SEW EURODRIVE

Operating Instructions

Synchronous Servomotors (Medium Inertia)

CM3C63 – 100

Edition 11/2023

26870517/EN

Table of Contents

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1 General information

1.1 About this documentation

The documentation at hand is the original.

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

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

1.2 Other applicable documentation

Observe the corresponding documentation for all additional components.

1.2.1 Additional information

This documentation contains additional information on the product or optional components:

- Wiring diagrams provided with the motor
- Addendum to the operating instructions "Safety Encoder and Safety Brake"

1.3 Structure of the safety notes

1.3.1 Meaning of signal words

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

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

1.3.2 Structure of section-related safety notes

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

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

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	No access for persons with pacemakers or implanted defibrillators
	Warning of hot surfaces
	Warning of risk of crushing
	Warning of automatic restart

1.3.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

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

1.4 Decimal separator in numerical values

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

Example: 30.5 kg

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1.5 Rights to claim under limited warranty

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

1.6 Product names and trademarks

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

1.7 Copyright notice

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2 Safety notes

2.1 Preliminary information

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

2.2 Duties of the user

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

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

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

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

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

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

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2.3 Target group

Specialist for mechanical work

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

- Qualifications in the field of mechanics in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrotechnical work

Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product, and who possess the following qualifications:

- Qualifications in the field of electrical engineering in accordance with the national regulations
- Familiarity with this documentation

Additional qualifications

In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation.

The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transport, storage, installation, operation and waste disposal may only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.4 Designated use

The product is intended for use in industrial and commercial systems.

In the case of installation in electrical systems or machines, it is prohibited to start the proper operation of the product until it is determined that the machine meets the requirements stipulated in the local laws and directives.

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

2.5 Restrictions of use

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

- Use in potentially explosive areas.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation.

Synchronous servomotors in design without encoder and with the **ELSM®** control mode **must not be used in lifting applications**. This control mode is permitted only for applications of horizontal materials handling.

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2.6 Magnetic fields

The rotor of the motor is equipped with permanent magnets. The magnets emit strong magnetic fields, even when no current is supplied. If permanent magnets are exposed, e.g. in case of removed rotor, health hazards may arise. This especially applies to persons with active medical implants.

Further, exposed permanent magnets cause strong forces of attraction with magnetizable materials, such as other motor components or tools. The attraction of other objects can cause severe injuries by crushing.

During operation, additional electromagnetic fields are generated.

Observe DGUV (German Social Accident Insurance) regulation 15 – "Electromagnetic fields" for use in industrial workplaces. In other countries, the corresponding national and local regulations and provisions must be complied with.

2.7 Transportation/storage

Observe the following notes when transporting the device:

- Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product is damaged, it must not be assembled, installed or started up.
- Note that retaining straps attached to the products might be under tension. To avoid cutting injuries, remove the retaining straps carefully from the product and wear suitable protective clothing, if necessary.
- The open keyway has sharp edges. Insert the key in the keyway and pull a protective tubing over the shaft.
- If the product weights more than 40 kg, use suitable lifting equipment such as belts.
- Always use lifting eyebolts and lifting eyes if available.
- Tighten lifting eyebolts.
- The lifting eyes/bores are designed to carry only the weight of the product without mount-on components. Mount-on units have separate suspension attachments, if necessary. Additionally use these attachments as described in the relevant operating instructions. Do not mount any additional loads.
- Adhere to DIN 580 for using lifting devices. The tension force vector of the slings must not exceed a 45° angle.
- Note the hazard from suspended loads. Do not stand under suspended loads. Secure the area where suspended loads can fall down. Secure loads using suitable holding fixtures (e.g. belts) before lifting them.
- If necessary, use suitable, sufficiently dimensioned handling equipment.
- Store the product in a dry, dust-free room if you do not install it right away.
- If you store the product for a longer time (independent of packaging and ambient conditions), observe the chapter "Startup after storage" (→ 🗎 83).
- Ensure that the product is not subject to mechanical impact.
- Do not transport or store the product on the fan guard.

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2.8 Installation/assembly

- Ensure that the product is installed and cooled according to the regulations in the documentation.
- Protect the product from strong mechanical strain.
- The product and its mounting parts must never protrude into the path of persons or vehicles.
- Ensure that components are not deformed and insulation spaces are not changed, particularly during transportation and handling.
- Electric components must not be mechanically damaged or destroyed.
- If you remove mechanical strained or heavy components, secure the construction to prevent injuries.

2.9 Electric work

2.9.1 Carrying out electric work safely

Observe the following information to carry out electrical work safely during installation and maintenance:

- Electrical work may only be carried out by electrically skilled persons.
- Always adhere to the 5 safety rules for working on electrical components:
  - Disconnect
  - Secure the drive against restart
  - Check that no voltage is applied
  - Ground and short-circuit it
  - Cover or safeguard neighboring live parts
- When the device is switched on, dangerous voltages are present on all power connections as well as on any connected cables and terminals. This is also the case even if the motor is at standstill.
- Ensure that the connection boxes are closed and screwed down before applying the supply voltage.
- Ensure that all required covers are mounted before applying the supply voltage.

2.9.2 Regenerative operation of drives

Moving the output element (e.g. coasting) generates a voltage at the live components of the motor connection. Observe the following information to avoid electric shock:

- Do not touch open live components (e.g. male contacts of the plug connector, terminals).
- Secure all open live components with a touch guard.
- Secure the output shaft against rotation when working without touch guard.

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2.9.3 Disconnecting and connecting plug-in connections while voltage is applied

An electric arc may occur when plug-in connections are disconnected or connected while voltage is applied (e.g. connection between drive and control). Observe the following to avoid risk of injury, risk of electric shock and damage to property:

- Ensure that the product is de-energized before disconnecting and connecting the plug-in connections.

2.9.4 Electrical connection

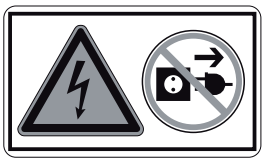
The connection must be a permanently secure electrical connection (no protruding wire ends). Use the corresponding cable end equipment. Establish a safe protective earth connection. When the motor is connected, the distances to non-insulated and live parts must not be shorter than the minimum values according to IEC 60664 and to national regulations. With low voltage, the distances should be no shorter than the following values, in compliance with IEC 60664:

Nominal voltage V_N	Distance
≤ 500 V	3 mm
≤ 690 V	5.5 mm

The terminal box must be free from foreign objects, dirt and humidity. Unused cable entry openings and the connection box itself must be sealed so that they are dust- and water-proof.

2.10 Warning notes on the motor

Observe the warning safety notes specified on the motor. The following safety notes can be found on the motor:

Safety note	Meaning
	Do not connect or disconnect the plug-in connection when voltage is applied.
	For motors with BK.. brake: Adhere to the specified polarity of the power supply of the BK.. brake. Check the polarity when replacing the brake.
	Warning of hot surfaces.

The attached safety notes can become dirty or illegible over time. Always make sure that safety and operating notes are legible. Replace damaged labels.

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2.11 Startup/operation

Make sure the connection boxes are closed and screwed before connecting the supply voltage.

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

When the device is switched on, dangerous voltages are present on all power connections as well as on any connected cables and terminals. This can also be the case if the motor is at standstill.

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

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Removing the cause of this problem or performing a reset can result in the machine or the system re-starting on its own. First, disconnect the product from the supply system before you start troubleshooting.

Risk of burns: The surface temperature of the product can exceed 60 °C during operation. Do not touch the product during operation. Let the product cool down before touching it.

2.12 Inspection/maintenance

Use only genuine spare parts in accordance with the valid spare parts list.

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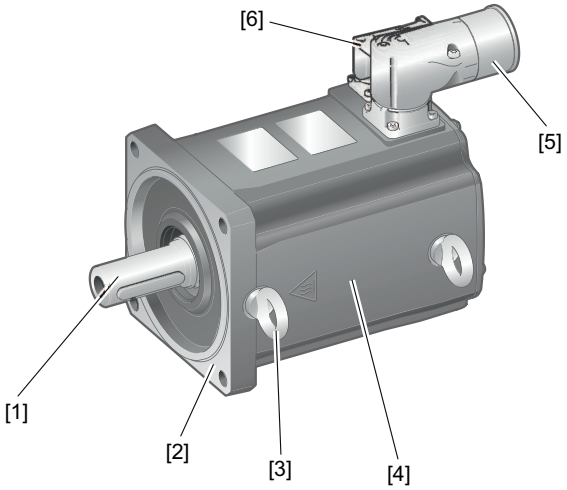
3 Motor structure

3.1 Basic structure

The following figures are schematic representations. Motor size and design may cause deviations.

3.1.1 Structure of the motor without brake

The following figure shows an overview of the motor components:



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[1] Output shaft with key
[2] Flange
[3] Eyebolt
[4] Housing
[5] Power plug connector
[6] Signal plug connector

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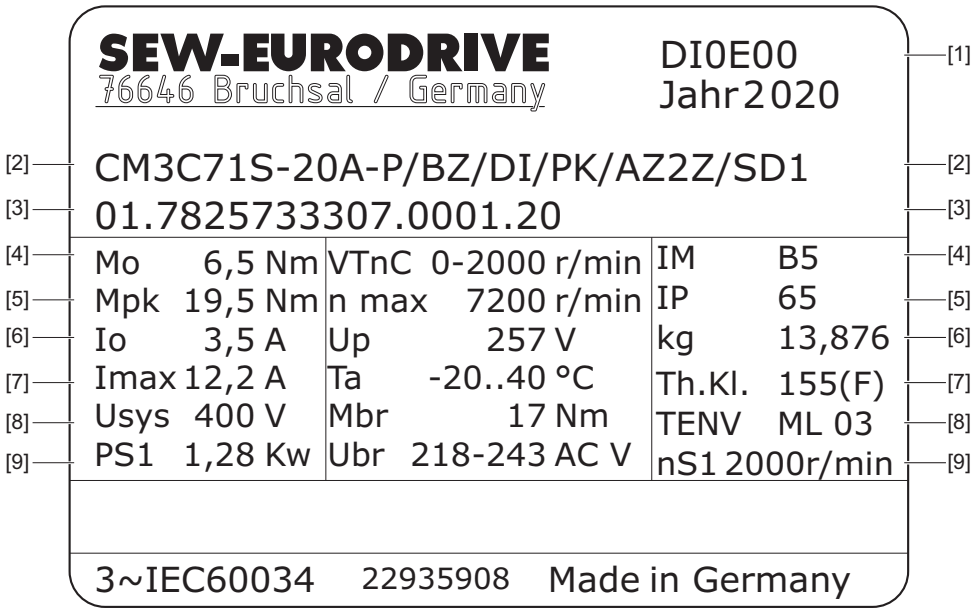
3.2 Nameplate and type designation

3.2.1 Nameplate on the motor

The following figure shows the 1st nameplate of a CM3C.. motor:



Line	Specifications (from left to right)
[1]	• Type code of the MOVILINK® DDI interface
[2]	• Type designation
[3]	• Serial number
[4]	• Standstill torque • Variable torque • Speed class • Mounting position
[5]	• Dynamic limit torque of the motor • Maximum permitted speed • Degree of protection according to IEC 60034-5
[6]	• Standstill current • Voltage at the open terminals of the motor at rated speed • Mass
[7]	• Maximum permitted current • Ambient temperature • Thermal class
[8]	• System voltage, voltage of the supplying inverter • Nominal braking torque • TENV (Totally Enclosed Non-Ventilated) • Mounting location (plant code)

Line	Specifications (from left to right)
[9]	• Rated power continuous duty • Brake voltage • Rated speed continuous duty

The following figure shows the 2nd nameplate of a CM3C.. motor:

Line	Information
[1]	• Type designation
[2]	• Serial number

The following table lists all the markings that can be provided on a nameplate, and an explanation of what they mean:

CE	CE marking to state compliance with European Directives (see EU Declaration of Conformity).
	CEL mark to represent the energy efficiency in the Chinese grade classification.
	CMIM logo to confirm compliance with the technical regulations of Morocco.
	FS logo with 2-digit number for identification of installed functional safety motor options.
	UR mark to confirm that UL (Underwriters Laboratory) is informed about the registered components; register number by UL: E337323
	CSA mark to confirm the market conformity of the Canadian Standard Association (CSA).

EAC	EAC mark (EurAsian Conformity) Confirms compliance with the technical regulations of the economic and customs union of Russia, Belarus, Kazakhstan, Armenia.
UA.TR. 013	The UA.TR mark declares conformity with the technical regulations of Ukraine.
UK CA	The UKCA mark states compliance with British guidelines.
	Motors and accessories may fall within the scope of the country-specific application of the WEEE Directive. Dispose of the product and of its accessories according to the national regulations of your country.
	Product label with QR code. The QR code on the product can be scanned. You will be redirected to the Digital Services of SEW-EURODRIVE. There, you have access to product-specific data, documents, and further services.

3.2.2 Serial number

The following table lists the structure of a serial number:

Example: 01. 77185696 09. 0001.19	
01.	Sales organization
77185696	Order number (8 digits)
09.	Order item (2 digits)
0001	Quantity (4 digits)
19	End digits of the year of manufacture (2 digits)

3.2.3 Type designation

This table shows an example type designation:

CM3C80L-60A-K/PK/RH1M/SMB	
CM3C	Product family
80L	Size and length of the motor
60A	Rated speed and system voltage
K	Shaft design
/PK	Temperature sensor
/RH1M	Encoder
/SMB	Plug connector

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3.3 Drive designs and options

3.3.1 Synchronous servomotors

Designation	
CM3C..	CM3C.. series (medium inertia)
63, 71, 80, 100	Sizes
S, M, L	Lengths
-20, -30, -45, -60	Speed classes: -20 = 2000 min^{-1} -30 = 3000 min^{-1} -45 = 4500 min^{-1} -60 = 6000 min^{-1}
A	System voltage: A = 400 V
-N, -K, -P, -E	Shaft design: -N = Shaft without key -K = Shaft with key -P = Shaft with pinion shaft end -E = Shaft with push-in pinion

3.3.2 Brakes and brake control

Designation	Option
/BK	Permanent-magnet holding brake
/BZ[1)]	Spring-loaded holding brake with increased working capacity
/BZ..D	Spring-loaded holding brake with increased working capacity for operation on direct DC voltage supply
/HR	Manual brake release of BZ.., BZ..D, and BZ..Z brake Automatic re-engaging

1) Optionally available as safety brake.

3.3.3 Temperature sensor/temperature detection

Designation	Option
/PK	Pt1000 temperature sensor

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3.3.4 Encoder

Designation	Option	Ability class
–	Without encoder	–
/RH1M	Single-turn encoder, resolver (standard)	Medium Class
/AK0H[1)]	Multi-turn encoder, HIPERFACE®	High Class
/AK1H[1)]	Multi-turn encoder, HIPERFACE®	High Class
/EK1H	Single-turn encoder, HIPERFACE®	High Class
/EZ2Z	Single-turn encoder, MOVILINK® DDI	Medium Class
/AZ2Z	Multi-turn encoder, MOVILINK® DDI	Medium Class
/EZ4Z	Single-turn encoder, MOVILINK® DDI	High Class
/AZ4Z	Multi-turn encoder, MOVILINK® DDI	High Class
/EH1E[1)]	Single-turn encoder, EnDat2.2	High Class
/AH1E[1)]	Multi-turn encoder, EnDat2.2	High Class
/EK0J[2)]	Single-turn encoder, HIPERFACE®	High Class
/AK0J[1), 2)]	Multi-turn encoder, HIPERFACE®	High Class
/AH1Q[1), 2)]	Multi-turn encoder, DRIVE-CLiQ	High Class

1) Optionally available as safety encoder.

2) Available on request.

3.3.5 Fan

Designation	Option
/VR	Forced cooling fan

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3.4 Functional safety

Motors from SEW-EURODRIVE are optionally available with functionally safe motor options. These are designed for implementing safety functions.

SEW-EURODRIVE labels a functionally safe motor option at the drive with an FS logo and a 2-digit number on the motor nameplate. The number is a code that indicates which components in the drive are safety-related. This makes it possible to uniquely identify an available functional safety motor option via the motor nameplate.

FS logo	Available functionally safe motor option		
	Decentralized inverters	Safety brake	Safety encoders
FS 01	X		
FS 02		X	
FS 04			X
FS 07	X		X
FS 11		X	X

If the FS logo, e.g. with the code "FS-11" is present on the motor nameplate, the combination of safety encoder and safety brake is available for the motor. Drives can also be equipped with two encoders, e.g. built-in encoder and add-on encoder. In such cases, the FS logo for the safety encoder always relates to the add-on encoder. If an FS logo is available, adhere to the information specified in the corresponding documentation.

If the drive bears the FS logo on the nameplate, adhere to the information in the following documentation:

- Addendum to the operating instructions "Safety encoders and safety brakes for synchronous servomotors CMP, CMPZ, and CM3C.."

In the addendum to the operating instructions "Safety encoders and safety brakes for synchronous servomotors CMP, CMPZ, and CM3C.." the characteristic safety values for determining the safety level of systems and machines are specified in chapter "Characteristic safety values".

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4 Mechanical installation

4.1 Before you start

INFORMATION

Observe the safety notes in chapter 2 of this documentation for the mechanical installation.

INFORMATION

The mounting position for installation must correspond with the specifications on the nameplate.

INFORMATION

Only SEW-EURODRIVE repair workshops, or SEW plants that provide the necessary expertise may modify the product.

Install the drive only if the following conditions are met:

- The information on the nameplate of the drive corresponds to the voltage supply system or to the output voltage of the inverter.
- The drive is undamaged (no damage caused by transportation or storage).
- All transport protection has been removed.
- Ambient temperature is as specified on the nameplate.

  Note that the temperature range of the gear unit might also be restricted (see "Gear units" operating instructions).
- You have ensured that there are no oils, acids, gases, vapors, radiation, etc. present.

The information above refers to standard orders. The requirements for special designs might vary from the standard. For this reason, refer to the order confirmation for deviating conditions. Make sure that the drive is designed according to the ambient conditions.

Functional safety

If the drive has the FS logo on the nameplate, observe the information on mechanical installation in the corresponding addendum to the operating instructions.

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4.2 Motor installation notes

⚠ WARNING

Magnetic fields can have an impact on the function of pacemakers and other active medical implants.

Health risk.

✓ The product has permanent magnets that generate a magnetic field, even when no current is supplied. During operation, additional electromagnetic fields are generated.

- If you have a pacemaker or any other active medical implant, keep a distance > 500 mm between the body part with the active medical implant and the motor.
- Inform people with active medical implants about the dangers.

⚠ CAUTION

Sharp edges due to open keyway.

Risk of cutting injuries.

- Insert the key into the keyway.
- Pull a protective tubing over the shaft.

NOTICE

Possible damage to the motor due to improper mounting.

The drive system might be damaged.

- Observe the notes in this chapter.

- Take account of derating at an installation altitude > 1000 m above sea level.
- Protect the components from mechanical damage.
- Only install the motor in the specified mounting position on a level, vibration-free and torsionally rigid support structure.
- For flange mounting, use the screws and tightening torques specified in chapter "Screw sizes and tightening torques for flange mounting".
- Align the motor and driven machine carefully so that the output shaft is not subjected to impermissible load. Observe the permitted overhung and axial loads.
- Do not jolt or hammer the shaft end.
- Only install or remove belt pulleys and couplings using suitable devices and cover them with a touch guard. Avoid impermissible belt tension. Observe the admitted overhung loads due to the belt tension.
- Motor shaft ends and flange surfaces must be thoroughly cleaned of anti-corrosion agents, contamination or similar. Use a commercially available solvent for this purpose. The solvent must not get into the bearings or sealing rings as this can damage the material.
- Make sure that the customer's counter-bearing is unobstructed and can move freely.
- Ensure that the cooling air supply to the motor is unobstructed.
- Make sure that no warm exhaust air from other devices is drawn in.

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- Balance parts to be subsequently mounted on the shaft only with half a key (motor shafts are balanced with half a key).
- Screw in the hand lever for brakemotors with manual brake release (with re-engaging manual brake release HR).
- Turn the rotor by hand and pay attention to unusual grinding noises.
- Check that the direction of rotation is correct in decoupled state.

4.2.1 Installation in damp locations or in the open

- If possible, arrange the motor and encoder connection in such a way that the connector cables are not pointing upwards.
- Clean the sealing surfaces of the connectors (motor or encoder connection) before reassembly.
- Replace embrittled seals.
- Touch up the anti-corrosion protection if necessary.
- Check the required degree of protection.
- Install covers (canopy) if necessary.

4.3 Installation tolerances

Shaft end	Flanges
Diameter tolerance according to EN 50347 • ISO k6 • Center hole according to DIN 332, shape DR	Centering shoulder tolerance according to EN 50347 • ISO j6

4.4 Screw sizes and tightening torques for flange mounting

Use the screw sizes and tightening torques specified in the table for flange mounting.

Motor size	Ø bore mm	Screw 8.8 DIN EN ISO 4762	Tightening torque[1)] Nm
CM3C63	6.5	M6 × 20[2)]	10.1
CM3C71	9	M8 × 35	24.6
CM3C80	11	M10 × 40	48
CM3C100	11	M10 × 40	48

1) The friction coefficient of the threads is 0.12.

2) Due to the flange geometry with this size, longer screws cannot be used.

4.5 Motor mounting to MD adapter

The following note only applies to motors in compact mounting with the MD adapter. These motors have the identification letter "D" for the shaft design in their type designation (e.g. CM3C71M-30A-**D**/PK/RH1M/SMB).

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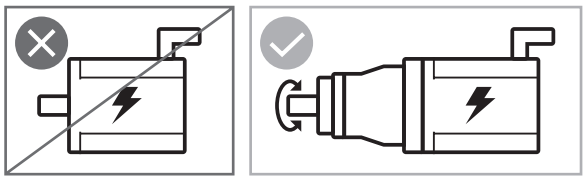
NOTICE

Motor operation without gear unit and adapter

Motor damage

- Never operate the motor prepared for mounting to the MD adapter without a gear unit or a suitable and intended test device.
- Gear units with the MD adapter may only be operated with CM3C.. servomotors with shaft design D.

On CM3C.. servomotors, a label is attached that indicates that CM3C.. servomotors with MD adapter must never be operated without a gear unit.



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5 Electrical installation

5.1 General information

⚠ WARNING

Danger due to live parts.

Severe or fatal injuries.

- Comply with the assembly specifications from the manufacturer.
- Switch off the electrical system before working on the main switch and prevent it from being switched on accidentally.
- Ensure that work is carried out by trained specialists only.
- Observe the 5 safety rules before commencing the work: Disconnect. Secure the device against a restart. Check that no voltage is applied. Ground and short-circuit it. Cover or cordon off neighboring live parts.

⚠ WARNING

Electric shock caused by missing or faulty ground connection.

Severe or fatal injuries.

- Each product must be secured with a ground connection.
- Make sure to install the ground connection correctly.
- Operate the product only with correctly connected protective earth, even for short-time measuring or test purposes.

⚠ WARNING

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

Severe or fatal injuries.

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

⚠ WARNING

Electric shock due to regenerative operation. Moving the output element generates a voltage at the male contacts of the power plug connector.

Severe or fatal injuries.

- Do not touch the male contacts in the power plug connector.
- Install a touch guard at the power plug connector if no mating connector is plugged in.

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⚠ WARNING

Magnetic fields can have an impact on the function of pacemakers and other active medical implants.

Health risk.

✓ The product has permanent magnets that generate a magnetic field, even when no current is supplied. During operation, additional electromagnetic fields are generated.

- If you have a pacemaker or any other active medical implant, keep a distance > 500 mm between the body part with the active medical implant and the motor.
- Inform people with active medical implants about the dangers.

⚠ WARNING

Unsecured key flung out of the keyway.

Severe or fatal injuries.

- Only operate the motor with attached customer output element (e.g. gear unit), or with a suitably secured key.

NOTICE

Malfunction and damage to the BK.. brake due to reverse polarity.

Damage to the brake

- It is essential that you observe the correct polarity of the brake power supply.
- Check the polarity when replacing the brake.

INFORMATION

Only SEW-EURODRIVE repair workshops, or SEW plants that provide the necessary expertise may modify the product.

- During installation, observe the instructions in chapter "Safety notes" (→ 🗎 8)
- Observe the information on the nameplate.
- Observe the information on the motor Pin assignment.
- Before starting up motors with brakes, check that the brake is functioning correctly.
- The motor may only be operated with a frequency inverter.
- Observe the operating instructions of the frequency inverter.

5.2 Additional regulations

The generally applicable installation regulations for low-voltage electric equipment (such as DIN IEC 60364, DIN EN 50110) must be complied with when setting up electrical machinery.

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5.3 Wiring notes

5.3.1 Protecting the brake control system against interference

To protect the brake control system against interference, do not route unshielded brake cables together with switched-mode power cables.

Switched-mode power cables include in particular:

- Output cables from servo inverters, converters, soft start units and brake units
- Supply cables for braking resistors and similar options

5.3.2 Protecting the motor protection devices against interference

Adhere to the following points to protect motor protection devices by SEW-EURODRIVE against interference:

- Route separately shielded feeder cables together with switched-mode power lines in one cable
- Do not route unshielded feeder cables together with switched-mode power lines in one cable.

5.4 Brake controls with functional control input

In addition to the voltage supply, the optional brake controls of the BMK., BMKB. and BMV. series offer a control input for a DC 24 V signal with which the brakes can be switched via a PLC.

It is a purely functional input that is not "functionally safe" with respect to safety technology.

Due to their operating principle, fault states can occur in these devices that lead to unintentional ongoing brake release, even if the control voltage has been switched off.

To prevent the brake from remaining released despite the control voltage being switched off, proceed as follows:

✓ For applications with functional safety, use a safety-related brake control e.g. a BST safe brake module.

1. Always disconnect all poles of the supply and control voltage for hoists and hoist-like applications.
2. ⚠ **WARNING!**
   Unintentional ongoing brake release due to unrecognized malfunction of the brake control. Severe or fatal injuries, e.g. due to falling hoist or extended coasting. Ensure that a malfunction of the control input can be detected through additional, suitable diagnostic measures e.g. by monitoring the braking current.
3. If you have any questions regarding the handling of the control input, contact SEW-EURODRIVE.

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5.5 Connecting the motor and the encoder system via plug connector SM./SB./SH.

As standard, the electric motors are supplied with the SM./SB. plug connector system in two-cable technology.

In the basic version, SEW-EURODRIVE delivers electric motors with a connector on the motor end and without mating connector. The encoder system is connected using a separate 12-pin round plug connector (M23). The mating connectors can be ordered separately or together with the motor.

Electric motors in the optional "encoderless design" are equipped with single-cable technology with SH. plug connector system upon delivery.

INFORMATION

Using an inverter with suitable control mode is mandatory for operating a motor in encoderless design.

The following control modes by SEW-EURODRIVE are available:

- ELSM® (Encoderless Synchronous Machine) control mode
- PMVC control mode (Permanent Magnet Vector Control)

All servomotors are equipped with quick-lock right-angle or radial connectors as standard (SpeedTec).

5.5.1 Notes regarding the connection of the power and signal cables via the connector system

Power cables and signal cables are connected with adjustable right-angle connectors as standard.

NOTICE

Damage to the right-angle connector in case of rotation without mating connector.

Damage to the plug connector and the sealing surface.

- Adjust the right-angle connector only while the mating connector is plugged in.
- If you do not have a mating connector at hand, do NOT use pliers to adjust the right-angle connector.

INFORMATION

- Comply with the permitted bending radii of the cables.
- When using low-capacity trailing cables, the bending radii are larger than for the previously used standard cables.
- SEW-EURODRIVE recommends the use of low-capacity cables.
- Use cables with a permitted continuous operating temperature of minimum 80 °C.

NOTICE

Potential damage to the right-angle connector.

Possible damage to property.

- Do not align the right-angle connector frequently.

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INFORMATION

The connector should only be rotated to install and connect the motor. Do not turn the plug connector regularly once it has been installed.

INFORMATION

To protect the motor protection devices or the brake control from damage, you must not route unshielded supply cables alongside switched-mode power cables.

Shielded supply cables may be routed together with switched-mode power lines in one cable.

Switched-mode power cables are:

- Output cables from servo inverters, converters, and brake units
- Supply cables for braking resistors and similar options

5.5.2 Type designation of plug connectors at the cable side

The following table describes a type designation:

Example: SM12	
S	**S:** Plug connector
M	**M**: Motor **B**: Brakemotor **H**: Hybrid design (power rating and signals)
1	**1**: Connector size 1 (1.5 – 4 mm^2) **B**: Connector size 1.5 (6 – 16 mm^2) **C**: Connector size
2	Cross section **1**: 1.5 mm^2 **2**: 2.5 mm^2 **4**: 4 mm^2 **6**: 6 mm^2 **10**: 10 mm^2 **16**: 16 mm^2 **25**: 25 mm^2 **35**: 35 mm^2

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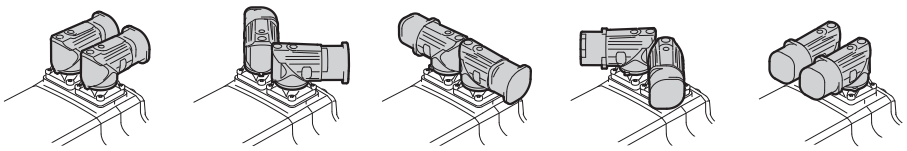
5.6 Connecting the two-cable technology

As standard, the power supply with or without brake supply is connected to motor via the quick-lock (SpeedTec) SM./SB. plug connector system.

In the basic design, SEW-EURODRIVE delivers the electric motors with a connector on the motor side and without a mating connector. The encoder system is connected using a separate 12-pin round circular connector (M23).

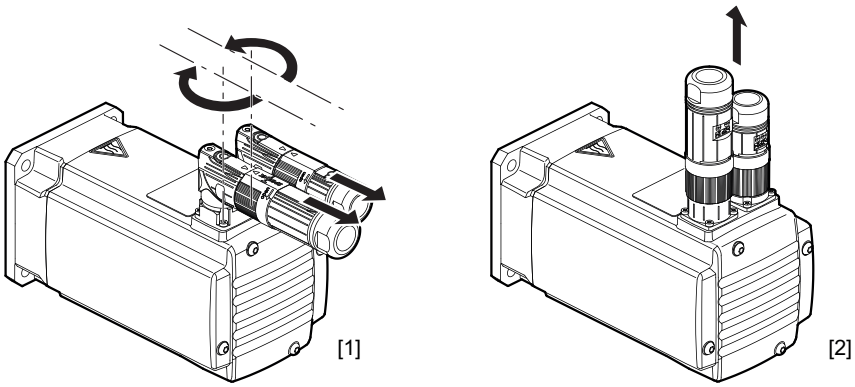
The mating connectors can be ordered separately or together with the motor.

The SM1/SB1, SMB/SBB right-angle connectors can be aligned to achieve all desired positions. The following figure illustrates examples of different positions of SM1/SB1, SMB/SBB plug connectors:



29125640203

The position defined for straight connectors is "radial". The radial plug connectors [2] are optional:



32769028491

[1] "Directional" connector position
[2] "Radial" connector position

The different plug connectors of the individual motor sizes are available in the following designs:

Connector position		Plug connector	
		SM1/SB1	SMB/SBB
Radial		X	X
Adjustable	Steplessly adjustable positions	X	X

X Available

– Not available

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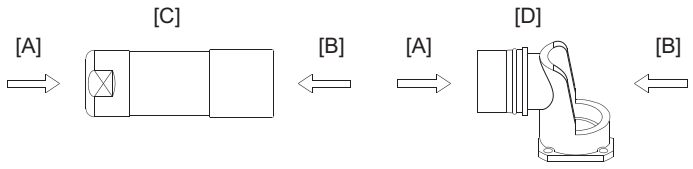
5.6.1 Key



8790995467

[A] View A
[B] View B
[C] Customer connector with socket contacts
[D] Flange socket with pin contacts installed at the factory

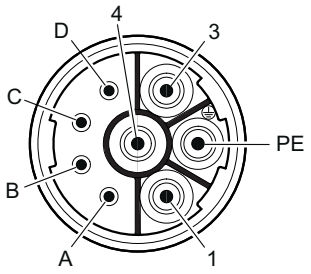
5.6.2 Connecting SM1/SB1 power plug connectors (M23)

The pin assignment of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors with resolver/HIPERFACE® interface

Connection type
M23, TE Connectivity - Intercontec Products, series 923, SEW insert, SpeedTec equipment, coding ring: without, male

Pin assignment

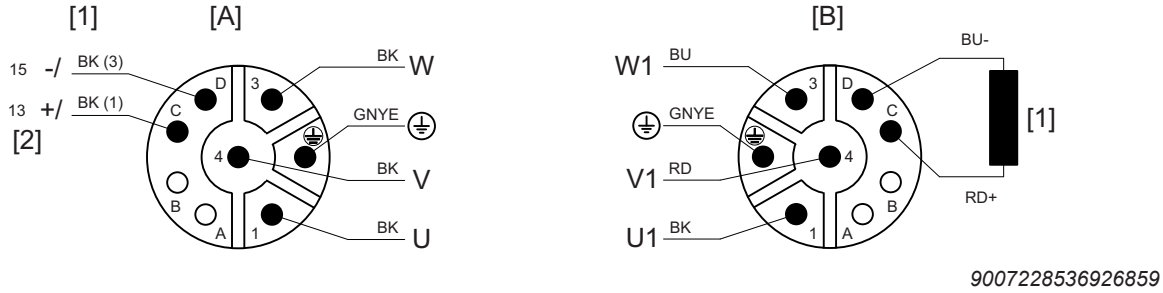


Motor assignment

Contact	Signal	Without brake	With BK../BZ..D brake	With BZ.. brake
A	Reserved	Do not connect	Do not connect	Do not connect
B	Reserved	Do not connect	Do not connect	Brake 14
C	Reserved	Do not connect	Brake +	Brake 13
D	Reserved	Do not connect	Brake -	Brake 15
PE	PE	Protective earth	Protective earth	Protective earth
1	U	Motor phase U	Motor phase U	Motor phase U
3	W	Motor phase W	Motor phase W	Motor phase W
4	V	Motor phase V	Motor phase V	Motor phase V

Pin assignment SM1./SB1. with/without BK.. brake

Connect the shield to the metal housing of the connector. The color code corresponds to the cables from SEW-EURODRIVE.

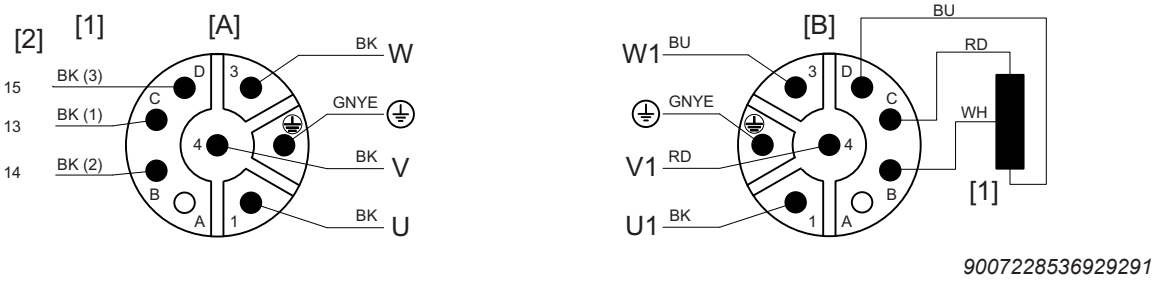


9007228536926859

[1] BK.. brake (optional)
[2] Connection to rectifier from SEW-EURODRIVE according to operating instructions.

Pin assignment SM1./SB1. with/without BZ../BZ..D brake

Connect the shield to the metal housing of the connector. The color code corresponds to the cables from SEW-EURODRIVE.



9007228536929291

[1] BZ../BZ..D brake (optional)
[2] Connection to rectifier from SEW-EURODRIVE in accordance with operating instructions. For BZ..D, there is no port 14 (contact B).

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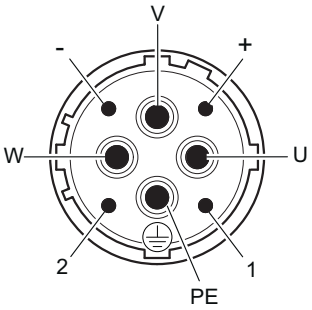
5.6.3 Connection SMB/SBB power plug connector (M40)

The pin assignment of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors with resolver/HIPERFACE® interface

Connection type
M40, TE Connectivity - Intercontec products, series 940, SEW insert, SpeedTec equipment, coding ring: without, male

Pin assignment

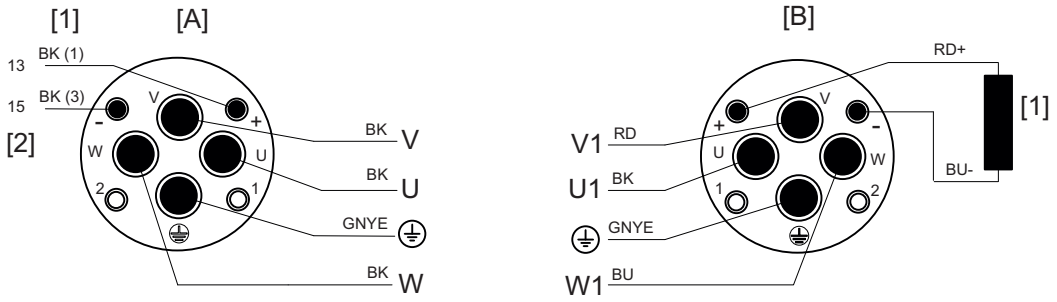


Motor assignment

Contact	Signal	Without brake	With BK../BZ..D brake	With BZ.. brake
+	Reserved	Do not connect	Brake +	Brake 13
-	Reserved	Do not connect	Brake -	Brake 15
1	Reserved	Do not connect	Do not connect	Brake 14
2	Reserved	Do not connect	Do not connect	Do not connect
PE	PE	Protective earth	Protective earth	Protective earth
U	U	Motor phase U	Motor phase U	Motor phase U
V	V	Motor phase V	Motor phase V	Motor phase V
W	W	Motor phase W	Motor phase W	Motor phase W

Pin assignment SMB./SBB. with/without BK.. brake

Connect the shield to the metal housing of the connector. The color code corresponds to the cables from SEW-EURODRIVE.

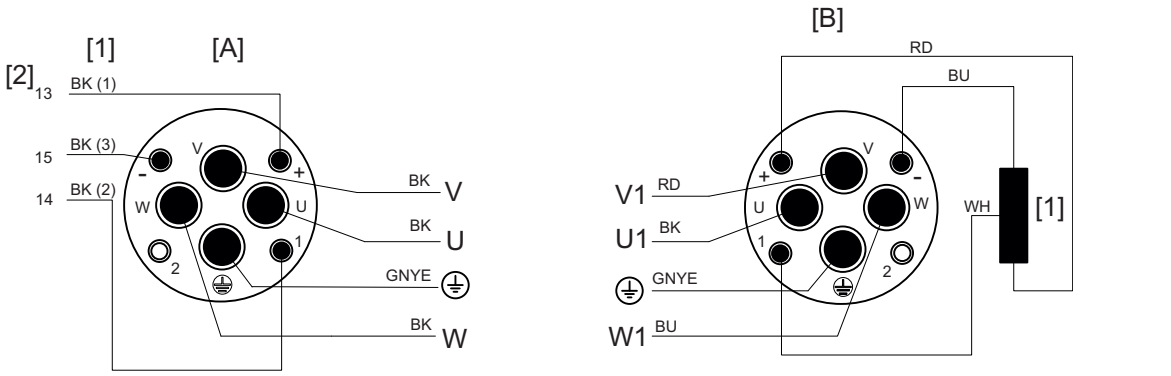


29282190731

[1] BK.. brake (optional)
[2] Connection to SEW rectifier according to operating instructions.

Pin assignment SMB./SBB. with/without BZ../BZ..D brake

Connect the shield to the metal housing of the connector. The color code corresponds to the cables from SEW-EURODRIVE.



29282193163

[1] BZ../BZ..D brake (optional)
[2] Connection to rectifier from SEW-EURODRIVE according to operating instructions. For BZ..D, there is no port 14 (contact 1).

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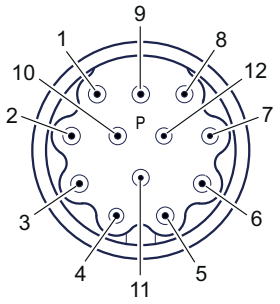
5.6.4 Connection of SM./SB. signal plug connector

The pin assignment of the plug connector depicts the contact end of the connections.

Function
Signal connection for motors with resolver/HIPERFACE® interface

Connection type
M23, TE Connectivity - Intercontec products, series 623, SEW insert, SpeedTec equipment, coding ring: without, male

Pin assignment



Motor assignment

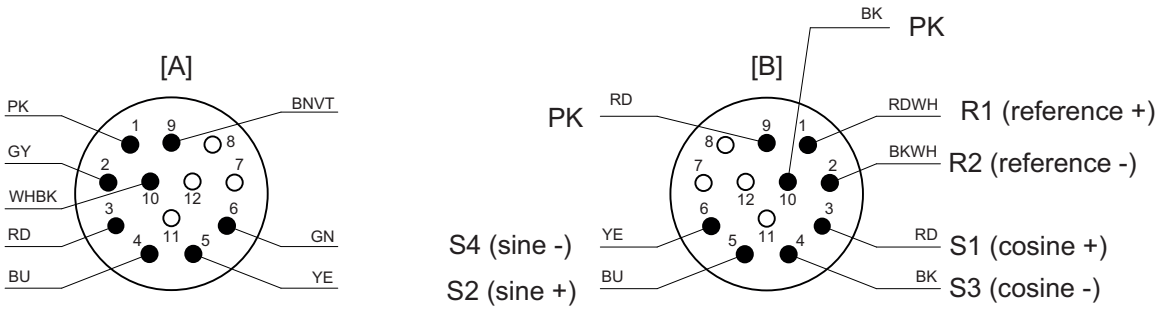
Contact	Signal	With AK0H/AK1H/EK1H encoder	With RH1M resolver
1	Reserved	Do not connect	Reference +
2	Reserved	Do not connect	Reference -
3	S1 cos+	Cosine +	Cosine +
4	S3 cos-	Cosine -	Cosine -
5	S2 sin+	Sine +	Sine +
6	S4 sin-	Sine -	Sine -
7	D -	Data -	Do not connect
8	D +	Data +	Do not connect
9	PK	Motor protection	Motor protection
10	PK	Motor protection	Motor protection
11	GND	Protective earth	Do not connect
12	VS	Voltage supply	Do not connect

Pin assignment for signal plug connectors RH1M resolver

INFORMATION

The connection diagram and signal logics of the RH1M resolver are identical for CMP.. and CM3C motors. Due to the installation design, the color coding of the cores might vary.

Pin assignment

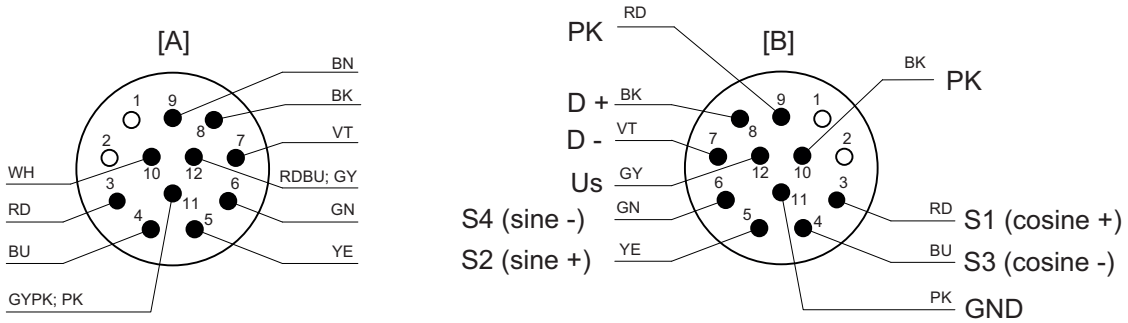


18014427791655691

Connect the shield to the metal housing of the connector. The color code corresponds to the cables from SEW-EURODRIVE.

Pin assignment for signal plug connector AAK0H, AK1H, EK1H encoder

Pin assignment

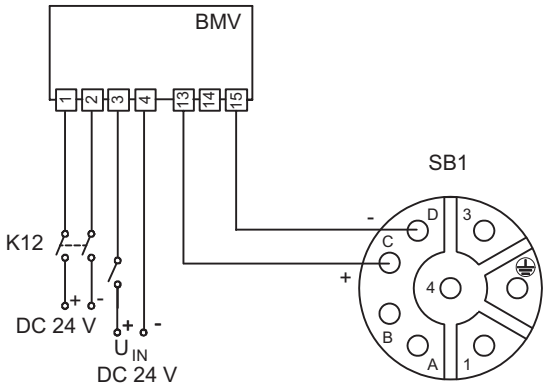


29282171275

Connect the shield to the metal housing of the connector. The color code corresponds to the cables from SEW-EURODRIVE.

5.6.5 Pin assignment of the brake control with /BK.. or /BZ..D brake

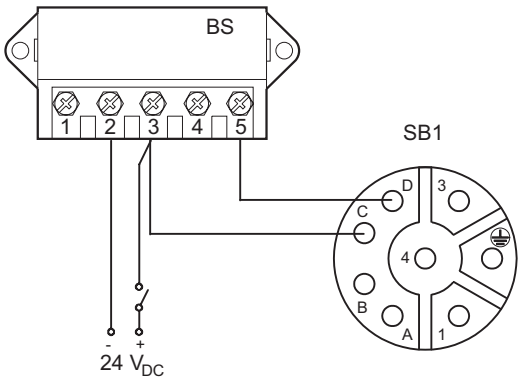
BMV brake controller



9007212241295115

Connection 1, 2	Power supply
Connection 3, 4	Signal (inverter)

Braking contactor BS or BZ.D



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Direct 24 V brake supply

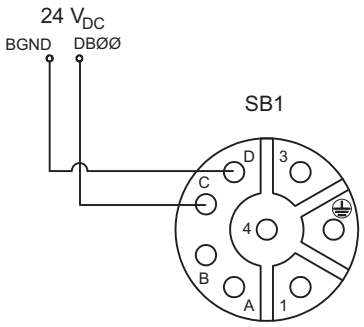
NOTICE

Malfunction and damage to the BK.. brake due to reverse polarity.

Damage to the brake

- It is essential that you observe the correct polarity of the brake power supply.
- Check the polarity when replacing the brake.

With MOVIAXIS®
or
MOVIDRIVE® modular



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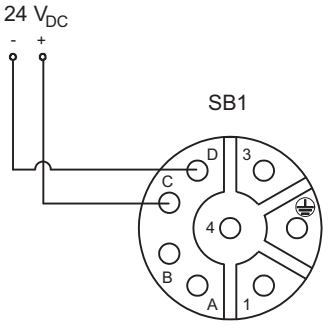
With third-party inverters



12986696203

The brake must be protected against overvoltages in the following cases, e.g. by means of a varistor protection circuit:

- for operation with third-party inverters,
- for brakes that are not supplied directly from inverters from SEW-EURODRIVE.

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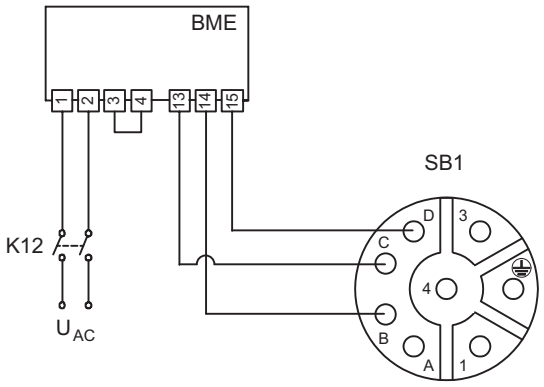
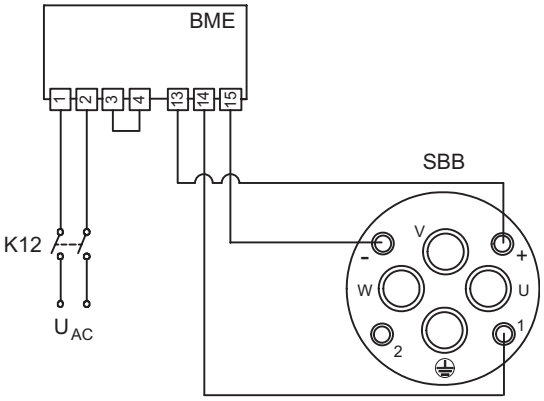
5.6.6 Pin assignments of the brake control with /BZ.. brake

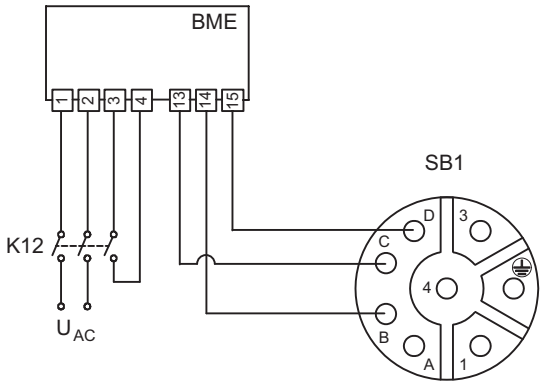
BME brake rectifier when using a BZ.. brake

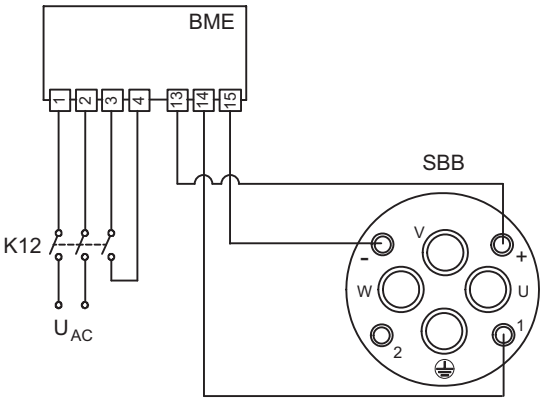
Cut-off in the AC circuit / standard application of the brake with SB1, SBB.





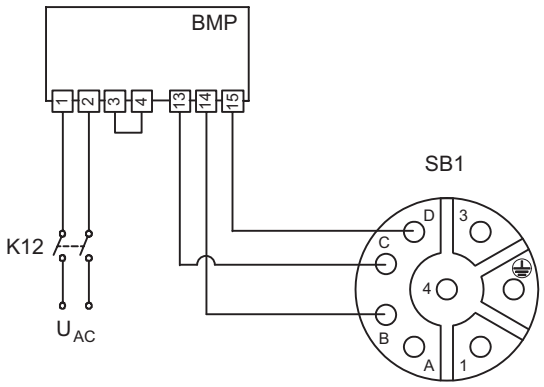
Cut-off in the DC and AC circuits / rapid application of the brake with SB1, SBB when using a BZ.. brake

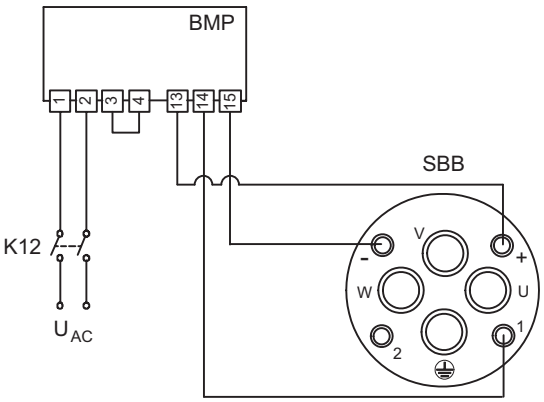




BMP brake rectifier when using a BZ.. brake

Cut-off in the DC and AC circuits / rapid application of the brake / integrated voltage relay with SBB.





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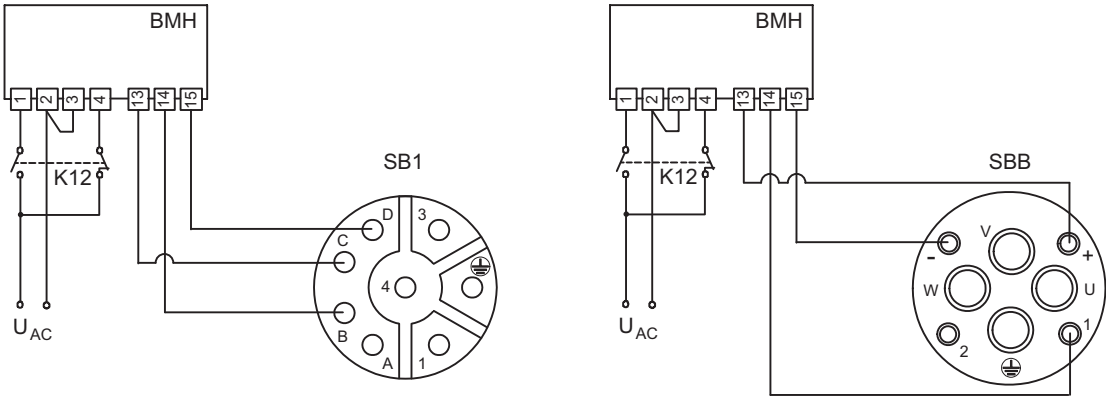
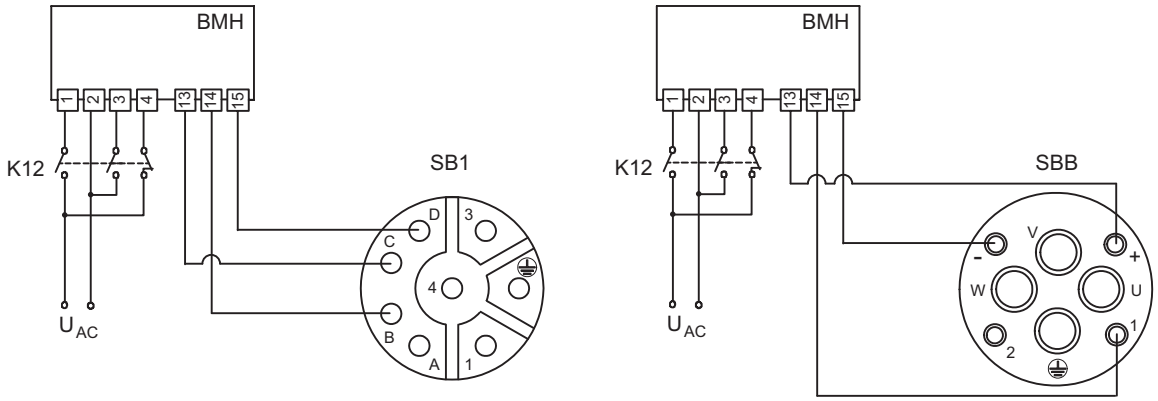
BMH brake rectifier

Cut-off in the AC circuit / normal application of the brake with SBB when using a BZ.. brake

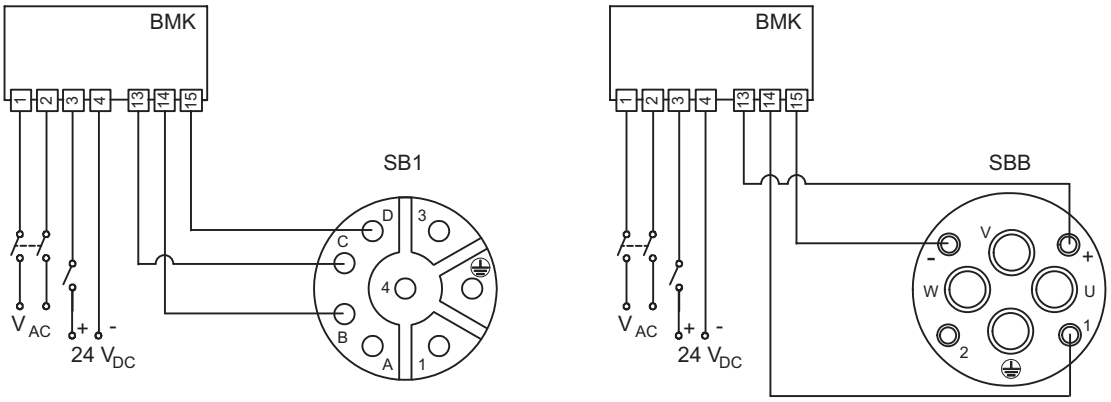


Cut-off in the DC and AC circuits / rapid application of the brake with SBB.. when using a BZ.. brake



BMK brake control unit when using a BZ.. brake

Cut-off in the DC and AC circuits / rapid application of the brake / integrated voltage relay / DC 24 V control input integrated with SBB.

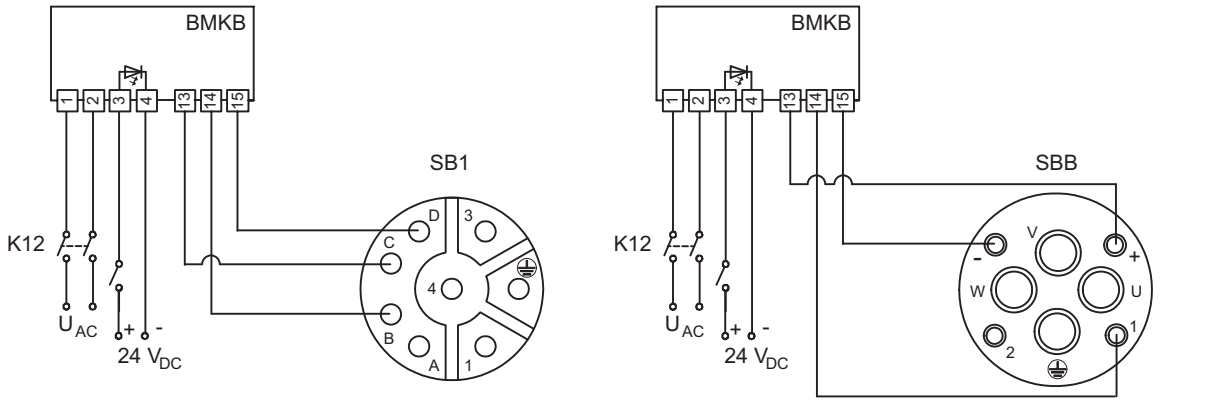


9007202156720139

Connection 1, 2 Power supply
Connection 3, 4 Signal (inverter)

BMKB brake control unit when using a BZ.. brake

Cut-off in the DC and AC circuits / rapid application of the brake / integrated voltage relay / DC 24 V control input integrated / LED ready for operation display with SBB.

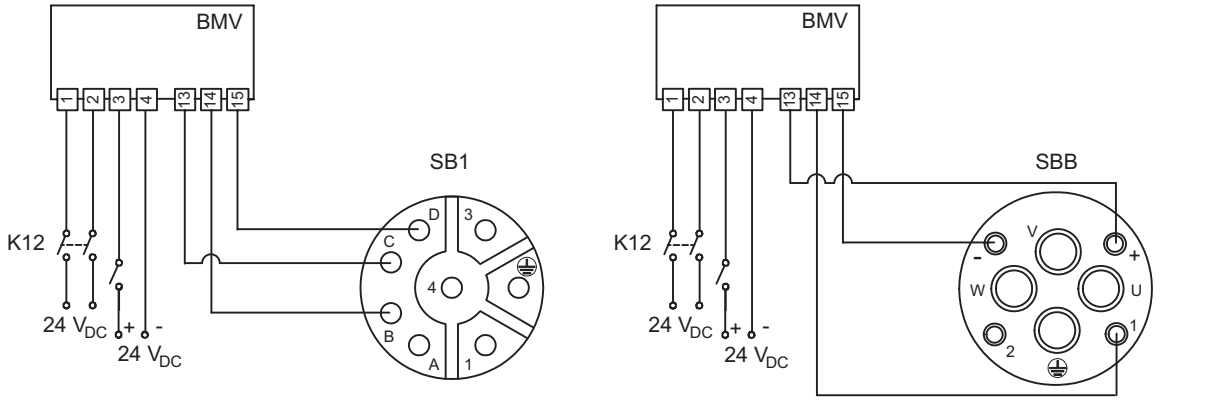


2901981835

Connection 1, 2 Power supply
Connection 3, 4 Signal (inverter)

BMV brake control unit when using a BZ.. brake

Cut-off in the DC and AC circuits / rapid application of the brake / DC 24 V control input integrated with SBB.



2901984523

Connection 1, 2 Power supply
Connection 3, 4 Signal (inverter)

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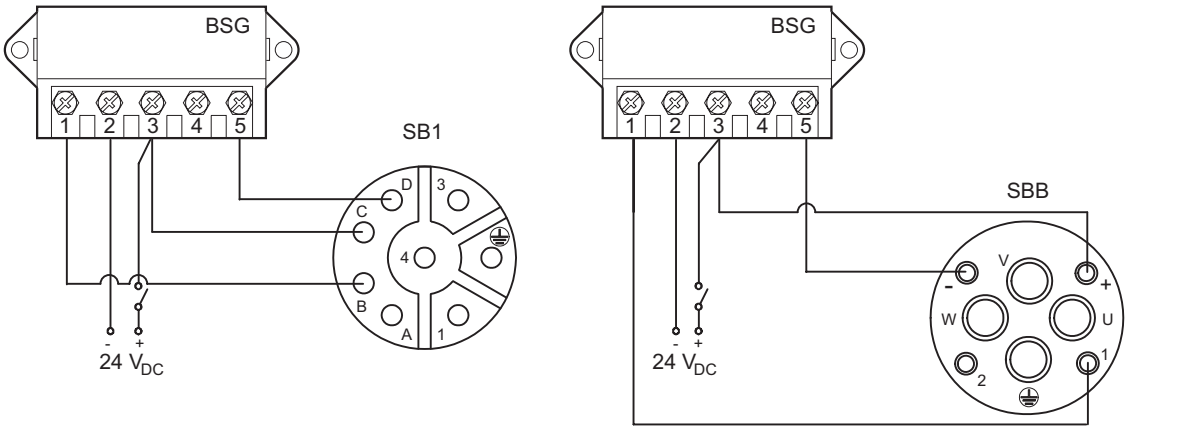
BSG brake control unit when using BZ.. brake

For DC 24 V supply with SBB.



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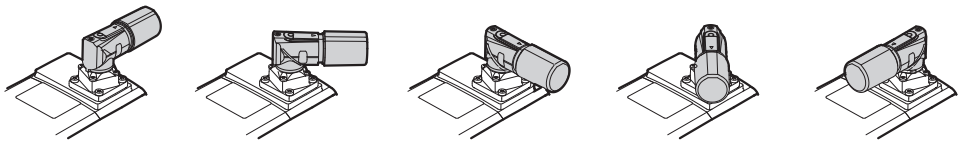
5.7 Connecting single-cable technology

Using the fully digital MOVILINK® DDI interface by SEW-EURODRIVE allows for connecting servomotors using single-cable technology. With this technology, all data of the motor, such as encoder data, temperature data, startup data, and data of further sensors is digitally transferred via a hybrid cable.

The right-angle SD1/SDB plug connectors can be rotated to achieve the required positions:



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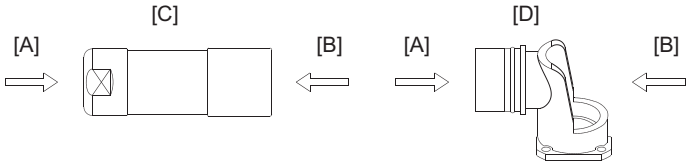
5.7.1 Key



8790995467

[A] View A
[B] View B
[C] Customer connector with socket contacts
[D] Flange socket with pin contacts installed at the factory

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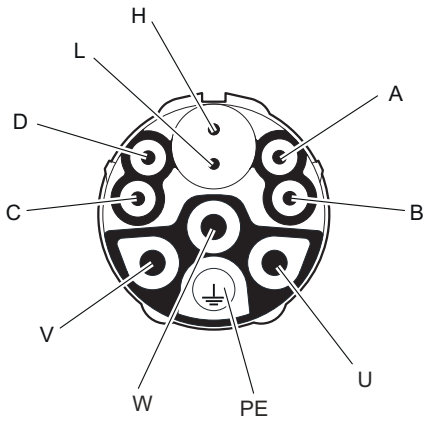
5.7.2 Connection of SH1 power plug connector (M23)

The pin assignment of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors in encoderless design

Connection type
M23, male, male thread, TE Connectivity – Intercontec products, series 723, SEW-EURODRIVE insert, SpeedTec equipment, coding ring: without, protected against contact

Pin assignment

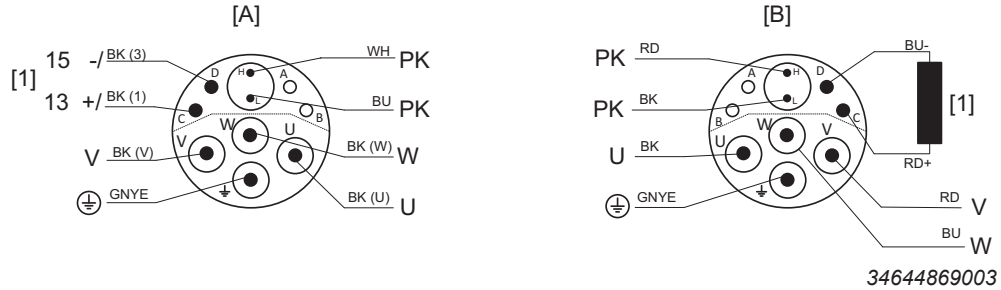


34609095051

Motor assignment

Contact	Signal	Without brake	With BK../BZ..D brake	With BZ.. brake
U	U	Motor phase U	Motor phase U	Motor phase U
V	V	Motor phase V	Motor phase V	Motor phase V
W	W	Motor phase W	Motor phase W	Motor phase W
A	Reserved	Do not connect	Do not connect	Do not connect
B	Reserved	Do not connect	Do not connect	Brake 14
C	Reserved	Do not connect	Brake +	Brake 13
D	Reserved	Do not connect	Brake -	Brake 15
PE	PE	Protective earth	Protective earth	Protective earth
H	H	Motor protection	Motor protection	Motor protection
L	L	Motor protection	Motor protection	Motor protection

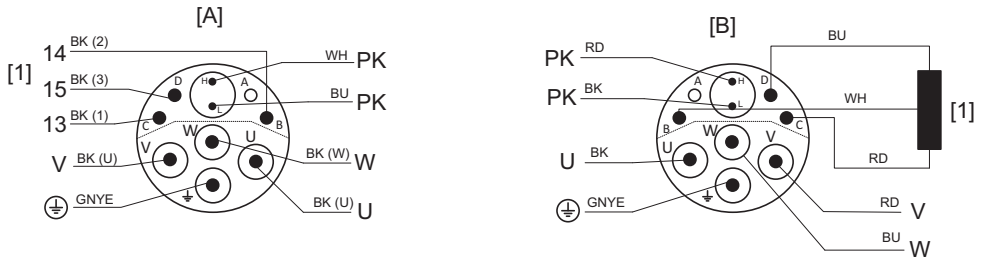
Pin assignment for SH1 without brake / with BZ..D/BK.. brake



34644869003

[1] BZ..D/BK.. brake (optional)

Pin assignment for SH1 without brake / with BZ.. brake



34644894731

[1] BZ.. brake (optional)

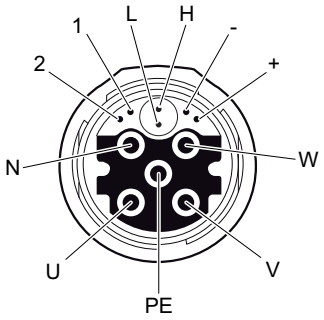
5.7.3 Connection of SHB (M40) power plug connectors

The pin assignment of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors in encoderless design

Connection type
M40, male, male thread, TE Connectivity – Intercontec products, series 740, SEW-EURODRIVE insert, SpeedTec equipment, coding ring: without, protected against contact

Pin assignment



Motor assignment

Contact	Signal	Without brake	With BK../BZ..D brake	With BZ.. brake
U	U	Motor phase U	Motor phase U	Motor phase U
V	V	Motor phase V	Motor phase V	Motor phase V
W	W	Motor phase W	Motor phase W	Motor phase W
1	Reserved	Do not connect	Do not connect	Do not connect
2	Reserved	Do not connect	Brake -	Brake 15
+	Reserved	Do not connect	Brake +	Brake 13
-	Reserved	Do not connect	Do not connect	Do not connect
N	Reserved	Do not connect	Do not connect	Brake 14
PE	PE	Protective earth	Protective earth	Protective earth
H	H	Motor protection	Motor protection	Motor protection
L	L	Motor protection	Motor protection	Motor protection

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Pin assignment for SHB without brake / with BZ..D/BK.. brake

34644913163

[1] BZ..D/BK.. brake (optional)

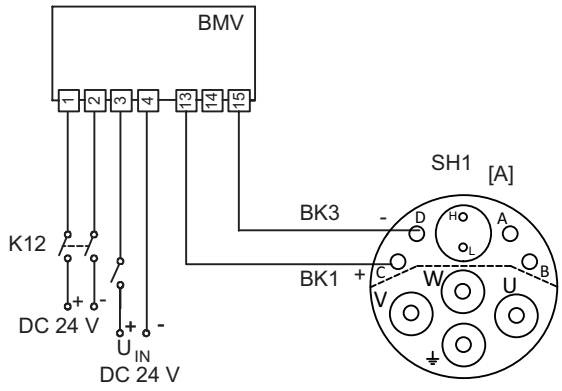
Pin assignment for SHB without brake / with BZ.. brake

34644925963

[1] BZ.. brake (optional)

5.7.4 Pin assignment of the brake control with /BK.. or /BZ..D brake

BMV brake controller



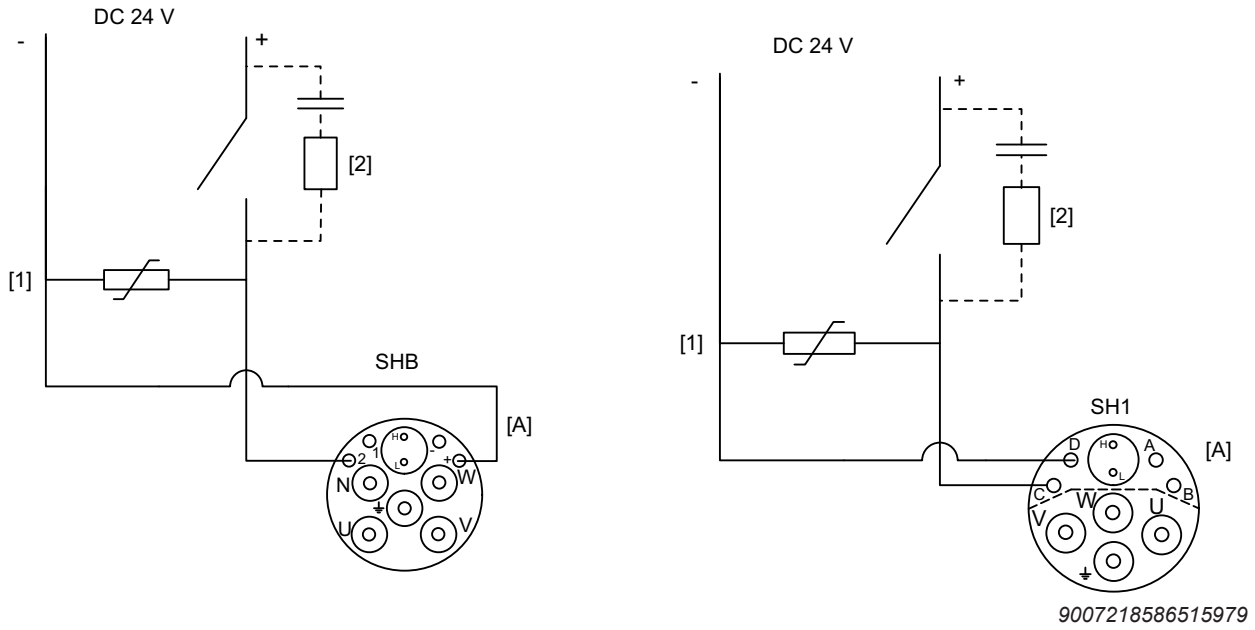
34755470603

Connection 1, 2 Power supply
Connection 3, 4 Signal (inverter)

Direct 24 V brake supply with non-SEW inverters

If the brake is not controlled via BMV brake control unit, a contactor must be used that is suitable for switching inductive DC loads. In this case a varistor circuit in parallel to the brake coil is required as overvoltage protection and EMC interference suppression of the 24 V supply. For brakes with external DC supply of more than 24 V and without BMV, a 300 V varistor must be used.

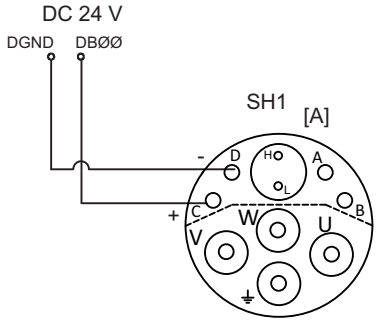
Additional option: If the varistor circuit is not sufficient for EMC interference suppression, an additional RC element can be switched via the contactor.



[1] Varistor
[2] RC element

Direct 24 V brake supply

With MOVIDRIVE® modular



NOTICE

Damage to the BK../BZ..D brake.

Possible damage to property.

- It is essential that you observe the correct polarity of the BK../BZ..D brake supply. Check the polarity when replacing the brake.

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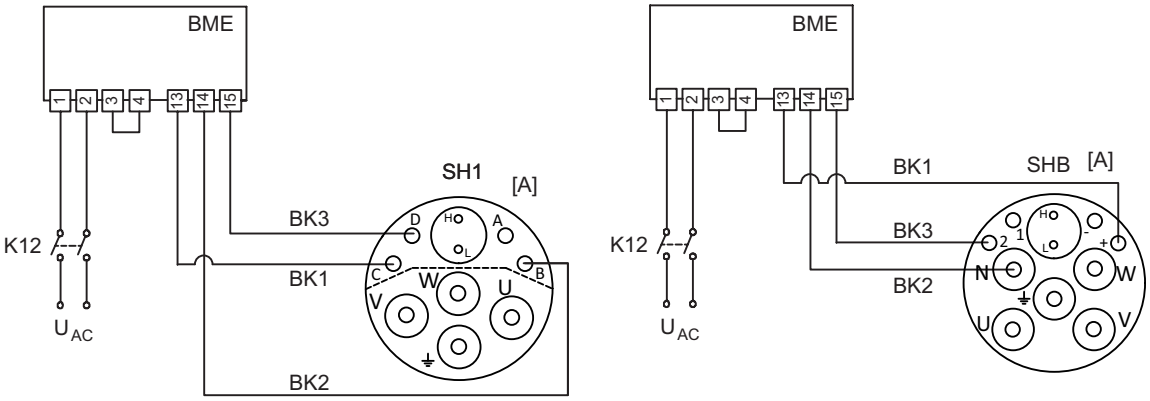
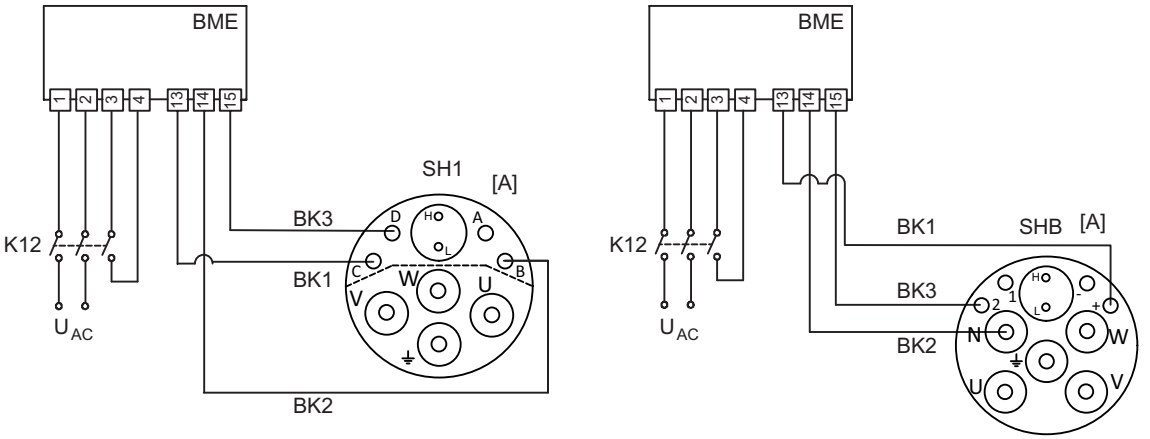
5.7.5 Pin assignments of the brake control with /BZ.. brake

BME brake rectifier

Cut-off in the AC circuit / standard application of the brake with SH1, SHB.

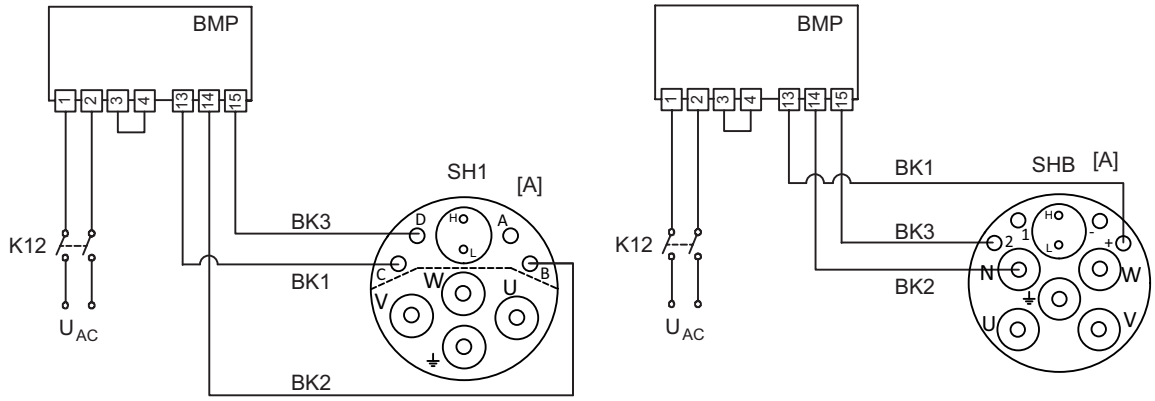


Cut-off in the DC and AC circuits / rapid application of the brake with SH1, SHB.



BMP brake rectifier

Cut-off in the DC and AC circuits / rapid application of the brake / integrated voltage relay with SH1 and SHB.



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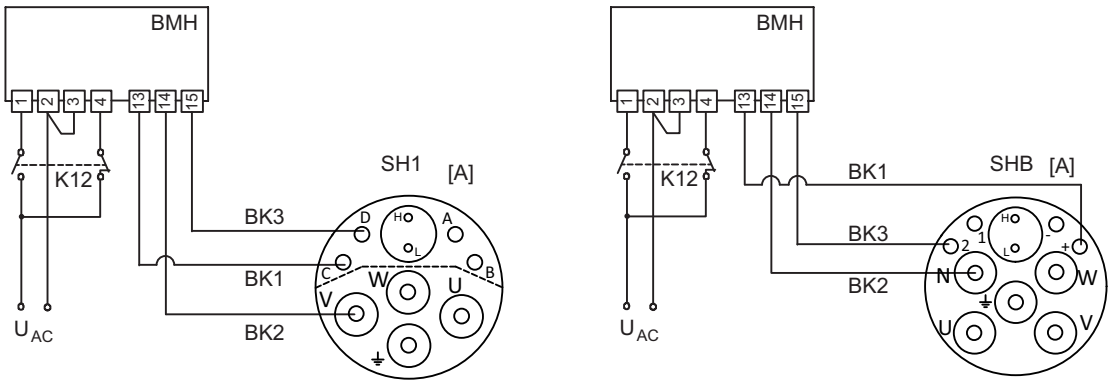
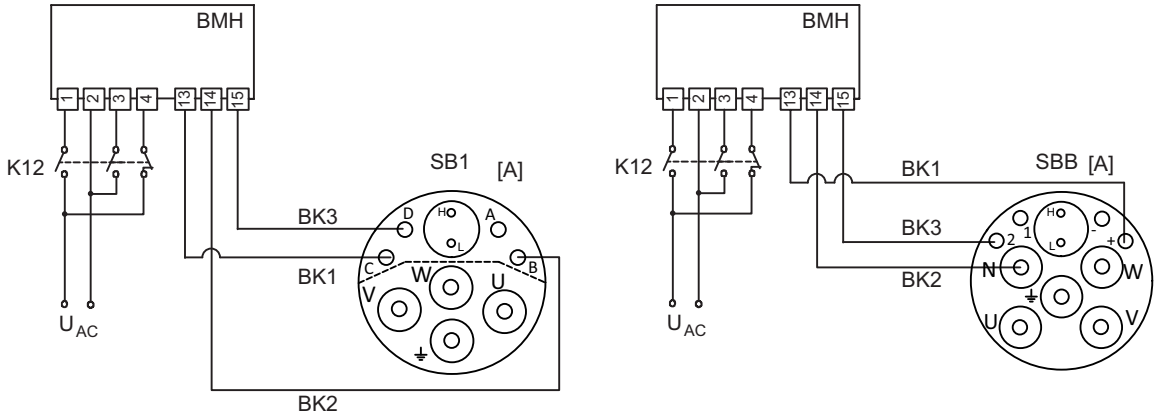
BMH brake rectifier

Cut-off in the AC circuit / standard application of the brake with SH1 and SHB.

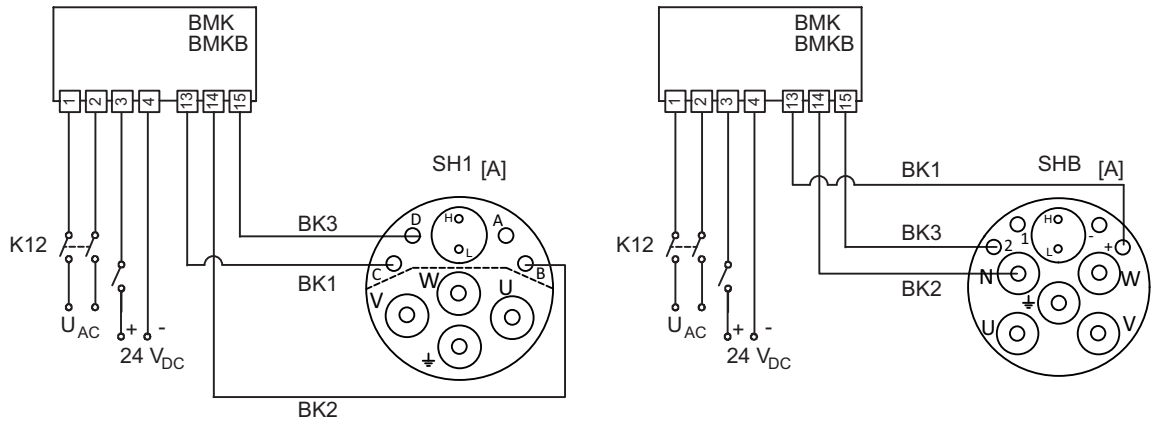


Cut-off in the DC and AC circuits / rapid application of the brake with SH1 and SHB.



BMK/BMKB brake control unit

Cut-off in the DC and AC circuits / rapid application of the brake / integrated voltage relay / DC 24 V control input integrated / LED ready for operation display with SH1 and SHB.



34756329995

Connection 1, 2	Power supply
Connection 3, 4	Signal (inverter)

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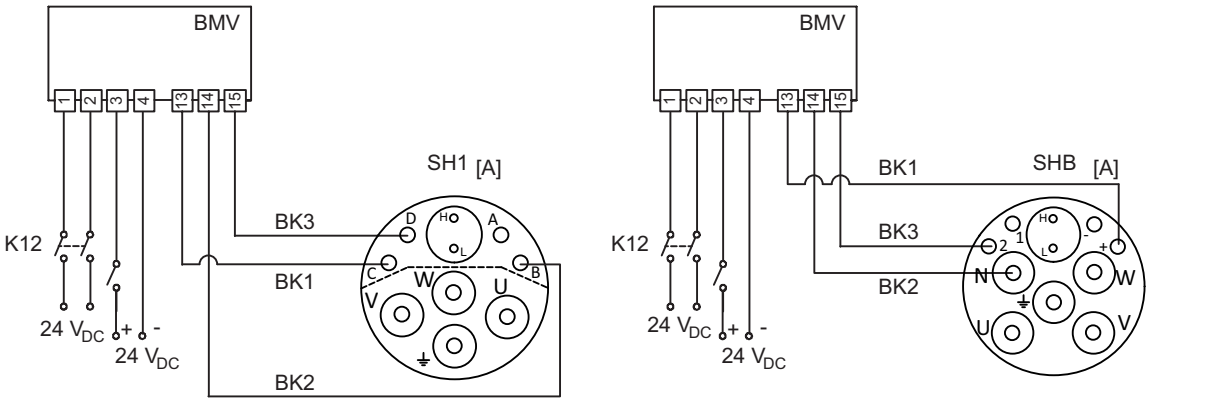
BMV brake controller

Cut-off in the DC and AC circuits / rapid application of the brake / DC 24 V control input integrated with SH1, SHB.



34756352523

Connection 1, 2	Power supply
Connection 3, 4	Signal (inverter)

5.8 Connection with terminal box

Optionally, you can connect the power and signal cables with conductor end sleeves via a terminal box.

INFORMATION

To protect the motor protection devices or the brake control from damage, you must not route unshielded supply cables alongside switched-mode power cables.

Shielded supply cables may be routed together with switched-mode power lines in one cable.

Switched-mode power cables are:

- Output cables from servo inverters, converters, and brake units
- Supply cables for braking resistors and similar options

- Check the cross section of the cables.
- Screw on the connections and the PE. Check for correct connection.
- An EMC screw fitting must be used for the cable entry of the signal cable to ensure a perfect shield connection.

⚠ WARNING

Risk of electric shock if signal cables or signal wires come into contact with power connections.

Fatal or serious injuries.

- The single conductors of signal cables (e.g. of encoders or temperature sensors) of the encoder cable must have minimum clearance of 4 mm from all bare and live parts of the terminal board and the eyelets.
- All single conductors of signal cables (e.g. of encoders or temperature sensors) or individual signal cables (e.g. with MOVILINK® DDI) must be insulated by the cable jacket or insulating tubing up to the connection to the terminal strip. Please ensure that the insulation cannot slip.

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5.8.1 Position of terminal box and cable entry

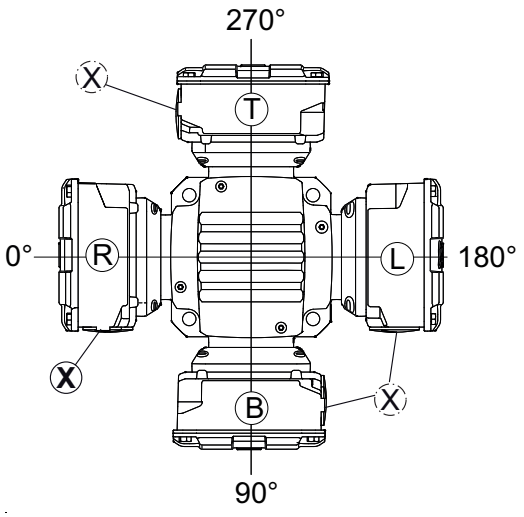
Product standard EN 60034 prescribes the following designations for terminal boxes positioned facing towards the output shaft (A-side):

- R (right)
- B (bottom)
- L (left)
- T (top)

This designation applies to motors without a gear unit in mounting position B3 (= M1).

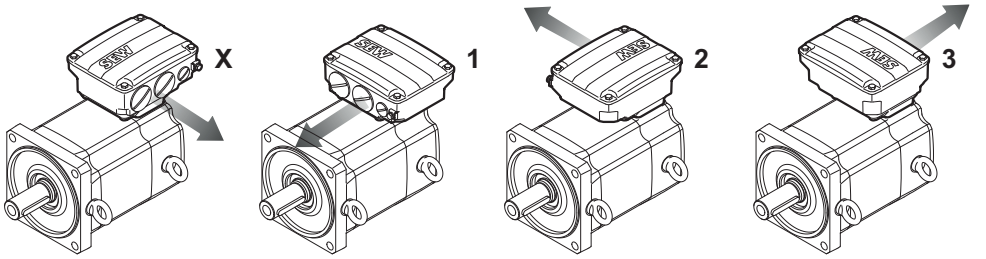
The position of the motor terminal box has so far been indicated with 0°, 90°, 180° or 270° as viewed onto the fan guard (B-side). For gearmotors, the previous designation is retained.

The following figure shows both designations. Where the mounting position of the motor changes, R, B, L and T are rotated accordingly.



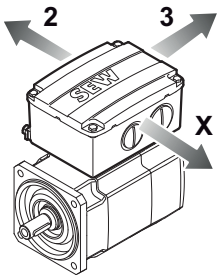
32761029643

The cable entry position is specified with X, 1, 2, 3. As standard, the terminal box is delivered in 270° design with cable entry "X".



9007228568864651

As depicted below, only terminal box position "X" is available for motor size CM3C63. Cable entry is possible from 3 sides.



9007228568088587

Observe that the terminal box position is defined when ordering the motor. The terminal box must not be turned afterwards. Contact SEW-EURODRIVE if necessary.

5.8.2 Connection cross section

Motor	Power		Brake		Encoder/resolver/ thermal motor protection		Cable entry
	Connection	Maximum connection cross section	Connection	Maximum connection cross section	Connection	Maximum connection cross section	Diameter
CM3C63	Spring terminals	4 mm^2	Spring terminals	1.5 mm^2	Spring terminals	1.5 mm^2	M25 × 1.5 (3×) M20 × 1.5 (3×)
CM3C71, CM3C80, CM3C100	M6 bolt	10 mm^2	Spring terminals	2.5 mm^2	Spring terminals	2.5 mm^2	M32 × 1.5 (2×) M16 × 1.5 (1×)

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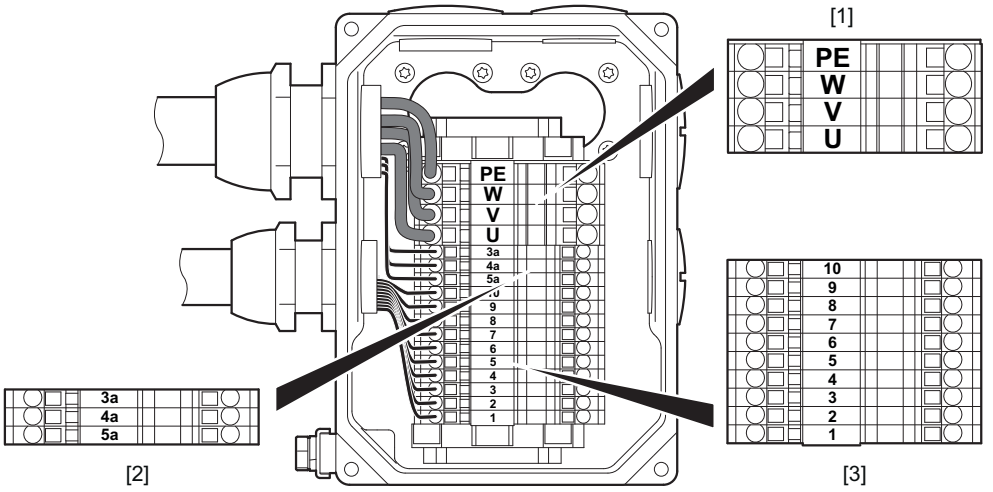
5.8.3 Terminal assignment of terminal box KK CM3C63



9007229916482315

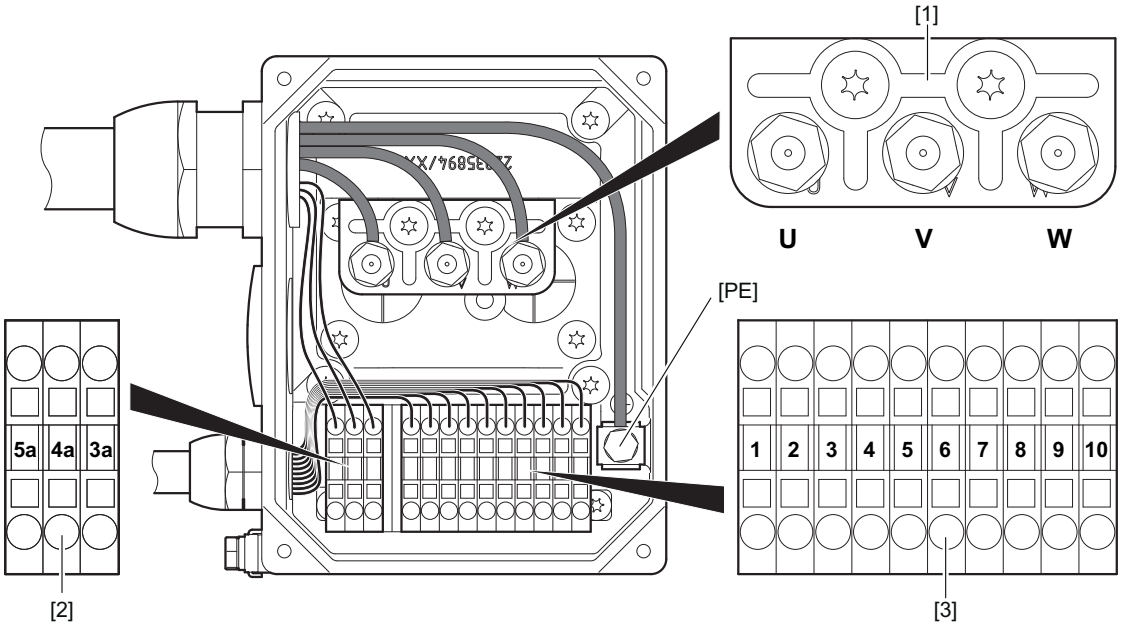
Terminal [1]	No.	Connection
Supply system	U	Line phase U
	V	Line phase V
	W	Line phase W
	PE	Protective earth

Terminal [2]	No.	Brake control connection			
		BMV..	BS24	BME.., BMP.., BMH.., BMK.., BST.., SBM..	BSG..
BK.. brake BZ..D brake	3a	–	–	–	1
	4a	13	3	–	–
	5a	15	5	–	–
BZ.. brake	3a	–	–	14	1
	4a	–	–	13	5
	5a	–	–	15	3

Terminal [3]	No.	RH1M resolver		AK1H, EK1H, AK0H encoders	
		Connection	Comment	Connection	Comment
Signal	1	R1 ref +	Reference +	cos +	Cosine +
	2	R2 ref -	Reference -	ref cos	Reference
	3	S1 cos +	Cosine +	sin +	Sine
	4	S3 cos-	Cosine -	ref sin -	Reference
	5	S2 sin+	Sine +	D -	DATA
	6	S4 sin-	Sine -	D +	DATA
	7	–	–	GND	Mass
	8	–	–	Vs	Voltage
	9	PK	Motor protection	PK	Motor protection
	10	PK	Motor protection	PK	Motor protection

The connection diagram and signal logics of the RH1M resolver are identical for CMP.. and CM3C.. motors. Due to the installation design, the color coding of the cores might vary.

5.8.4 Terminal assignment of terminal box KK CM3C71 – 100



9007229921948043

Terminal [1]	No.	Connection
Supply system	U	Line phase U
	V	Line phase V
	W	Line phase W
	PE	Protective earth

Terminal [2]	No.	Brake control connection			
		BMV..	BS24	BME.., BMP.., BMH.., BMK.., BST.., SBM..	BSG..
BK.. brake BZ..D brake	3a	–	–	–	–
	4a	13	3	–	–
	5a	15	5	–	–
BZ.. brake	3a	–	–	14	1
	4a	–	–	13	5
	5a	–	–	15	3

Terminal [3]	No.	RH1M resolver		AK1H, EK1H, AK0H encoders	
		Connection	Comment	Connection	Comment
Signal	1	R1 ref +	Reference +	S1 cos +	Cosine +
	2	R2 ref -	Reference -	S3 cos-	Cosine -
	3	S1 cos +	Cosine +	S4 sin+	Sine +
	4	S3 cos-	Cosine -	S2 sin-	Sine -
	5	S2 sin+	Sine +	D -	Data -
	6	S4 sin-	Sine -	D +	Data +
	7	–	–	GND	Mass
	8	–	–	Vs	Voltage
	9	PK	Motor protection	PK	Motor protection
	10	PK	Motor protection	PK	Motor protection

The connection diagram and signal logics of the RH1M resolver are identical for CMP.. and CM3C.. motors. Due to the installation design, the color coding of the cores might vary.

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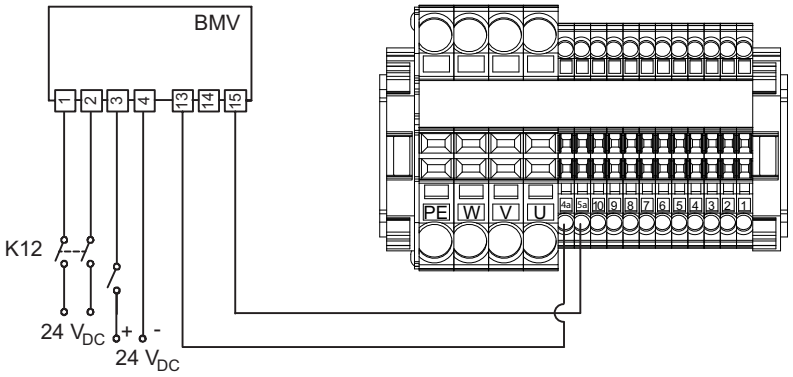
5.8.5 Pin assignments of the brake control with BK.. or BZ..D brake

In every application, the BK holding brake can be controlled via the BMV brake relay or a customer relay with varistor overvoltage protection.

If the system complies with the specifications for direct brake control, then a BK.. brake can also be controlled directly via the brake output of a servo inverter by SEW-EURODRIVE.

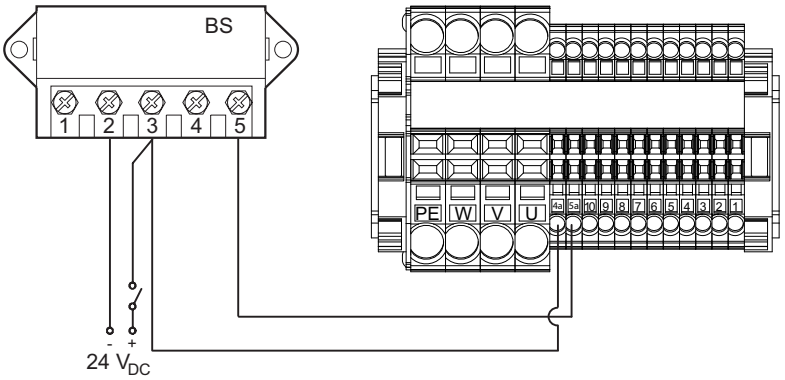
BMV brake control unit – CM3C63



9007202156696971

Connection 1, 2	Power supply
Connection 3, 4	Signal (inverter)

BS braking contactor – CM3C63



9007202156702347

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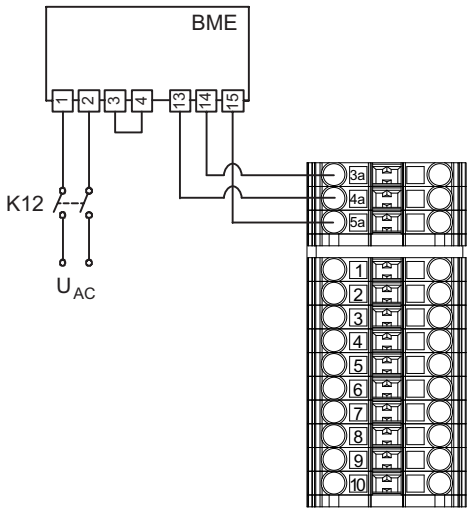
5.8.6 Pin assignment of the brake control with BZ.. brake

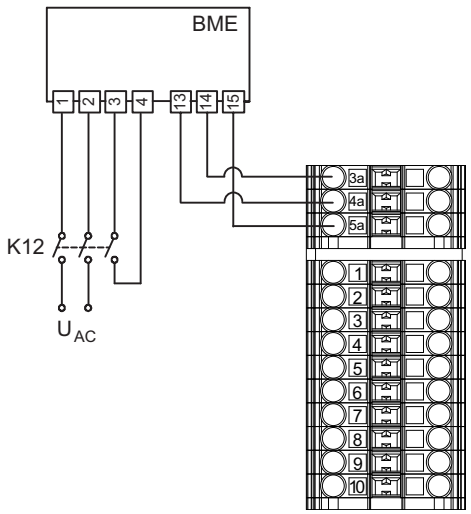
BME.. brake rectifier

Cut-off in the AC circuit / normal application of the brake.



2901990923

Cut-off in the DC and AC circuit / quick application of the brake.



2901992587

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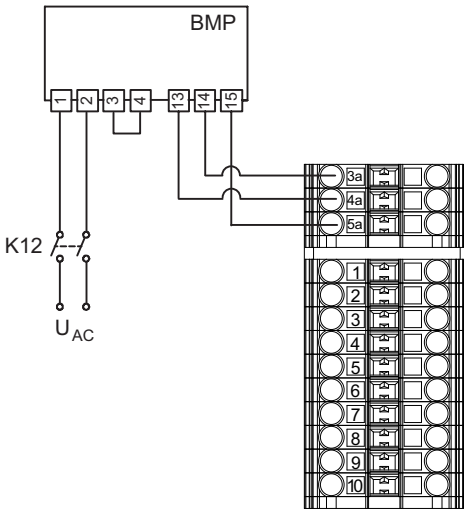
BMP.. brake rectifier

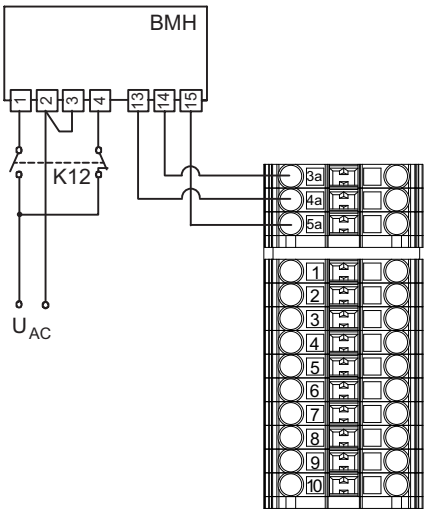
Cut-off in the DC and AC circuits / rapid application of the brake / integrated voltage relay.



2901995275

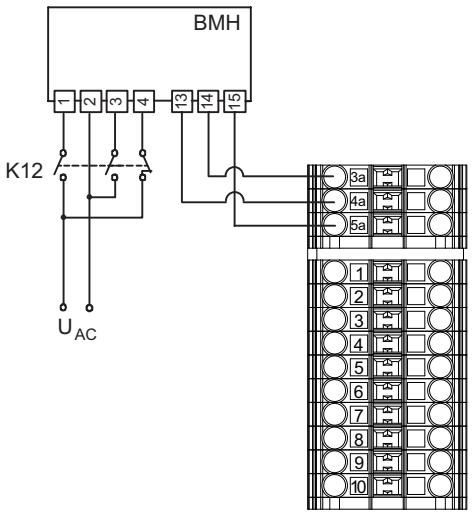
BMH.. brake rectifier

Cut-off in the AC circuit / normal application of the brake.



2901997963

Cut-off in the DC and AC circuit / quick application of the brake.



2901999627

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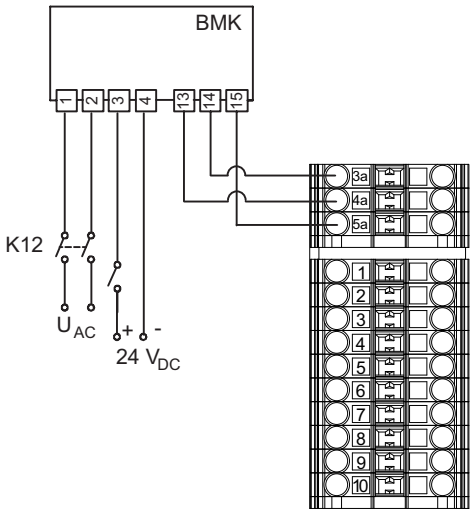
BMK.. brake control unit

Cut-off in the DC and AC circuits / rapid application of the brake / integrated voltage relay.

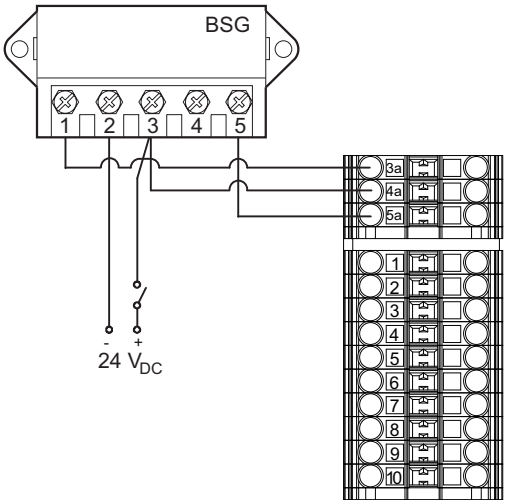


2902002315

Connection 1, 2	Power supply
Connection 3, 4	Signal (inverter)

BSG.. brake control unit

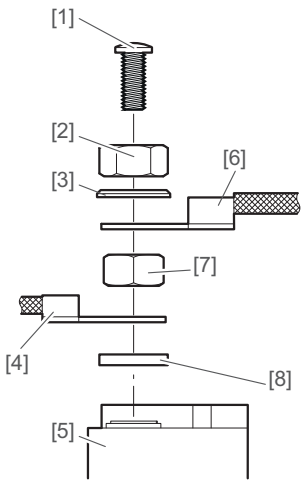
For DC voltage supply with DC 24 V.



2902005003

5.8.7 Power connection on terminal box

The following figure shows the power connection in the terminal box.



18014401410364299

[1] Terminal stud
[2] Top nut
[3] Washer
[4] Motor cable
[5] Terminal board
[6] Customer's cable
[7] Bottom nut
[8] Lock washer

For designing the terminal box, positions 4, 6 and 7 are regarded as current-carrying.

Terminal stud diameter	Tightening torque of hex nut	Connection by customer Cross section	Design	Connection type	Scope of delivery
M4	1.6 Nm	≤ 6 mm²	Version 1b	Ring cable lug	Preassembled terminal links
		≤ 6 mm²	Design 2	Ring cable lug	Small connection accessories enclosed in bag
M5	2.0 Nm	≤ 10 mm²	Design 2	Ring cable lug	Small connection accessories enclosed in bag
M6	3.0 Nm	≤ 16 mm²	Design 3	Ring cable lug	Small connection accessories enclosed in bag
M8	6.0 Nm	≤ 25 mm²	Design 3	Ring cable lug	Premounted connection pieces
M10	10.0 Nm	≤ 50 mm²	Design 3	Ring cable lug	Premounted connection pieces

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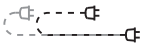
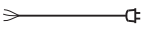
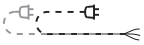
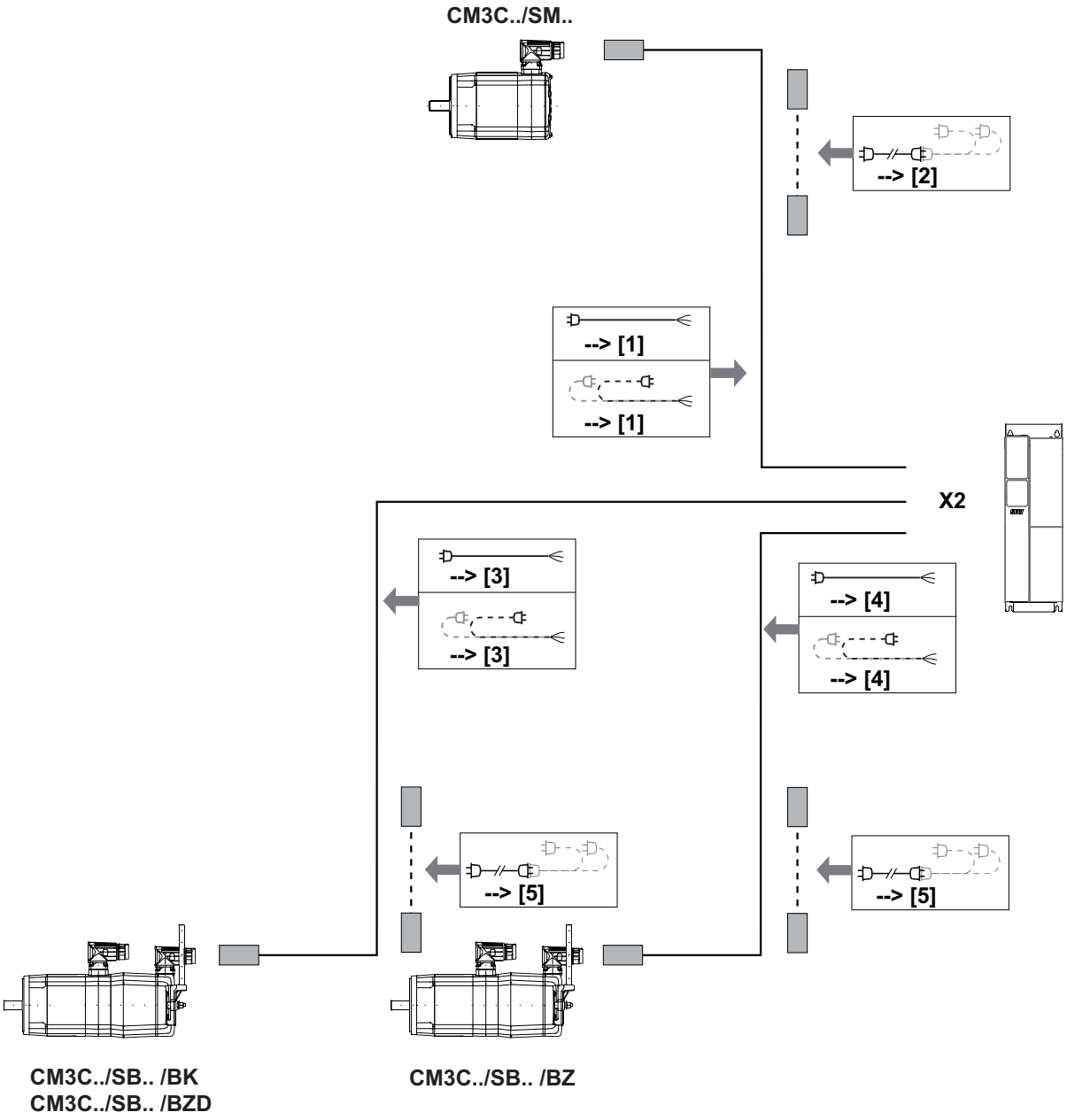
5.9 Prefabricated cables for two-cable technology

5.9.1 Meaning of the symbols

Symbol	Meaning
	Connection cable: Connector → connector for fixed installation
	Connection cable: Connector → connector for cable carrier installation
	Connection cable: Connector → open end for fixed installation
	Connection cable: Connector → open end for cable carrier installation
	Connection cable extension: Connector → connector for fixed installation
	Connection cable extension: Connector → connector for cable carrier installation
12345678	Part number of the cable

SEW-EURODRIVE does not offer prefabricated cables for encoders EH0E, AH0E, EH1E and AH1E with EnDat 2.2. Refer to chapter "Technical data of the encoders" for information on the available connectors.

5.9.2 Overview of power cables for CM3C.. motors



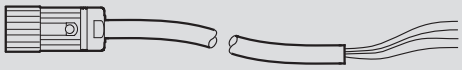
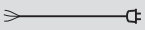
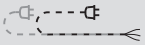
27021630644900875

[1] Motor cables ../SM.. (→ 🗎 63)
[2] Motor extension cable ../ SM.. (→ 🗎 64)
[3] Brakemotor cable ../SB.. for /BK and /BZD brakes (→ 🗎 66)
[4] Brakemotor cable ../SB.. for /BZ brakes (→ 🗎 65)
[5] Brakemotor extension cable ../SB.. for /BK, /BZD and /BZ brakes (→ 🗎 66)

For further information on the cables, refer to chapter "Configuring the permitted cable length".

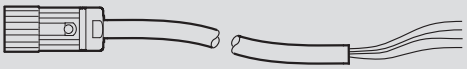
Motor cables ../SM..

Design

	Motor side  Inverter side			 Fixed installation	 Cable carrier installation
Cable type	**Connector type/ size**	**Cable cross section**	**Connector type/ size**	**Part number**	
Motor cable	SM1 / M23 SpeedTec	4 × 1.5 mm²	Open end	28125002	28125010
		4 × 2.5 mm²		28125029	28125037
		4 × 4 mm²		28125045	28125053
	SMB / M40 SpeedTec	4 × 6 mm²		28125061	28125088
		4 × 10 mm²		28125096	28125118
		4 × 16 mm²		28125126	28125134

Connection

Motor side Inverter side



Contact		Signal	Conductor color	Conductor color IEC 60757	Identification	Assembly	Description
M23	**M40**						
A	2	–	–	–	–	–	–
B	1	–	–	–	–	–	–
C	+	–	–	–	–	–	–
D	–	–	–	–	–	–	–
1	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
2	PE	PE	Green/yellow	GNYE	–	Not prefabricated	PE connection
3	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
4	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V

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Motor extension cables ../SM..

Design

	Motor side / Inverter side			Fixed installation	Cable carrier installation
Cable type	**Connector type/ size**	**Cable cross section**	**Connector type/ size**	**Part number**	
Motor extension cable	SM1 / M23 SpeedTec	4 × 1.5 mm²	SM1 / M23 SpeedTec	–	28125142
		4 × 2.5 mm²		–	28125150
		4 × 4 mm²		–	28125169
	SMB / M40 SpeedTec	4 × 6 mm²	SMB / M40 SpeedTec	–	28125177
		4 × 10 mm²		–	28125185
		4 × 16 mm²		–	28125193

Brakemotor cables ../SB.. for /BK and /BZD brakes

Design

	Motor side / Inverter side			Fixed installation	Cable carrier installation
Cable type	**Connector type/ size**	**Cable cross section**	**Connector type/ size**	**Part number**	
Brakemotor cable[1] for BK.. and BZ..D brakes	SB1 / M23 SpeedTec	4 × 1.5 mm² + 3 × 1 mm²	Open end	28125207	28125215
		4 × 2.5 mm² + 3 × 1 mm²		28125223	28125231
		4 × 4 mm² + 3 × 1 mm²		28125258	28125266
	SBB / M40 SpeedTec	4 × 6 mm² + 3 × 1.5 mm²		28125274	28125282
		4 × 10 mm² + 3 × 1.5 mm²		28125290	28125304
		4 × 16 mm² + 3 × 1.5 mm²		28125312	28125320

1) The cable contains 3 cores but only 2 cores are used.

Connection

Motor side Inverter side

Contact		Signal	Conductor color	Conductor color IEC 60757	Identification	Assembly	Description
M23	**M40**						
A	2	–	–	–	–	–	–
B	1	–	–	–	–	–	–
C	+	Brake	Black	BK	BK (1)	Not prefabricated	Brake connection +
D	–	Brake	Black	BK	BK (3)	Not prefabricated	Brake connection -
1	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U

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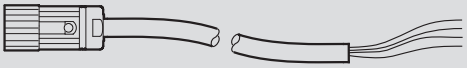
Motor side — Inverter side



Contact		Signal	Conductor color	Conductor color IEC 60757	Identification	Assembly	Description
M23	M40						
2	PE	PE	Green/yellow	GNYE	–	Not prefabricated	PE connection
3	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
4	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V

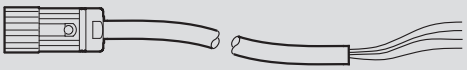
Brakemotor cables ../SB.. for /BZ brakes

Design

	Motor side — Inverter side			Fixed installation	Cable carrier installation
Cable type	**Connector type/ size**	**Cable cross section**	**Connector type/ size**	**Part number**	
Brakemotor cable for BZ.. brake	SB1 / M23 SpeedTec	4 × 1.5 mm² + 3 × 1 mm²	Open end	28125339	28125347
		4 × 2.5 mm² + 3 × 1 mm²		28125355	28125363
		4 × 4 mm² + 3 × 1 mm²		28125371	28125398
	SBB / M40 SpeedTec	4 × 6 mm² + 3 × 1.5 mm²		28125401	28125428
		4 × 10 mm² + 3 × 1.5 mm²		28125436	28125444
		4 × 16 mm² + 3 × 1.5 mm²		28125452	28125460

Connection

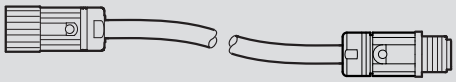
Motor side — Inverter side



Contact		Signal	Conductor color	Conductor color IEC 60757	Identification	Assembly	Description
M23	M40						
A	2	–	–	–	–	–	–
B	1	Brake	Black	BK	BK (2)	Prefabricated	Brake connection 14
C	+	Brake	Black	BK	BK (1)	Prefabricated	Brake connection 13
D	–	Brake	Black	BK	BK (3)	Prefabricated	Brake connection 15
1	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
2	PE	PE	Green/yellow	GNYE	–	Not prefabricated	PE connection
3	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
4	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V

Brakemotor extension cables ../SB.. for /BK, /BZD and /BZ brakes

Design

	Motor side		Inverter side		
				Fixed installation	Cable carrier installation
Cable type	**Connector type/ size**	**Cable cross section**	**Connector type/ size**	**Part number**	
Brakemotor extension cable for BK../BZ..D/BZ.. brakes	SB1 / M23 SpeedTec	4 × 1.5 mm^2 + 3 × 1 mm^2	SM1 / M23 SpeedTec	–	28125479
		4 × 2.5 mm^2 + 3 × 1 mm^2		–	28125487
		4 × 4 mm^2 + 3 × 1 mm^2		–	28125495
	SBB / M40 SpeedTec	4 × 6 mm^2 + 3 × 1.5 mm^2	SMB / M40 SpeedTec	–	28125509
		4 × 10 mm^2 + 3 × 1.5 mm^2		–	28125517
		4 × 16 mm^2 + 3 × 1.5 mm^2		–	28125525

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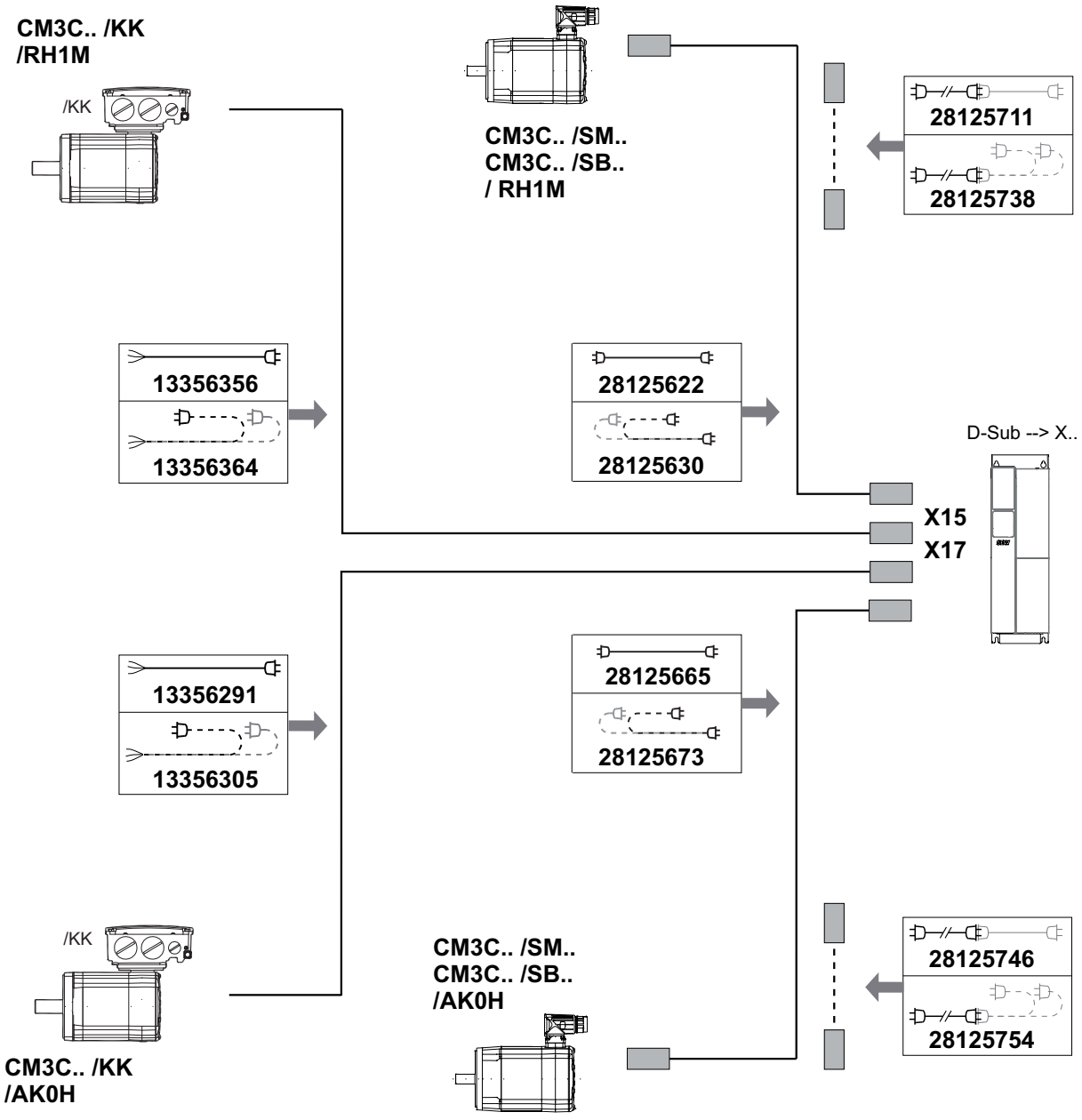
5.9.3 Overview of encoder cables for MOVI-C® and MOVIAXIS® inverters

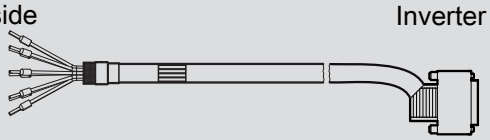


18014431391548811

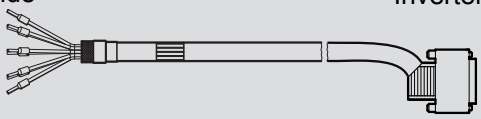
All prefabricated encoder cables with connectors on the motor side are designed in SpeedTec.

D-Sub --> X..	X15: MOVIDRIVE® modular/system/technology basic device The encoders and resolver can be connected only to X15 at the MOVIDRIVE® modular/system/technology basic device. X17: CES11A multi-encoder card

Encoder cable from RH1M resolver, terminal box to MOVI-C® and MOVIAXIS® inverters

Terminal strip	Motor side  Inverter side			D-sub 15-pin
Contact	**Signal**	**Conductor color**	**Conductor color IEC 60757**	**Contact**
1	R1 (reference +)	Pink	PK	5
2	R2 (reference -)	Gray	GY	13
3	S1 (cosine +)	Red	RD	2
4	S3 (cosine -)	Blue	BU	10
5	S2 (sine +)	Yellow	YE	1
6	S4 (sine -)	Green	GN	9
7	n.c.	n.c.	n.c.	n.c.
8	n.c.	n.c.	n.c.	n.c.
9	PK	Brown/violet	BN/VT	14
10	PK	White/black	WH/BK	6

Encoder cable from HIPERFACE® encoder to MOVI-C® and MOVIAXIS® inverters

Terminal strip	Motor side  Inverter side			D-sub 15-pin
Contact	**Signal**	**Conductor color**	**Conductor color IEC 60757**	**Contact**
1	S1 (COS +)	Red	RD	1
2	S3 (COS -)	Blue	BU	9
3	S2 (SIN +)	Yellow	YE	2
4	S4 (SIN -)	Green	GN	10
5	Data -	Violet	VT	12
6	Data +	Black	BK	4
7	GND	Gray-pink/pink	GYPK/PK	8
8	Vs	Red-blue/gray	RDBU/GY	15
9	PK	Brown	BN	14
10	PK	White	WH	6

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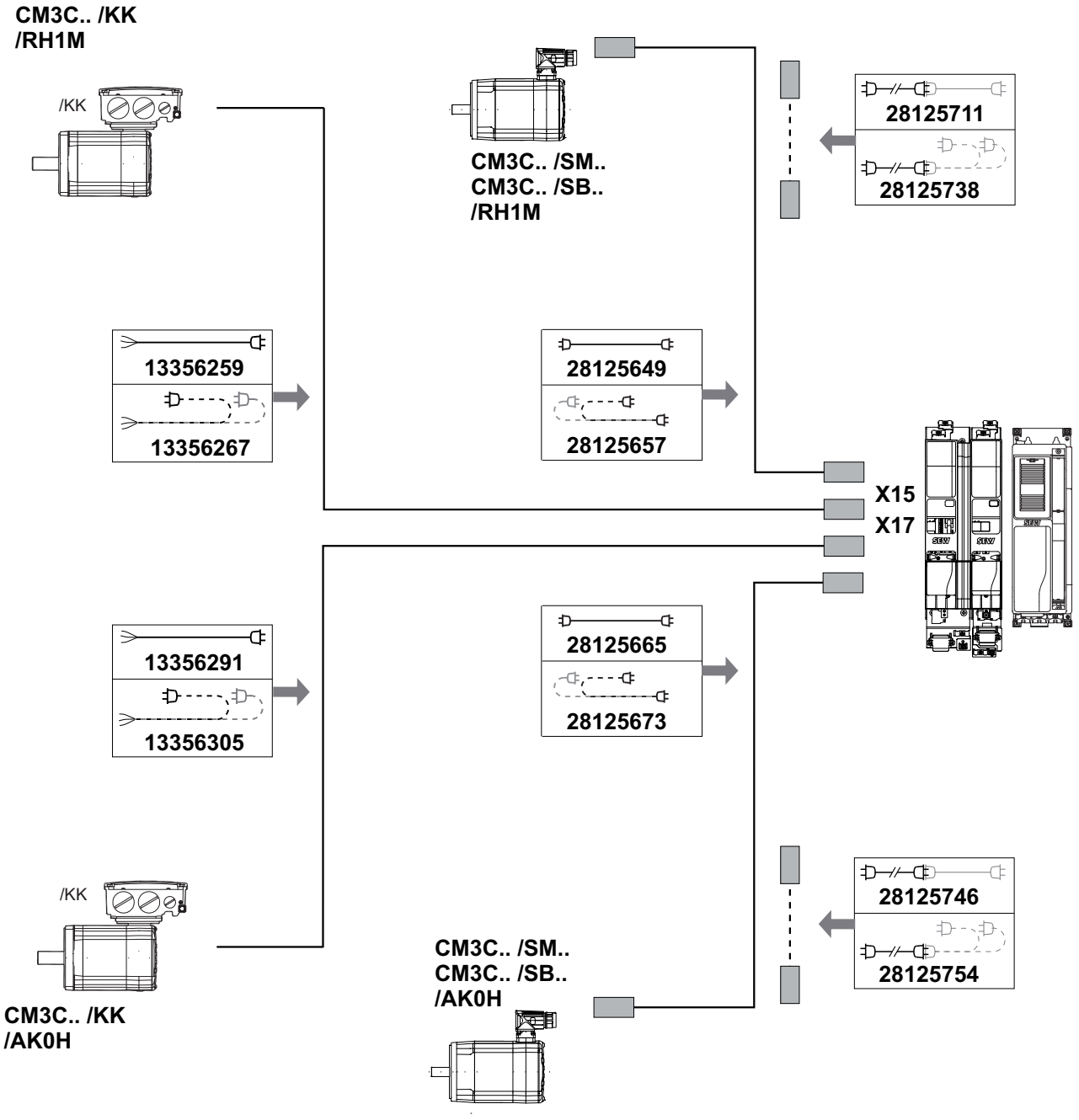
5.9.4 Overview of encoder cables for MOVIDRIVE® B inverters

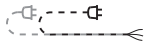
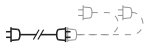


9007232138205835

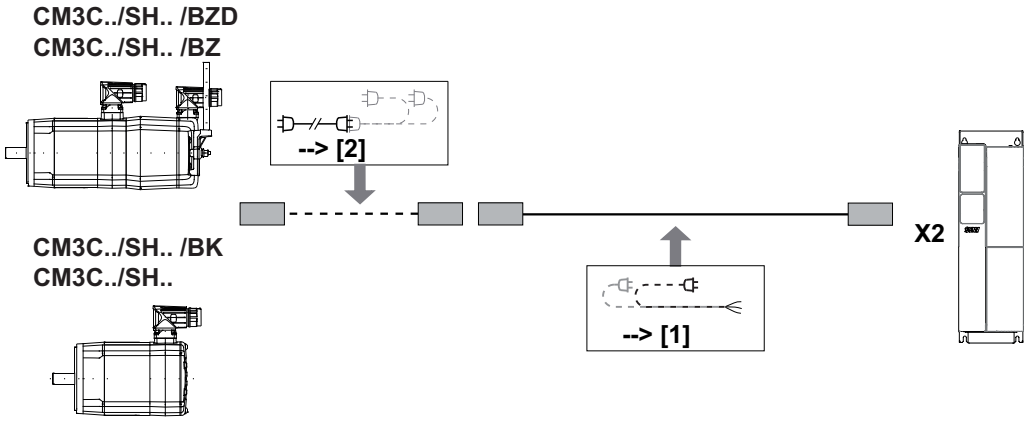
All prefabricated encoder cables with connectors on the motor side are designed in SpeedTec.

5.10 Prefabricated cables for single-cable technology

5.10.1 Meaning of the symbols

Symbol	Meaning
	Connection cable: Connector → open end for cable carrier installation
	Connection cable extension: Connector → connector for cable carrier installation

5.10.2 Overview of motor hybrid cables without encoder



9007235078837387

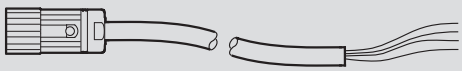
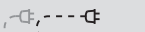
[1] Motor/brakemotor cable (→ 🗎 70)

[2] Extension cable (→ 🗎 72)

For further information on the cables, refer to chapter "Configuring the permitted cable length".

Motor/brakemotor cable ../SH..

Design

	Motor side  Inverter side			Fixed installation 	Cable carrier installation 
Cable type	**Connector type/ size**	**Cable cross section**	**Connector type/ size**	**Part number**	
Motor cable/ brakemotor cable	SH1 / M23 SpeedTec	4 × 1.5 mm² + 3 × 1 mm² + 4 × 0.34 mm²	Open end	–	18191290
		4 × 2.5 mm² + 3 × 1 mm² + 4 × 0.34 mm²		–	18191304
		4 × 4 mm² + 3 × 1 mm² + 4 × 0.34 mm²		–	18191312
	SHB / M40 SpeedTec	4 × 6 mm² + 3 × 1.5 mm² + 4 × 0.34 mm²		–	18191320
		4 × 10 mm² + 3 × 1.5 mm² + 4 × 0.34 mm²		–	18191339

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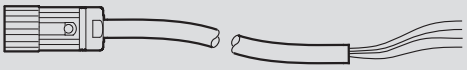
For further information on the cables, refer to chapter "Configuring the permitted cable length".

Connection without a brake

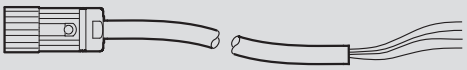
Motor side Inverter side



Contact		Signal	Conductor color	Conductor color IEC 60757	Identification	Assembly	Description
M23	M40						
U	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
V	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V
W	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
A	1	Reserved	–	–	–	Not prefabricated	Do not connect
B	N	Reserved	–	–	–	Not prefabricated	Do not connect
C	+	Reserved	–	–	–	Not prefabricated	Do not connect
D	2	Reserved	–	–	–	Not prefabricated	Do not connect
PE	PE	PE	Yellow/green	GNYE	–	Not prefabricated	PE connection
H	H	PK	White	WH	–	Not prefabricated	Motor protection
L	L	PK	Blue	BU	–	Not prefabricated	Motor protection

Connection with a /BK or /BZD brake

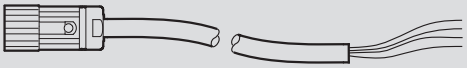
Motor side Inverter side



Contact		Signal	Conductor color	Conductor color IEC 60757	Identification	Assembly	Description
M23	M40						
U	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
V	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V
W	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
A	1	Reserved	–	–	–	Not prefabricated	Do not connect
B	N	Reserved	–	–	–	Not prefabricated	Do not connect
C	+	Brake +	Black	BK	BK1	Not prefabricated	Brake connection +
D	2	Brake -	Black	BK	BK3	Not prefabricated	Brake connection -
PE	PE	PE	Yellow/green	GNYE	–	Not prefabricated	PE connection
H	H	PK	White	WH	–	Not prefabricated	Motor protection
L	L	PK	Blue	BU	–	Not prefabricated	Motor protection

Connection with a /BZ brake

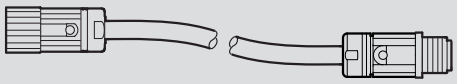
Motor side Inverter side



Contact		Signal	Conductor color	Conductor color IEC 60757	Identification	Assembly	Description
M23	M40						
U	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
V	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V
W	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
A	1	Reserved	–	–	–	Not prefabricated	Do not connect
B	N	14	Black	BK	Bk/2	Not prefabricated	Brake connection 14
C	+	13	Black	BK	Bk/1	Not prefabricated	Brake connection 13
D	2	15	Black	BK	Bk/3	Not prefabricated	Brake connection 15
PE	PE	PE	Yellow/green	GNYE	–	Not prefabricated	PE connection
H	H	PK	White	WH	–	Not prefabricated	Motor protection
L	L	PK	Blue	BU	–	Not prefabricated	Motor protection

Extension cable ../SH..

Design

	Motor side Inverter side 			Fixed installation	Cable carrier installation
Cable type	**Connector type/ size**	**Cable cross section**	**Connector type/ size**	**Part number**	
Motor extension cable	SH1 / M23 SpeedTec	4 × 1.5 mm² + 3 × 1 mm² + 4 × 0.34 mm²	SH1 / M23 SpeedTec	–	18191347
		4 × 2.5 mm² + 3 × 1 mm² + 4 × 0.34 mm²		–	18191355
		4 × 4 mm² + 3 × 1 mm² + 4 × 0.34 mm²		–	18191363
	SHB / M40 SpeedTec	4 × 6 mm² + 3 × 1.5 mm² + 4 × 0.34 mm²	SHB / M40 SpeedTec	–	18191371
		4 × 10 mm² + 3 × 1.5 mm² + 4 × 0.34 mm²		–	18191398

For further information on the cables, refer to chapter "Configuring the permitted cable length".

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5.11 Assembling the cables

Observe the following when you assemble the cables yourself:

- The socket contacts for the motor connection are implemented as crimping contacts. Only use suitable tools for crimping.
- Insulate the connecting wires. Cover the connections with heat shrink tubings.
- Incorrectly installed socket contacts can be removed without removal tools.

5.11.1 Assembling mating connectors power cable

Mating connector type SM1/SB1 SpeedTec	Crimping area U, V, W, PE mm²	Crimping area Brake mm²	Cable clamping diameter mm
13354698	0.35 – 2.5	0.35 – 2.5	9 – 14
13354256	0.35 – 2.5		14 – 17
13354264	2.5 – 4		14 – 17

Mating connector type SMB/SBB SpeedTec	Crimping area U, V, W, PE mm²	Crimping area Brake mm²	Cable clamping diameter mm
13421778	1.5 – 10	0.35 – 2.5	9 – 16
13421751	1.5 – 10		16.5 – 25
13421670	6 – 16		16.5 – 25

The connector service packs also contain the brake pins, so that no difference needs to be made between motor and brakemotor.

5.11.2 Assembling mating connector encoder cable

Part number signal mating connector SpeedTec	Crimping area mm²	Cable crimping diameter mm
16447115	0.14 – 1	6 – 10

The complete connector service pack always includes the following parts:

- Feedback connector
- Insulation inserts
- Socket contacts

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5.12 Options

5.12.1 BK brake

BK holding brake – description

The BK brake is a permanent magnet holding brake with emergency stop function.

For further information, refer to chapter "Technical data of the BK.. brake".

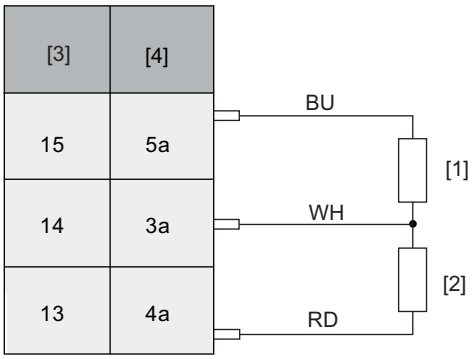
5.12.2 BZ brake

BZ.. holding brake – description

The BZ.. holding brake is an electromagnetic disk brake with a DC coil with emergency stop function. The brake opens electrically and uses spring force to brake. The brake is applied in case of a power failure. The brake meets the basic safety requirements. The brake can also be released mechanically if equipped with manual brake release. The manual brake release function is self-reengaging (..HR). The brake is controlled by a brake control that is either installed in the control cabinet or in the terminal box.

Observe the notes in the relevant operating instructions concerning the switching sequence of motor enable and brake control during standard operation. For wiring diagrams of the brake control, refer to chapter "Wiring diagram of the brake control for BZ.. brake".

Connection of resistance coils



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[1] R_{TS}: Resistance value of the coil section
[2] R_{BS}: Resistance value of the accelerator coil
[3] BME, BMP, BMH, BMV, BMK, BMKB
[4] Auxiliary terminals

5.12.3 Thermal motor protection

NOTICE

Motor overheating due to inadequate thermal motor protection.

Motor damage

- In addition to a temperature sensor activate a current monitoring device (I^2t, rms current monitoring) and a motor model for thermal protection, as installed in servo systems by SEW-EURODRIVE.

/PK temperature sensor

INFORMATION

Make sure the used inverter has the relevant evaluation electronics for the PK (Pt1000) temperature sensor. The thermal protection function must become active in case of overtemperature.

Thermal motor protection in combination with the corresponding evaluation electronics prevents the motor from overheating and consequently from being damaged. A temperature sensor provides only indirect protection as only one sensor value is determined.

The /PK option consists of a Pt1000 platinum sensor, which is installed in one of the 3 motor windings. Unlike the /KY semiconductor sensor, the platinum sensor has an almost linear characteristic curve and is more accurate. In combination with a frequency inverter containing the thermal model of the motor, the frequency inverter can also provide a motor protection function because of the /PK.

The option /PK equals a protective separation.

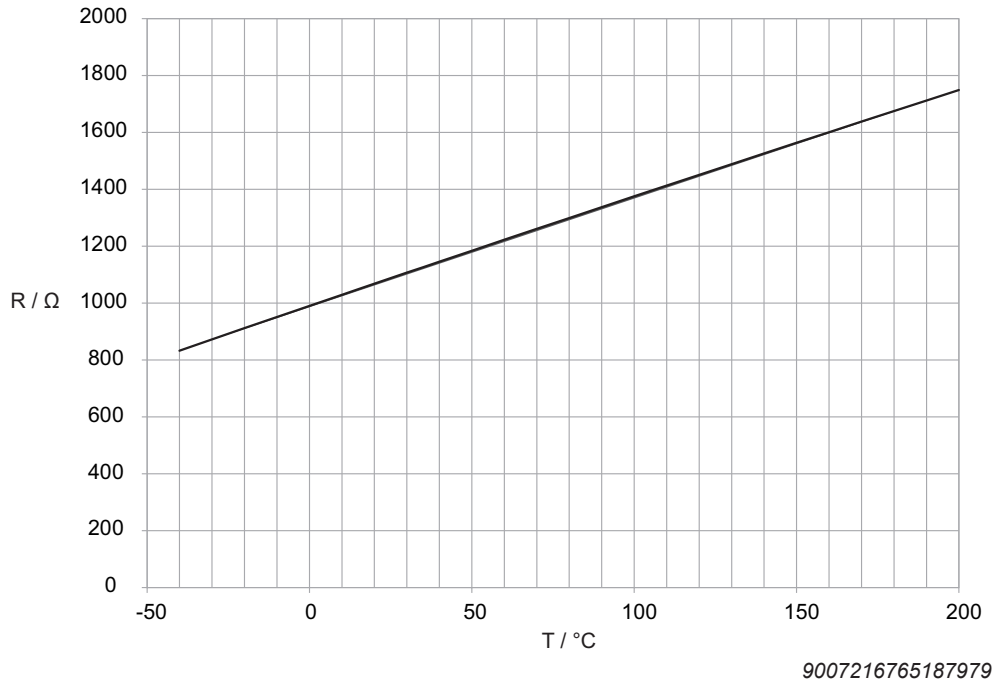
The Pt1000 temperature sensor continuously detects the motor temperature.

	Pt1000
Connection	Red – black
Total resistance at 20 – 25 °C	1050 Ω < R < 1150 Ω
Test current	< 3 mA

INFORMATION

The temperature sensor is unipolar which means that interchanging the incoming cables does not change the measurement result.

Typical characteristic curve of Pt1000



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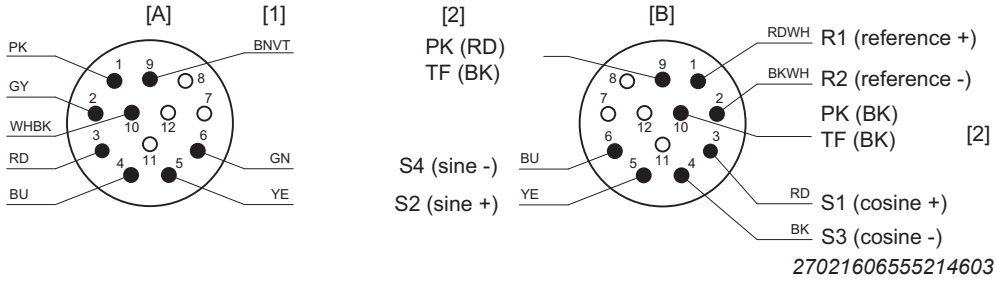
Connect the motor and the encoder system via an SM./SB. plug connector.

Connecting the signal plug connectors of the RH1M resolver

Pin assignment



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[1] Shield connected to the metal housing of the connector. Color code according to SEW-EURODRIVE cables

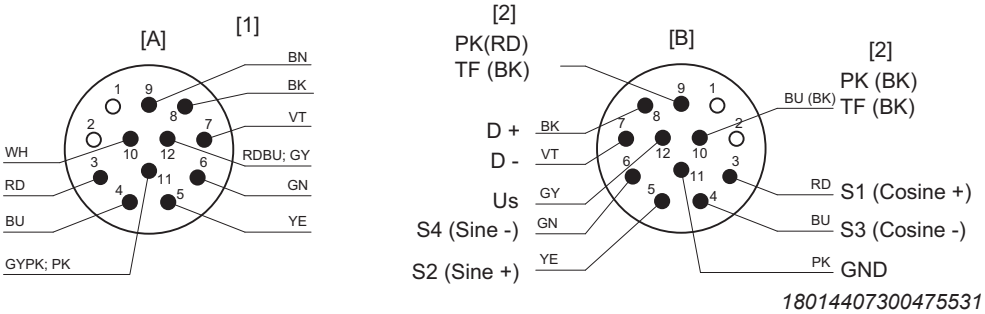
[2] PK (RD/BK), optional TF (BK)

Pin assignment of the plug connector lower part [B]

Contact	Color code	Connection
1	RD/WH	R1 (reference +)
2	BK/WH	R2 (reference -)
3	RD	S1 (cosine +)
4	BK	S3 (cosine -)
5	YE	S2 (sine +)
6	BU	S4 (sine -)
7	–	–
8	–	–
9	BK	PK/TF
10	BK	PK/TF
11	–	–
12	–	–

Connection of the signal plug connector of encoders AK0H, EK0H, AK1H and EK1H

Pin assignment



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[1] Shield connected to the metal housing of the connector. Color code according to SEW-EURODRIVE cable

[2] PK (RD/BK)

Pin assignment of the plug connector lower part [B]

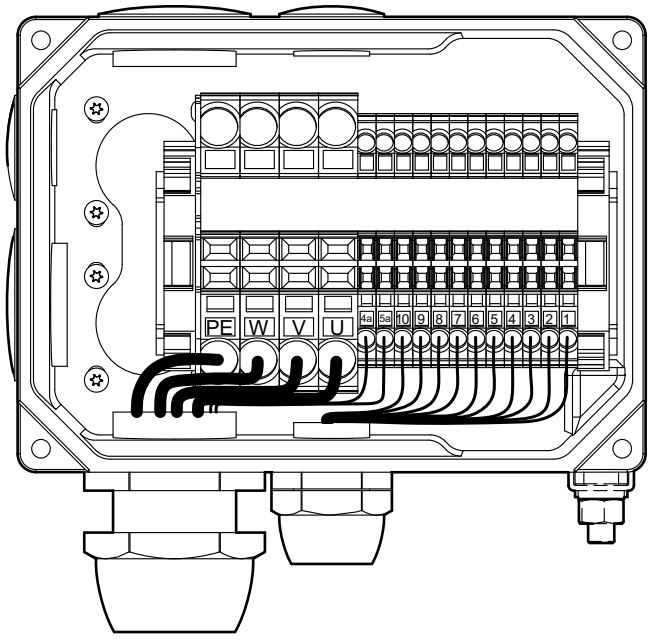
Contact	Color code	Connection
1	–	–
2	–	–
3	RD	S1 (cosine +)

Contact	Color code	Connection
4	BU	S3 (cosine -)
5	YE	S2 (sine +)
6	GN	S4 (sine -)
7	VT	D -
8	BK	D +
9	BK	PK/TF
10	BK	PK/TF
11	PK	Voltage reference (GND)
12	GY	Supply voltage Vs

Connect the motor and encoder system to the terminal box KK, KKS, KL and KLS

- Check the cross section of the cables.
- Screw in the connections and the PE.
- Check the winding connections in the terminal box and tighten them, if necessary.
- An EMC screw fitting must be used for the cable entry of the signal cable to ensure a perfect shield connection.

Connections CMP50 and CMP63



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Assignment			
	No.	Connection	Core identification
Power	U	U	(BK/WH) Black with white lettering U, V, W
	V	V	
	W	W	
	PE	Protective earth	(GN/YE) Green/yellow

Assignment					
	No.	Core identification		Brake control connection	
		BP	BK	BMV	BS
Brake	4a	+ (YE) Yellow	+ (RD) Red	13	3
	5a	- (YE) Yellow	- (BU) Blue	15	5

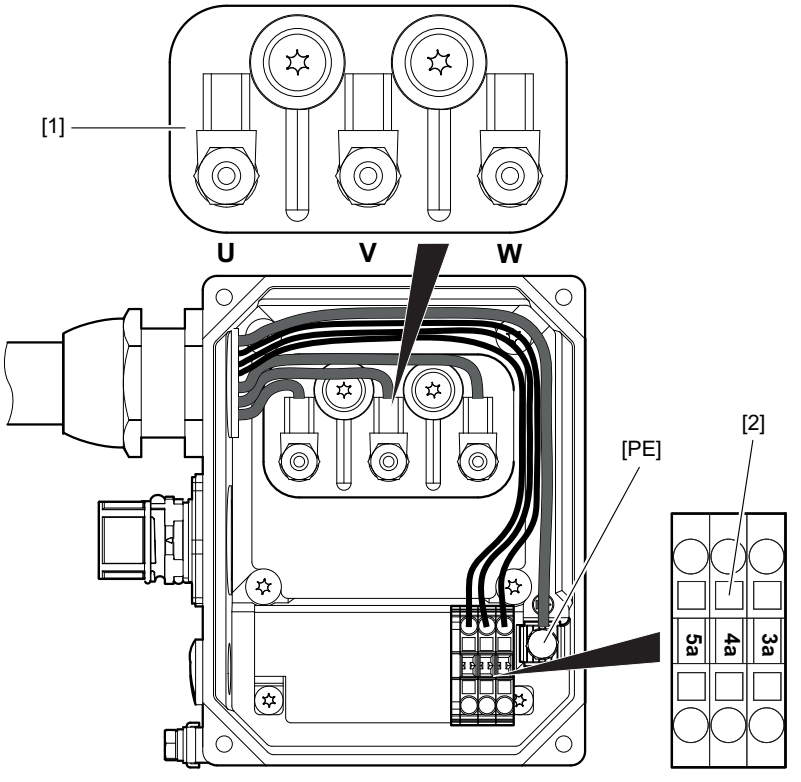
The brake has a standard connection voltage of 24 V DC.

Assignment					
	No.	Connection for resolver		Encoder connection	
Signal	1	ref +	Reference	cos +	Cosine
	2	ref -		ref cos	Reference
	3	cos +	Cosine	sin +	Sine
	4	cos -		ref sin	Reference
	5	sin +	Sine	D -	DATA
	6	sin -		D +	DATA
	7	–	–	GND	Protective earth
	8	–	–	Vs	Supply voltage
	9	PK+/TF	Motor protection	PK+/TF	Motor protection
	10	PK-/TF		PK-/TF	

Signal

Resolver			Encoder		
1	ref +	Reference	1	cos +	Cosine
2	ref -		2	ref cos	Reference
3	cos +	Cosine	3	sin +	Sine
4	cos -		4	ref sin	Reference
5	sin +	Sine	5	D -	DATA
6	sin -		6	D +	DATA
7	–	–	7	GND	Ground
8	–	–	8	Vs	Supply voltage
9	PK+/TF	Motor protection	9	PK+/TF	Motor protection
10	PK-/TF		10	PK-/TF	

Terminal assignment of terminal box KKS CMP71 – CMP112



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Assignment		
Terminal [1]	**No.**	**Connection**
Motor	U	Motor phase U
	V	Motor phase V
	W	Motor phase W
	PE	Protective earth

Assignment	No.	Brake control connection			
Terminal [2]		**BMV**	**BS24**	**BME, BMP, BMH, BMK, BST, SBM**	**BSG**
BP.. brake	3a	–	–	–	–
	4a	13	3	–	–
	5a	15	5	–	–
BY.. brake	3a	–	–	14	1
	4a	–	–	13	3
	5a	–	–	15	5

Signal

Resolver			Encoder		
1	ref +	Reference	1	cos +	Cosine
2	ref –		2	ref cos	Reference
3	cos +	Cosine	3	sin +	Sine
4	cos –		4	ref sin	Reference
5	sin +	Sine	5	D –	DATA
6	sin –		6	D +	DATA
7	–	–	7	GND	Ground
8	–	–	8	Vs	Supply voltage
9	PK+/TF	Motor protection	9	PK+/TF	Motor protection
10	PK-/TF		10	PK-/TF	

5.12.4 VR forced cooling fan

The synchronous servomotors size CM3C71 – CM3C100 can be equipped with a VR forced cooling fan as an option.

Adhere to the minimum clearance of 100 mm to the machine environment – even with motors with forced air cooling – so that the flow of hot air is not obstructed.

If required, remove any deposits or dirt from the motor. Dirt on the motor surface causes reduced heat dissipation and can therefore cause thermal motor overload.

INFORMATION

The forced cooling fan can only be used up to a maximum oscillation and shock load of 1 g.

Electrical connection

⚠ CAUTION

Starting up the fan when it is not installed.

Risk of injury due to rotating parts.

- The fan may only be taken into operation after installation.

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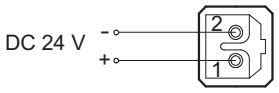
The VR forced cooling fan is only available for DC 24 V voltage.

- DC 24 V ± 20%
- Plug connector connection
- Maximum connection cross section 2 × 1 mm²
- Cable gland Pg7 with inner diameter 7 mm



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Connector contact	Connection
1	24 V +
2	0 V

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6 Startup

6.1 General information

⚠ WARNING

Risk of injury due to missing or defective protective covers.

This can result in severe or fatal injuries.

- Install the protective covers of the system according to the instructions.
- Never start up the drive if the protective covers are not installed.

⚠ WARNING

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

Severe or fatal injuries.

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

⚠ WARNING

Electric shock due to regenerative operation. Moving the output element generates a voltage at the male contacts of the power plug connector.

Severe or fatal injuries.

- Do not touch the male contacts in the power plug connector.
- Install a touch guard at the power plug connector if no mating connector is plugged in.

⚠ WARNING

Unsecured key flung out of the keyway.

Severe or fatal injuries.

- Only operate the motor with attached customer output element (e.g. gear unit), or with a suitably secured key.

⚠ WARNING

Magnetic fields can have an impact on the function of pacemakers and other active medical implants.

Health risk.

- ✓ The product has permanent magnets that generate a magnetic field, even when no current is supplied. During operation, additional electromagnetic fields are generated.
- If you have a pacemaker or any other active medical implant, keep a distance > 500 mm between the body part with the active medical implant and the motor.
- Inform people with active medical implants about the dangers.

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⚠ WARNING

Disabling functional safety devices.

Severe or fatal injuries.

- Only qualified personnel is allowed to carry out work on functional safety components.
- Any work on functional safety components must be carried out by strictly observing the specifications in the operating instructions at hand and the respective addendum to the operating instructions. Otherwise, the warranty will become void.

⚠ CAUTION

The surfaces on the drive can be very hot during operation.

Risk of burns.

- Let the motor cool down sufficiently before you start working on it.

NOTICE

The maximum limit torque (M_{pk}) and the maximum current (I_{max}) must not be exceeded, not even for acceleration.

The drive system might be damaged.

- Limit the maximum current at the inverter.

NOTICE

If the hand lever is not removed after startup, the brakemotor can be damaged.

Possible damage to property.

- Remove the hand lever after startup of brakemotors with self-reengaging manual brake release.

NOTICE

Destruction of the motor due to multiple acknowledgments of a motor protection fault.

Damage to property, damage to the motor.

- First, determine the cause of the fault before acknowledging a motor protection fault.
- Do not acknowledge a motor protection fault more than once.

INFORMATION

Observe the following for motors with brakes:

- Only operate the brake as holding brake.
- The brake may only be applied when the speed is ≤ 20 min^{-1}. For greater speeds, contact SEW-EURODRIVE.
- Emergency stops from higher motor speeds are permitted.

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6.2 Before startup

Ensure the following before startup:

- Operate the motors only with a frequency inverter.
- The frequency inverter must be suitable for controlling a synchronous permanent magnet motor.
- Prior to startup, configure the SEW-EURODRIVE frequency inverter using the suitable engineering software.
- The drive must be undamaged and not blocked.
- All connections, especially the PE, have been made correctly.
- All protection covers are installed correctly.
- All motor protection devices are activated.
- There are no other sources of danger.
- With brakemotors, check for proper function of the brakes.
- The motor surface must not be covered by heat-sensitive or insulating materials.
- After an extended storage period (independent of the ambient conditions), observe the information in chapter "Startup after storage" (→ 🗎 83).

6.3 Startup

During startup, run in the motor at low speed and without axial or radial shaft load for 10 revolutions in each direction, so that the bearing lubrication is distributed evenly.

6.4 Startup after storage

If you use a motor that has been stored for a longer period of time (depending on the ambient conditions), observe the following points in addition to chapter "Before startup" (→ 🗎 83):

- Run in the motor at low speed and without axial or radial shaft load for 10 revolutions in each direction so that the bearing lubrication is again distributed evenly.
- For brakemotors with BK.. brake, SEW-EURODRIVE recommends a loop-in routine (3 minutes running at 300 min^{-1}, brake application 1 – 2 times per second).
- The bearing grease service life is reduced after storage periods > 1 year.
- After more than 4 years in storage, have the motor inspected for signs of aging of the ball bearings grease by SEW-EURODRIVE.
- Check whether the motor has absorbed moisture due to the longer storage time. Measure the insulation resistance with a measurement voltage of DC 500 V.

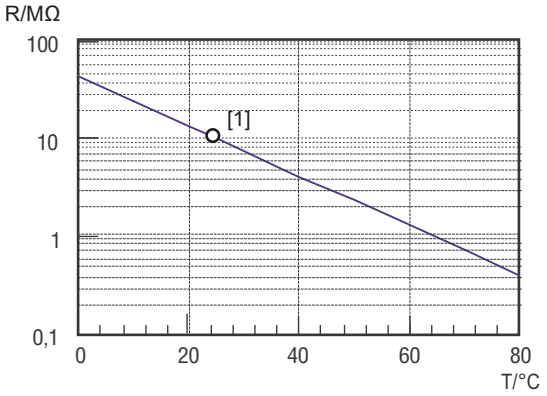
  The insulation resistance depends greatly on the temperature. You can measure the insulation resistance between the connection pins and the motor housing using an insulation measuring device. If the insulation resistance is not sufficient, the motor must be dried.

INFORMATION

If the insulation resistance is too low, the motor has absorbed moisture.

SEW-EURODRIVE recommends to send the motor back to SEW-EURODRIVE together with a description of the fault.

The following figure shows the minimum insulation resistance depending on the temperature.



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[1] Resistance temperature point (RT point)

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7 Inspection/maintenance

7.1 General information

⚠ WARNING

Risk of injury if the drive starts up unintentionally.

Severe or fatal injuries.

- Before you start working on the unit, disconnect the motor and all connected options from the power supply.
- Secure the motor against unintended power-up.

⚠ WARNING

Danger from falling hoist.

Severe or fatal injuries.

- Secure or lower the hoist drive.

⚠ WARNING

Magnetic fields can have an impact on the function of pacemakers and other active medical implants.

Health risk.

✓ The product has permanent magnets that generate a magnetic field, even when no current is supplied. During operation, additional electromagnetic fields are generated.

- If you have a pacemaker or any other active medical implant, keep a distance > 500 mm between the body part with the active medical implant and the motor.
- Inform people with active medical implants about the dangers.

⚠ WARNING

Deactivating the functional safety devices.

Severe or fatal injuries.

- All work on functional safety components may be carried out only by qualified personnel.
- All work on functional safety components must be carried out strictly in accordance with the specifications in these operating instructions and the corresponding addendum to the operating instructions. Otherwise, the warranty will become void.

⚠ CAUTION

The surfaces on the drive can be very hot during operation.

Risk of burns.

- Let the motor cool down sufficiently before you start working on it.

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⚠ CAUTION

Inhaling, swallowing brake abrasion that accumulates in small quantities in the terminal box.

Irritation of the respiratory tract and respiratory organs.

- ✓ Wear a respirator of class FFP2 when performing work in the terminal box of brakemotors.
- Avoid swirling of the brake abrasion.
- Remove the brake abrasion with suitable extraction systems or damp cloths that bind dust.
- The dust must not be blown out.
- Make sure that there is adequate ventilation in the work environment.

INFORMATION

Observe the information of the machine and system manufacturer in the machine maintenance plan.

Repairs

Only SEW-EURODRIVE or repair workshops or plants that provide the necessary expertise may repair or modify the motor/brakemotor.

Before you take the motor back into operation, check to see if the regulations have been adhered to. Confirm the compliance with a corresponding identification on the motor or by issuing a test report.

Perform a safety and functional check following all maintenance and repair work (thermal protection).

7.2 Maintenance intervals

INFORMATION

The amount of wear depends on many factors and may be high. The system manufacturer must calculate the required inspection/maintenance intervals individually in accordance with the project planning documents.

Factors that can shorten inspection and maintenance intervals include:

- Number of real emergency stop braking operations
- Particularly high number of cycles with high motor acceleration
- Especially high cyclic duration factor at high speed
- Changing direction of rotation (reversing operation)
- Vertical mounting positions and pivoted mounting positions
- High mass moments of inertia due to the motion of the drive, e.g. in mobile drives or drives subject to high impact and vibration load
- Application-related generative torques or torsional vibrations
- External environmental factors, such as moisture, high degree of UV exposure, low ambient temperatures, etc.

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Unit / part of unit	Time interval	What should I do?
Servomotor	• Every 10 000 operating hours[1)]	Inspect the servomotor: • Check ball bearing. • Clean cooling air ducts. • Check PE connection for proper functioning.
Drive	• Depending on external factors	• Touch up or renew the surface protection/anti-corrosion coating.
BK.. brake	• At least after 3 months, depending on the operating conditions • After 2000 braking operations from the rated speed	Inspect the brake: • Connect the brake connections to the controlled power supply unit and determine the opening voltage by increasing the voltage from 10 to 24 V (clicking of the brake). Contact SEW-EURODRIVE, if necessary. • Check the braking torque. Grind in the brake if necessary, see chapter "Startup after storage" (→ 🗎 83). • Contact SEW-EURODRIVE Service when maintenance is required.
BZ.. brake	• Every 0.5 to 2 years, depending on the load conditions	Inspect the brake: • Measure the working air gap. During every maintenance work, when the drive is being opened: • Vacuum any brake abrasion
Motor surface Cooling air ducts	• Depending on external factors	• Clean motor surfaces. • Clean cooling air ducts.

1) The periods of wear are affected by many factors and may be shorter than the recommendation above.

7.3 Notes on the BK.. brake

- The brake must be replaced when the permitted total work W_{insp}, determined during project planning, is reached. Contact SEW-EURODRIVE.
- The brake may only be replaced by SEW-EURODRIVE or a qualified workshop.

7.4 Notes on the BZ.. brake

The working air gap of the BZ.. brake is increased when the brake lining carrier wears. Therefore regularly (see chapter "Maintenance intervals" (→ 🗎 86)) measure the working air gap according to the following chapter.

If the working air gap exceeds the maximum permitted value, the brake lining carrier or the brake must be replaced by SEW-EURODRIVE or another qualified workshop.

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7.4.1 Changing the brake disks

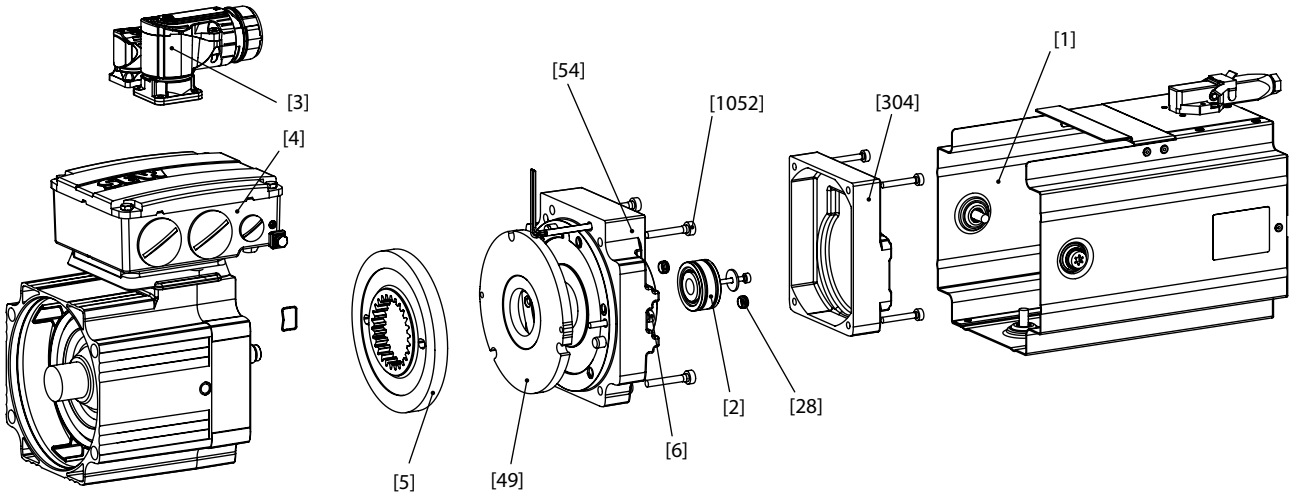
When fitting a new brake disk inspect the other removed parts as well and install new ones if necessary.

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Disconnect the motor and all connected options from the power supply before you start working.
- Secure the motor against unintended power-up.



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[1] Forced cooling fan
[2] Encoder/resolver
[3] Plug connector
[4] Terminal box
[5] Brake lining carrier
[6] Retaining screws of the pressure plate
[28] Closing caps
[49] Pressure plate
[54] Magnet body
[304] Cover
[1052] Cap screw

1. Remove forced cooling fan [1], if installed
2. Remove cover [304]
3. Remove the encoder or resolver [2]
4. Plug connector [3]:
   - Break out the brake contacts in the plug connector
5. Terminal box [4]:
   - Disconnect the brake cable
6. Not applicable for manual release:
   - Remove the closing caps [28]
   - Fasten the pressure plate with screws [6]
7. Loosen the cap screws [1052]
8. Carefully remove the entire magnet body [54] together with the pressure plate [49] - pay attention to the brake cable!
9. Remove the brake lining carrier [5]

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10. Check the clasp [69]
11. Clean the brake components
12. Installing the new brake lining carrier [5]
13. Reinstall the brake parts
14. Not applicable for manual release:
    - Remove the screws [6] to fasten the pressure plate
    - Mount the closing cap [28]
15. Calibrate the encoder or resolver [2]
16. Mount cover [304]
17. If present, install the forced cooling fan [1]

INFORMATION

After replacing the brake disk, the maximum braking torque is reached only after several cycles.

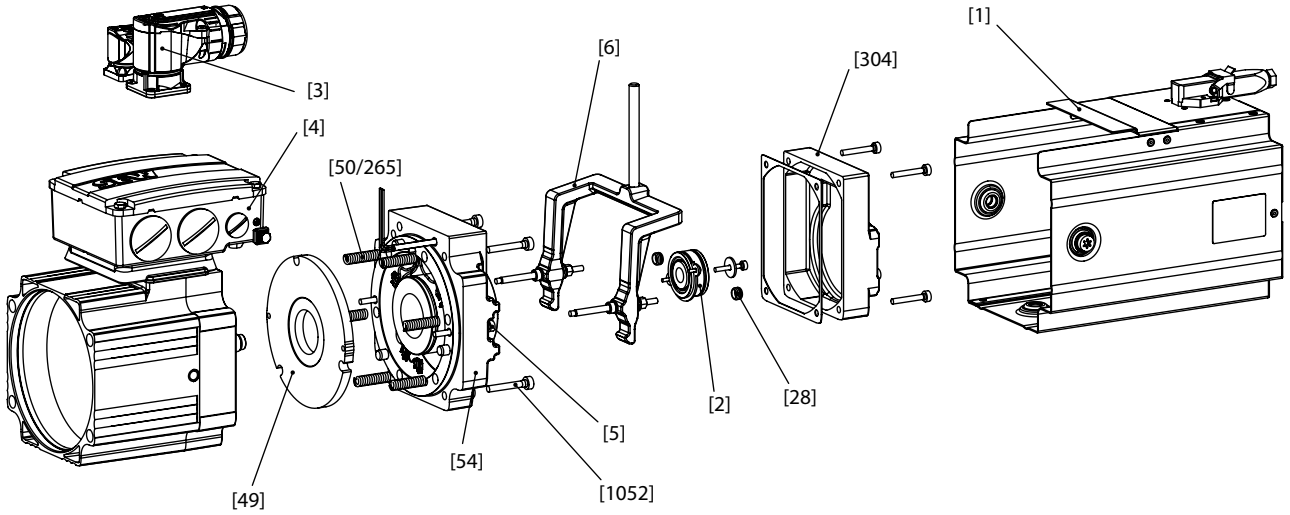
7.4.2 Changing the braking torque

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Disconnect the motor and all connected options from the power supply before you start working.
- Secure the motor against unintended power-up.



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[1]	Forced cooling fan	[28]	Closing caps
[2]	Encoder/resolver	[49]	Pressure plate
[3]	Plug connector	[50/265]	Brake springs
[4]	Terminal box	[54]	Magnet body
[5]	Retaining screws of the pressure plate	[304]	Cover
[6]	Manual brake release	[1052]	Cap screw

1. Remove forced cooling fan [1], if installed
2. Remove cover [304]
3. Remove the encoder or resolver [2]
4. Plug connector [3]:
   - Break out the brake contacts in the plug connector
5. Terminal box [4]:
   - Disconnect the brake cable
6. If manual brake release [6] is present:
   - Removing
7. No manual brake release available:
   - Remove the closing caps [28]
8. Loosen the cap screws [1052]
9. Carefully remove the entire magnet body [54] - pay attention to the brake cable!
10. Remove the pressure plate [49]
11. Replace or add brake springs [50/265], see the following table
12. Arrange brake springs symmetrically
13. If necessary, replace the pressure plate [49], see chapter "Braking work and braking torques "
14. Reinstall the brake parts
15. If manual brake release [6] is present:
    - Installation, graphic in chapter "Retrofitting manual brake release"
16. No manual brake release available:
    - Attach the closing caps [28]
17. Calibrate the encoder or resolver [2]
18. Mount cover [304]
19. If present, install the forced cooling fan [1].

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7.4.3 Change the magnet

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Disconnect the motor and all connected options from the power supply before you start working.
- Secure the motor against unintended power-up.

See "figure" (→ 🗎 89).

1. Remove forced cooling fan [1], if installed
2. Remove cover [304]
3. Remove the encoder or resolver [2]
4. Plug connector [3]:
   - Break out the brake contacts in the plug connector
5. Terminal box [4]:
   - Disconnect the brake cable
6. If manual brake release [6] is present:
   - Removing
7. No manual brake release available:
   - Remove the closing caps [28]
8. Loosen the cap screws [1052]
9. Carefully remove the entire magnet body [54] - pay attention to the brake cable!
10. Mount the magnet body [54]; with plug connectors: crimp the crimp connector onto the litz wires after threading through the brake endshield
11. Reinstall the brake parts
12. If manual brake release [6] is present:
    - Installation, graphic in chapter "Retrofitting manual brake release"
13. No manual brake release available:
    - Attach the closing caps [28]
14. Calibrate the encoder or resolver [2]
15. Mount cover [304]
16. If present, install the forced cooling fan [1]

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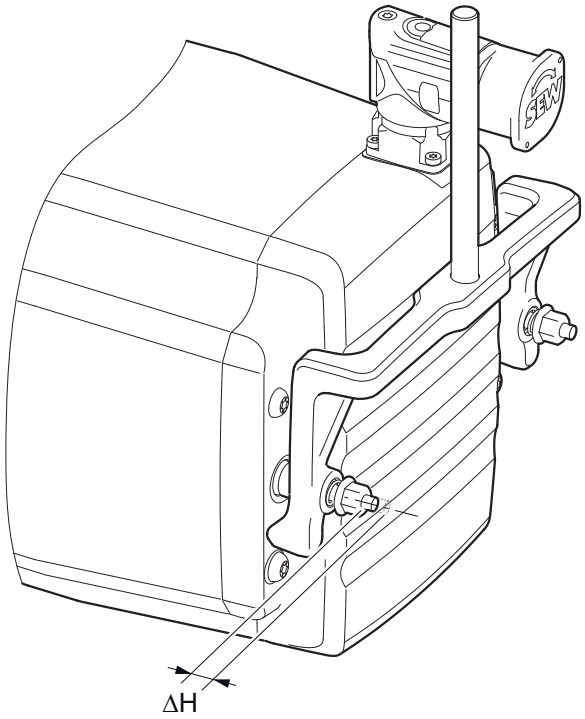
7.4.4 Measuring the working air gap of the BZ.. brake

Measure the working air gap indirectly with the motion of the pressure plate while releasing the brake. Depending on the motor design, the procedure varies:

- Brake with manual brake release (→ 🗎 92).
- Brake without manual brake release (→ 🗎 92).
- Brake without manual brake release with single-cable technology or terminal box (→ 🗎 94).

Measuring the working air gap for brakes with manual brake release

1. ⚠ **WARNING!** Risk of injury!
   De-energize the motor and brake and safeguard the drive against unintentional power-up.
2. If installed, remove the forced cooling fan.
3. Connect the brake to the voltage supply.
4. Release and apply the brake electrically. Measure the motion ΔH of the pressure plate at the studs. This motion ΔH corresponds to the working air gap.
5. If the dimension ΔH is > **0.6 mm**, the brake lining carrier or the brake must be replaced. The working air gap cannot be adjusted.



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Measuring the working air gap for brakes without manual brake release

1. ⚠ **WARNING!** Risk of injury!
   De-energize the motor and brake and safeguard the drive against unintentional power-up.
2. If installed, remove the forced cooling fan.
3. Remove the signal connector.

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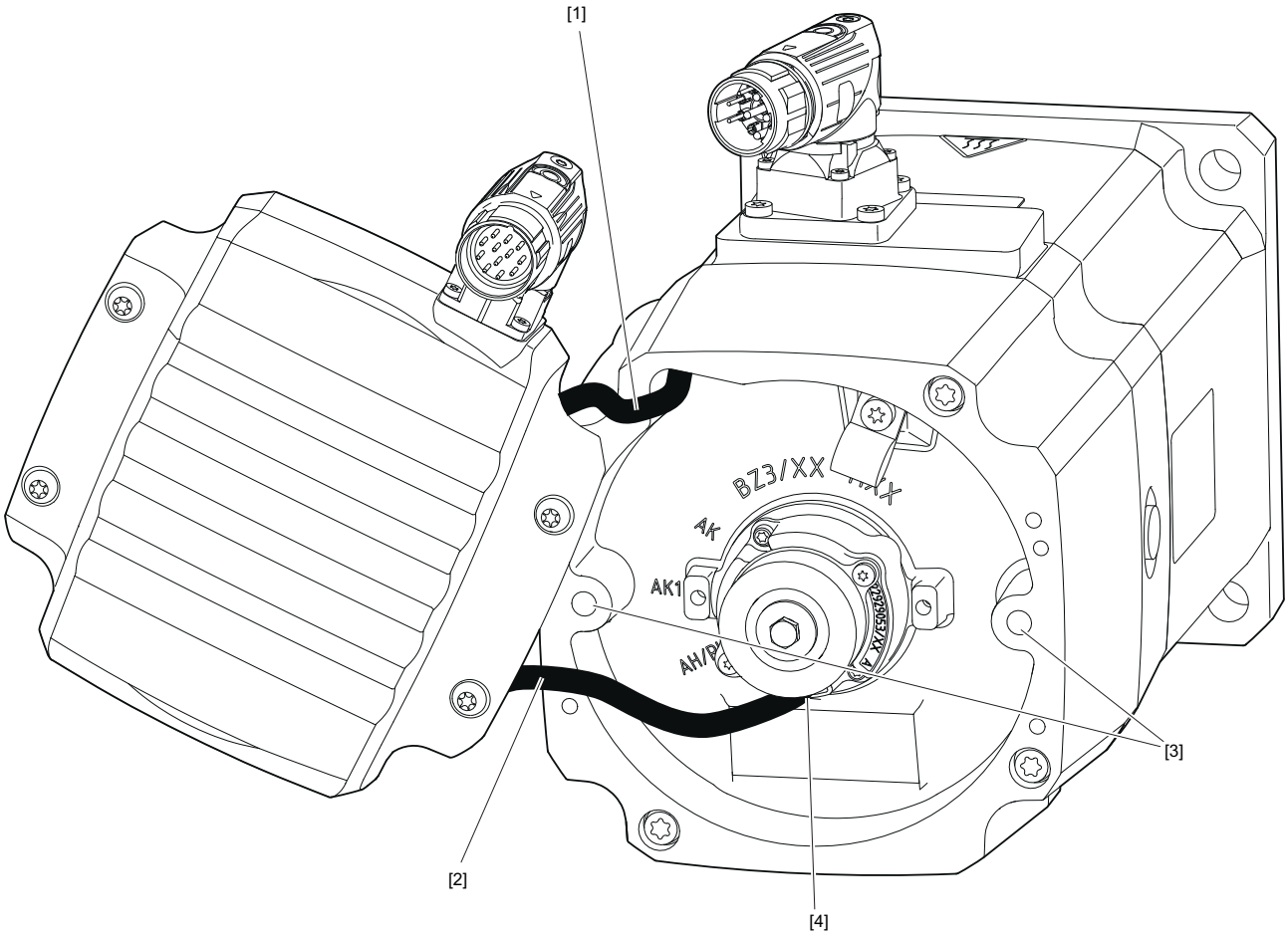
4. ⚠ **CAUTION!** The Litz wires [1] [2] for the temperature sensor and the encoder must not be damaged or crushed. The Litz wires have only small excess length. Remove the encoder cover carefully. To reduce the stress on the Litz wires, it is recommended to temporarily attach the encoder cover to the drive (see following figure).



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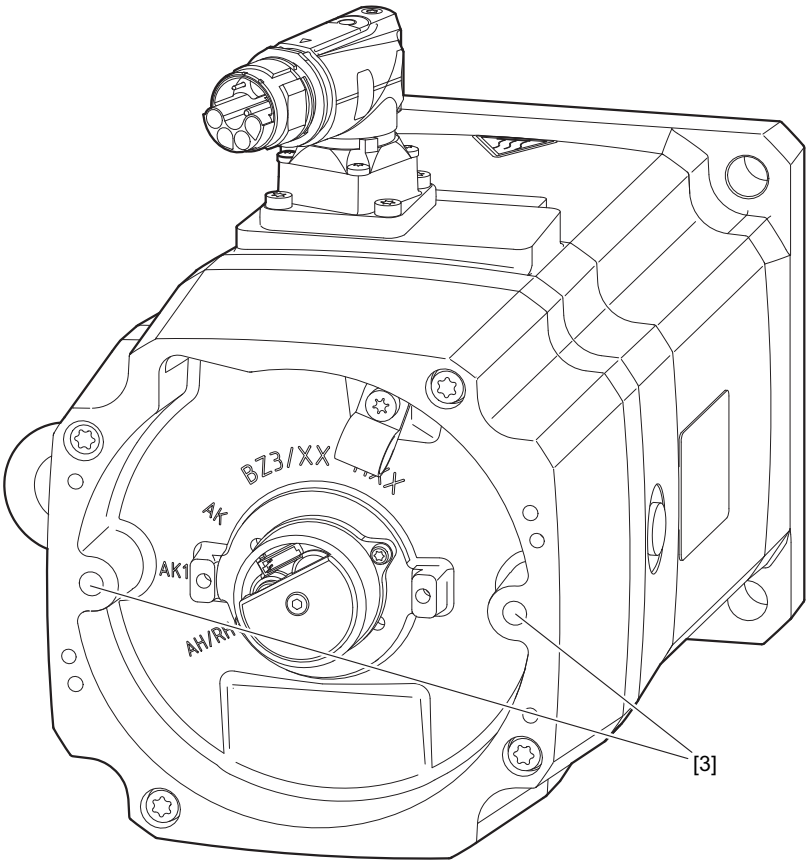
[1] Litz wires for temperature sensor
[2] Litz wires for encoder
[3] Holes of the manual brake release
[4] Plug-in connection encoder connector / encoder

5. Insert the stud (for information on sizes and tightening torques, refer to chapter "Recommendations for studs" (→ 🗎 95)) into the holes of the manual brake release [3] of the brake.
6. Connect the brake to the voltage supply.
7. Release and apply the brake electrically. Measure the motion ΔH of the pressure plate at the studs. This motion ΔH corresponds to the working air gap.
8. If the dimension ΔH is > **0.6 mm**, the brake lining carrier or the brake must be replaced. The working air gap cannot be adjusted.
9. Remove the studs from the holes of the manual brake release [3].
10. **Important!** Check the Litz wires [1] [2] for possible damages.
11. **Important!** Check of the encoder connector is correctly inserted into the encoder [4].

12. Install the encoder cover. Tighten the screws with a tightening torque of 6.8 Nm.

Measuring the working air gap for brakes without manual brake release with single-cable technology or terminal box

1. ⚠ **WARNING!** Risk of injury!
   De-energize the motor and brake and safeguard the drive against unintentional power-up.
2. If installed, remove the forced cooling fan.
3. Remove the encoder cover.
4. Insert the stud (for information on sizes and tightening torques, refer to chapter "Recommendations for studs" (→ 🗎 95)) into the holes of the manual brake release [3] of the brake.



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[3] Holes of the manual brake release

5. Connect the brake to the voltage supply.
6. Release and apply the brake electrically. Measure the motion ΔH of the pressure plate at the studs. This motion ΔH corresponds to the working air gap.
7. If the dimension ΔH is > **0.6 mm**, the brake lining carrier or the brake must be replaced. The working air gap cannot be adjusted.
8. Remove the studs from the holes of the manual brake release [3].
9. Install the encoder cover. Tighten the screws with a tightening torque of 6.8 Nm.

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Recommendations for studs

Brake	Screw size	Tightening torque Nm
BZ05, BZ05D, BZ1,BZ1D, BZ3 BZ3D	DIN938 M5 × 110	3.5
BZ5, BZ5D	DIN938 M6 × 110	6.5

7.5 Cleaning

Dirt, dust or chips on the drive increase the operating temperature as the optimum heat dissipation of the motor is no longer possible.

Clean the servomotor regularly, depending on the operating and ambient conditions.

7.6 Connection cable

Check the connection cable for damage at regular intervals. Replace if necessary.

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8 Technical data

8.1 Information on the technical data – conditions

The technical data of the servomotors apply under the following boundary conditions:

- Maximum ambient temperature 40 °C
- System voltage 400 V
- Pulse width modulation frequency (PWM frequency) at least 8 kHz
- Flange surface made from aluminum, painted black, measuring 375 mm × 375 mm × 12 mm
- Housing is painted
- Maximum winding temperature 145 °C
- Motor mounting position IM B5 according to IEC/EN 60034-7 or mounting position M1 according to the SEW-EURODRIVE definition for gearmotors

8.2 Technical data of the BK.. brakes

The following tables list the technical data of the BK.. brakes. These operate with a defined braking torque for each brake size.

INFORMATION

Response and application times are approximate values.

Possible response times of switching elements or controllers were not taken into account.

8.2.1 Technical data of the BK.. brake

			CM3C63		CM3C71	
Brake			**BK05**	**BK06**	**BK08**	**BK1**
Static braking torque	$M_{4,100°C}$	Nm	3.8	7.1	7.8	16
Dynamic braking torque	M_1	Nm	2.4	3.9	5	11.6
Nominal brake voltage (rating range)	V_N	DC V	24 (21.6 – 26.4)			
Nominal holding current	I_H	DC A	0.56	0.63	0.63	0.75
Response time of the brake without high-speed excitation	$t_{1,II}$	ms	50	70	90	100
Brake application time in case of DC cut-off	$t_{2,I}$	ms	30	30	25	50
Permitted braking work per braking in case of emergency stop	$W_{per,N}$	kJ	0.37	0.74	0.37	0.55
Permitted braking work until maintenance	W_{insp}	kJ	742	1480	742	1100
Permitted mechanical speed	$n_{max,0}$	min^{-1}	7200	7200	7200	7200
Permitted brake application speed in case of emergency stop	$n_{max,1}$	min^{-1}	6000	6000	6000	6000

			CM3C80		CM3C100	
Brake			**BK2**	**BK3**	**BK4**	**BK6**
Static braking torque	$M_{4,100°C}$	Nm	18	30	30	46
Dynamic braking torque	M_1	Nm	10.7	23.8	23.8	33.6
Nominal brake voltage (rating range)	V_N	DC V	24 (21.6 – 26.4)			
Nominal holding current	I_H	DC A	0.80	0.94	0.94	1.0

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			CM3C80		CM3C100	
Brake			**BK2**	**BK3**	**BK4**	**BK6**
Response time of the brake without high-speed excitation	$t_{1,II}$	ms	100	200	200	220
Brake application time in case of DC cut-off	$t_{2,I}$	ms	40	60	60	60
Permitted braking work per braking in case of emergency stop	$W_{per,N}$	kJ	0.85	1.2	1.2	2.7
Permitted braking work until maintenance	W_{insp}	kJ	1700	2400	2400	5400
Permitted mechanical speed	$n_{max,0}$	min^{-1}	7200	7200	5400	5400
Permitted brake application speed in case of emergency stop	$n_{max,1}$	min^{-1}	6000	6000	4500	4500

8.2.2 Operating currents for BK.. brakes

	BK05	BK06	BK08	BK1
Braking torque $M_{4,\ 100\ °C}$ in Nm	3.8	7.1	7.8	16
Nominal power brake coil in W	13.4	15	14.1	18
Operating current in A V_N = 24 (21.6 – 26.4) VDC	0.56	0.63	0.59	0.75

	BK2	BK3	BK4	BK6
Braking torque $M_{4,\ 100\ °C}$ in Nm	18	30	30	46
Nominal power brake coil in W	19.2	22.5	22.5	24
Operating current in A V_N = 24 (21.6 – 26.4) VDC	0.8	0.94	0.94	1.0

$M_{4,\ 100\ °C}$ Minimum static braking torque (holding torque) at 100 °C

V_N Nominal voltage (rated voltage range)

When dimensioning the 24 V supply, it is not necessary to consider a current reserve for releasing the brake, i.e. the ratio of inrush current to operating current is 1.

8.2.3 Resistance values of BK.. brake coils

	BK05	BK06	BK08	BK1
Braking torque $M_{4,\ 100\ °C}$ in Nm	3.8	7.1	7.8	16
Nominal power brake coil in W	13.4	15	14.1	18
Coil resistance R at 20 °C in Ω V_N = 24 (21.6 – 26.4) VDC	43	38	41	32

	BK2	BK3	BK4	BK6
Braking torque $M_{4,\ 100\ °C}$ in Nm	18	30	30	46
Nominal power brake coil in W	19.2	22.5	22.5	24
Coil resistance R at 20 °C in Ω V_N = 24 (21.6 – 26.4) VDC	30	26	26	24

$M_{4,\ 100\ °C}$ Minimum static braking torque (holding torque) at 100 °C

R Coil resistance at 20 °C

V_N Nominal voltage (rated voltage range)

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8.3 Technical data for the BZ.. and BZ..D brakes

8.3.1 Technical data of the BZ.. brake

			CM3C63				CM3C71			
Brake			BZ05				BZ1			
Static braking torque	$M_{4,100°C}$	Nm	2.5	3.2	4.5	6	5.9	8.4	12	17
Dynamic braking torque	M_1	Nm	2.5	3.2	4.5	6	5.9	8.4	12	17
Response time of the brake with high-speed excitation	$t_{1,II}$	ms	30				40			
Brake application time in case of AC cut-off	$t_{2,I}$	ms	80				80			
Brake application time in case of AC/DC or DC cut-off	$t_{2,II}$	ms	15				15			
Permitted braking work per braking in case of emergency stop	$W_{per,N}$	kJ	2.15				4.82			
Permitted braking work until maintenance	W_{insp}	kJ	17000				39000			
Permitted mechanical speed	$n_{max,0}$	min^{-1}	7200				7200			
Permitted brake application speed in case of emergency stop	$n_{max.1}$	min^{-1}	6000				6000			
Inrush current ratio	ESV	1	5.1				5.3			

Nominal DC brake voltage (Rating range)			**Nominal DC holding current of the brake I_H A**	
24[1] (21.6 – 26.4)	V_N	V	0.5	0.72

1) The brake voltage DC 24 V requires a high current and is possible only with a limited cable length.

Nominal AC brake voltage (Rating range)			**Nominal AC holding current of the brake I_H A**	
110 (99 – 121)	V_N	V	0.27	0.39
230 (218 – 243)			0.12	0.16
400 (380 – 431)			0.06	0.09
460 (432 – 484)			0.06	0.08
500 (484 – 542)			0.05	0.07

			CM3C80				CM3C100			
Brake			BZ3				BZ5			
Static braking torque	$M_{4,100°C}$	Nm	11	16	23	32	22	32	44	63
Dynamic braking torque	M_1	Nm	11	16	23	32	22	32	44	63
Response time of the brake with high-speed excitation	$t_{1,II}$	ms	60				100			
Brake application time in case of AC cut-off	$t_{2,I}$	ms	100				120			
Brake application time in case of AC/DC or DC cut-off	$t_{2,II}$	ms	20				30			
Permitted braking work per braking in case of emergency stop	$W_{per,N}$	kJ	5.35				10.2			
Permitted braking work until maintenance	W_{insp}	kJ	43000				46000			
Permitted mechanical speed	$n_{max,0}$	min^{-1}	7200				5400			
Permitted brake application speed in case of emergency stop	$n_{max.1}$	min^{-1}	6000				4500			
Inrush current ratio	ESV	1	5.3				5.2			

Nominal DC brake voltage (Rating range)			**Nominal DC holding current I_H A**	
24[1] (21.6 – 26.4)	V_N	V	0.92	1.15

1) The brake voltage DC 24 V requires a high current and is possible only with a limited cable length.

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Nominal AC brake voltage (Rating range)			Nominal AC holding current I_H A	
110 (99 – 121)	V_N	V	0.49	0.62
230 (218 – 243)			0.21	0.26
400 (380 – 431)			0.12	0.15
460 (432 – 484)			0.11	0.14
500 (484 – 542)			0.09	0.12

8.3.2 Technical data of the BZ..D brake

			CM3C63		CM3C71	
Brake			BZ05D		BZ1D	
Static braking torque	$M_{4,100°C}$	Nm	2.5	3.2	5.9	8.4
Dynamic braking torque	M_1	Nm	2.5	3.2	5.9	8.4
Nominal brake voltage (rating range)	V_N	DC V	24 (21.6 – 26.4)			
Nominal holding current	I_H	DC A	0.98		1.11	
Response time of the brake without high-speed excitation	$t_{1,II}$	ms	180		240	
Brake application time in case of DC cut-off	$t_{2,I}$	ms	20		20	
Permitted braking work per braking in case of emergency stop	$W_{per,N}$	kJ	2.15		4.82	
Permitted braking work until maintenance	W_{insp}	kJ	17000		39000	
Permitted mechanical speed	$n_{max,0}$	min^{-1}	7200		7200	
Permitted brake application speed in case of emergency stop	$n_{max,1}$	min^{-1}	6000		6000	

			CM3C80		CM3C100	
Brake			BZ3D		BZ5D	
Static braking torque	$M_{4,100°C}$	Nm	11	16	22	32
Dynamic braking torque	M_1	Nm	11	16	22	32
Nominal brake voltage (rating range)	V_N	DC V	24 (21.6 – 26.4)			
Nominal holding current	I_H	DC A	1.06		1.35	
Response time of the brake without high-speed excitation	$t_{1,II}$	ms	270		280	
Brake application time in case of DC cut-off	$t_{2,I}$	ms	30		40	
Permitted braking work per braking in case of emergency stop	$W_{per,N}$	kJ	5.35		10.2	
Permitted braking work until maintenance	W_{insp}	kJ	43000		46000	
Permitted mechanical speed	$n_{max,0}$	min^{-1}	7200		5400	
Permitted brake application speed in case of emergency stop	$n_{max,1}$	min^{-1}	6000		4500	

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8.3.3 Resistance values of BZ.. and BZ..D brake coils

	BZ05	BZ05D	BZ1	BZ1D
Nominal power brake coil in W	18	22.9	24.2	25.2

Nominal voltage V_N		BZ05		BZ05D	BZ1		BZ1D
V_{AC}	V_{DC}	R_{BS} Ω	R_{TS} Ω	R_H Ω	R_{BS} Ω	R_{TS} Ω	R_H Ω
–	**24** (21.6 – 26.4)	6.47	28.7	27.6	4.53	20.2	23.6
110 (99 – 121)	–	20.4	92.5	–	14.5	63.8	–
230 (218 – 243)	–	104	433	–	74.4	323	–
400 (380 – 431)	–	327	1481	–	220	1022	–
460 (432 – 484)	–	431	1865	–	276	1346	–
500 (484 – 542)	–	546	2844	–	352	1704	–

	BZ3	BZ3D	BZ5	BZ5D
Nominal power brake coil in W	30.7	24.5	40	34.1

Nominal voltage V_N		BZ3		BZ3D	BZ5		BZ5D
V_{AC}	V_{DC}	R_{BS} Ω	R_{TS} Ω	R_H Ω	R_{BS} Ω	R_{TS} Ω	R_H Ω
–	**24** (21.6 – 26.4)	3.7	15.6	23.8	2.89	12.1	19.3
110 (99 – 121)	–	11.4	50.8	–	9.13	38.3	–
230 (218 – 243)	–	59.2	254	–	46.3	194	–
400 (380 – 431)	–	182	766	–	149	581	–
460 (432 – 484)	–	224	976	–	186	721	–
500 (484 – 542)	–	278	1263	–	234	1171	–

R_{BS} Accelerator coil resistance at 20 °C

R_{TS} Coil section resistance at 20 °C

V_N Nominal voltage (rated voltage range)

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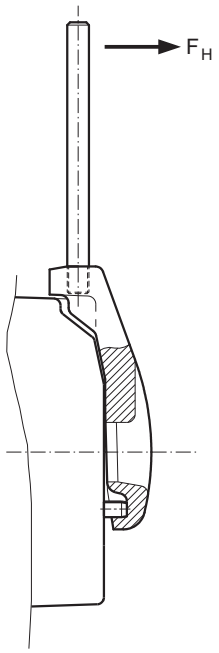
8.3.4 Manual brake release

In brakemotors with /HR option “Manual brake release with automatic reengaging function,” you can release the brake manually using the provided lever. The following table shows the required actuating force applied to the lever at maximum braking torque. The values are based on the assumption that you operate the lever at the upper end.



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Brake	Motor	Actuating force F_H N
BZ05, BZ05D	CM3C63	100
BZ1, BZ1D	CM3C71	160
BZ3, BZ3D	CM3C80	160
BZ5, BZ5D	CM3C100	250

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8.4 Characteristic safety values of BK.. brakes

The values specified in the following table apply to BK.. brakes in standard applications.

	Characteristic safety values according to EN ISO 13849-1	
Classification	Category B	
System structure	1-channel (Cat. B)	
$MTTF_d$ value	Calculation via B_{10D} value	
B_{10D} value	BK05	10×10^6
	BK06	10×10^6
	BK08	10×10^6
	BK1	10×10^6
	BK2	8×10^6
	BK3	8×10^6
	BK4	6×10^6
	BK6	6×10^6

8.5 Characteristic safety values of BZ.. brakes

The values specified in the following table apply to BZ.. brakes in standard applications.

	Characteristic safety values according to EN ISO 13849-1	
Classification	Category B	
System structure	1-channel (Cat. B)	
$MTTF_D$ value	Calculation via B_{10D} value	
B_{10D} value	BZ05, BZ05D	15×10^6
	BZ1, BZ1D	15×10^6
	BZ3, BZ3D	12×10^6
	BZ5, BZ5D	9×10^6

SEW-EURODRIVE offers BZ.. brakes also as safety brakes. For more information, consult the addendum to the operating instructions "Safety encoders and safety brakes – CM3C.. servomotors – Functional safety".

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9 Malfunctions

9.1 General information

⚠ WARNING

Risk of injury if the drive starts up unintentionally.

Severe or fatal injuries.

- Before you start working on the unit, disconnect the motor and all connected options from the power supply.
- Secure the motor against unintended power-up.

⚠ CAUTION

Risk of burns due to hot surfaces.

Injury.

- Let the product cool down before touching it.

NOTICE

Destruction of the motor due to multiple acknowledgements of a motor protection fault.

Damage to property, damage to the motor.

- First, determine the cause of the fault before acknowledging a motor protection fault.
- Do not acknowledge a motor protection fault more than once.

9.2 Malfunctions in the motor

Fault	Possible cause	Measure
Motor does not start	Supply cable interrupted.	Check connections and correct, if necessary.
	Thermal motor protection tripped.	Check the thermal motor protection for correct setting and correct fault, if necessary.
	Inverter defective, overloaded, connected incorrectly, or set incorrectly.	Check inverter, check wiring.
Incorrect direction of rotation	Incorrect setpoint polarity	Check inverter, check setpoints.
Motor is buzzing and has high current consumption	Drive blocked.	Check drive.
	Brake does not release.	See chapter "Brake malfunctions" (→ 🗎 104).
	Malfunction on the encoder cable	Check the encoder cable.
	Inverter set incorrectly.	Check the inverter.

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Fault	Possible cause	Measure
Motor heats up too much (measure temperature; significantly above 120 °C)	Overload	Check load for sluggishness; use larger motor or reduce load, if necessary; check the travel profile.
	Ambient temperature too high	Observe permitted temperature range.
	Insufficient cooling	Correct the cooling air supply or clear the cooling air ducts; retrofit the forced cooling fan, if necessary.
	Forced cooling fan does not run.	Check connection and correct, if necessary.
	Nominal duty type (S1 to S10, EN 60034) exceeded, e.g. due to excessive effective torque.	Adjust the nominal duty type of the motor to the required operating conditions; consult a specialist, if necessary, to determine the correct drive
	Inverter not optimized	Check the inverter.
Running noise on the motor	Bearing damage	Contact SEW-EURODRIVE.
		Replace the motor
	Vibration of the rotating parts	Rectify cause, possible imbalance.
	With a forced cooling fan: Foreign objects in cooling air ducts	Clean cooling air ducts.

9.3 Brake malfunctions

9.3.1 BK.. brake

Fault	Possible cause	Measure
Brake does not release	Brake connected incorrectly.	Check the connection of the brake.
	Incorrect voltage at brake control unit, e.g. voltage drop in the supply cable > 10%.	Check voltage at motor connection: Correct connection voltage; check cable cross section.
	Brake coil has interturn fault or short circuit to exposed conductive part.	Contact SEW-EURODRIVE.
Brake does not apply/brake.	Incorrect braking torque.	Contact SEW-EURODRIVE.
		Motor/brake replacement by SEW-EURODRIVE.
Noise/squeaking near the brake	Brake parameters set incorrectly in the inverter.	Check brake release and application times.
Brake does not apply	Maximum permitted working air gap exceeded because brake lining worn down.	Contact SEW-EURODRIVE.
		Motor/brake replacement by SEW-EURODRIVE.

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9.3.2 BZ.. brake

Fault	Possible cause	Measure
Brake does not release	Brake control unit failed.	Install a new brake control system, check internal resistance and insulation of brake coil, check switchgear.
	Brake connected incorrectly.	Check brake connection.
	Max. permitted working air gap exceeded because brake lining worn down.	Contact SEW-EURODRIVE.
		Replacement of the brake lining carrier by SEW-EURODRIVE-trained staff.
	Brake coil has interturn fault or short circuit to exposed conductive part.	Check switching devices.
		Replace complete brake and brake control. Contact SEW-EURODRIVE.
	Brake lining worn down.	Contact SEW-EURODRIVE.
		Replacement of the brake lining carrier by SEW-EURODRIVE-trained staff.
	Incorrect voltage at brake control unit.	Apply correct voltage. Specified brake voltage on the nameplate.
	Voltage drop along the incoming cable > 10%.	Provide for correct connection voltage. Specified brake voltage on the nameplate.
		Check cable cross section of brake cable. If necessary, increase cross section.
	Rectifier defective.	Replace rectifier and brake coil; it may be more economical to replace the complete brake.
		Contact SEW-EURODRIVE.
Brake does not apply/brake.	Brake lining worn down.	Replacement of the brake lining carrier by SEW-EURODRIVE-trained staff.
	Incorrect braking torque.	Check the project planning. If necessary, adjust braking torque by changing the type and number of brake springs.
		Contact SEW-EURODRIVE.
	Manual brake release device not set correctly.	Set the adjusting nuts correctly.
Brake is applied with time lag	Brake is switched on AC voltage side.	Switch both, the DC and AC voltage sides; observe wiring diagram.
Noise/squeaking near the brake	Brake parameters set incorrectly in the inverter.	Check brake release and application times.

9.4 Encoder malfunctions

Faults on the encoder are output on the inverter with an appropriate error message.

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For more information on errors and maintenance, refer to the document "Built-In Encoders and Add-On Encoders, DR.., DRN.., DRU.., EDR.., EDRN.. AC Motors – Integrated, Cone Shaft, Spread Shaft, Plug-In Shaft, Hollow Shaft, Encoder Mounting Adapters".

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10 Service

10.1 SEW-EURODRIVE service

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

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

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

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11 Waste disposal

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

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

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

- Oil and grease

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

Waste disposal according to WEEE Directive 2012/19/EU

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

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

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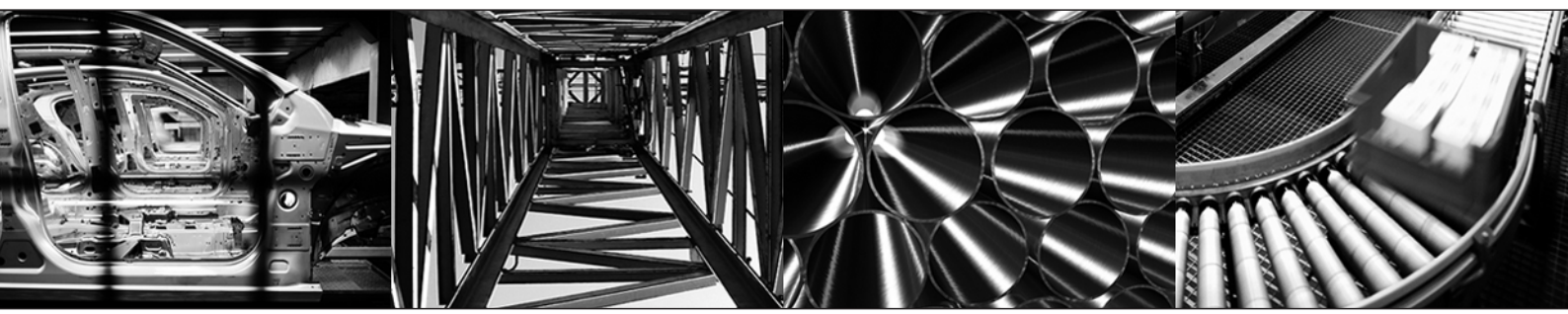

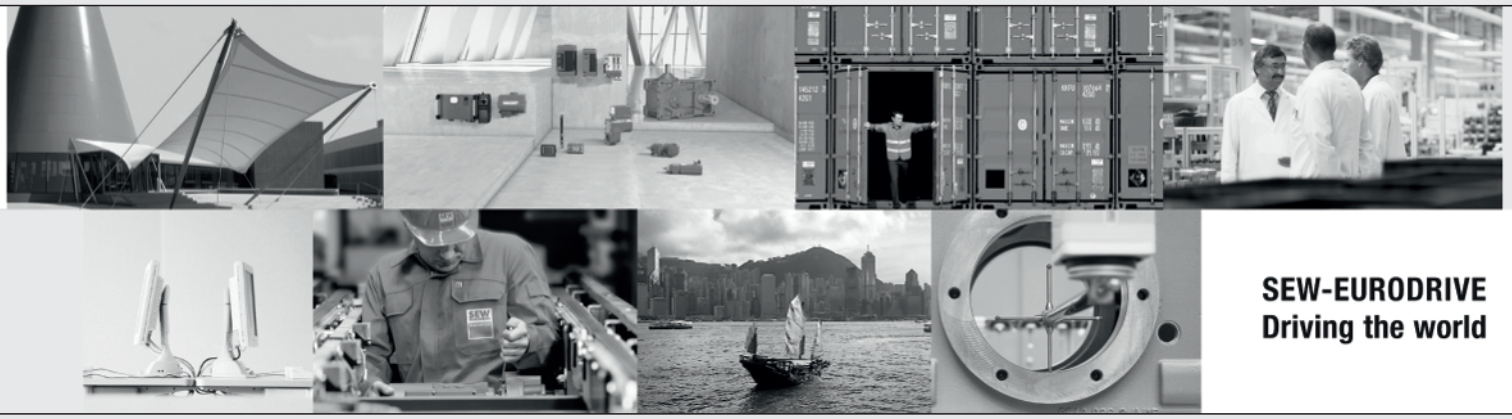

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