82 51 832-0230
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sri Lanka			
Sales	Colombo	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
Swaziland			
Sales	Manzini	C G Trading Co. (Pty) Ltd PO Box 2960 Manzini M200	Tel. +268 2 518 6343 Fax +268 2 518 5033 engineering@cgtrading.co.sz
Sweden			
Assembly Sales Service	Jönköping	SEW-EURODRIVE AB Gnejsvägen 6-8 553 03 Jönköping Box 3100 S-550 03 Jönköping	Tel. +46 36 34 42 00 Fax +46 36 34 42 80 http://www.sew-eurodrive.se jonkoping@sew.se
Switzerland			
Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Taiwan			
Sales	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Huw S. Road Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
	Nan Tou	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
Tanzania			
Sales	Daressalam	SEW-EURODRIVE PTY LIMITED TANZANIA Plot 52, Regent Estate PO Box 106274 Dar Es Salaam	Tel. +255 0 22 277 5780 Fax +255 0 22 277 5788 http://www.sew-eurodrive.co.tz info@sew.co.tz
Thailand			
Assembly Sales Service	Chonburi	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Tunisia			
Sales	Tunis	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn
Turkey			
Assembly Sales Service	Kocaeli-Gebze	SEW-EURODRİVE Hareket 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 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

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Ukraine			
Assembly Sales Service	Dnipropetrovsk	ООО «СЕВ-Евродрайв» ул. Рабочая, 23-В, офис 409 49008 Днепропетровск	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
Uruguay			
Assembly Sales	Montevideo	SEW-EURODRIVE Uruguay, S. A. Jose Serrato 3569 Esqina Corumbe CP 12000 Montevideo	Tel. +598 2 21181-89 Fax +598 2 21181-90 sewuy@sew-eurodrive.com.uy
USA			
Production Assembly Sales Service	Southeast Region	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Production +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly Sales Service	Northeast Region	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Wellford	SEW-EURODRIVE INC. 148/150 Finch Rd. Wellford, S.C. 29385	IGLogistics@seweurodrive.com
	Additional addresses for service provided on request!		
Uzbekistan			
Technical Office	Tashkent	SEW-EURODRIVE LLP Representative office in Uzbekistan 96A, Sharaf Rashidov street, Tashkent, 100084	Tel. +998 71 2359411 Fax +998 71 2359412 http://www.sew-eurodrive.uz sew@sew-eurodrive.uz
Vietnam			
Sales	Ho Chi Minh City	Nam Trung Co., Ltd Huế - South Vietnam / Construction Materials 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 khanh-nguyen@namtrung.com.vn http://www.namtrung.com.vn
	Hanoi	MICO LTD Quảng Trị - North Vietnam / All sectors except Construction Materials 8th Floor, Ocean Park Building, 01 Dao Duy Anh St, Ha Noi, Viet Nam	Tel. +84 4 39386666 Fax +84 4 3938 6888 nam_ph@micogroup.com.vn http://www.micogroup.com.vn

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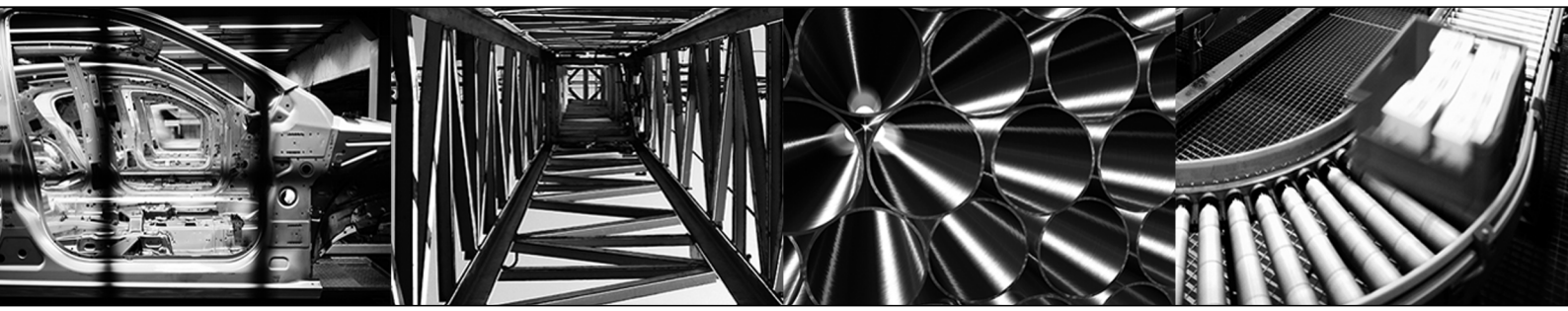

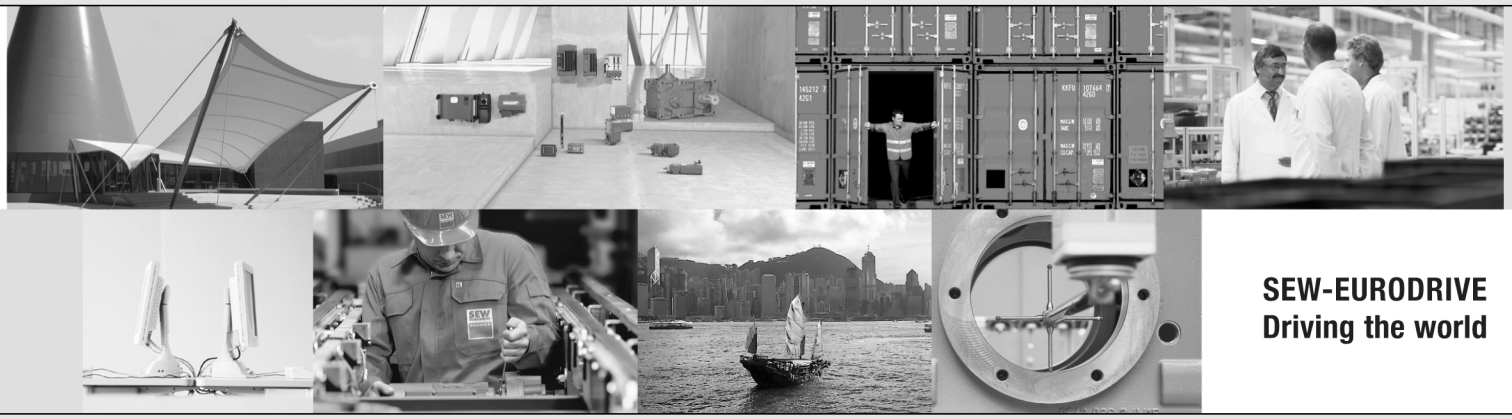

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