SEW EURODRIVE

Operating Instructions

AC Motors

DR..71 – 315, DRN63 – 315, DR2..56 – 80

Edition 06/2019

25957074/EN

Contents

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1 General information

1.1 About this documentation

The current version of the documentation is the original.

This documentation is an integral part of the product. The documentation is 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 Structure of the safety notes

1.2.1 Meaning of signal words

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

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

1.2.2 Structure of section-related safety notes

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

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

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

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Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

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

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1.3 Rights to claim under limited warranty

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

1.4 Product names and trademarks

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

1.5 Copyright notice

1.6 Other applicable documentation

Observe the corresponding documentation for all further components.

1.6.1 DR..71 – 315, DRN63 – 315, DR2..56 – 80 AC motors

The following publications and documents have to be observed as well:

- Wiring diagrams provided with the motor
- "Gear Unit Series R..7, F..7, K..7, K..9, S..7, SPIROPLAN® W" operating instructions for gearmotors
- Catalogs for AC motors
- Catalogs for gearmotors
- Addendum to the operating instructions "Safety Encoders and Safety Brakes, AC Motors DR.., DRN.., DR2.., EDR.., EDRN.. – Functional Safety"
- "Project Planning for BE.. Brakes" manual – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake"
- If required, "MOVIMOT® MM..D Functional Safety" manual

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2 Safety notes

2.1 Preliminary information

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

2.2 Duties of the user

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

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

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

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

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

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

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2.3 Target group

Specialist for mechanical work

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

- Qualification in the mechanical area in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrotechnical work

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

- Qualification in the electrotechnical area in accordance with the national regulations
- Familiarity with this documentation

Additional qualification

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

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.

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2.5 Transportation/storage

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.

The lifting eyebolts are designed to carry only the weight of the motor without gear unit. Tighten installed lifting eyebolts. Mounted gear units have separate suspension attachments, which must be used according to the gear unit operating instructions when lifting the gearmotor. Do not mount any additional loads.

The installed lifting eyebolts are in accordance with DIN 580. Observe the loads and regulations specified there. The tension force vector of the slings must not exceed a 45° angle in accordance with DIN 580.

If necessary, use suitable, sufficiently dimensioned handling equipment.

Observe the following notes when transporting the device:

- Always use all attachment points if available. The attachment points are designed to carry only the mass of the product. Severe or fatal injuries. Do not apply any additional loads.
- Ensure that the product is not subject to mechanical impact.

If the product is not immediately installed, it must be stored in a dry and dust-free location. The product can be stored for up to 9 months without requiring any special measures before startup. Do not store the product outdoors.

Do not transport or store the product on the fan guard.

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2.6 Installation/assembly

Note the following points during installation:

- Make sure that the supports are even, the foot and flange mounting is correct and if there is direct coupling, align with precision.
- Avoid resonance between the rotational frequency and the double supply system frequency.
- Release brake (for motors with mounted brake).
- Turn the rotor by hand and listen for unusual grinding noise.
- Check the direction of rotation in decoupled state.
- Only install or remove belt pulleys and couplings using suitable devices (heat up). Cover the belt pulleys and couplings with a touch guard. Avoid unacceptable belt tension.
- Establish any necessary pipe connections.
- Mounting positions with the shaft end pointing upward must be equipped with a cover to prevent foreign objects from falling into the fan. Ensure that ventilation openings are not obstructed and that used air cannot be drawn in again straight away. The same applies to air from adjacent units.

See also the information in chapter "Mechanical installation" (→ 🗎 32).

2.6.1 Restrictions of use

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

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

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2.7 Electric work

2.7.1 Carrying out electric work safely

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

- Electric 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 at all power connections as well as at any connected cables and terminals. This also applies even when the product is inhibited and the motor is at standstill.

2.7.2 Electrical connection

Exceeding the stated tolerances in EN 60034-1 (VDE 0530, Part 1) – voltage ± 5%, frequency ± 2%, curve shape, symmetry – increases the heating and influences electromagnetic compatibility. Adhere to the standard EN 50110. Observe other applicable national regulations, such as DIN VDE 0105 for Germany.

Observe the wiring information and differing data on the nameplate as well as the provided wiring diagram.

The connection must be a permanently secure electrical connection (no protruding wire ends). Use the corresponding cable end equipment. Establish a safe PE 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 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.

Secure the key(s) for the test run without output elements.

When operating low-voltage machines with brakes, check that the brake is functioning properly before startup.

Observe the notes in chapter "Electrical installation".

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2.8 Startup/operation

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.

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

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

Make sure that any existing transport protection is removed.

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

Ensure that the terminal box is closed and screwed down before applying the supply voltage.

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

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Removing the cause of this problem can result in the drive re-starting. Disconnect the product from the power supply before you start with troubleshooting.

Overheating of motors with backstop /RS

With low motor speeds, the centrifugal forces are so low that the backstop sprags brush against the inner and outer ring. This causes overheating of the friction surfaces.

- Do not permanently operate motors with backstop /RS below lift-off speed.

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3 Motor structure

3.1 Basic structure

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

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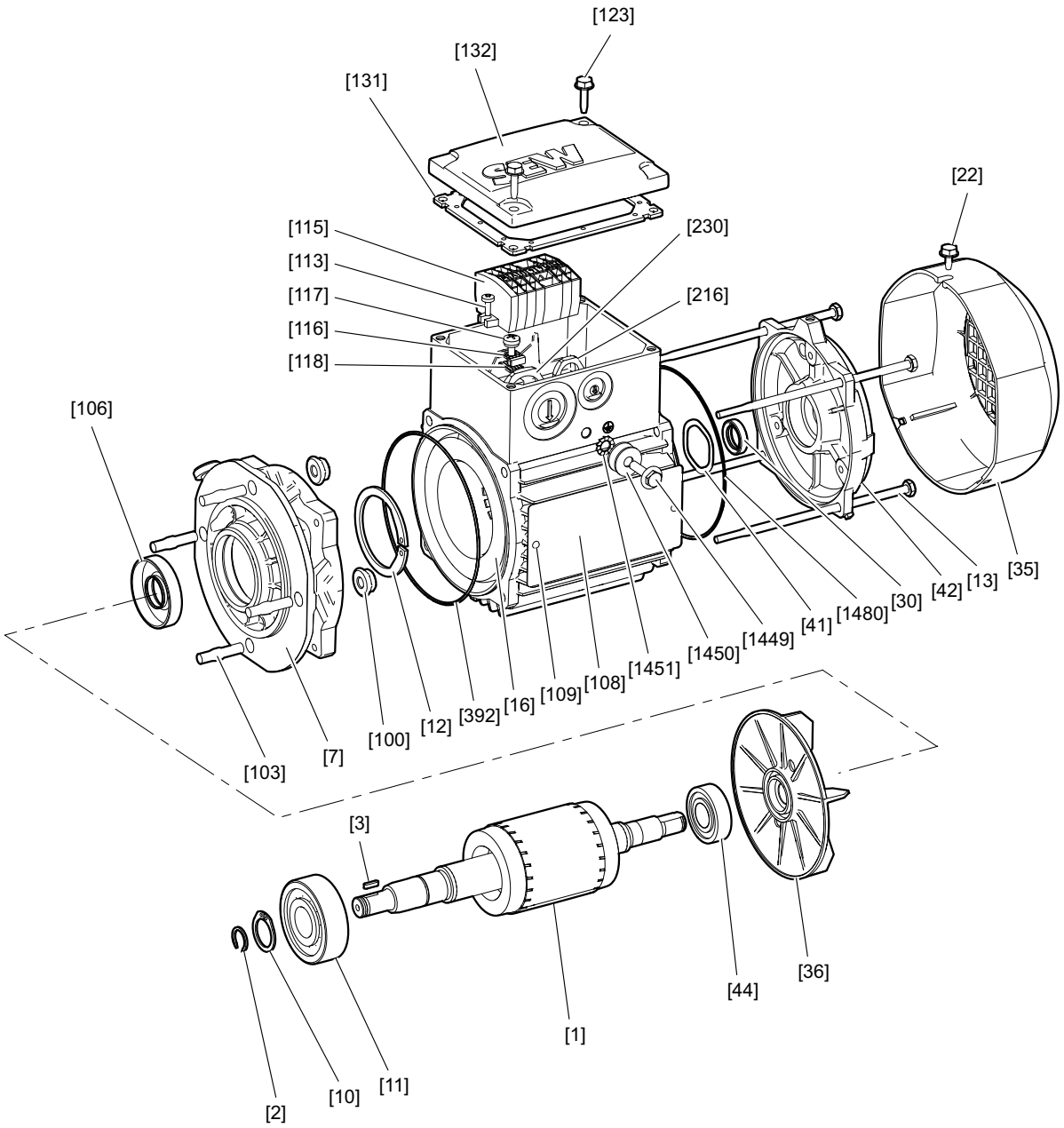
3.2 Basic design of DR2..56 motors



26857323531

[1]	Rotor	[22]	Hex head screw	[106]	Oil seal	[131]	Gasket for cover
[2]	Retaining ring	[30]	Oil seal	[108]	Nameplate	[132]	Terminal box cover
[3]	Key	[35]	Fan guard	[109]	Grooved pin	[216]	Hex nut
[7]	Flanged endshield	[36]	Fan	[113]	Cylinder head screw	[230]	Hex nut
[10]	Retaining ring	[41]	Equalizing ring	[115]	Terminal board	[392]	O-ring
[11]	Deep groove ball bearing	[42]	Rear endshield	[116]	Terminal clip	[1449]	Hex head screw
[12]	Retaining ring	[44]	Deep groove ball bearing	[117]	Flat head screw	[1450]	Washer
[13]	Cap screw	[100]	Hex nut	[118]	Washer	[1451]	Serrated lock washer
[16]	Stator	[103]	Stud	[123]	Hex head screw	[1480]	O-ring

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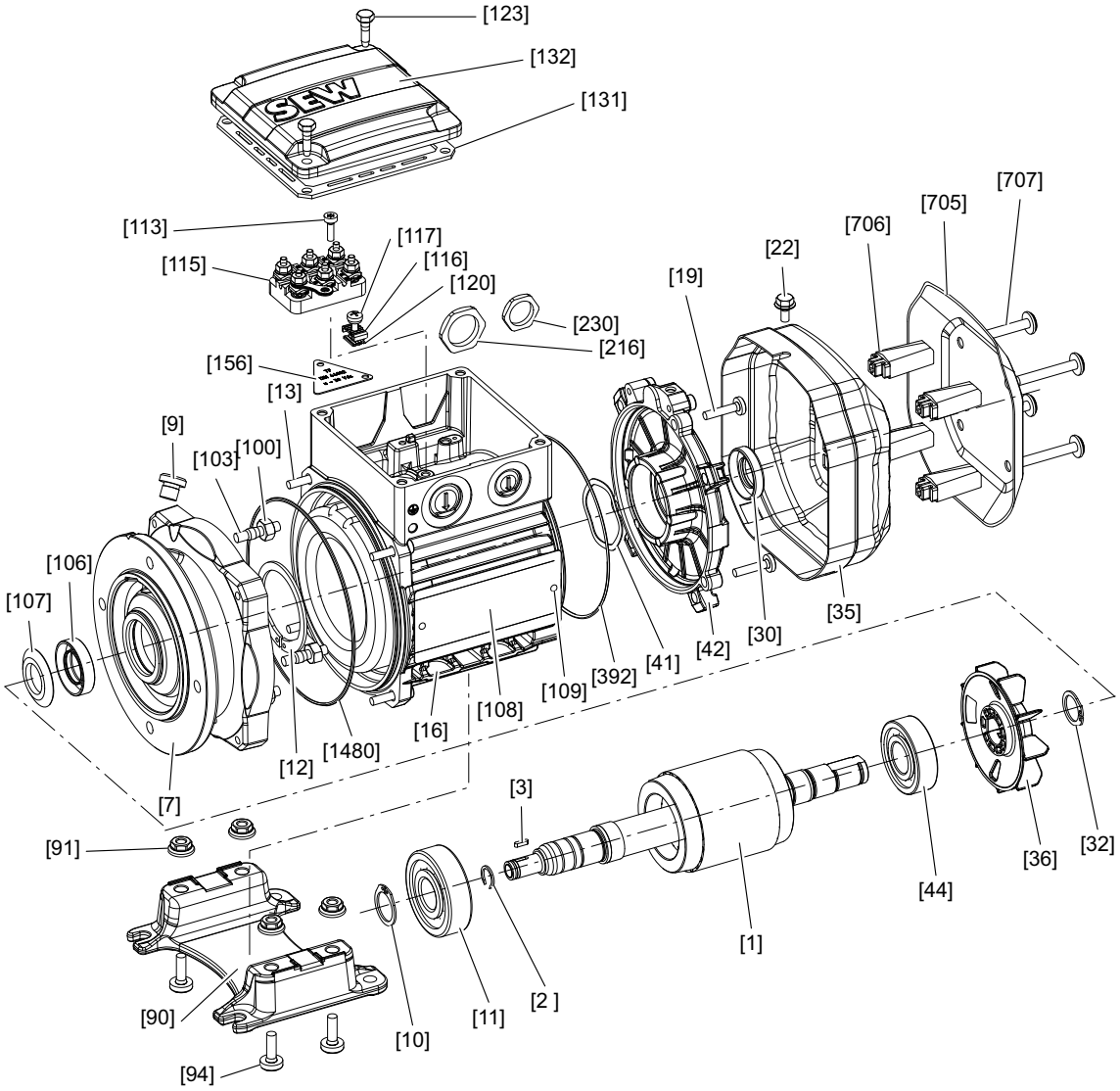
3.3 Basic design of DRN63, DR2..63 motors



22297409803

[1]	Rotor	[22]	Hex head screw	[100]	Hex nut	[123]	Hex head screw
[2]	Retaining ring	[30]	Oil seal	[103]	Stud	[131]	Gasket for cover
[3]	Key	[32]	Retaining ring	[106]	Oil seal	[132]	Terminal box cover
[7]	Flanged endshield	[35]	Fan guard	[107]	Oil flinger	[156]	Information sign
[9]	Screw plug	[36]	Fan	[108]	Nameplate	[216]	Hex nut
[10]	Retaining ring	[41]	Equalizing ring	[109]	Grooved pin	[230]	Hex nut
[11]	Deep groove ball bearing	[42]	B-side endshield	[113]	Cylinder head screw	[392]	O-ring
[12]	Retaining ring	[44]	Deep groove ball bearing	[115]	Terminal board	[705]	Canopy
[13]	Cap screw	[90]	Bed plate	[116]	Terminal clip	[706]	Spacer
[16]	Stator	[91]	Hex nut	[117]	Flat head screw	[707]	Hex head screw
[19]	Pan head screw	[94]	Flat head screw	[120]	Support plate	[1480]	O-ring

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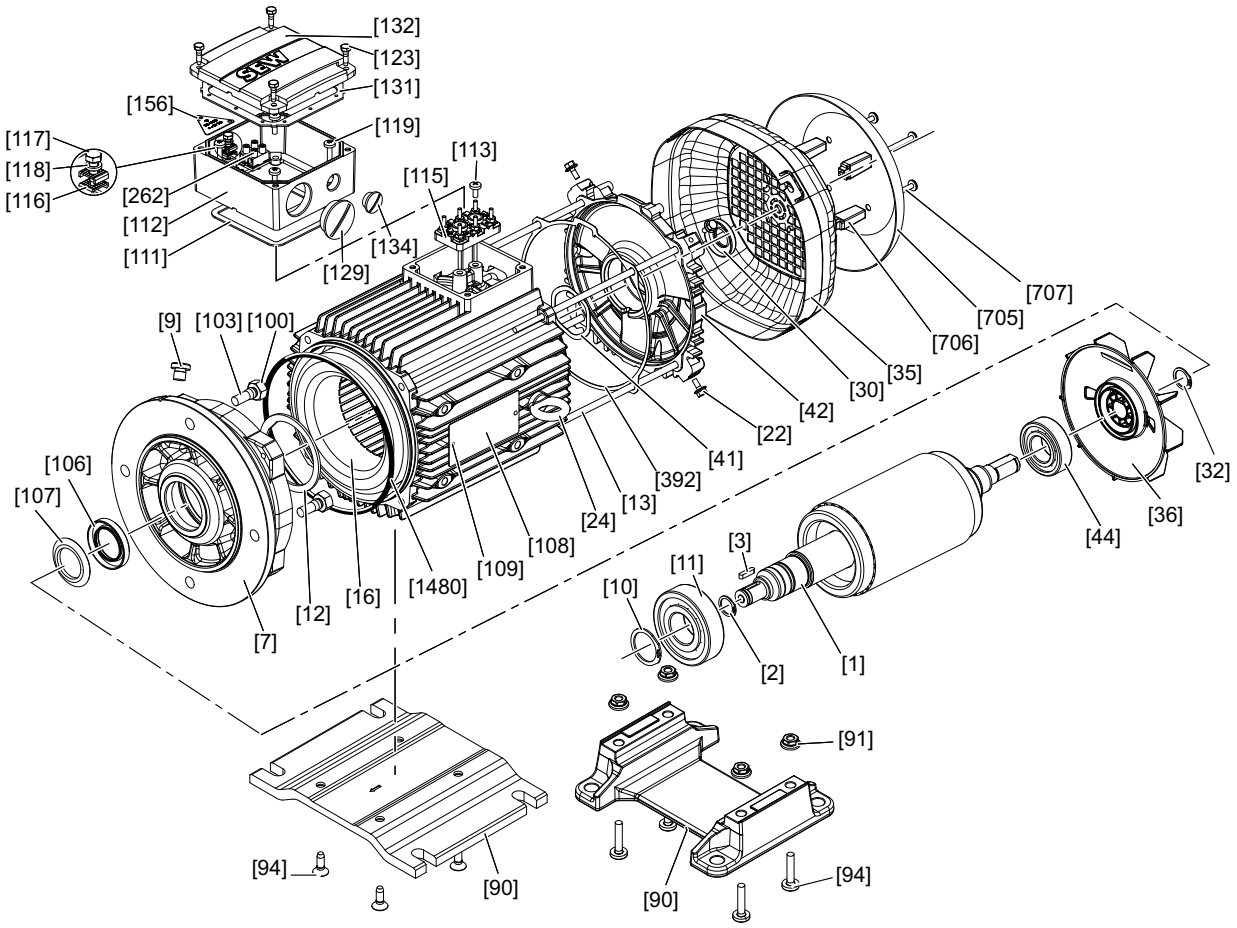
3.4 Basic design of DR..71 – 132, DRN71 – 132S, DR2..71 – 80 motors



18014411878699915

[1]	Rotor	[32]	Retaining ring	[107]	Oil flinger	[123]	Hex head screw
[2]	Retaining ring	[35]	Fan guard	[108]	Nameplate	[129]	Screw plug with O-ring
[3]	Key	[36]	Fan	[109]	Grooved pin	[131]	Gasket for cover
[7]	Flanged endshield	[41]	Equalizing ring	[111]	Gasket for lower part	[132]	Terminal box cover
[9]	Screw plug	[42]	B-side endshield	[112]	Terminal box lower part	[134]	Screw plug with O-ring
[10]	Retaining ring	[44]	Deep groove ball bearing	[113]	Pan head screw	[156]	Information sign
[11]	Deep groove ball bearing	[90]	Bed plate	[115]	Terminal board	[262]	Terminal clip
[12]	Retaining ring	[91]	Hex nut	[116]	Terminal clip	[392]	Gasket
[13]	Cap screw	[94]	Screw			[705]	Canopy
[16]	Stator	[100]	Hex nut	[117]	Hex head screw	[706]	Spacer
[22]	Hex head screw	[103]	Stud	[118]	Lock washer	[707]	Pan head screw
[24]	Lifting eyebolt	[106]	Oil seal	[119]	Pan head screw	[1480]	O-ring
[30]	Oil seal						

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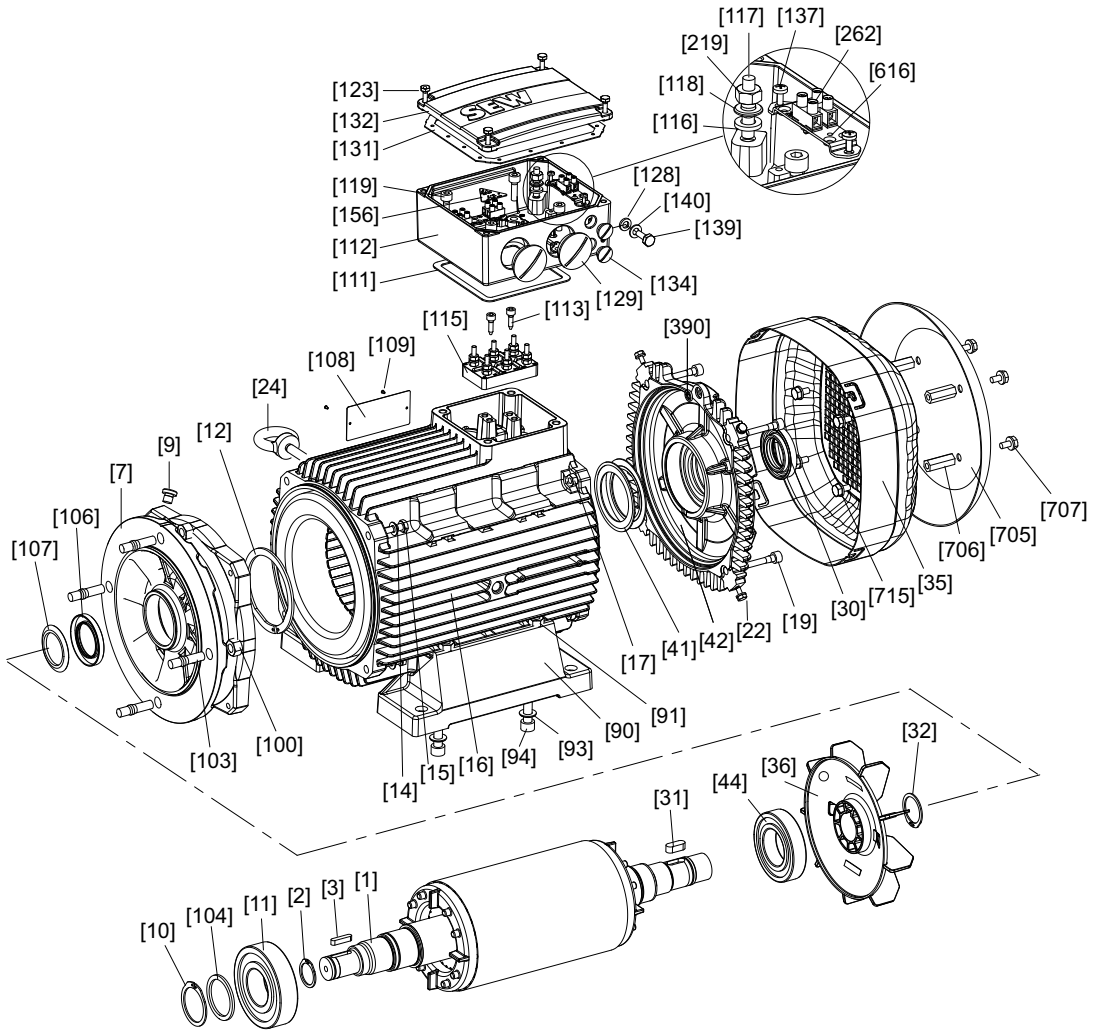
3.5 Basic structure DR..160 – 180, DRN132M – 180 motors



18014399036804619

[1]	Rotor	[31]	Key	[108]	Nameplate	[132]	Terminal box cover
[2]	Retaining ring	[32]	Retaining ring	[109]	Grooved pin	[134]	Screw plug with O-ring
[3]	Key	[35]	Fan guard	[111]	Gasket for lower part	[137]	Screw
[7]	Flange	[36]	Fan	[112]	Terminal box lower part	[139]	Hex head screw
[9]	Screw plug	[41]	Cup spring	[113]	Screw	[140]	Washer
[10]	Retaining ring	[42]	Rear endshield	[115]	Terminal board	[156]	Information label
[11]	Deep groove ball bearing	[44]	Deep groove ball bearing	[116]	Serrated lock washer	[219]	Hex nut
[12]	Retaining ring	[90]	Foot	[117]	Stud	[262]	Connection terminal
[14]	Washer	[91]	Hex nut	[118]	Washer	[390]	O-ring
[15]	Hex head screw	[93]	Washer	[119]	Cap screw	[616]	Retaining plate
[16]	Stator	[94]	Cap screw	[123]	Hex head screw	[705]	Canopy
[17]	Hex nut	[100]	Hex nut	[128]	Serrated lock washer	[706]	Spacer
[19]	Cap screw	[103]	Stud	[129]	Screw plug with O-ring	[707]	Hex head screw
[22]	Hex head screw	[104]	Supporting ring	[131]	Gasket for cover	[715]	Hex head screw
[24]	Eyebolt	[106]	Oil seal				
[30]	Sealing ring	[107]	Oil flinger				

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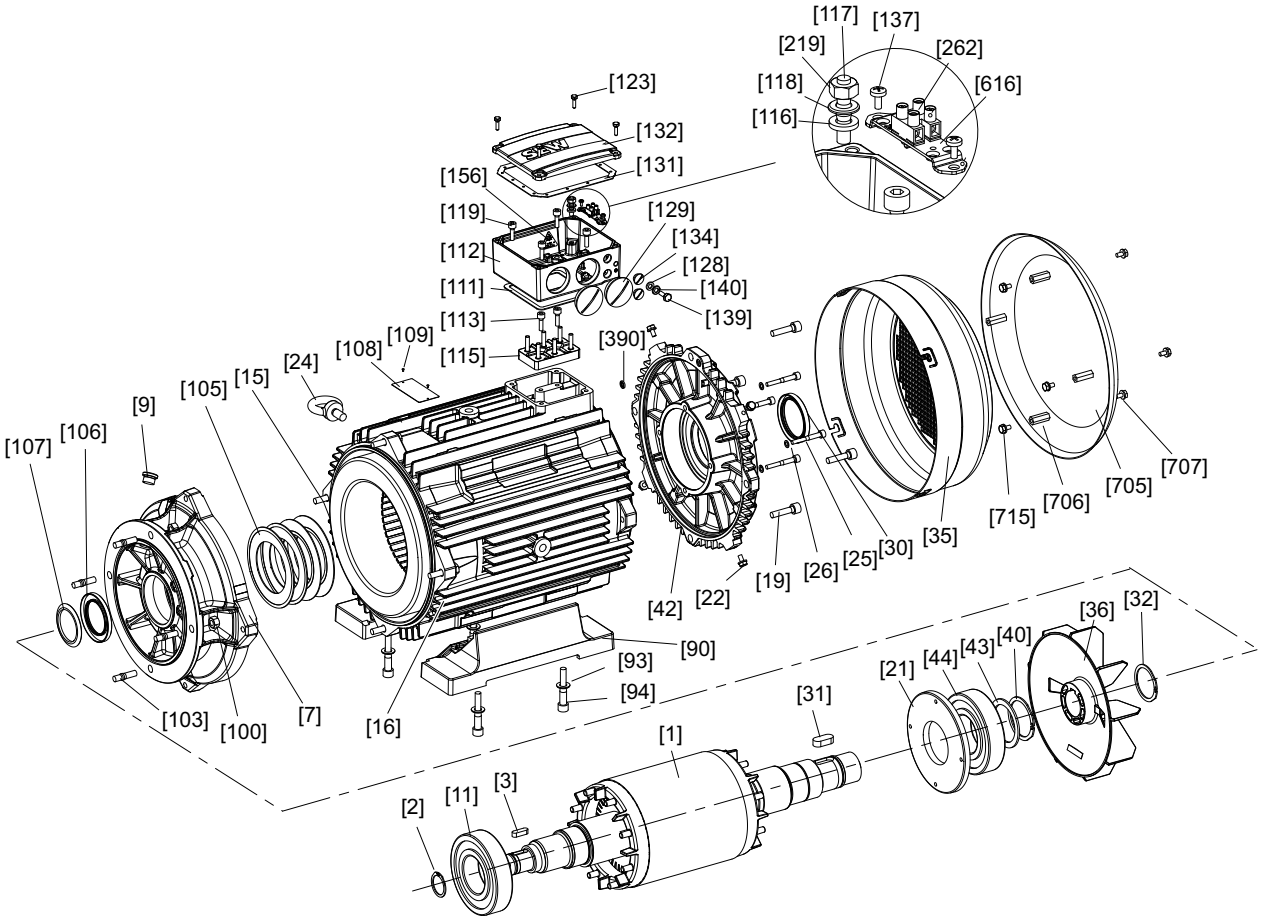
3.6 Basic structure DR..200 – 225, DRN200 – 225 motors



9007200332597387

[1]	Rotor	[31]	Key	[107]	Oil flinger	[132]	Terminal box cover
[2]	Retaining ring	[32]	Retaining ring	[108]	Nameplate	[134]	Screw plug
[3]	Key	[35]	Fan guard	[109]	Grooved pin	[137]	Screw
[7]	Flange	[36]	Fan	[111]	Gasket for lower part	[139]	Hex head screw
[9]	Screw plug	[40]	Retaining ring	[112]	Terminal box lower part	[140]	Washer
[11]	Deep groove ball bearing	[42]	Rear endshield	[113]	Cap screw	[156]	Information label
[15]	Hex head screw	[43]	Supporting ring	[115]	Terminal board	[219]	Hex nut
[16]	Stator	[44]	Deep groove ball bearing	[116]	Serrated lock washer	[262]	Connection terminal
[19]	Cap screw	[90]	Foot	[117]	Stud	[390]	O-ring
[21]	Oil seal flange	[93]	Washer	[118]	Washer	[616]	Retaining plate
[22]	Hex head screw	[94]	Cap screw	[119]	Cap screw	[705]	Canopy
[24]	Eyebolt	[100]	Hex nut	[123]	Hex head screw	[706]	Spacer bolt
[25]	Cap screw	[103]	Stud	[128]	Serrated lock washer	[707]	Hex head screw
[26]	Shield ring	[105]	Cup spring	[129]	Screw plug	[715]	Hex head screw
[30]	Oil seal	[106]	Oil seal	[131]	Gasket for cover		

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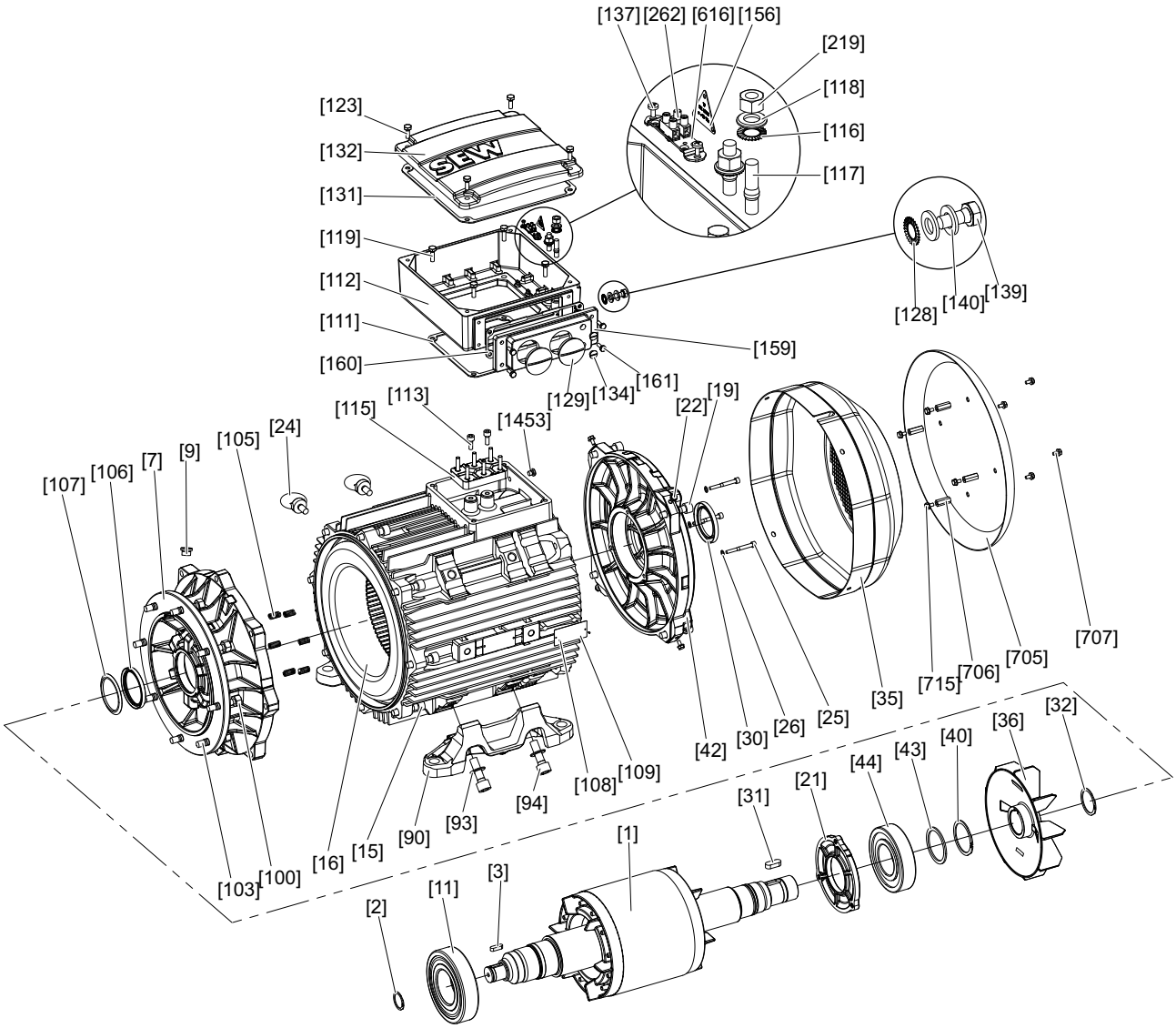
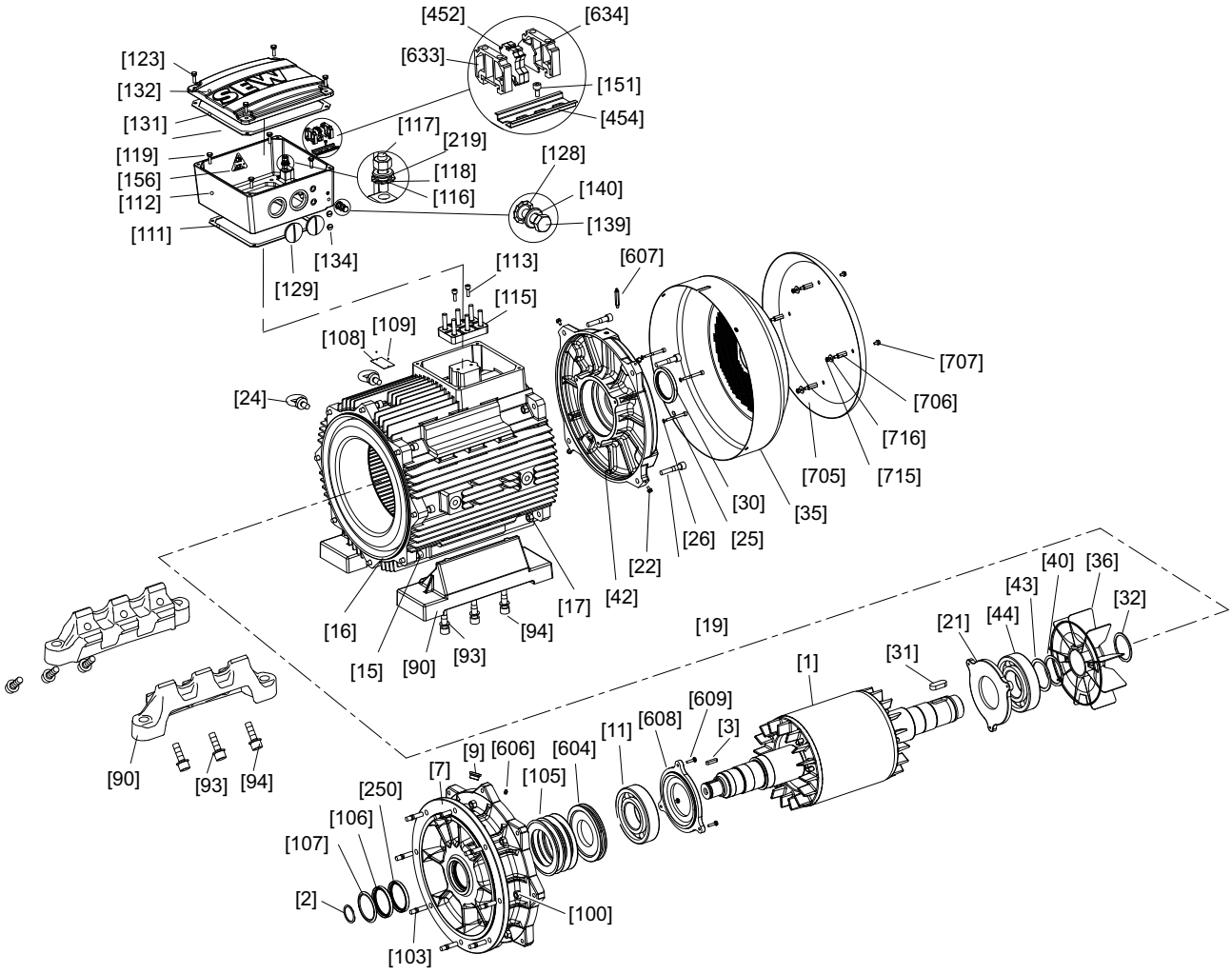
3.7 Basic structure DR..250 – 280, DRN250 – 280 motors



9007206690410123

[1]	Rotor	[32]	Retaining ring	[108]	Nameplate	[134]	Screw plug
[2]	Retaining ring	[35]	Fan guard	[109]	Grooved pin	[137]	Screw
[3]	Key	[36]	Fan	[111]	Gasket for lower part	[139]	Hex head screw
[7]	Flange	[40]	Retaining ring	[112]	Terminal box lower part	[140]	Washer
[9]	Screw plug	[42]	B-side endshield	[113]	Cap screw	[156]	Information sign
[11]	Deep groove ball bearing	[43]	Supporting ring	[115]	Terminal board	[159]	Connection piece
[15]	Cap screw	[44]	Deep groove ball bearing	[116]	Serrated lock washer	[160]	Connection piece seal
[16]	Stator	[90]	Foot	[117]	Stud	[161]	Hex head screw
[19]	Cap screw	[93]	Washer	[118]	Washer	[219]	Hex nut
[21]	Oil seal flange	[94]	Cap screw	[119]	Hex head screw	[262]	Connection terminal
[22]	Hex head screw	[100]	Hex nut	[123]	Hex head screw	[616]	Retaining plate
[24]	Lifting eyebolt	[103]	Stud	[128]	Serrated lock washer	[705]	Canopy
[25]	Cap screw	[105]	Compression spring	[129]	Screw plug	[706]	Spacer bolt
[26]	Shield ring	[106]	Oil seal	[131]	Gasket for cover	[707]	Hex head screw
[30]	Oil seal	[107]	Oil flinger	[132]	Terminal box cover	[715]	Hex head screw
[31]	Key					[1453]	Screw plug

3.8 Basic structure DR..315, DRN315 motors



45035996625703563

[1]	Rotor	[32]	Retaining ring	[111]	Gasket for lower part	[156]	Information sign
[2]	Retaining ring	[35]	Fan guard	[112]	Terminal box lower part	[219]	Hex nut
[3]	Key	[36]	Fan	[113]	Cap screw	[250]	Oil seal
[7]	Flange	[40]	Retaining ring	[115]	Terminal board	[452]	Terminal strip
[9]	Screw plug	[42]	B-side endshield	[116]	Serrated lock washer	[454]	Mounting rail
[11]	Rolling bearing	[43]	Supporting ring	[117]	Stud	[604]	Lubrication ring
[15]	Cap screw	[44]	Rolling bearing	[118]	Washer	[606]	Grease nipple
[16]	Stator	[90]	Foot	[119]	Hex head screw	[607]	Grease nipple
[17]	Hex nut	[93]	Washer	[123]	Hex head screw	[608]	Oil seal flange
[19]	Cap screw	[94]	Cap screw	[128]	Serrated lock washer	[609]	Hex head screw
[21]	Oil seal flange	[100]	Hex nut	[129]	Screw plug	[633]	End bracket
[22]	Hex head screw	[103]	Stud	[131]	Gasket for cover	[634]	End plate
[24]	Eyebolt	[105]	Cup spring	[132]	Terminal box cover	[705]	Canopy
[25]	Cap screw	[106]	Oil seal	[134]	Screw plug	[706]	Spacer bolt
[26]	Shield ring	[107]	Oil flinger	[139]	Hex head screw	[707]	Hex head screw
[30]	Oil seal	[108]	Nameplate	[140]	Washer	[715]	Hex nut
[31]	Key	[109]	Grooved pin	[151]	Cap screw	[716]	Washer

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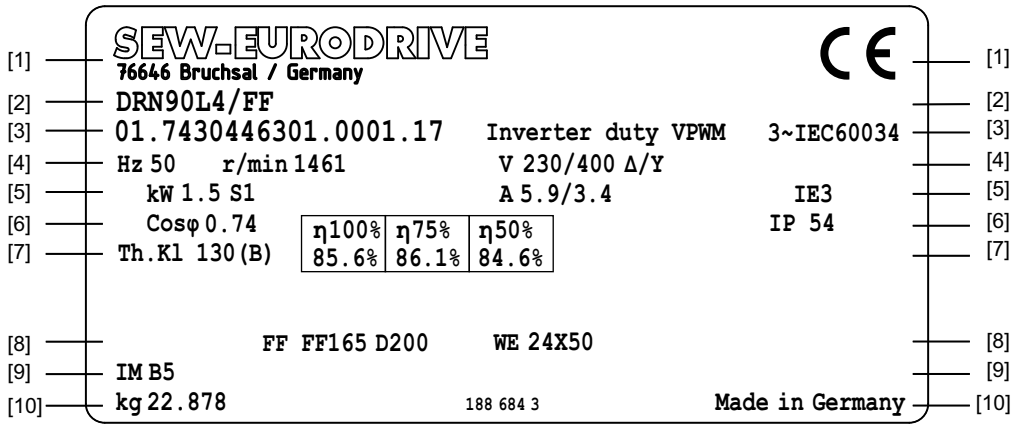
3.9 Nameplate

3.9.1 DRN.. motor nameplate

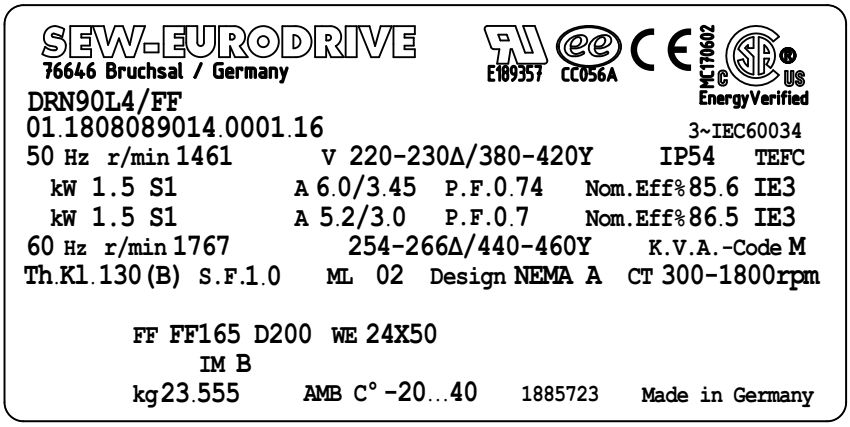
The following figure shows an example of a nameplate:



9007220942512011

Line	Information
[1]	• Manufacturer, address • CE label
[2]	• Type designation
[3]	• Serial number • Suitability for inverter operation • Number of phases and underlying rating and performance standard
[4]	• Rated frequency • Rated speed • Nominal voltage
[5]	• Rated power and operating mode • Rated current • IE class
[6]	• Power factor • Degree of protection according to IEC 60034-5
[7]	• Thermal class • Rated efficiency for motors included in the validity of the IEC 60034-30-1 standard
[8]	• Flange • Shaft end
[9]	• Mounting position
[10]	• Weight • Part number nameplate • Country of manufacture

3.9.2 DRN.. global motor nameplate



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3.9.3 Markings

The following table lists all the markings that can be provided on a nameplate or attached to the motor, and an explanation of what they mean.

CE	CE mark to state compliance with European guidelines, such as the Low Voltage Directive.
UR	UR logo to confirm that UL (Underwriters Laboratory) is informed about the registered components; register number by UL: E189357
CC056A	DoE mark to confirm compliance with US-American efficiency limit values for AC motors.
c UL us LISTED	UL logo to confirm that a component is UL (Underwriters Laboratory) tested, also valid for CSA in conjunction with the register number
MC170602 c SA us Energy Verified	CSAe mark to confirm compliance with the Canadian efficiency limit values for AC motors
CCC	CCC logo to confirm the adherence to the Chinese regulation for small appliances
VIK	VIK mark to confirm the compliance with the directive of the German Association of Energy and Power Industry (V.I.K.)
FS 02	FS logo with 2-digit number for identification of installed functional safety motor options
EAC	EAC mark (EurAsian Conformity) Confirms compliance with the technical regulations of the economic and customs union of Russia, Belarus, Kazakhstan, Armenia.

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UA.TR. 013	UA.TR mark to confirm compliance with the technical regulations of the country Ukraine.
IE2 EU REGULATION 640/2009 USE WITH VARIABLE SPEED DRIVE ONLY! 1364 171 9	Motors with this mark may only be operated with frequency inverter (VSD = Variable Speed Drive) according to regulation 640/2009.
	BIS mark Confirmation of compliance with the Indian standard IS 12615.
	CEL mark showing energy efficiency in the Chinese grade classification.
	KEL mark confirming the requirements of REELS (Regulation of Energy Efficiency and Labeling Standard).
RENDIMENTO E FATOR DE POTÊNCIA APROVADOS PELO INMETRO PROCEL NBR - 17094-1 INMETRO Registro INMETRO no: 005431/2015	ENCE mark (Brazil) Confirmation of compliance with the Brazilian efficiency limit values for AC motors.

3.9.4 Serial number

The following table lists the structure of a serial number:

Example: 01. 12212343 01. 0001. 18	
01.	Sales organization
12212343	Order number (8 digits)
01.	Order item (2 digits)
0001	Quantity (4 digits)
18	End digits of the year of manufacture (2 digits)

3.10 Type designation

The following table shows the structure of a motor type designation:

DRN132M4/BE11/HR/FI/TF	
DR	Product family
N	Code for product line identification
132M	Size
4	Number of poles
/**BE11**	Brake
/HR	Manual brake release
/FI	Output option
/TF	Thermal motor protection

3.10.1 Designation of the motors

Designation	
DRS..	Standard motor, Standard Efficiency IE1
DR2S..	Standard motor, Standard Efficiency IE1 (2nd generation)
DRE..	Energy-efficient motor, High Efficiency IE2
DRP..	Energy-efficient motor, Premium Efficiency IE3
DRN..	Energy-efficient motor, Premium Efficiency IE3
DRU..	Energy-efficient motor, Super Premium Efficiency IE4
DRL..	Asynchronous servomotor
DR2L..	Asynchronous servomotor (2nd generation)
DRK..	Single-phase operation with running capacitor
DRM..	Torque motor: AC motor for operation at speed n = 0
DR2M..	Torque motor: AC motor for operation at speed n = 0 (2nd generation)
DR..J	Line start permanent magnet motor
56 – 315	Nominal sizes: 56, 63, 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315
K, S, M, L, MC, LC, ME, MS, MK, H, LS, LM	Lengths
R, Q P, I B	Power designation (identification of motors with the same size but with different power)
2, 4, 6, 8, 8/2, 8/4, 4/2, 12	Number of poles

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3.11 Designs and options

3.11.1 Output variants

Designation	Description
/FI	IEC foot-mounted motor
/F.A /F.B	Universal foot-mounted motor
/FG	7series integral motor, as stand-alone motor
/FF	IEC flange-mounted motor with bore
/FT	IEC flange-mounted motor with threads
/FL	General flange-mounted motor (other than IEC)
/FM	7-series integral motor with IEC feet
/FE	IEC flange-mounted motor with bore and IEC feet
/FY	IEC flange-mounted motor with threads and IEC feet
/FK	General flange-mounted motor (deviating from IEC) with feet
/FC	C-face flange-mounted motor, dimensions in inch

3.11.2 Mechanical attachments

Designation	Description
/BE..[1)]	Spring-loaded brake with specification of size
/HR	Manual brake release of the brake, re-engaging
/HF	Manual brake release, lockable
/RS	Backstop
/MSW	MOVISWITCH®
/MM03 – MM40	MOVIMOT®
/MO	MOVIMOT® option(s)
/MI	Motor identification module for MOVIMOT®

1) Also available in design for functional safety

3.11.3 Temperature sensor / temperature detection

Designation	Description
/TF	Temperature sensor (PTC thermistor or PTC resistor)
/TH	Thermostat (bimetallic switch)
/KY	1 KTY84 – 130 sensor
/PT	1 or 3 PT100 sensor(s)
/PK	PT1000 temperature sensor

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3.11.4 Encoder

Designation	Description
/ES7S[1)], /EG7S[1)], /EH7S	Add-on speed sensor with sin/cos interface
/EV7S	Add-on speed sensor ES7S with sin/cos interface, spread shaft via mounting adapter for third-party encoders
/ES7R, /EG7R, /EH7R	Add-on speed sensor with TTL(RS422) interface, U = 9 – 26 V
/EV7R	Add-on speed sensor ES7S with TTL(RS422) interface, spread shaft via mounting adapter for third-party encoders
/ES7C, /EG7C, /EH7C	Add-on speed sensor with HTL interface
/EI7C[1)], /EI76, /EI72, /EI71	Built-in incremental encoder with HTL interface and 24/6/2/1 period(s)
/EI8C, /EI8R	Built-in incremental encoder with HTL interface and 1024 periods
/AS7W[1)], /AG7W[1)]	Add-on absolute encoder, RS485 interface (multi-turn) and sin/cos interface
/AV7W	Add-on absolute encoder AS7W with RS485 interface (multi-turn), spread shaft via mounting adapter for third-party encoders
/AS7Y[1)], /AG7Y[1)], /AH7Y[1)]	Add-on absolute encoder, SSI interface (multi-turn) and sin/cos interface
/AV7Y	Add-on absolute encoder AS7Y with SSI interface (multi-turn), spread shaft via mounting adapter for third-party encoders
/ES7A, /EG7A	Mounting adapter for speed sensors with solid shaft
/EV2T, /EV2R, /EV2S, /EV2C	Add-on incremental encoder with solid shaft
/EH7T	Add-on speed sensor with TTL(RS422) interface
/EK8S, /EK8R, /EK8C	Incremental encoder
/AK8Y, /AK8W, /AK8H	Multi-turn absolute encoder
/EV8S, /EV8R, /EV8C	Incremental encoder
/AV8Y, /AV8W, /AV8H	Multi-turn absolute encoder
/XV.A	Mounting adapter for third-party speed sensors
/XV..	Mounted third-party speed sensors
/XH.A	Mounting adapter for third-party hollow-shaft encoders

1) Also available in design for functional safety

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3.11.5 Connection alternatives

Designation	Description
/IS	Integrated plug connector
/ISU	Integrated plug connector – Design with only the lower part of the plug connector
/ASE.	HAN 10ES plug connector on terminal box with single-locking latch (cage clamp contacts on the motor side)
/ASB.	HAN 10ES plug connector on terminal box with double-locking latch (cage clamp contacts on the motor side)
/ACE.	HAN 10E plug connector on terminal box with single-locking latch (crimp contacts on the motor side)
/ACB.	HAN 10E plug connector on terminal box with double-locking latch (crimp contacts on the motor side)
/AME. /ABE. /ADE. /AKE.	HAN Modular 10B plug connector on terminal box with single-locking latch (crimp contacts on the motor side)
/AMB. /ABB. /ADB. /AKB.	HAN Modular 10B plug connector on terminal box with double-locking latch (crimp contacts on the motor side)
/KCC	6 or 10-pole terminal strip with cage clamp contacts
/KC1	C1-profile-compliant connection of the electrified monorail drive (VDI guideline 3643), for more compact connection areas.
/IV	Other industrial plug connectors according to customer specifications

3.11.6 Ventilation

Designation	Description
/V	Forced cooling fan
/Z	Additional inertia (flywheel fan)
/AL	Metal fan
/U	Non-ventilated (without fan)
/OL	Non-ventilated (closed B-side)
/C	Canopy for the fan guard
/LF	Air filter
/LN	Low-noise fan guard

3.11.7 Bearing

Designation	Description
/NS	Relubrication device
/ERF	Reinforced bearings on A-side with rolling bearing
/NIB	Insulated bearing B-side

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3.11.8 Condition monitoring

Designation	Description
/DUB	Mount-on microswitch for monitoring function and wear of the brake (Diagnostic Unit Brake)
/DUE	Eddy-current sensor for function and wear monitoring of the brake (Diagnostic Unit Eddy Current)

3.11.9 Other additional features

Designation	Description
/DH	Condensation drain hole
/RI	Reinforced winding insulation
/RI2	Reinforced winding insulation with increased resistance against partial discharge
/2W	2nd shaft end on the motor/brakemotor

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3.12 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 allows to uniquely identify an available functionally safe motor option via the motor nameplate.

FS logo	Available functionally safe motor option		
	Decentralized inverters	Safety brake	Safety encoder
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. 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 document:

- Addendum to the operating instructions "Safety Encoders and Safety Brakes, AC Motors DR.., DRN.., DR2.., EDR.., EDRN.. – Functional Safety"

To determine the safety level for systems and machines yourself, refer to the characteristic safety values 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.

Install the drive only if the following conditions are met:

- The specifications on the nameplate of the drive correspond to the supply system or the output voltage of the inverter.
- The drive is undamaged (no damage caused by transportation or storage).
- All transport protection has been removed.
- You are certain that the following requirements have been met:
  - Ambient temperature according to the nameplate.

    Note that the temperature range of the gear unit may also be restricted (see "Gear unit" operating instructions).

    Any differing specifications on the nameplate must be observed.
  - No oils, acids, gases, vapors, dusts, radiations, etc.
  - Max. installation altitude 1000 m above sea level.

    Observe the section "Designated use" in chapter 2.
  - Note the restrictions for encoders.
  - Special design: Drive configured in accordance with ambient conditions.

The aforementioned information refers to standard orders. The conditions might be different when you order drives other than the standard. Refer to the order confirmation for deviating 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 Preliminary work after longer periods of storage

Depending on the duration and ambient conditions during storage, corrosion, aging of lubricants, embrittlement of sealing elements, and moisture absorption in the insulation can occur.

Perform the described measures on any drives that have been stored for longer than 9 months.

Corrosion

- Check for damage to the motor and/or components (coating, shafts, connection and fastening parts).
- Correct the corrosion damage.

Embrittlement of seals

- Visually inspect seals and look for fissures, hardening, and embrittlement.
- Replace any damaged seals.

Reduced grease service life

If the drives are stored for longer than a year, the service life of the bearing grease is reduced due to aging and de-oiling of the lubricant.

- Check the condition and usability of the rolling bearings.
- Replace any damaged rolling bearings.

Reduced grease quantity

- If motors are stored for longer than 5 years, regrease them according to the specifications on the motor nameplate using a relubrication device.

Moisture absorption

- Check to see that the wiring space of the motor is dry and clean.
- Remove moisture and dirt.
- If the motor has absorbed moisture, measure the insulation resistance (see chapter "Measuring the insulation resistance" (→ 🗎 34)) and dry the motor (see chapter "Drying the motor" (→ 🗎 35)).

4.2.1 Checking the brake

If motors with brake have been stored or non-operational for longer than 9 months, check their function before taking them into operation.

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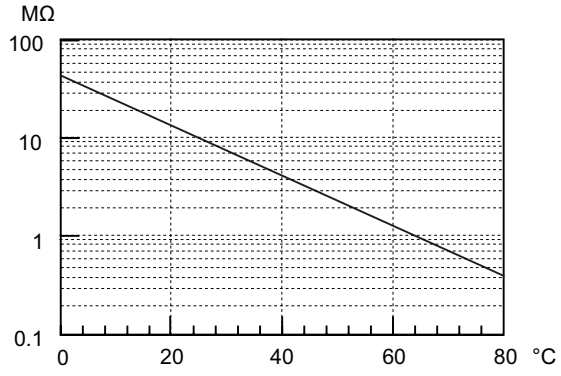
4.2.2 Measuring the insulation resistance

The insulation resistance (see following figure) varies greatly depending on the temperature.

If the measured resistance is within the range of the limit characteristic curve (depending on the ambient temperature), the insulation resistance is sufficient. If the value is below the limit characteristic curve, dry the motor.



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4.2.3 Drying the motor

Use either warm air or an isolation transformer to dry the motor.

INFORMATION

The motors of size 56 and DR..J motors must be dried only by warm air.

⚠ WARNING

Risk of crushing due to torque at the motor shaft.

Severe or fatal injuries.

- Only use warm air for drying DR..J motors.

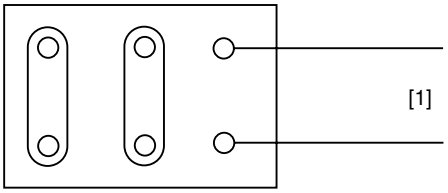
Drying the motor with warm air

1. Dry the motor with warm air.
2. End the drying process when the minimum insulation resistance is exceeded.

Dry the motor with an isolation transformer

1. Connect the windings in series.
2. Auxiliary AC voltage supply max. 10% of the nominal voltage with max. 20% of the rated current

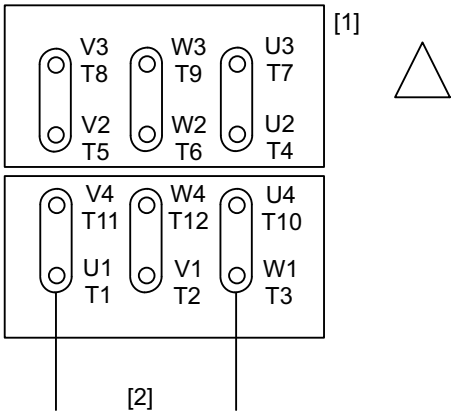
Connect the windings in series: R13 wiring diagram



2336250251

[1] Transformer

Connect the windings in series: wiring diagram R72



2343045259

[1] Motor terminal boards [2] Transformer

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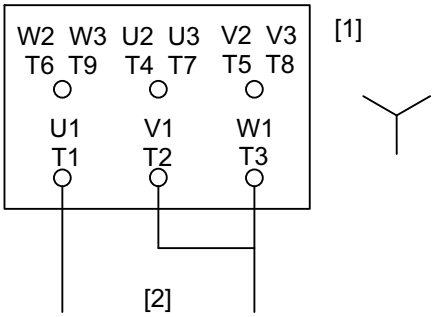
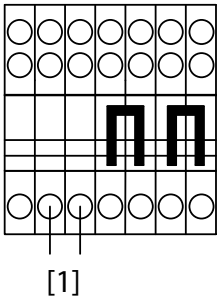
Connect the windings in series: Wiring diagram R76



2343047179

[1] Motor terminal boards [2] Transformer

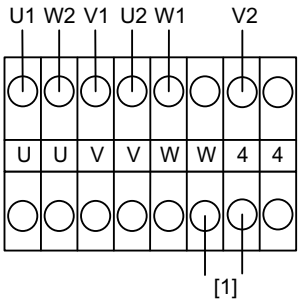
Connect the windings in series: Wiring diagram C13



3955447819

[1] Transformer

Connect the windings in series: Wiring diagram A13



27511350155

[1] Transformer

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4.3 Motor installation notes

⚠ 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

Improper assembly may damage the drive and corresponding components.

The drive system might be damaged.

- Observe the following information.

- Remove any anti-corrosion agent and dirt from motor shaft ends and flange surfaces. Use a commercially available solvent. Do not allow the solvent to come in contact with the bearings or sealing rings.
- Only install the gearmotor in the specified mounting position on a level, vibration-free and torsionally rigid support structure.
- The mounting position for installation must correspond with the specifications on the nameplate.
- Make sure that there is sufficient clearance around the motor to provide an adequate cooling air supply, and that the motor does not draw in warm exhaust air from other units.
- Align the motor and the driven machine carefully in order to prevent the output shaft from being exposed to unacceptable strain. Observe the permitted overhung and axial forces.
- Do not jolt or hammer the shaft end.
- Use an appropriate cover, e.g. option /C "Canopy", to prevent objects or fluids entering motors in vertical mounting positions (M4/V1).
- Balance components for subsequent mounting on the shaft with a half key (motor shafts are balanced with a half key).
- Existing condensation drain holes are sealed with closing plugs. If contaminated, the condensation drain holes must be checked for proper functioning on a regular basis and cleaned if required.

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4.3.1 Mounting the motor with aluminum feet

To mount motors with a foot made of aluminum, you have to use washers with an outer diameter that is at least twice the screw diameter (e.g. DIN EN ISO 7090).

Use bolts of strength class 8.8 up to max. 10.9.

Tightening torque according to VDI 2230-1.

Motors	Maximum permitted screw lengths
DRN63 – DRN71	M6 × 20
DR2..63 – DR2..71MS	M6 × 20
DRN80 – 90	M8 × 20
DR2..71M – DR2..80	M10 × 25
DRN100 – 132S	M10 × 25

DRN/DR2..63 motors

With DRN/DR2..63 motors, the aluminum foot is slotted in the front due to the limited space.

Position the screws beforehand or fasten the foot with stud bolts.

4.3.2 Installation in damp locations or outdoors

- Use suitable cable glands for the incoming cable (use reducing adapters if necessary) according to the installation instructions.
- If possible, arrange the terminal box in such a way that the cable entries are pointing downwards.
- Seal the cable entry properly.
- Clean the sealing surfaces of the terminal box and the terminal box cover carefully before re-assembly; replace embrittled gaskets.
- If required, touch up the corrosion protection (especially at the eyebolts).
- Check the degree of protection.
- Protect the shaft against corrosion using a suitable anti-corrosion agent.

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4.4 Installation tolerances

Shaft end	Flanges
Diameter tolerance according to EN 50347 • ISO j6 with Ø ≤ 28 mm • ISO k6 with Ø ≥ 38 mm up to ≤ 48 mm • ISO m6 at Ø ≥ 55 mm • Centering bore according to DIN 332, shape DR	Centering shoulder tolerance according to EN 50347 • ISO j6 with Ø ≤ 250 mm • ISO h6 with Ø ≥ 300 mm

4.5 Assembling the input elements

Drive components that are installed on the motor shaft end, e.g. pinions, must be warmed up prior to assembly in order to prevent damage, e.g. to the encoder of stand-alone motors.

⚠ WARNING

Unsecured key skidding out of the keyway.

Severe or fatal injuries due to flying parts.

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

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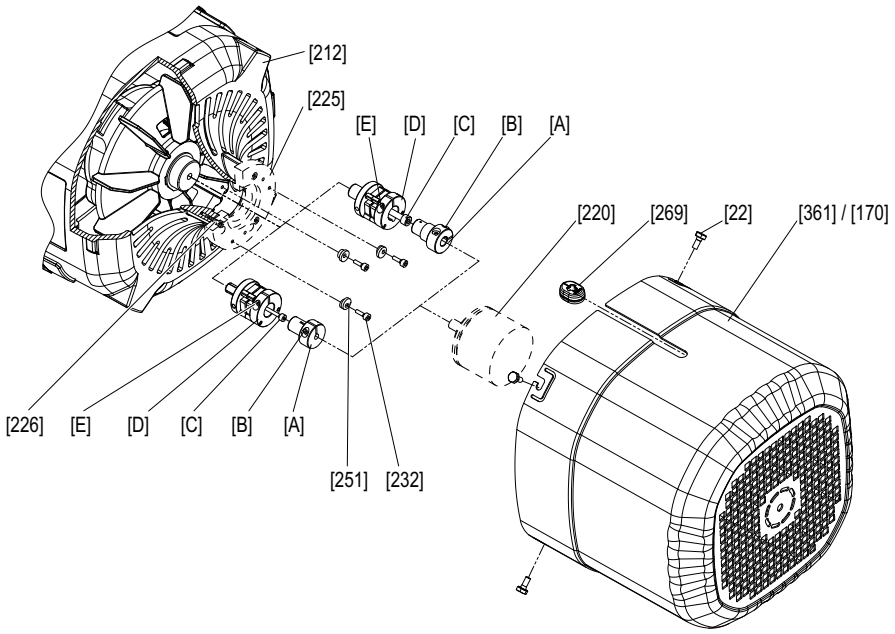
4.6 Encoder mounting adapter

If a drive was ordered with encoder mounting adapter, SEW-EURODRIVE will deliver the drive with enclosed coupling. Do not connect the coupling for operation without the encoder.

4.6.1 Mounting the XV../EV.. encoder mounting adapter to DR..71 – 225, DRN80 – 225 motors

If you have ordered the XV.. or EV.. encoder mounting adapter, the adapter [A] and the coupling [B – E] are enclosed with the motor and are to be assembled by the customer.

The following figure shows how to assemble the coupling and the adapter:



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[22] Screw
[170] Forced cooling fan guard
[212] Fan guard with encoder mount
[220] Encoder
[225] Intermediate flange (XV1A)
[232] Screws (XV1A, XV2A)
[251] Conical spring washers (XV1A, XV2A)
[361] Safety cover
[269] Cable grommet
[A] Adapters
[B] Retaining screw
[C] Central retaining screw
[D] Coupling (spread- or solid shaft coupling)
[E] Retaining screw
[226] Screw

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Mounting the XV../EV.. encoder mounting adapter to DR..71 – 225, DRN80 – 225 motors

1. Remove the safety cover [361], or the forced cooling fan if required.
2. **For XV2A, XV3A, and XV4A:** Remove the intermediate flange [225].
3. Screw the coupling [D] to the bore at the shaft end using screw [C].
4. Plug the adapter [A] onto the pin of the encoder [220].
5. Tighten the central retaining screw [B].
6. **For XV2A, XV3A, XV4A:** Mount the intermediate flange [225] using the screws [226].
7. Plug the encoder [220] with adapter [A] onto the coupling [D].
8. Tighten the retaining screw [E].
9. **For XV1A, XV2A:** Re-install the retaining screws [232] with conical spring washers.
10. **For XV3A, XV4A:** Installed by the customer via bores in the encoder plate.

Motor	Screw	Tightening torque
DR..71 – 132 DRN80 – 132S	[C]	3 Nm
DR..160 – 225 DRN132M – 225:	[C]	8 Nm
All	[226]	3 Nm
All	[B]	3 Nm
All	[E]	3 Nm
All	[232]	3 Nm

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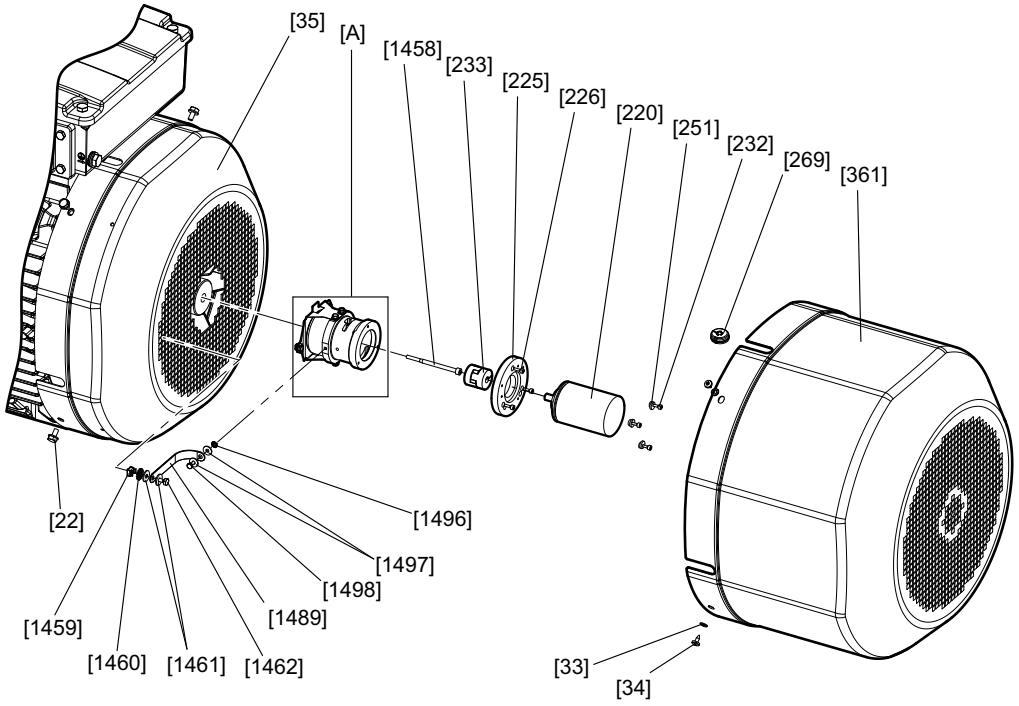
4.6.2 Mounting the XV../EV.. encoder mounting adapter to DR..250 – 280, DRN250 – 280 motors

If you have ordered the XV../EV.. encoder mounting adapter, the coupling [233] is enclosed with the motor and must be installed by the customer.

The following figure shows an example of how the coupling is installed:



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[22]	Screw	[361]	Safety cover (normal/long)
[33]	Washer	[1458]	Screw
[34]	Screw	[1459]	Cage nut
[35]	Fan guard	[1460]	Serrated lock washer
[220]	Encoder	[1461]	Washer
[225]	Intermediate flange (optional)	[1462]	Screw
[226]	Screw	[1489]	Ground strap
[232]	Screws (.V1A, .V2A)	[1496]	Serrated lock washer
[233]	Coupling	[1497]	Washer
[251]	Conical spring washers (.V1A, .V2A)	[1498]	Screw
[269]	Cable grommet	[A]	Encoder mounting adapter

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Mounting encoders to XV../EV.. encoder mounting adapters at DR..250 – 280, DRN250 – 280 motors

1. Remove the safety cover [361], or the forced cooling fan if required.
2. Place the coupling [233] onto the pin of the encoder mounting adapter [A].
3. Tighten the screw of the coupling [233] via the slots in the encoder mounting adapter.
4. **For XV2A, XV3A, XV4A:** Mount the intermediate flange [225] to the encoder mounting adapter [A] using screw [226].
5. **For XV1A, XV2A:** Insert the screws [232] with eccentric disk spring washers [251] in the encoder mounting adapter [A].
6. Fasten the encoder [220] to the encoder mounting adapter [A] or the intermediate flange [225].
7. Plug the encoder [220] into the coupling [233].
8. To secure the eccentric disks [251], insert the screws [232].
9. **For XV1A, XV2A:** Tighten the screws [232] while turning the eccentric disks [251] in clockwise direction into the groove of the encoder [220].
10. Tighten the screw of the coupling [233].
11. Insert the encoder cable into the cable grommet [269].
12. Insert the cable grommet [269] into the recess of the safety cover [361] or the forced cooling fan.
13. Mount the safety cover [361] onto the forced cooling fan.

Motor	Screw	Tightening torque
DR..250 – 280 DRN250 – 280	Screw of the coupling [233]	3 Nm
DR..250 – 280 DRN250 – 280	[226]	3 Nm
DR..250 – 280 DRN250 – 280	[232]	3 Nm

4.6.3 XH.A encoder mounting adapter

The XH1A, XH7A and XH8A encoder mounting adapters for hollow shaft encoders are premounted on delivery.

To mount the encoder, proceed as described in chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).

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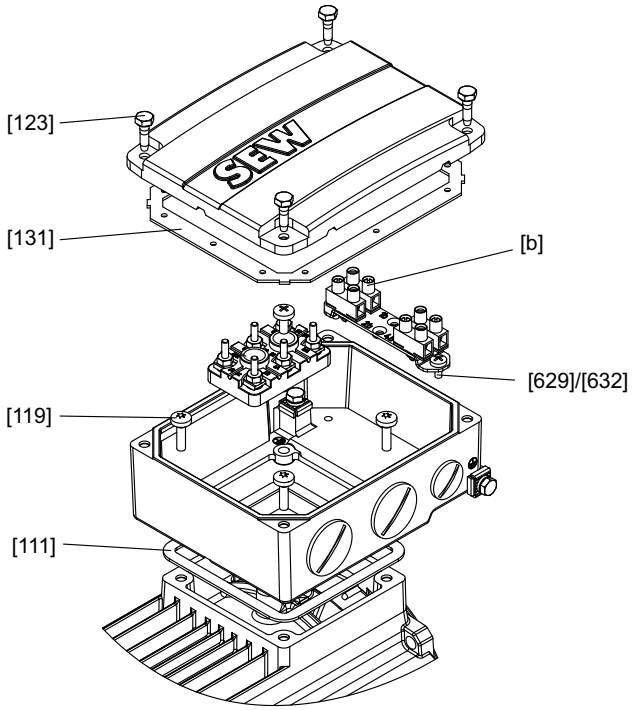
4.7 Terminal box

4.7.1 Turning the terminal box

The following figure shows the structure of the terminal box variant with terminal board:



9007206616947979

[111] Gasket
[119] Terminal box lower part hex head screws (4 x)
[123] Terminal box cover hex head screws (4 x)
[131] Gasket
[b] Terminal
[629]/ [632] Screws

Proceed as follows to turn the terminal box:

1. Loosen the screws [123] of the terminal box cover. Remove the terminal box cover.
2. Remove the screws [629]/[632].
3. Remove the terminal [b].
4. Remove the retaining screws [119] of the terminal box.
5. Clean the sealing surfaces at the stator shoulder, terminal box lower part and terminal box cover.
6. Check the gaskets [111] and [131] for damages.
7. Replace any damaged seals.
8. ⚠ **DANGER!** Electric shock due to damaged cables. Severe or fatal injuries. When installing the terminal box lower part or the terminal board, make sure the cables are not crushed or twisted. Do not use sharp or pointed objects to align the cables.
   Turn the terminal box to the required position.
9. Make sure that the gasket is positioned correctly [111].

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10. Attach the terminal box lower part.
11. Apply the corresponding tightening torque to tighten the screws [119] of the terminal box lower part.
12. Refer to chapter "Appendix" (→ 🗎 269) for the arrangement of the auxiliary terminals.
13. Secure terminal [b] with screws [629]/[632].
14. Make sure that the gasket is positioned correctly [131].
15. Attach the terminal box cover to the terminal box lower part.
16. Apply the corresponding tightening torque to tighten the screw [123] of the terminal box cover.
17. To make sure that the cables have not been damaged, perform an insulation test after reassembly, see chapter "Preliminary work after longer periods of storage" (→ 🗎 33).

Tightening torques of the terminal box lower part

Motor	Screw	Tightening torque
		Nm
DR..71 – 132 DRN71 – 132S DR2..71– 80	[119]	5
DR..160 – 225 DRN132M – 225	[119]	27.3
DR..250 – 315 DRN250 – 315	[119]	54

Tightening torques of the terminal box cover

Motor	Screw	Tightening torque
		Nm
DR2..56	[123]	3
DR..71 – 132 DRN63 – 132S DR2..63– 80	[123]	4
Aluminum DR..160 – 225 DRN132M – 225	[123]	11.3
Gray cast iron DR..160 – 225 DRN132M – 225	[123]	27.3
DR..250 – 315 DRN250 – 315	[123]	54

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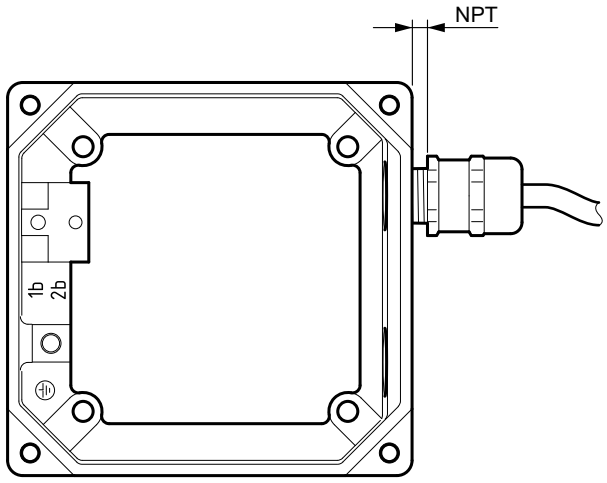
4.7.2 Terminal box with NPT thread

In terminal boxes with NPT thread, cable glands cannot always be screwed in all the way (up to the O-ring).



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For applications in wet areas, SEW-EURODRIVE recommends using metric screw fittings.

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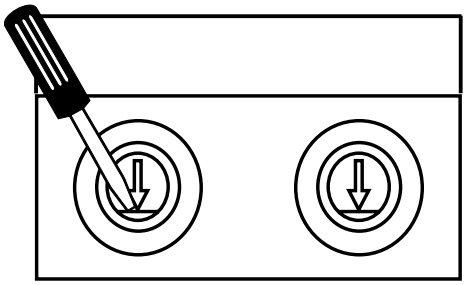
4.7.3 Breaking open knock-outs

In order to be able to insert cables into the terminal box, the prepared knock-outs must be broken open.

✓ Required tools: Screwdriver or chisel.

1. **NOTICE!** Damage to the terminal box or fragments inside the motor. Possible physical damage. Exercise caution when breaking open the knock-outs.
   Break open the knock-out [K] by using a chisel or screwdriver.
2. Check the opening for residual burr. If any residual burr is present, remove it by using a suitable tool.



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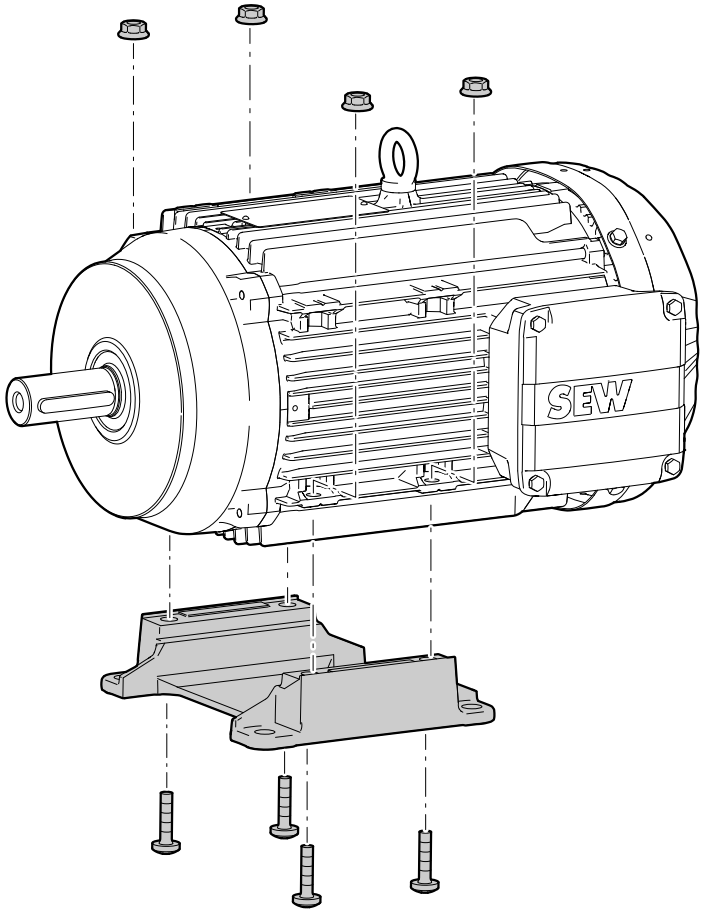
4.8 Retrofitting (option /F.A) or modifying (option /F.B) motor feet

4.8.1 DRN71 – 132S, DR2..71 – 80 motors

The following figure shows a motor with option /F.A (retrofit foot).



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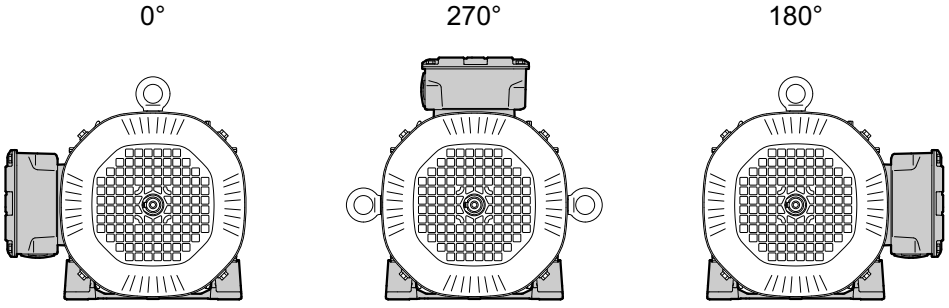
✓ The contact surfaces at the foot [90] and stator [16] are painted.

1. Observe the following figure when selecting the contact surfaces. The figure illustrates the possible terminal box positions with reference to the retrofittable motor feet.



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2. Remove the paint from the stator [16] contact surface where the foot is to be screwed on.
3. Apply a thin layer of corrosion protection to the contact surfaces after the paint has been removed.
4. Remove the paint from the contact surfaces of the foot [90].

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5. Apply a thin layer of corrosion protection to the contact surfaces after the paint has been removed.
6. Attach the foot [90] to the motor using the screws [94] and washers [91]. Tighten the screws in diametrically opposite sequence. The screws are micro-encapsulated. This is why you have to screw in and tighten the screws quickly.
7. If necessary, you can apply paint or corrosion protection at the joint after attaching the foot [90].

Changing the motor foot position

For converting the motor foot to another position, observe the following points:

- After removing the screws [94], check for damage to the thread or other similar damage.
- When changing the position of the motor foot, apply corrosion protection to unpainted surfaces.

Tightening torques

Motor	Screw	Tightening torque
DRN71 – 90, DR2..71 – 80	M6	11.3 Nm
DRN100 – 132S	M8	27.3 Nm

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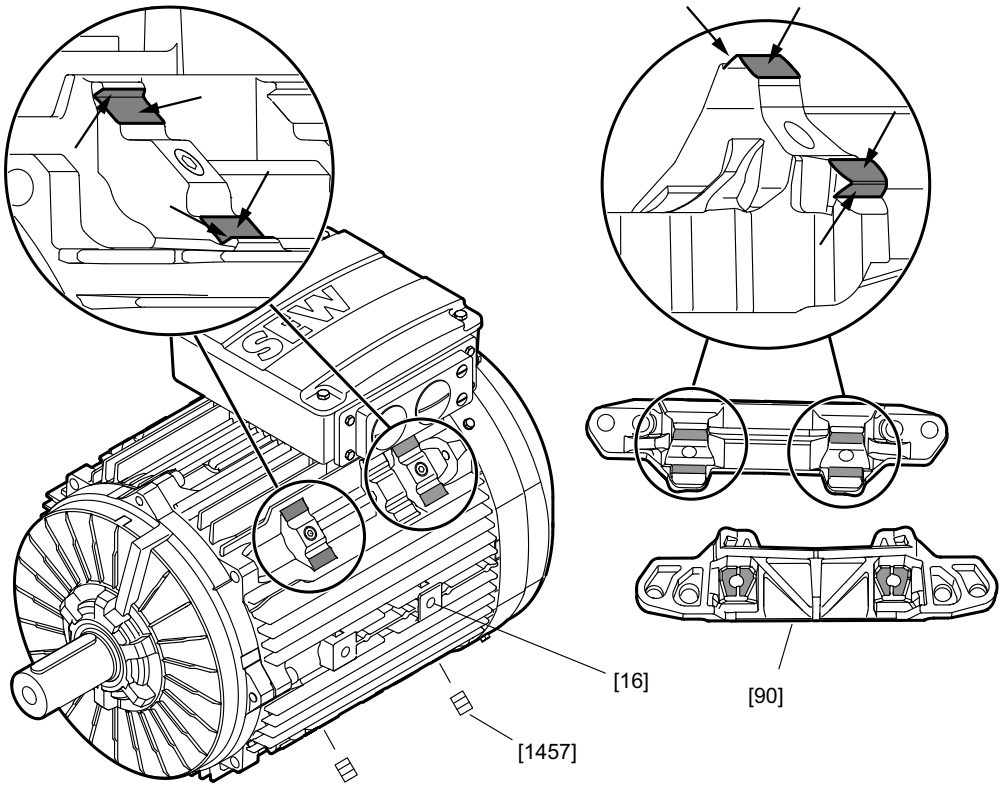
4.8.2 DR..250 – 315, DRN..225 – 315 motors

The following figure shows a motor with option /F.A (retrofit feet).



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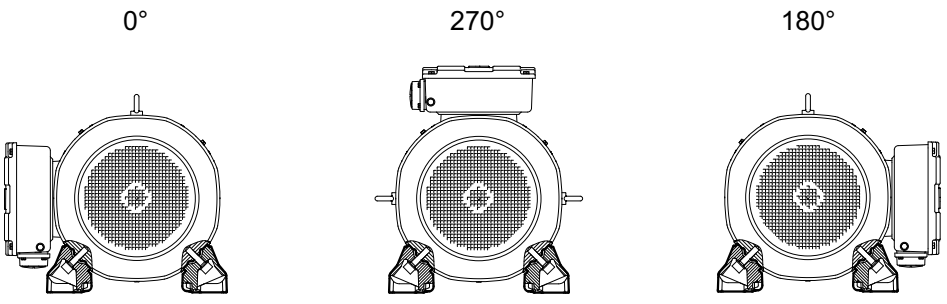
[16]	Stator	[1457]	Set screw
[90]	Foot		Remove the paint from the marked surfaces.

✓ The tapped holes of the foot mounting surfaces are closed with set screws [1457]. The contact surfaces at the feet [90] and stator [16] are painted.

1. Observe the following figure when selecting the contact surfaces. The figure illustrates the possible terminal box positions with reference to the retrofittable motor feet.



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2. Remove the set screws [1457] from those threads into which you will screw the foot screws [94].
   - ⇨ Sizes 250 – 280: 8 set screws
   - ⇨ Size 315: 12 set screws

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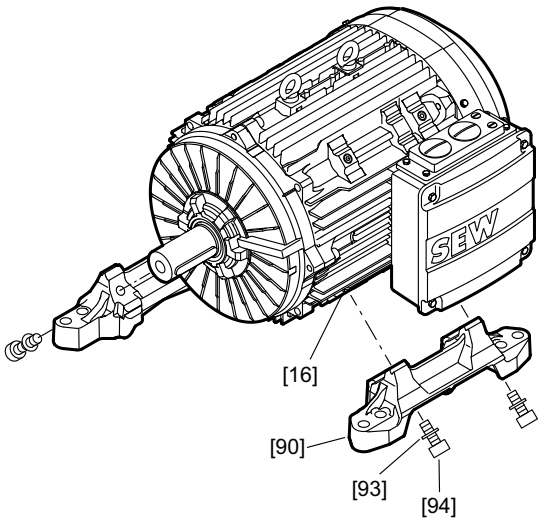
3. Remove the paint from the contact surfaces of the stator [16] where the feet are to be screwed on.
   - ⇨ Sizes 250 – 280: 8 surfaces
   - ⇨ Size 315: 12 surfaces
4. Apply a thin layer of corrosion protection to the contact surfaces after the paint has been removed.
5. Remove the paint from the contact surfaces of the feet [90].
6. Apply a thin layer of corrosion protection to the contact surfaces after the paint has been removed.
7. Attach the feet [90] to the motor using the screws [94] and washers [93]. The screws are micro-encapsulated. This is why you have to screw in and tighten the screws quickly.
8. Apply paint or corrosion protection at the parting line after attaching the feet [90].

Changing motor feet positions



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[16] Stator
[90] Foot
[93] Washer
[94] Screw

For converting the motor feet to another position, observe the following points:

- After removing the screws [94], check for damage to the thread or other similar damage.
- Remove the old micro-encapsulation.
- Clean the threads of the screws [94].
- Apply a high-strength thread locker to the screw threads [94] before inserting the screws again.
- The set screws removed from the new mounting position can be reused for the bores of the old mounting position. After inserting the set screw [1457] into the open tapped holes in the stator [16], paint or corrosion protection can be applied on the bare joining surfaces of the stator.
- When the position of the motor feet is changed, apply corrosion protection to the unpainted surfaces.

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Tightening torques

Motor	Screw	Tightening torque
DRN225	M16	230 Nm
DR..250/DRN250	M20	464 Nm
DR..280/DRN280	M20	464 Nm
DR..315/DRN315	M20	464 Nm

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4.9 Direct mounting of a motor on a gear unit

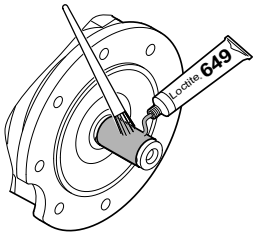
INFORMATION

Secure all pinions on the motor or input shaft with Loctite® 649 even if a retaining ring is additionally present.

If the pinion is already fastened to the shaft, start cleaning the sealing surface (step 6).

Joining the pinion to the motor or input shaft

1. Clean and degrease the shaft and the bore of the pinion.
2. Apply Loctite® 649 to the shaft after the securing hole over the entire area of the circumference.



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3. Warm the pinion up to **at least** 100 °C to a **maximum of** 130 °C.
4. Push the pinion onto the shaft.
5. Secure the pinion on the shaft with the retaining ring.

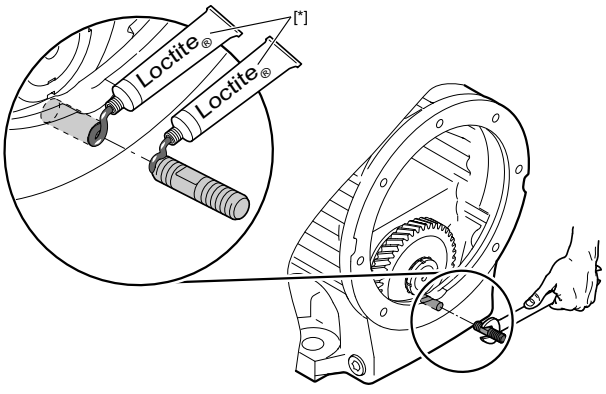
Cleaning the sealing surfaces

6. Remove oils, grease, irregularities of the surface, rust and old Loctite® residue from the flange surfaces.

Sealing threads that lead into the housing interior

To prevent oil from escaping after installation, flange threads that lead into the housing interior must be sealed!

7. Clean and degrease thread through bores that lead into the housing interior and their studs.
8. Apply Loctite® 574 or Loctite® 5188 (selection according to the table at the end of the chapter) in a continuous ring on the upper threads of the flange thread and the stud.



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[*] Loctite® according to the table at the end of the chapter

Screwing in the studs

9. Screw the studs into the thread up to the shoulder.

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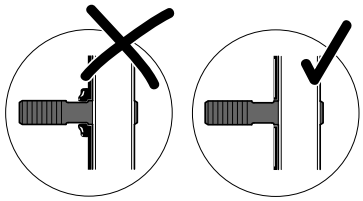
10. Remove any excess Loctite® (see following diagram) from the sealing surface 60 minutes after screwing in at the latest.



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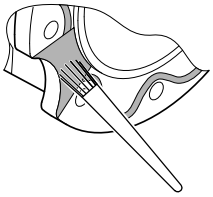
Sealing the flange surface

INFORMATION

Always apply the sealant over a large area in narrow places and on the gear units R97, R107, R127, F97 or F107.



11. Only distribute Loctite® 574 or Loctite® 5188 (selection according to the table at the end of the chapter) to one of the sealing surfaces. Apply the sealant in beads or over a large area without gaps. Use a suitable application tool that does not contaminate the sealing surface, for example, a non-shedding brush or a short-hair lamb's wool roller.

Joining flange surfaces

12. Join the flange surfaces together. Next, **immediately** tighten the nuts with the specified torque (see the table at the end). If you tighten the nuts too late, the sealing film can tear.
13. The sealant must harden for 30 minutes and must not come into contact with the gear oil.

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4.9.1 Tightening torques

Screw/nut	Tightening torque Nm
M6	11.3
M8	27.3
M10	54
M12	93
M16	230

4.9.2 Selection and use of Loctite®

Sealant	Use	Suitability	Batch size	Part number
Loctite® 649	Locking agent for pinions	All gear units	50 ml	09120998
Loctite® 574	Surface sealing agent	All gear units except for R97 – R127, F97, F107	7 ml	09102558
Loctite® 5188		R97 – R127, F97, F107	50 ml	03207013

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4.10 Options

4.10.1 /HR, /HF Manual brake release

The option manual brake release /HR, /HF is preinstalled and set at the factory for some brake sizes. If your drive was not delivered with manual brake release and you wish to retrofit it, observe the instructions in chapter "Retrofitting the /HR, /HF manual brake release" (→ 🗎 203).

Activating and loosening the /HF manual brake release

⚠ WARNING

No brake function due to activated manual brake release.

Severe or fatal injuries.

- Before startup, make sure that the hand lever has been removed or secured against unintentional activation to prevent unintentional brake release during operation.

You can use the option /HF (lockable manual brake release) to continuously mechanically release the BE.. brake with a set screw and a releasing lever.

On delivery, the set screw is inserted far enough to not fall out and to not affect the brake performance. The set screw is self-locking. This prevents it from unintended turning in or from falling out.

In case of BE03 brakes, the set screw is stored in the grommets between the stator fins.

Activating the /HF manual brake release with BE03 brake

Proceed as follows:

1. Screw in the set screw until there is no more clearance at the releasing lever.
2. To release the brake manually, screw in the set screw by 1/2 – 1 turn.

Activating the /HF manual brake release with BE05 – BE122 brake

Proceed as follows:

1. Screw in the set screw until there is no more clearance at the releasing lever.
2. To release the brake manually, screw in the set screw by 1/4 – 1/2 turn.

Loosening the /HF manual brake release with BE03 brake

Proceed as follows:

1. Remove the set screw completely from the thread.
2. Fasten the set screw between the stator fins with both grommets.

Loosening the /HF manual brake release with BE05 – BE122 brake

Proceed as follows:

1. Loosen the set screw at least until the floating clearance of the manual brake release has completely returned, see chapter "Retrofitting the /HR, /HF manual brake release".

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Activating and loosening the /HR manual brake release

⚠ WARNING

No brake function due to activated manual brake release.

Severe or fatal injuries.

- Before startup, make sure that the hand lever has been removed or secured against unintentional activation to prevent unintentional brake release during operation.

You can use the option /HF manual brake release to mechanically release the BE.. brake for a short time via a combination of releasing lever and hand lever. It is designed with a spring mechanism, so that it reengages automatically.

During assembly, the mechanics inside the fan guard is preset at the factory. A hand lever is included in the delivery that is attached to the stator housing.

Activating the /HR manual brake release

Proceed as follows:

1. Remove the hand lever from the stator housing.
2. Screw the thread of the hand lever completely into the thread of the releasing lever.
3. To release the brake, pull the hand lever in the direction away from the terminal box. The correct direction of use is indicated by an arrow symbol on the fan guard or on the closing part on the fan guard opening.

Loosening the /HR manual brake release

INFORMATION

The releasing procedure can be performed with usual force application, do not apply too much force to the lever to avoid damage to the drive.

Proceed as follows:

1. Let go of the lever in the actuated state. The lever automatically reengages to the initial position and the brake is applied.
2. Screw out the hand lever and keep it safe. With motors of sizes 63 – 280, you can attach the hand lever to the stator housing with the provided grommets or clamps.

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4.10.2 Air filter /LF

The air filter is a filter fleece that is installed in front of the fan grille. It can be easily removed and installed for cleaning purposes.

The attached air filter prevents dust and other particles that are drawn in by the air flow from being distributed. It also prevents that the ducts between the cooling fins become clogged with dust.

In very dusty environments, the air filter protects the cooling fins from dirt or from becoming clogged.

The air filter must be cleaned or replaced depending on the amount of dust in the environment. No maintenance intervals can be specified due to the individuality of each drive and the environment where it is installed.

Technical data	Air filter
Approvals	All certifications
Ambient temperature	-40 °C to +100 °C
Filter material	Viledon PSB290SG4

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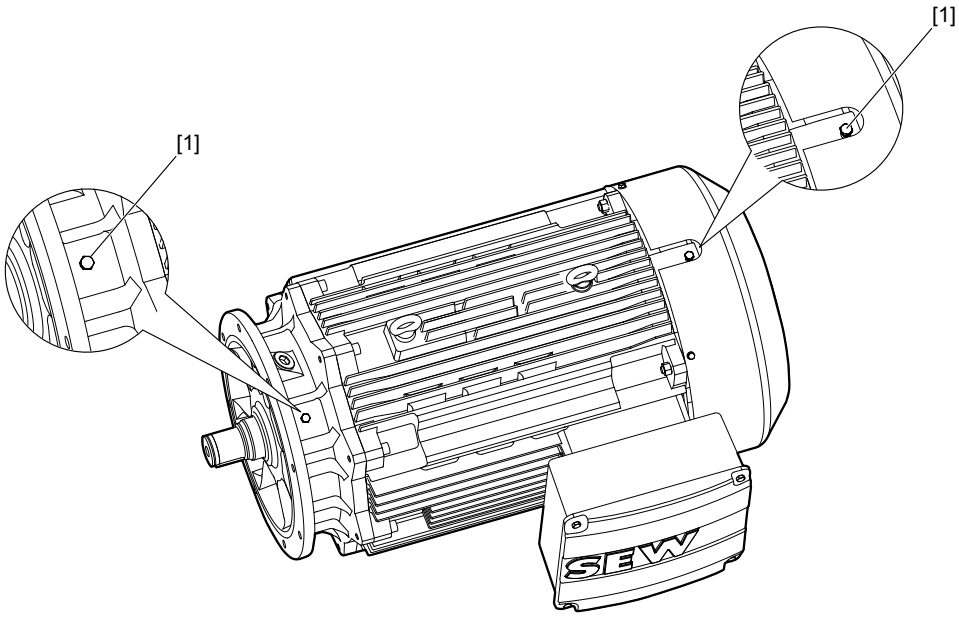
4.10.3 Mounting adapter for measuring nipple

Depending on the respective order specifications, SEW-EURODRIVE delivers the drives as follows:

- With bore
- With bore and included measuring nipples for vibration measurement.

The following figure shows a motor with bores and inserted measuring nipples [1]:



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[1] Bore with inserted measuring nipples

Proceed as follows to connect the customer measuring device:

1. Remove the protective plugs from the bores.
2. Insert the measuring nipple in the bores of the motor and screw in the measuring nipple with a tightening torque of 15 Nm.
3. Plug the mounting adapter of the measuring unit into the measuring nipple.

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4.10.4 Second shaft end with optional cover

SEW-EURODRIVE delivers motors with the 2nd shaft end option /2W with the key inserted and secured by transport protection.

⚠ WARNING

Unsecured key skidding out of the keyway.

Severe or fatal injuries due to flying parts.

- Only operate the motor with a suitably secured key.

⚠ WARNING

Rotating shaft end or attachments.

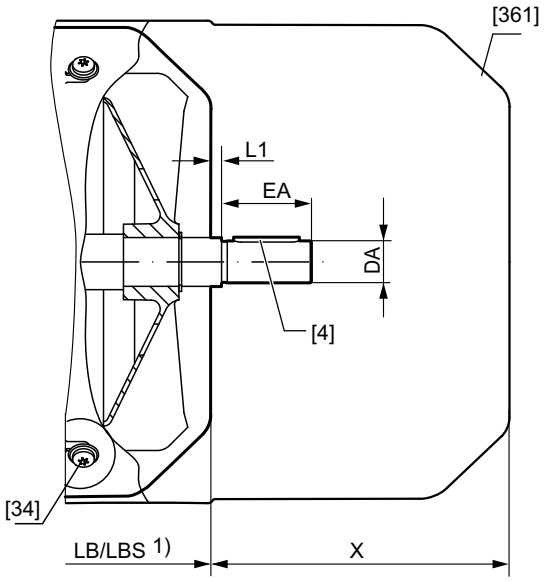
Severe or fatal injuries.

- Only start the motor with installed protective cover at the second shaft end.

The protection cover must meet the impact resistance requirements of EN 60079-0 (VDE 0170-1):2014-06, chapter 26.4.2.

As an option, SEW-EURODRIVE can also provide the safety cover [361] for the 2nd motor shaft end already installed at the DR..71 – 280 and DRN63 – 280 motors. This is not included in the delivery as standard.

The following figure shows the dimensions of the optional cover.



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[4] Keyway
[34] Tapping screw
[361] Safety cover
LB/LBS Length of the motor/brakemotor
1) Refer to the "AC Motors" catalog for dimensions

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Dimensions

Motors			DA	EA	L1	X
DR..	DRN..	DR2..	mm	mm	mm	mm
–	DRN63	DR2..63	11	23	2	78
–	DRN63 /BE	DR2..63 /BE				
DR..71	DRN71	DR2..71	11	23	2	91.5
DR..71 /BE	DRN71 /BE	DR2..71 /BE				88
DR..80	DRN80	DR2..80	14	30	2	95.5
DR..80 /BE	DRN80 /BE	DR2..80 /BE				94.5
DR..90	DRN90	–	14	30	2	88.5
DR..90 /BE	DRN90 /BE	–				81
DR..100	DRN100	–	14	30	2	87.5
DR..100 /BE	DRN100 /BE	–				81
DR..112 – 132	DRN112 – 132S	–	19	40	3.5	125
DR..112 – 132 /BE	DRN112 – 132S /BE	–				120.5
DR..160	DRN132M/L	–	28	60	4	193
DR..160 /BE	DRN132M/L /BE	–				187
DR..180	DRN160 – 180	–	38	80	4	233
DR..180 /BE	DRN160 – 180 /BE	–				236
DR..200 – 225	DRN200 – 225	–	48	110	5	230
DR..200 – 225 /BE	DRN200 – 225 /BE	–				246
DR..250 – 280	DRN250 – 280	–	55	110	3	243.5
DR..250 – 280 /BE	DRN250 – 280 /BE	–				

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5 Electrical installation

5.1 General information

⚠ WARNING

Electric shock due to incorrect installation.

Severe or fatal injuries.

- Use switch contacts in utilization category AC-3 according to EN 60947-4-1 for switching the motor.
- Use switch contacts to switch the brake. Depending on brake type and type design, the switch contacts meet the specifications in the following utilization categories:
  - Switch contacts for the supply voltage for operation with AC voltage: AC-3 according to EN 60947-4-1, or AC-15 according to EN 60947-5-1.
  - Switch contact for the supply voltage for operation with DC voltage: Preferably AC-3 or DC-3 according to EN 60947-4-1. As an alternative, contacts in utilization category DC-13 according to EN 60947-5-1 are also permitted.
  - Switch contacts for optional cut-off in the DC circuit: AC-3 according to EN 60947-4-1.
- When motors are powered by inverters, you must adhere to the wiring instructions in the frequency inverter operating instructions.

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5.2 Wiring diagrams and terminal assignment diagrams

Connect the motor as shown in the wiring connection diagrams provided with the motor. You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

INFORMATION

Do not connect or start up the motor if the wiring diagram is missing.

5.3 Wiring notes

During installation observe the safety notes in chapter 2 and 5.

5.3.1 Protecting the brake control system against interference

Brake cables must always be routed separately from other unshielded power cables with phased currents to prevent interference with brake control. In particular, power cables with phased currents include:

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

For line-operated motors and when using AC and DC circuit cut-off, the connection between the brake rectifier and the external switch contact must be in a different power cable that is separate from the motor power supply.

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:

- You may route separately shielded supply cables together with switched-mode power cables in one cable.
- Do not route unshielded supply cables together with switched-mode power lines in one cable.

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5.4 Special aspects for operation with a frequency inverter

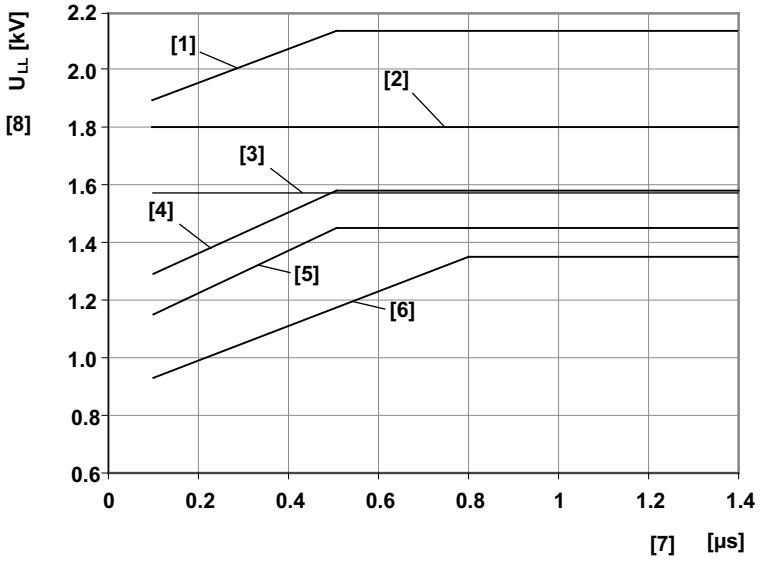
When motors are powered from inverters, you must observe the wiring instructions issued by the inverter manufacturer. You must also observe the operating instructions for the frequency inverter.

5.4.1 Motors with SEW-EURODRIVE frequency inverter

Operation of the motor on SEW-EURODRIVE frequency inverters has been tested. The required dielectric strength values of the motors were confirmed and the startup routines adjusted to the motor data. You can operate the motor with any frequency inverter from SEW-EURODRIVE. To do this, start up the motor as described in the operating instructions for the frequency inverter.

5.4.2 Motor with non-SEW inverter

Operating SEW-EURODRIVE motors on third-party frequency inverters is permitted if the pulse voltages at the motor terminals indicated in the following figure are not exceeded.



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[1] Permitted pulse voltage for DR.., DRN.. motors with reinforced insulation and increased resistance against partial discharge (/RI2)
[2] Permitted pulse voltage for DR.., DRN.. motors with reinforced insulation (/RI)
[3] Permitted pulse voltage according to NEMA MG1 part 31, $V_N \leq 500$ V
[4] Permitted pulse voltage according IEC 60034-25, limit value curve A for nominal voltage $V_N \leq 500$ V, star connection
[5] Permitted pulse voltage according IEC 60034-25, limit value curve A for nominal voltage $V_N \leq 500$ V, delta connection
[6] Permitted pulse voltage according to IEC 60034-17
[7] Voltage rise time
[8] Permitted pulse voltage

The insulation class depends on the voltage.

- ≤ 500 V = standard insulation
- ≤ 600 V = /RI
- > 600 V – 690 V = /RI2

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INFORMATION

Compliance with the following limit values must be checked and considered:

- The supply voltage level at the third-party inverter
- The threshold of the brake chopper voltage
- The operating mode of the motor (motor mode/generator mode)

→ If the permitted pulse voltage is exceeded, you must install limiting measures, such as filters, chokes or special motor cables. Consult the manufacturer of the frequency inverter.

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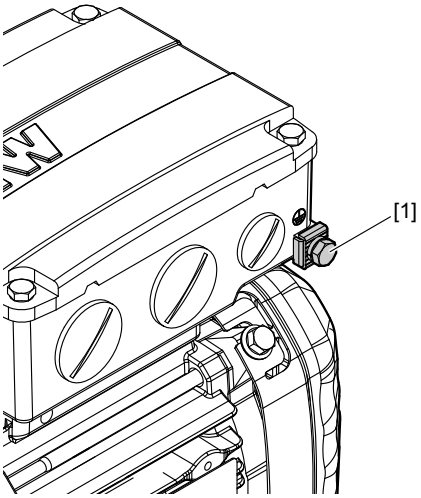
5.5 Exterior grounding at the terminal box, LF grounding

In addition to the interior PE connection, a LF grounding cable can be attached to the outside of the terminal box. It is not installed as standard.

LF grounding can be ordered as completely pre-installed at the factory. For this, an aluminum or gray cast iron terminal box designed for brake connections is required for DR..71 – 132, DRN71 – 132S, DR2..71 – 80 motors. For DR..160 – 225, DRN132M – 225 motors, this option can be combined with all terminal box types.

The option can be combined with "HF grounding" (→ 🗎 67).

DR..71 – 132, DRN71 – 132S, DR2..71 – 80 motors



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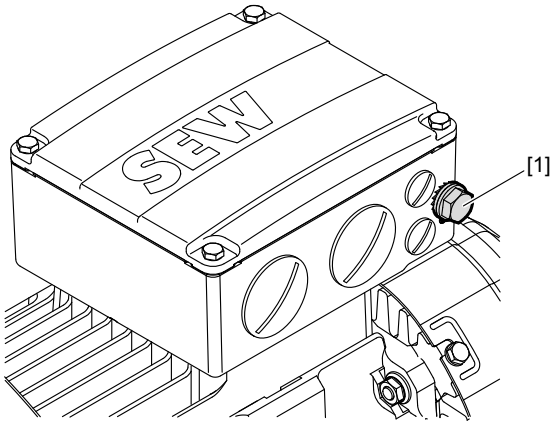
[1] LF grounding at the terminal box

DR..160 – 225, DRN132M – 225 motors



8026938379

[1] LF grounding at the terminal box

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5.6 Improving the grounding (EMC), HF grounding

For improved, low-impedance grounding at high frequencies, we recommend using the following connections with corrosion protected connection elements:

HF grounding is not installed as standard.

The HF grounding option can be combined with LF grounding at the terminal box.

If you require LF grounding in addition to HF grounding, you can connect the conductor to the same point.

The HF grounding option can be ordered as follows:

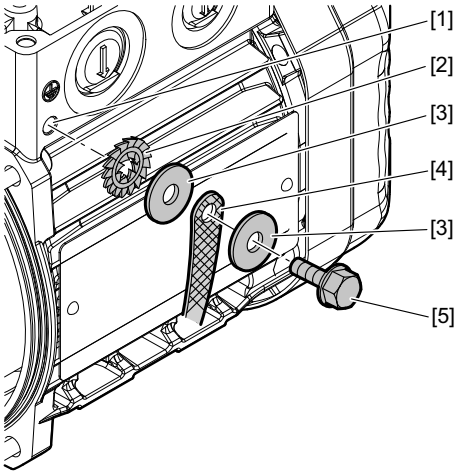
- Completely pre-assembled at the factory
- As "grounding terminal" kit for customer installation; part numbers listed in the following table.

Motors	Part number of "Grounding terminal" kit
DRN63, DR2..56 – 63	21014817
DR..71 – 100M, DRN71 – 100LS, DR2..71 – 80	21015988
DR..100L – 132, DRN100L – 132S	13633945
DR..160 – 225, DRN132M – 225 with aluminum terminal box	

INFORMATION

If 2 or more ground straps are used, you have to attach them with a longer screw. The specified tightening torques refer to a strap thickness of t ≤ 3 mm.

5.6.1 DRN63, DR2..56 – 63 motors with HF(+LF) grounding



22297406859

[1] Use of the pre-cast bore at the stator housing
[2] Serrated lock washer
[3] Disk ISO 7093
[4] Ground strap (not included in the delivery)
[5] Self-tapping screw DIN 7500 M5 × 16, tightening torque 5 Nm

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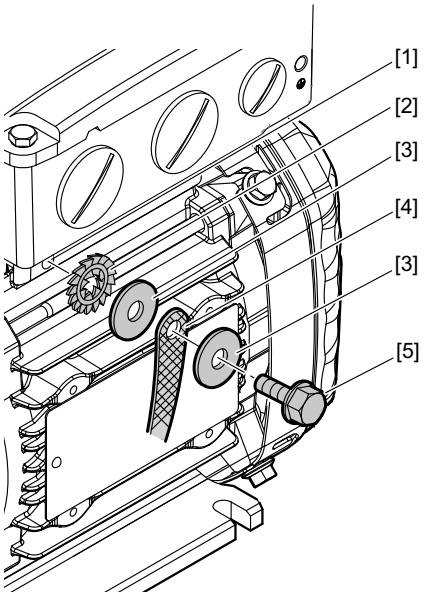
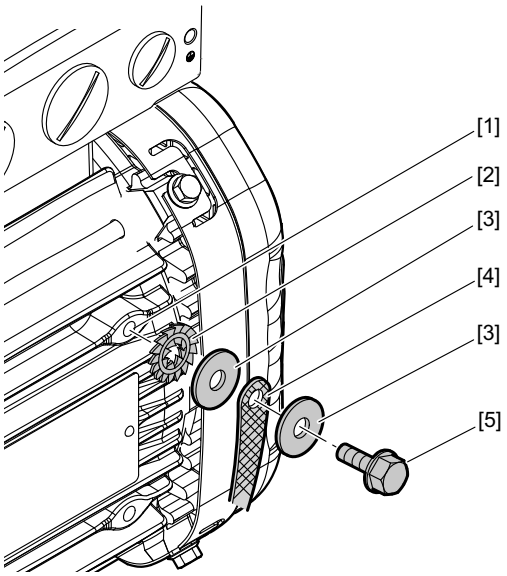
5.6.2 DR..71 – 80, DRN71 – 80, DR2..71 – 80 motors with HF(+LF) grounding



8026768011

[1] Use of the pre-cast bore at the stator housing
[2] Serrated lock washer
[3] Disk ISO 7093
[4] Ground strap (not included in the delivery)
[5] Self-tapping screw DIN 7500 M6 × 16, tightening torque 10 Nm

5.6.3 DR..90, DRN90 motors with HF(+LF) grounding



8026773131

[1] Use of the pre-cast bore at the stator housing
[2] Serrated lock washer
[3] Disk ISO 7093
[4] Ground strap (not included in the delivery)
[5] Self-tapping screw DIN 7500 M6 × 16, tightening torque 10 Nm

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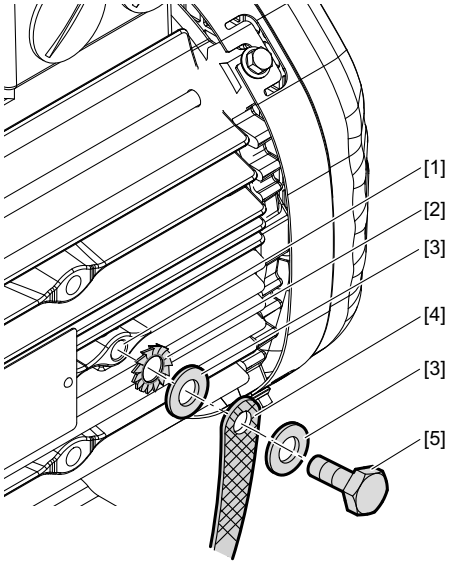
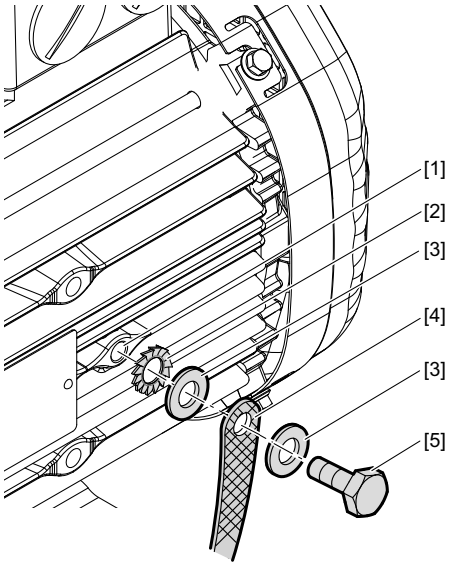
5.6.4 DR..100M, DRN100LS motors with HF(+LF) grounding



18014402064551947

[1] Use of the pre-cast bore at the stator housing
[2] Serrated lock washer
[3] Disk ISO 7093
[4] Ground strap (not included in the delivery)
[5] Self-tapping screw DIN 7500 M6 × 16, tightening torque 10 Nm

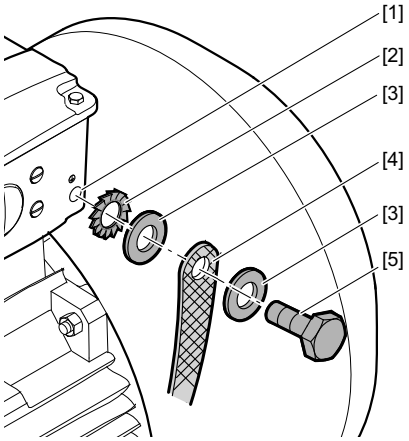
5.6.5 DR..100L – 132, DRN100LM – 132S motors with HF(+LF) grounding



18014402064551947

[1] Use of tapped hole for lifting eyes
[2] Serrated lock washer DIN 6798
[3] Washer ISO 7089/ISO 7090
[4] Ground strap (not included in the delivery)
[5] Hex head screw ISO 4017 M8 × 18, tightening torque 10 Nm

5.6.6 DR..160 – 315, DRN132M – 315 motors with HF(+LF) grounding



9007202821668107

[1] Use of the tapped holes at the terminal box
[2] Serrated lock washer DIN 6798
[3] Washer ISO 7089/ISO 7090
[4] Ground strap (not included in the delivery)
[5]
- Hex head screw ISO 4017 M8 × 18 (with aluminum terminal boxes of DR..160 – 225, DRN132M – 225 motors), tightening torque 10 Nm
- Hex head screw ISO 4017 M10 × 25 (with gray cast iron terminal boxes of DR..160 – 225, DRN132M – 225 motors), tightening torque 10 Nm
- Hex head screw ISO 4017 M12 x 30 (terminal boxes of DR../DRN250 – 315 motors), tightening torque 15.5 Nm

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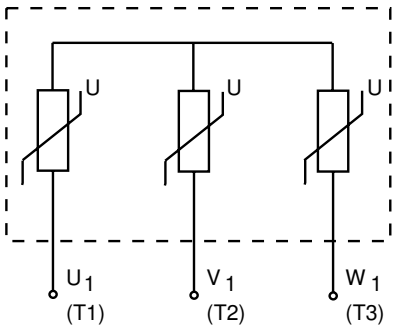
5.7 Special aspects in switching operation

When the motors are used in switching operation, possible interference of the switchgear must be excluded by ensuring suitable wiring. According to EN 60204 (electrical equipment of machines), motor windings must have interference suppression to protect the numerical or programmable logic controllers. As it is primarily switching operations that cause interference, SEW-EURODRIVE recommends installing protective circuit in the switching devices.

If the drive has been delivered with a suppressor circuitry in the motor, you must observe the provided wiring diagram.

5.8 Special aspects of torque motors and low-speed motors

Due to the design of DRM.., DR2M.. torque motors and low-speed motors, very high induction voltages may be generated when they are switched off. Consequently, SEW-EURODRIVE recommends using the varistor circuit shown below for protection. The size of the varistors depends, amongst other factors, on the starting frequency.

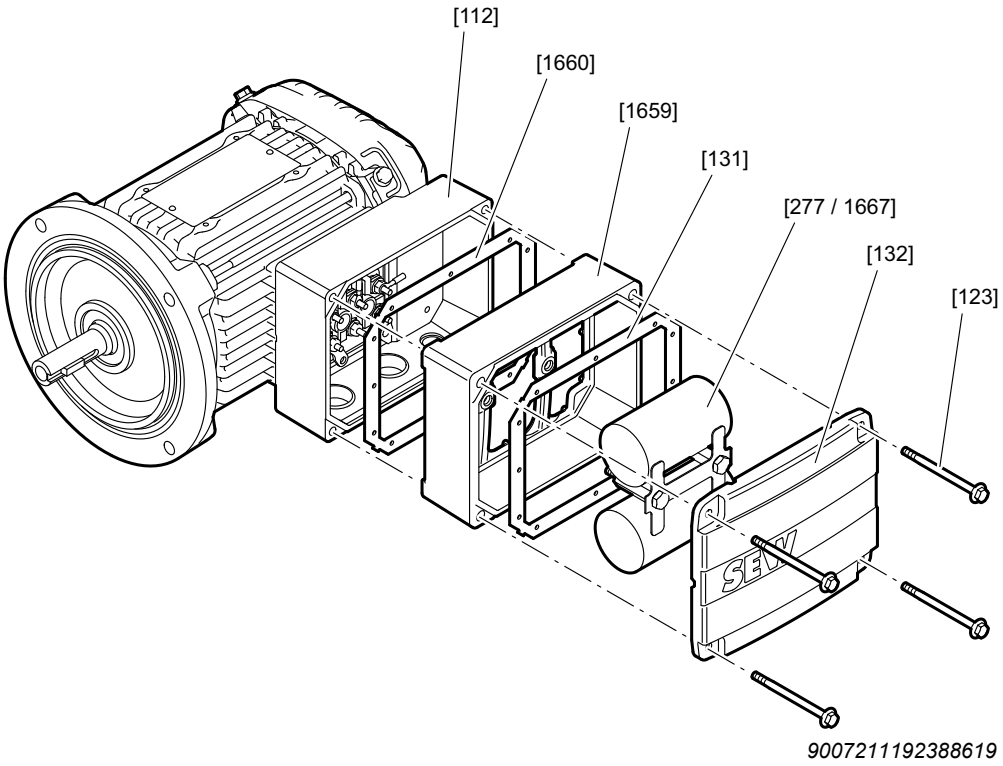


2454566155

5.9 Special aspects of DRK.. single-phase motors

Scope of delivery and motor design

DRK.. single-phase motors are delivered with installed running capacitor in the terminal box. Starting relay, centrifugal switch or start-up capacitor are not supplied.



9007211192388619

[112]	Terminal box	[277]/[1667]	Capacitor
[1660]	Seal	[132]	Terminal box cover
[1659]	Adapter piece	[123]	Screw
[131]	Seal		

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5.9.1 Connecting DRK.. single-phase motors

⚠ WARNING

Electric shock due to charged capacitor.

Severe or fatal injuries.

- After disconnection from the power supply, wait 5 seconds before opening the terminal box.

DRK.. single-phase motors are delivered with 1 or 2 installed and connected running capacitors. The data specified in chapter "Technical data" (→ 🗎 262) apply.

INFORMATION

If a running capacitor installed by SEW-EURODRIVE must be replaced, only use capacitors with the same technical data.

INFORMATION

Start-up against the complete rated torque is not possible with only the running capacitors.

Parts which are not supplied must be ordered from specialist retailers and must be connected according to the corresponding instructions and "wiring diagrams" (→ 🗎 284).

Proceed as follows during connection:

- Remove terminal box cover [132]
- Remove adapter piece [1659] with the running capacitors [277]/[1667]
- Perform the connection according to supplied wiring diagrams.

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5.10 Notes regarding the connection of the motor

INFORMATION

It is essential to comply with the valid wiring diagram. Do not connect or start up the motor if this wiring diagram is missing. You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

⚠ WARNING

Danger due to contaminated terminal box.

Severe or fatal injuries.

- Seal the terminal box and unused cable entries against dust and humidity.
- Remove present foreign objects, dirt and humidity from the terminal box.

Observe the following points when connecting the motor:

- Check cable cross section
- Arrange terminal links correctly
- Screw on the connections and the PE conductor correctly
- Make sure that the connection cables are not cramped to avoid damage to the cable insulation.
- Observe air gaps, see chapter "Electrical connection" (→ 🗎 13)
- In the terminal box: Check winding connections and tighten them if necessary
- Perform the connection in accordance with the enclosed wiring diagram
- Avoid protruding wire ends
- Connect the motor according to the prescribed direction of rotation

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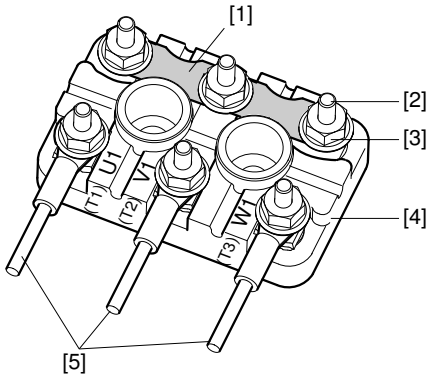
5.11 Connecting the motor via terminal block

5.11.1 According to wiring diagram R13

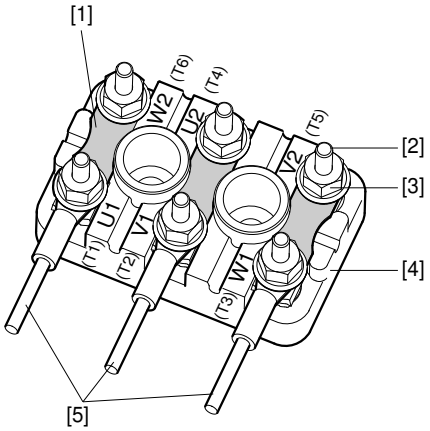
Arrangement of terminal links with 人 connection



27021598003155723

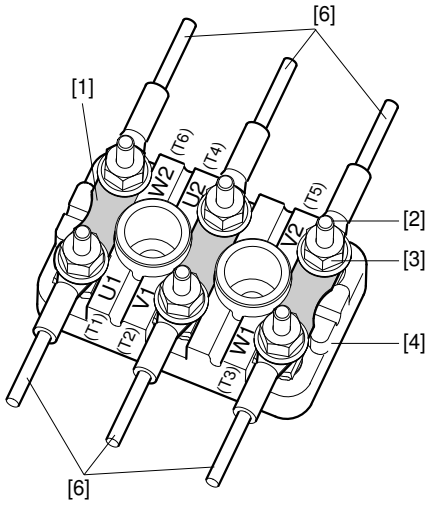
Arrangement of terminal links with △ connection

DR..71 – 280, DRN63 – 280, DR2..63 – 80 motors
(single-sided supply):



9007199493672075

DR../DRN250 – 315 motors
(double-sided supply):



9007199734852747

[1] Terminal link
[2] Terminal studs
[3] Flange nut
[4] Terminal board
[5] Customer connection
[6] Customer connection with divided connection cable

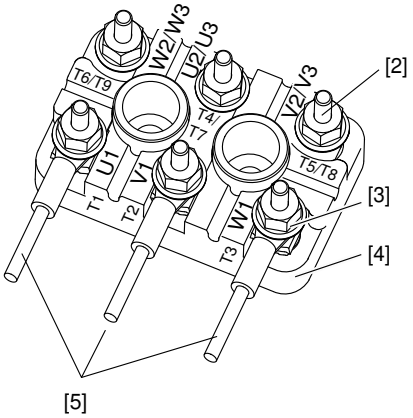
INFORMATION

For DR../DRN250 – 315 motors, SEW-EURODRIVE recommends a double-sided supply for load currents higher than

- M12: 250 A
- M16: 315 A

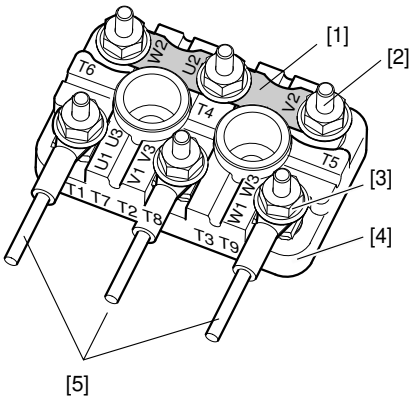
5.11.2 According to wiring diagram R76

Arrangement of terminal links with ⅄ connection



2319075083

Arrangement of terminal links with ⅄⅄ connection



9007201591100811

[1] Terminal link
[2] Terminal studs
[3] Flange nut
[4] Terminal board
[5] Customer connection

INFORMATION

Three winding lead ends must be rewired to change from high to low voltage:

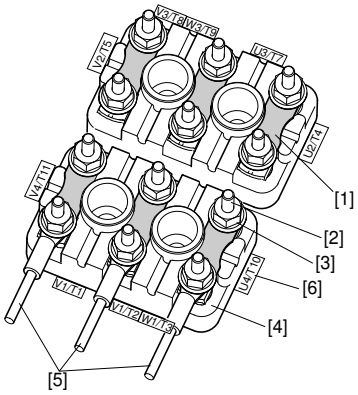
The lines designated U3 (T7), V3 (T8) and W3 (T9) must be reconnected.

- U3 (T7) from U2 (T4) to U1 (T1)
- V3 (T8) from V2 (T5) to V1 (T2)
- W3 (T9) from W2 (T6) to W1 (T3)

→ Changing from low to high voltage is carried out in reverse order. In both cases, the customer connection is made to U1 (T1), V1 (T2) and W1 (T3). You can change the direction of rotation by interchanging 2 supply cables.

5.11.3 According to wiring diagram R72

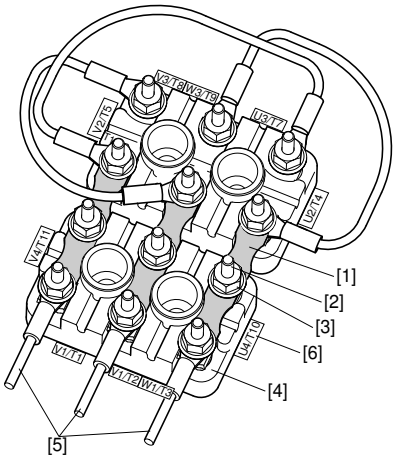
Arrangement of terminal links with △ connection



18014400828555147

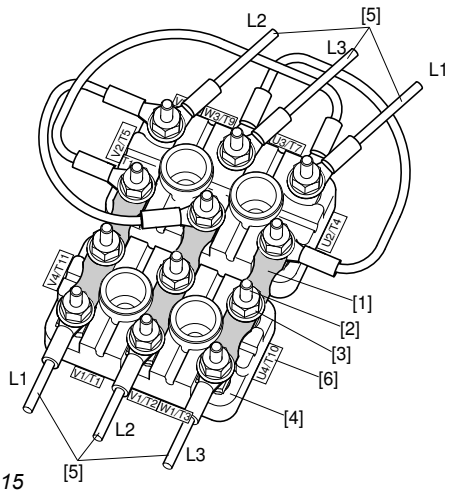
Arrangement of terminal links with △△ connection

DR..71 – 280, DRN63 – 280, DR2..63 – 80 motors
(single-sided supply):



18014400845874315

DR../DRN250 – 315 motors
(double-sided supply):



9007208157343883

[1] Terminal link
[2] Terminal studs
[3] Flange nut
[4] Terminal board
[5] Customer connection
[6] Wiring designation plate
L1 Conductor 1
L2 Conductor 2
L3 Conductor 3

INFORMATION

For DR../DRN250 – 315 motors, SEW-EURODRIVE recommends a double-sided supply for load currents higher than

- M10: 160 A

5.11.4 Connection variants via terminal block

The motors are supplied and connected differently depending on the electrical design. Arrange the terminal links as shown in the wiring diagram and screw them on firmly. Observe the tightening torques specified in the following tables.

DRN63, DR2..63 motors							
Terminal stud	**Tightening torque hex nut**	**Connection**	**Design**	**Connection type**	**Scope of delivery**	**PE connection screw**	**PE design**
Ø		**Cross section**				**Ø**	
M4	**1.6 Nm**	**≤ 1.5 mm²**	**1a**	**Conductor end sleeve**	**Preassembled terminal links**	M4	6
		≤ 2.5 mm²	**1a**	**Solid wire**	**Preassembled terminal links**		
		≤ 6 mm²	**1b**	**Ring cable lug**	**Preassembled terminal links**		
		≤ 6 mm²	2	Ring cable lug	Connection accessories enclosed		
DR..71 – 100, DRN71 – 100, DR2..71 – 80 motors							
Terminal stud	**Tightening torque hex nut**	**Connection**	**Design**	**Connection type**	**Scope of delivery**	**PE connection screw**	**PE design**
Ø		**Cross section**				**Ø**	
M4	**1.6 Nm**	**≤ 1.5 mm²**	**1a**	**Conductor end sleeve**	**Preassembled terminal links**	M5	4
		≤ 2.5 mm²	**1a**	**Solid wire**	**Preassembled terminal links**		
		≤ 6 mm²	**1b**	**Ring cable lug**	**Preassembled terminal links**		
		≤ 6 mm²	2	Ring cable lug	Connection accessories enclosed		
M5	2.0 Nm	≤ 2.5 mm²	1a	Solid wire Conductor end sleeve	Preassembled terminal links		
		≤ 16 mm²	1b	Ring cable lug	Preassembled terminal links		
		≤ 16 mm²	2	Ring cable lug	Connection accessories enclosed		
M6	3.0 Nm	≤ 35 mm²	3	Ring cable lug	Connection accessories enclosed		
DR..112 – 132, DRN112 – 132M motors							
Terminal stud	**Tightening torque hex nut**	**Connection by customer**	**Design**	**Connection type**	**Scope of delivery**	**PE connection screw**	**PE design**
Ø		**Cross section**				**Ø**	
M5	**2.0 Nm**	**≤ 2.5 mm²**	**1a**	**Solid wire Conductor end sleeve**	**Preassembled terminal links**	M5	4
		≤ 16 mm²	**1b**	**Ring cable lug**	**Preassembled terminal links**		
		≤ 16 mm²	2	Ring cable lug	Connection accessories enclosed		
M6	3.0 Nm	≤ 35 mm²	3	Ring cable lug	Connection accessories enclosed		
DR..160, DRN132L motors							
Terminal stud	**Tightening torque hex nut**	**Connection by customer**	**Design**	**Connection type**	**Scope of delivery**	**PE connection screw**	**PE design**
Ø		**Cross section**				**Ø**	
M6	**3.0 Nm**	**≤ 35 mm²**	**3**	**Ring cable lug**	**Connection accessories enclosed**	M8	5
M8	6.0 Nm	≤ 70 mm²	3	Ring cable lug	Connection accessories enclosed	M10	5

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DR..180 – 225, DRN160 – 225 motors							
Terminal stud	**Tightening torque hex nut**	**Connection by customer**	**Design**	**Connection type**	**Scope of delivery**	**PE terminal stud**	**PE design**
Ø		**Cross section**				**Ø**	
M8	**6.0 Nm**	**≤ 70 mm²**	**3**	**Ring cable lug**	**Connection accessories enclosed**	M8	5
M10	10 Nm	≤ 95 mm²	3	Ring cable lug	Connection accessories enclosed	M10	5
M12	15.5 Nm	≤ 95 mm²	3	Ring cable lug	Connection accessories enclosed	M10	5
DR../DRN250 – 280 motors							
Terminal stud	**Tightening torque hex nut**	**Connection by customer**	**Design**	**Connection type**	**Scope of delivery**	**PE terminal stud**	**PE design**
Ø		**Cross section**				**Ø**	
M10	**10 Nm**	**≤ 95 mm²**	**3**	**Ring cable lug**	**Connection accessories enclosed**	M12	5
M12	**15.5 Nm**	**≤ 95 mm²**	**3**	**Ring cable lug**	**Connection accessories enclosed**	M12	5
DR../DRN315 motors							
Terminal stud	**Tightening torque hex nut**	**Connection by customer**	**Design**	**Connection type**	**Scope of delivery**	**PE terminal stud**	**PE design**
Ø		**Cross section**				**Ø**	
M12	**15.5 Nm**	**≤ 95 mm²**	**3**	**Ring cable lug**	**Premounted connection pieces**	M12	5
M16	**30 Nm**	**≤ 120 mm²**					

The designs in bold print apply to S1 operation for the standard voltages and standard frequencies according to the data in the catalog. Other designs may have different connections, for example, different terminal stud diameters and/or a different scope of delivery.

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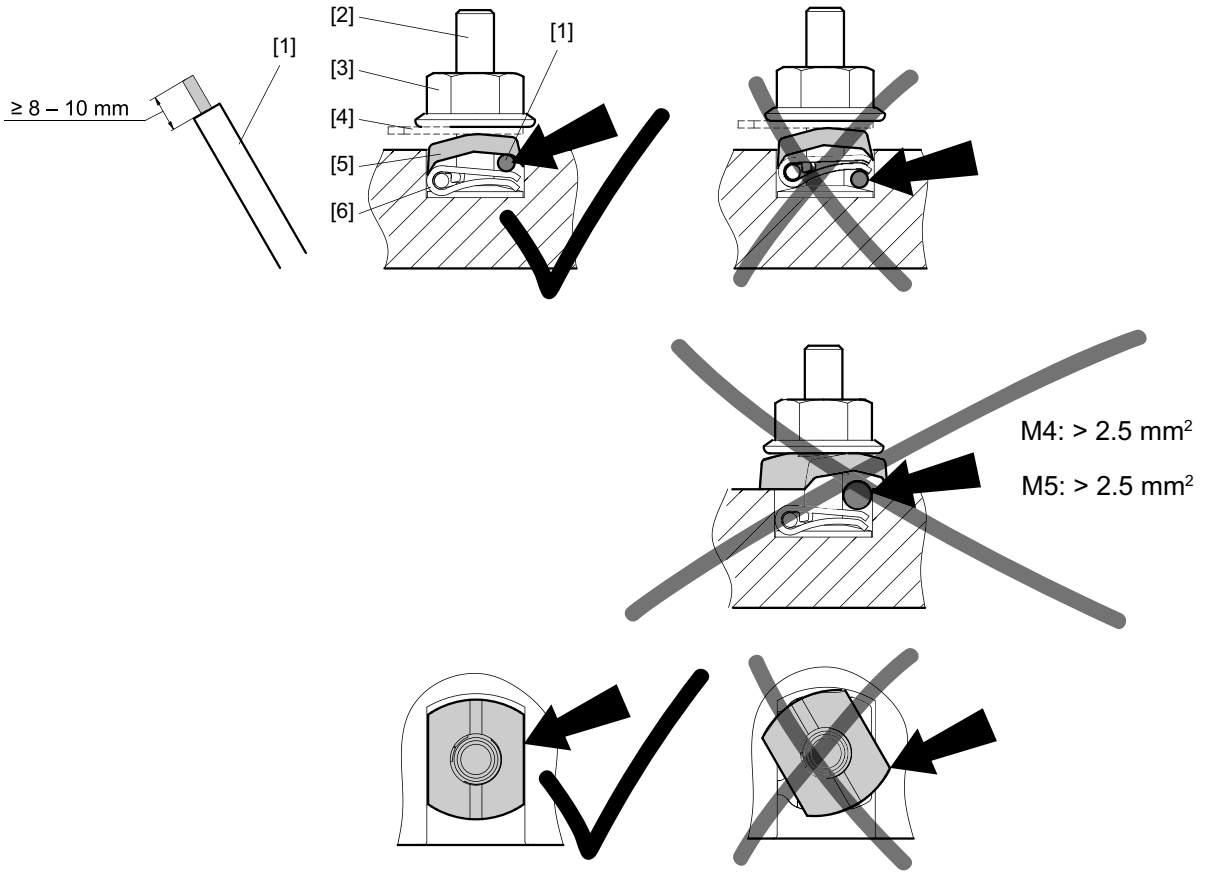
Variant 1a



36028797107830923

[1] External connection
[2] Terminal stud
[3] Flange nut
[4] Terminal link
[5] Terminal washer
[6] Winding connection with Stocko terminal

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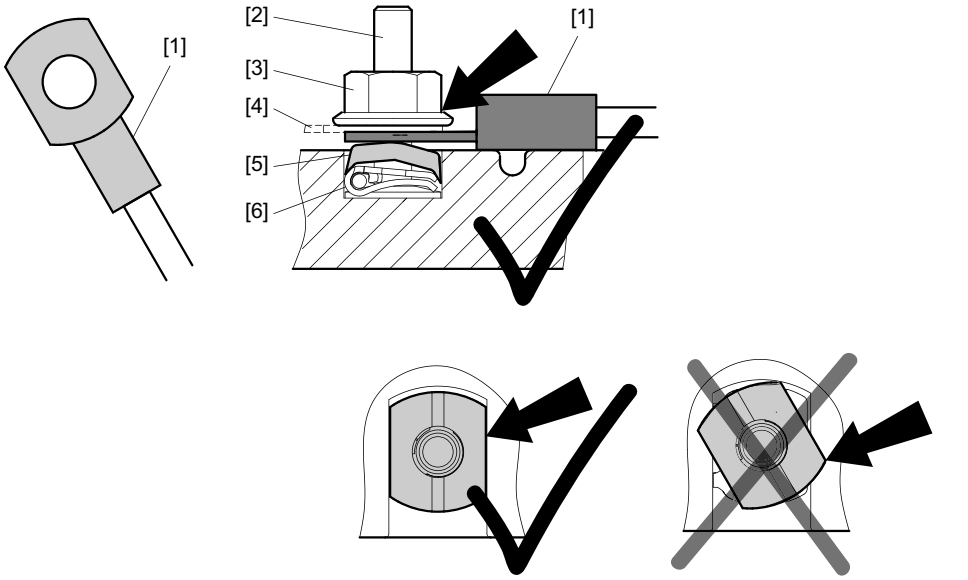
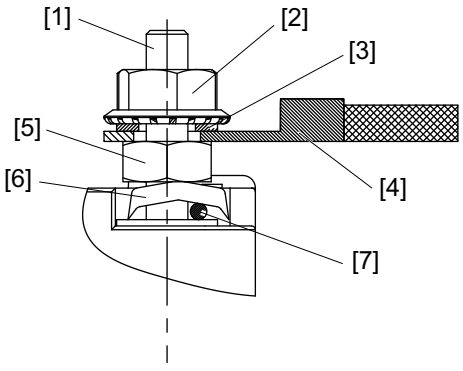
Variant 1b:



18014398598346763

[1] External connection with ring cable lug, according to DIN 46237 or DIN 46234, for example
[2] Terminal stud
[3] Flange nut
[4] Terminal link
[5] Terminal washer
[6] Winding connection with Stocko terminal

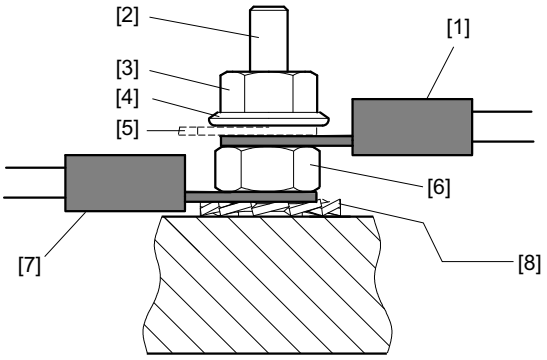
Variant 2



9007199440180363

[1] Terminal board
[2] Flange nut
[3] Terminal link
[4] External connection with ring cable lug, according to DIN 46237 or DIN 46234, for example
[5] Bottom nut
[6] Terminal washer
[7] Winding connection

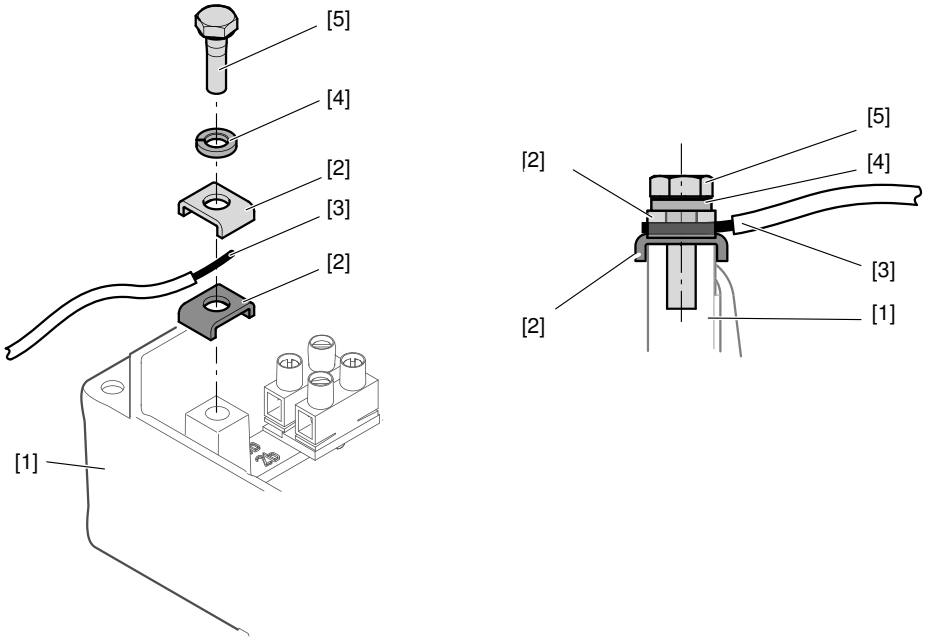
Variant 3



9007199454382091

[1] External connection with ring cable lug, according to DIN 46237 or DIN 46234, for example
[2] Terminal stud
[3] Upper nut
[4] Washer
[5] Terminal link
[6] Bottom nut
[7] Winding connection with ring cable lug
[8] Serrated lock washer

Variant 4



18014399649088651

[1] Terminal box
[2] Terminal clip
[3] PE conductor
[4] Lock washer
[5] Hex head screw

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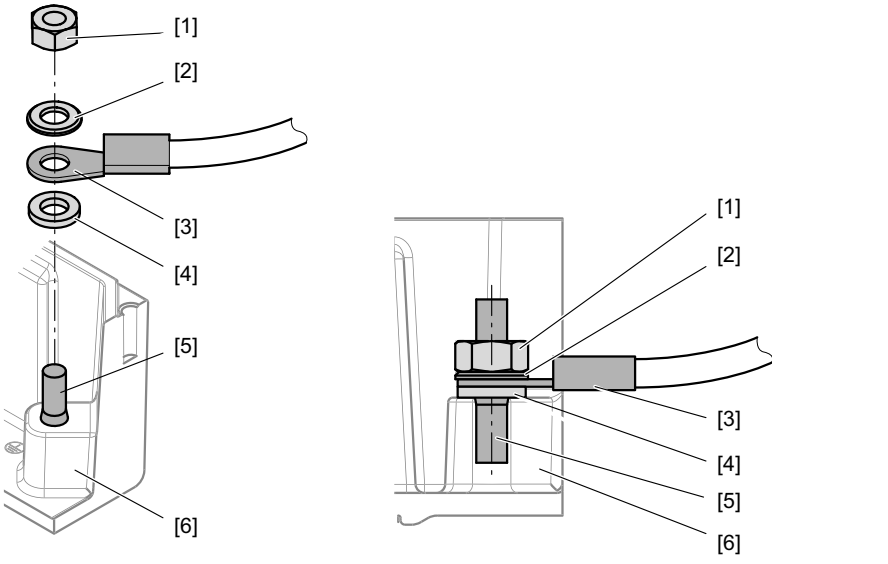
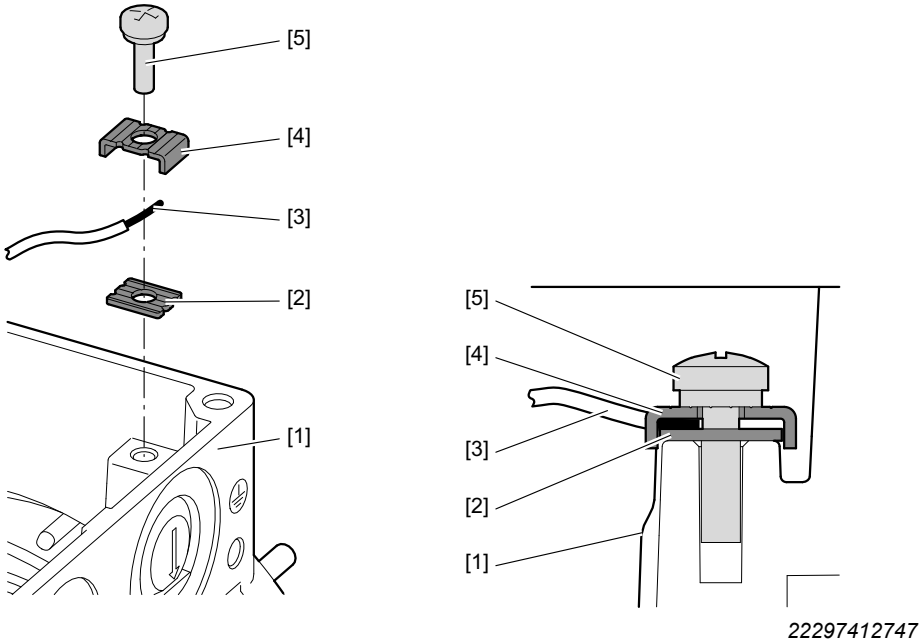
Variant 5



[1] Hex nut
[2] Washer
[3] PE conductor on cable lug
[4] Serrated lock washer
[5] Stud
[6] Terminal box

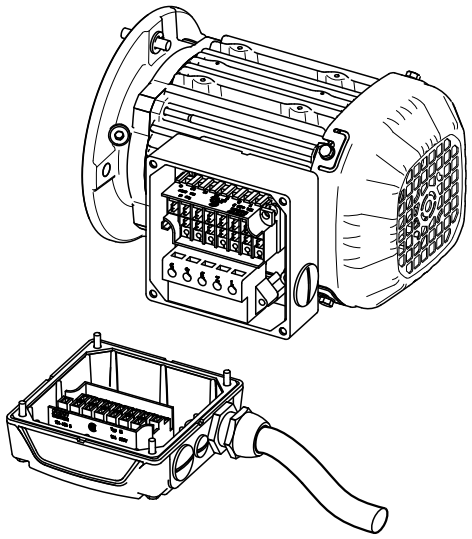
Variant 6



[1] Terminal box
[2] Support plate
[3] PE conductor
[4] Terminal clip
[5] Flat head screw

5.12 Connecting the motor plug connector

5.12.1 IS/ISU plug connector



1009070219

The lower part of the /IS, /ISU plug connector option is completely prewired at the factory, including the additional features such as brake control.

The upper connector section of the /IS option is included in the scope of delivery. It must be connected according to the wiring diagram.

The /ISU option is delivered without the upper connector section.

The /IS, /ISU plug connector option has CSA approval up to 600 V. Note for application according to CSA regulations: Tighten the M3 clamping screws with a tightening torque of 0.5 Nm.

Cable cross section

Make sure that the type of cable complies with the applicable regulations. The rated currents are specified on the nameplate. The cable cross sections that can be used are listed in the following table.

Without variable terminal link	With variable terminal link	Link cable	Double assignment (Motor and brake/SR)
0.25 – 4.0 mm^2	0.25 – 2.5 mm^2	Max. 1.5 mm^2	max. 1 × 2.5 and 1 × 1.5 mm^2

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Wiring the upper section of the plug connector

- Loosen the housing cover screws:
  - Remove the housing cover
- Loosen the screws from the upper section of the plug connection:
  - Remove upper connector section from the cover
- Strip the insulation off the connection cable:
  - Strip off about 9 mm of insulation
- Pass the cable through the cable gland

Wiring up as shown in wiring diagram R83

- Connect the lines as shown in the wiring diagram:
  - Tighten the clamping screws with a tightening torque of 0.5 Nm.
- Install the plug connector (see chapter "Installing the connector" (→ 🗎 87))

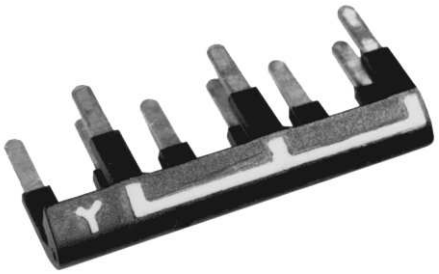
Wiring up as shown in wiring diagram R81

For ⅄/△ startup:

- Connect with 6 lines:
  - Tighten the clamping screws carefully.
  - Motor contactors in the control cabinet
- Install the plug connector (see chapter "Installing the connector" (→ 🗎 87))

For ⅄ or △ operation:

- Connect as shown in the wiring diagram
- Install the variable terminal link as shown in the following figures according to the desired motor operation (⅄ or △)
- Install the plug connector (see chapter "Installing the connector" (→ 🗎 87))



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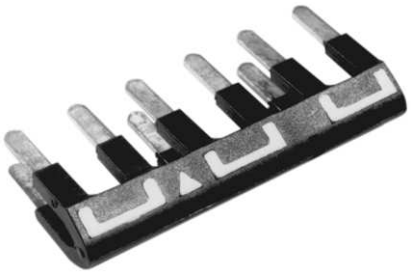

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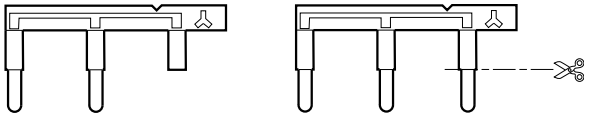
Brake control system BSR – preparing the variable terminal link

For ⅄operation:

On the ⅄ side of the variable terminal link as shown in the following figure: Remove only the bare metal pin of the marked prong horizontally – install a touch guard!



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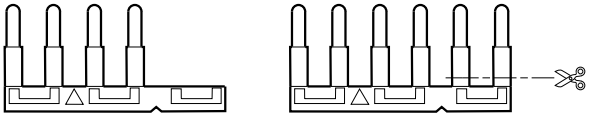
For △operation:

On the △ side of the variable terminal link as shown in the following figure: Completely remove two prongs horizontally.



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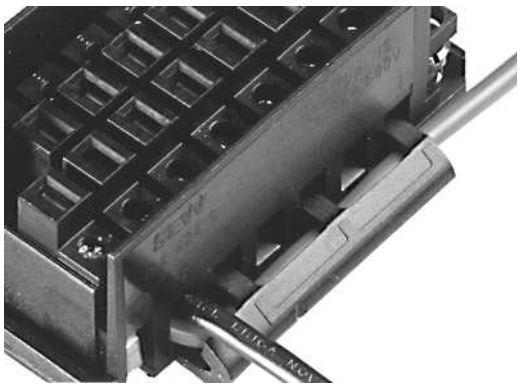
Wiring according to the R81 wiring diagram for ⅄ or △ operation with double terminal assignment

- At terminal for double assignment:
  - Connect the link cable
- When operation is as required:
  - Insert the link cable in the variable terminal link
- Installing the variable terminal link
- At terminal for double assignment:
  - Connect the motor lead above the variable terminal link
- Connect the other lines as shown in the wiring diagram
- Install the plug connector (see chapter "Installing the connector" (→ 🗎 87))



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Installing the plug connector

The housing cover of the IS plug connector can be screwed onto the lower housing part depending on the required position of the cable lead. You have to install the upper part in the housing cover according to the position of the lower part:

1. Define the required mounting position.
2. Install the upper section of the plug connector into the housing cover in accordance with the mounting position.
3. Close the plug connector.
4. Tighten the cable gland.
5. Check all screws of tightening and contact connections for tight fit.

⚠ WARNING

No grounding due to incorrect installation.

Severe or fatal injuries.

- Tighten the retaining screws of the IS plug connector properly with 2 Nm as these screws also act as protective earth contacts.

IS female connector

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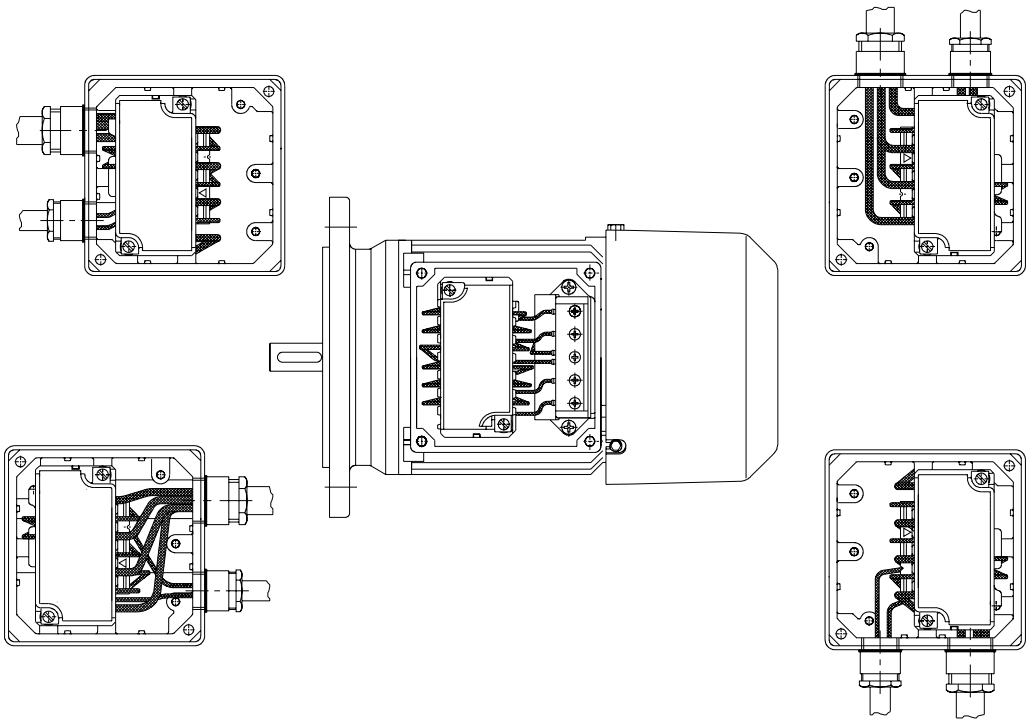
Mounting position of the upper section of the plug connector in the housing cover



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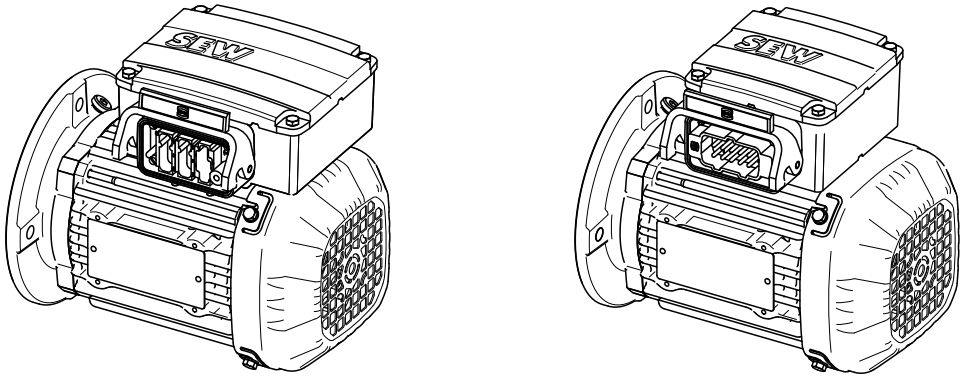
5.12.2 AB.., AD.., AM.., AK.., AC.., AS.. plug connectors



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The installed AB.., AD.., AM.., AK.., AC.. and AS.. connector systems are based on the connector systems made by Harting.

- AB.., AD.., AM.., AK.. Han Modular®
- AC.., AS.. Han 10E / 10ES

The connectors are located at the side of the terminal box. They are locked either using two clamps or one clamp on the terminal box.

The internal motor wiring is performed at the factory according to the order information. The mating connector must be prefabricated by the user.

The mating connector (grommet housing) with socket contacts is not included in the delivery.

INFORMATION

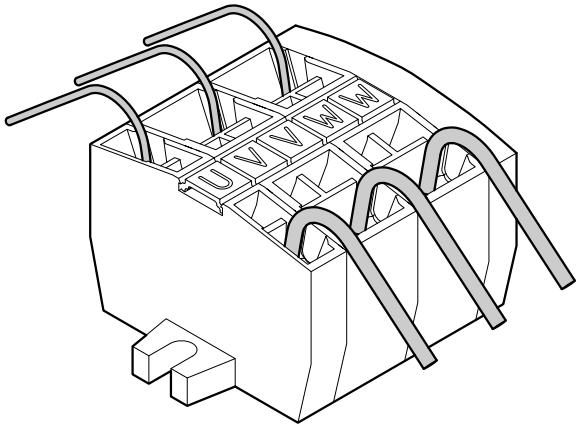
The degree of protection is only guaranteed if the mating connector is plugged in and locked.

5.13 Connecting the motor via terminal strip

5.13.1 According to wiring diagram R10

1. Connect the motor according to the enclosed wiring diagram.
2. Check the maximum cable cross section.
   - ⇨ 2.5 mm² rigid
   - ⇨ 2.5 mm² flexible
   - ⇨ 1.5 mm² flexible with conductor end sleeve
3. The stripping length must be 8 – 9 mm.
4. Connect the protective earth as described in chapter "Variant 6" (→ 🗎 83).

Arrangement of the terminal leads for 人 connection



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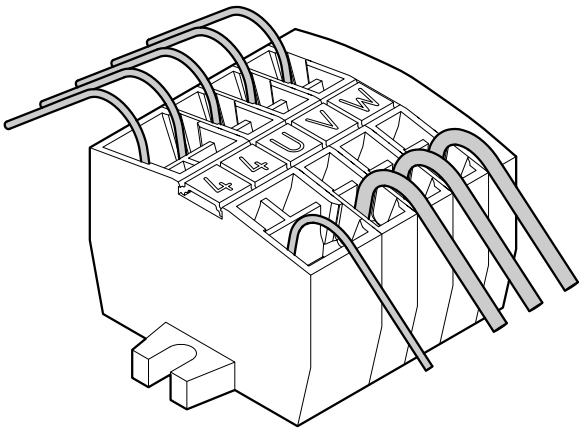
5.13.2 According to wiring diagram R12

1. Connect the motor according to the enclosed wiring diagram.
2. Check the maximum cable cross section.
   - ⇨ 2.5 mm² rigid
   - ⇨ 2.5 mm² flexible
   - ⇨ 1.5 mm² flexible with conductor end sleeve
3. The stripping length must be 8 – 9 mm.
4. Connect the protective earth as described in chapter "Variant 6" (→ 🗎 83).

Arrangement of the terminal leads for ⅄ connection



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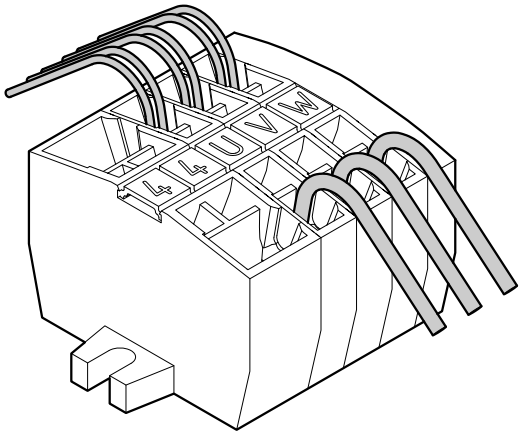
Arrangement of the terminal leads for △ connection



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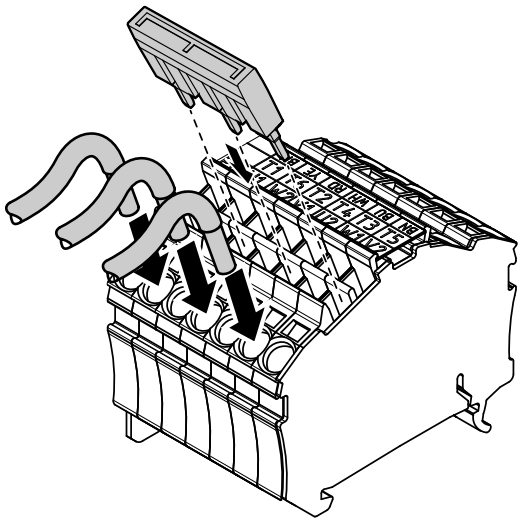
5.13.3 According to wiring diagram C13 with terminal strip /KCC

1. Connect the motor according to the enclosed wiring diagram.
2. Check the maximum cable cross section.
   - ⇨ 4 mm² rigid
   - ⇨ 4 mm² flexible
   - ⇨ 2.5 mm² flexible with conductor end sleeve
3. Check the winding connections in the terminal box and tighten them, if necessary.
4. The stripping length must be 10 – 12 mm.

Arrangement of terminal links with ⅄ connection



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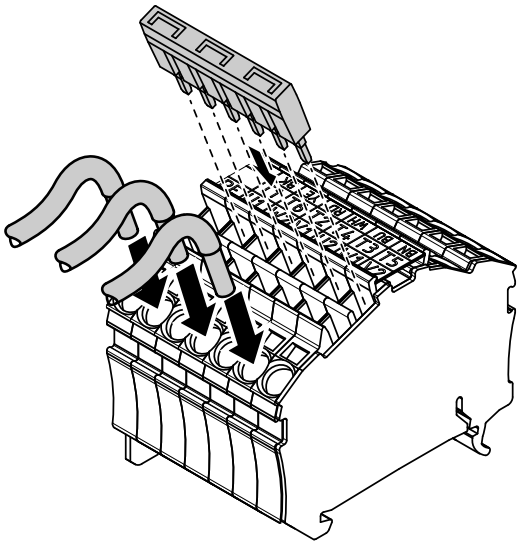
Arrangement of terminal links with △ connection



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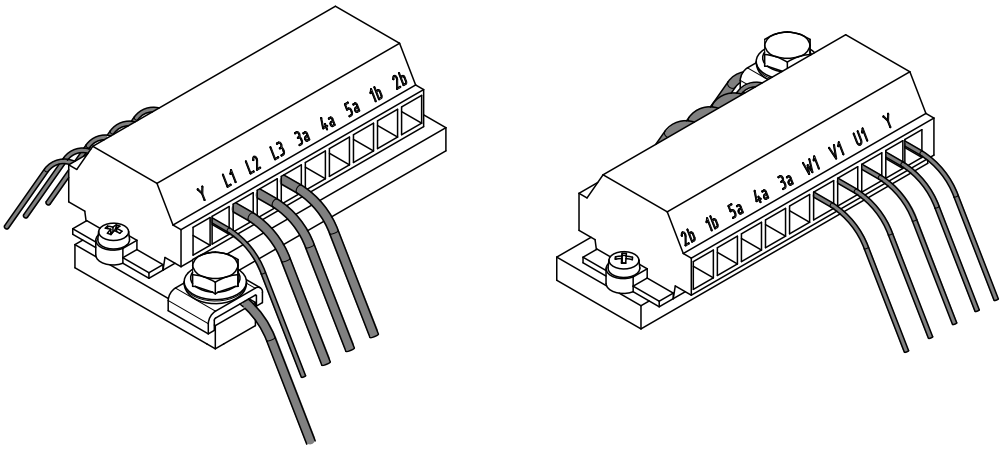
5.13.4 According to wiring diagram C12 with KC1 terminal strip

1. Connect the motor according to the enclosed wiring diagram.
2. Check the maximum cable cross section.
   - ⇨ 2.5 mm² rigid
   - ⇨ 2.5 mm² flexible
   - ⇨ 1.5 mm² flexible with conductor end sleeve
3. The stripping length must be 8 – 9 mm.

Arrangement of the terminal leads for ⅄ connection



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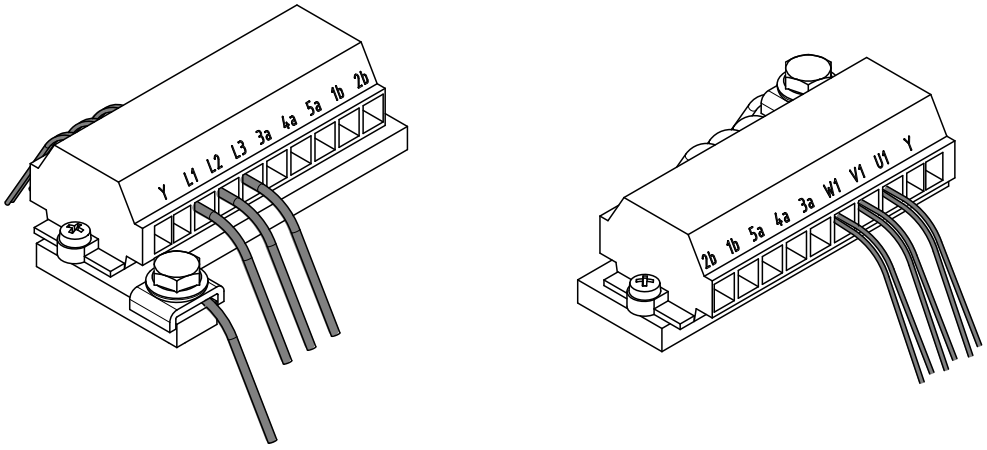
Arrangement of the terminal leads for △ connection



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5.14 Connecting the brake

The BE.. brakes are powered by energized DC voltage and are released electrically. The brake is applied mechanically when the voltage supply is disconnected.

⚠ WARNING

Delayed brake application or unintentional brake release due to incorrect control or connection.

Severe or fatal injuries, e.g. due to falling hoist.

- Comply with the applicable regulations issued by the relevant employer's liability insurance association regarding phase failure protection and the associated circuit/circuit modification.
- Connect the brake according to the enclosed wiring diagram.
- In case of emergency off, always disconnect all poles of the brake control from the supply voltage.
- Only use suitable contactors with sufficient contact rating (utilization category according to EN 60947-4-1/EN 60947-5-1, see chapter "Brake voltage supply" (→ 🗎 96)).
- For contactor selection, observe the inductive load to switch, and the high current load while switching the brake.

5.14.1 Connecting the brake control

The brake is powered by a brake control system with protection circuit. The brake control is either installed in the motor's terminal box or in the control cabinet. If the motor is prepared for the brake control in the control cabinet, the brake supply cables are connected to a terminal strip in the motor terminal box.

Screw terminals are usually used as terminals on the terminal strip or on the brake control. Terminals with cage clamp technology can also be used.

The connectable cable cross sections are restricted to 2.5 mm^2. If you use larger cable cross sections due to application reasons, additional intermediate terminals must be used.

The brake is internally connected to the motor PE. An additional connection for the brake is not necessary.

⚠ WARNING

Delayed brake application or unintentional brake release due to incorrect control or connection.

Severe or fatal injuries, e.g. due to falling hoist.

- Observe the specifications of this documentation for connecting the brake.
- If you are uncertain about brake control, voltage supply type and design, or overvoltage and short circuit protection, contact the plant manufacturer or SEW-EURODRIVE.

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5.14.2 Permitted brake controls

INFORMATION

The following specifications refer to motors designed for operation at ambient temperatures of -20 °C to +40 °C, and with thermal class 130 (B) or 155 (F). Deviations may occur depending in the installed motor options.

In individual cases, always also observe the additional specifications in the order confirmation and on the motor nameplate.

The brake is designed for operation with AC voltage or DC voltage, depending on the design. A brake control by SEW-EURODRIVE is used that is either installed in the motor terminal box or in the control cabinet.

BE02 – 2 brakes can also be operated without brake control by SEW-EURODRIVE with DC voltage. Observe the information on the motor nameplate. In this case, a suitable overvoltage protection must be installed at the terminal strips in the terminal box using varistors. The varistors are not included in the scope of delivery of the motor. Observe the project planning notes from SEW-EURODRIVE.

The following brake control types are not permitted:

- Operation with AC voltage without brake control by SEW-EURODRIVE with BE02 – 122 brakes.
- Operation with DC voltage without brake control by SEW-EURODRIVE with BE5 – BE122 brakes.
- Operation with third-party brake control systems.

For an overview of available brake controls by SEW-EURODRIVE and of the technical data, refer to chapter "Brake control" (→ 🗎 234).

⚠ WARNING

Severe or fatal injuries

Great and unexpected elongation of the stopping distance.

- Operate each brake with a separate brake control.
- Observe the notes on dimensioning in the catalog, or contact SEW-EURODRIVE.

5.14.3 Optional separation of DC and AC circuits

In case of brakes operated with AC voltage, make sure the disconnection type designated by the manufacturer is applied correctly during the brake connection. The following types are distinguished:

- Cut-off in the AC circuit with normal application time
- Cut-off in AC circuit and DC circuit with shortened application time

The correct switch-off type must be ensured by a respective wiring. Certain brake controls by SEW-EURODRIVE realize the same AC and DC cut-off via integrated switching relays (e.g. BMP1.5), or via mounted relays (e.g. BSR or BUR).

The switch-off type is specified on the included wiring diagrams by a pictogram.

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⚠ WARNING

Delayed brake application or unintentional ongoing brake release due to incorrect switch-off.

Severe or fatal injuries, e.g. due to falling hoist or extended coasting.

- During project planning, consider the required cut-off type and the effects on the expected stopping distance in particular.
- Only use the faster cut-off in the DC and AC circuit for hoists and hoist-like applications.
- When you are not sure if the application is a hoist-like application, contact SEW-EURODRIVE.
- Make sure that the configured cut-off type (AC or AC-DC) is implemented correctly during startup, regardless of the type of application.

5.14.4 Brake voltage supply

The brake voltage supply must match the values specified on the nameplate of the motor. The brake must be supplied via the designated brake control.

The specifications on the nameplate have a tolerance of +/-5% of the stated nominal value, or of the mean value of the stated connection range. Observe order-specific deviations.

Make sure the voltage supply is sufficiently stable by using cable cross sections and voltage sources that are dimensioned accordingly. Make sure the supply voltage does not drop below 90% of the nominal value during starting. This could be caused by an increased inrush current, see chapter "Operating currents" (→ 🗎 226).

In case of single-speed drives (not pole-changing) operated directly at the supply system (meaning without frequency inverter or soft start devices), the brake supply voltage can also be taken from the terminal board of the motor. Adhere to the following restrictions:

- The nominal brake voltage must either match the phase-to-neutral voltage, or the phase-to-phase voltage of the motor (observe nameplate and motor switching type).
- In case of hoists or hoist-like applications, the BSR.. brake control must be used for cut-off in the DC and AC circuits.
- For combinations with BMP3.1 brake control (BE60 – 122) a voltage supply via the terminal board is not permitted.

INFORMATION

In variable-speed motors and motors operated with soft start devices, the brake voltage must not be picked up at the motor terminal board because the voltage there is not constant.

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5.14.5 Switching equipment

The high current utilization during switching the brake (inductive load) requires suitable contactors/switch contacts, to obtain the correct function of the brake.

Depending on brake type and type design, the switch contacts must meet the specifications in the following utilization categories:

- Switch contacts for the supply voltage at AC voltage operation: AC-3 according to EN 60947-4-1, or AC-15 according to EN 60947-5-1.
- Switch contact for the supply voltage at DC voltage operation: Preferably AC-3 or DC-3 according to EN 60947-4-1. As an alternative, contacts in utilization category DC-13 according to EN 60947-5-1 are also permitted.
- Switch contacts for optional separation on DC side: AC-3 according to EN 60947-4-1.

Observe the specifications on the provided wiring diagram.

Using a semi-conductor relay is not permitted.

5.14.6 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.

⚠ 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.

- Always disconnect all poles of the supply and control voltage for hoists and hoist-like applications.
- Ensure that a malfunction of the control input can be detected through additional, suitable diagnostic measures e.g. by monitoring the braking current to meet increased safety and reliability requirements.
- Use the BST.. brake control for functional safety applications.
- If you have any questions regarding the handling of the control input, contact SEW-EURODRIVE.

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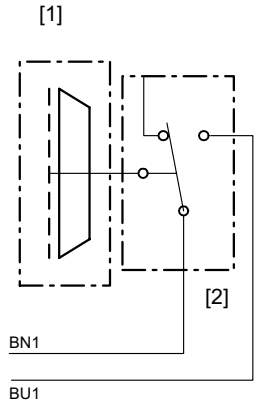
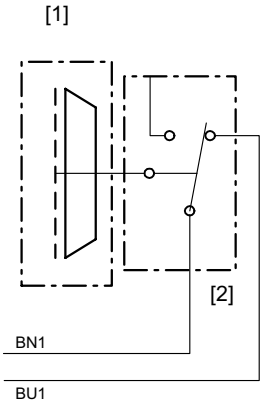
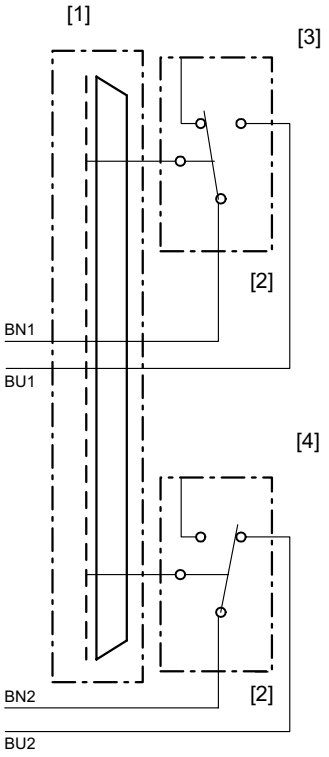
5.14.7 Damage protection against overvoltage and short circuit

To obtain protection against overvoltage damages (e.g. due to short circuit), a sufficiently dimensioned fusing must be used at the supply cables.

Observe the notes on dimensioning in the catalog, or contact SEW-EURODRIVE.

5.14.8 Connecting diagnostic unit /DUB

Connect the diagnostic unit as shown in the wiring connection diagrams provided with the motor. The maximum permitted connection voltage is AC 250 V with a maximum current of 6 A. With low voltage, the maximum voltage is AC 24 V or DC 24 V with max. 0.1 A. A subsequent change to low voltage is not permitted.

Function monitoring	Wear monitoring	Function and wear monitoring
		

[1]	Brake	[1]	Brake	[1]	Brake
[2]	Microswitch MP321-1MS	[2]	Microswitch MP321-1MS	[2]	Microswitch MP321-1MS
				[3]	Function monitoring
				[4]	Wear monitoring

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5.14.9 Connecting the diagnostic unit /DUE option for function and wear monitoring

The /DUE diagnostic unit (Diagnostic Unit Eddy Current) is a contactless measuring system for function and wear monitoring of the brake and the continuous measurement of the current working air gap.

The measuring system consists of:

- Sensor, integrated in the magnet body of the brake
- Evaluation unit in the motor terminal box that is supplied via a DC 24 V voltage.

If the diagnostic unit /DUE was ordered, the function and wear monitoring is preinstalled and calibrated at the factory. The customer must connect the diagnostic unit, see wiring diagram. The switching point of the wear monitoring is preset to the maximum permitted value. According to the table in chapter "Evaluation unit" (→ 🗎 210), a reduced value can also be set.

For the status of the evaluation unit, refer to chapter "Retrofitting the /DUE diagnostic unit for function and wear monitoring" (→ 🗎 209).

Information on retrofitting the /DUE diagnostic unit can be found in chapter "Retrofitting the /DUE diagnostic unit for function and wear monitoring" (→ 🗎 209).

Connecting the evaluation unit

The maximum permitted cable cross section at terminals "k" of the evaluation unit is 1.5 mm^2 with conductor end sleeve without plastic collar, 0.75 mm^2 with plastic collar. The recommended cable cross section at terminals "k" is 0.5 mm^2 with conductor end sleeve with plastic collar.

INFORMATION

Use shielded cables to wire the evaluation unit. Connect the shield to the GND potential, or use the shield plate at the user's signal evaluation.

SEW-EURODRIVE recommends routing the power cable of the drive and the cable of the diagnostic unit separately.

- Unless they are shielded, sensor cables must always be routed separately from other power cables with phased currents.
- Provide the appropriate equipotential bonding between drive and control cabinet.

Important characteristics of the cable to be used are:

- Total shielding (outer shield) of the cable
- 100 m maximum length for fixed installation
- 50 m maximum length for cable carrier installation

The required number of cores depends on the type of function/signals that are to be transferred to the higher-level controller and then processed.

At the factory, the diagnostic unit /DUE is pre-installed, calibrated and set to the wear limit permitted for the brake. The diagnostic unit has to be calibrated again after service or maintenance work such as sensor replacement or replacement of the evaluation electronics. The calibration can be take place directly at the evaluation electronics (at the terminal box) or alternatively via the higher-level controller. In the second case, the required signals for calibration have to be routed to the higher-level controller.

The reference ground GND and the reference ground analog output AGND have the same potential. In case this potential is not treated separately in the application, AGND is not necessary.

Number of required cores	Function	Abbreviation
3	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output function	FCT
3	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output wear	WEAR
4	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output function	FCT
	Digital output wear	WEAR
4	Voltage supply	DC 24 V
	Reference ground	GND
	Analog output current air gap	OUT
	Reference ground analog output	AGND
6	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output function	FCT
	Digital output wear	WEAR
	Analog output current air gap	OUT
	Reference ground analog output	AGND
8	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output function	FCT
	Digital output wear	WEAR
	Analog output current air gap	OUT
	Reference ground analog output	AGND
	Calibration zero value	ZERO
	Calibration of infinite value	INF

INFORMATION

If the calibration inputs ZERO and/or INF are routed to the outside to a PLC or a controller, they have to be continuously connected to AGND in normal operation to avoid EMC interferences in the calibration cables.

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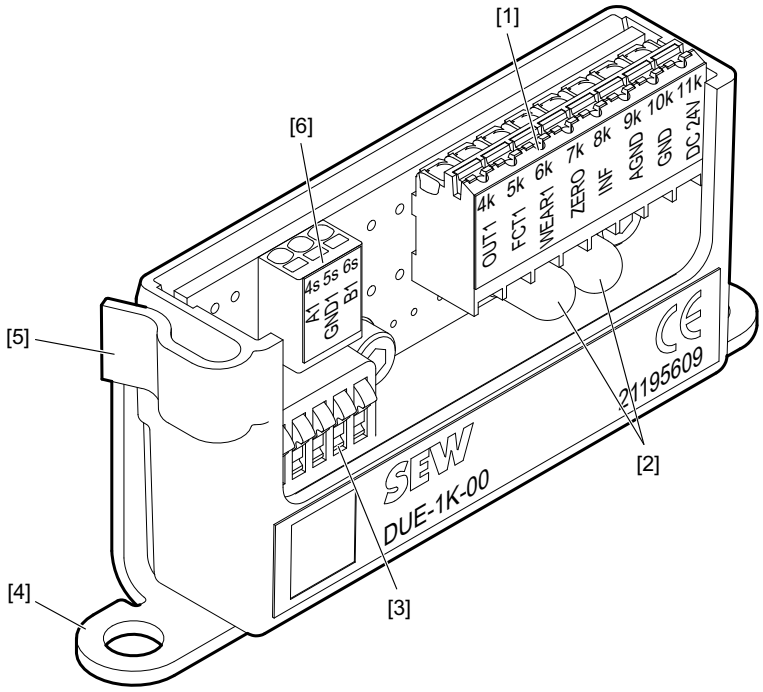
INFORMATION

Signal outputs of the evaluation unit /DUE that are switched may not be used as voltage supply for other evaluation units /DUE or comparable systems. Each evaluation unit /DUE has to be supplied with voltage separately.

Designation of the components

The system comprises a sensor and single-channel evaluation unit. The function monitoring of the brake is realized via a digital signal (NO contact). A digital output (NC contact) signals if the wear limit was reached. Further, a current output allows for continuous monitoring of the brake wear.



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[1] Terminals 4k – 11k
[2] LEDs for function and wear, brake
[3] DIP switches S1 – S5
[4] Fastening of terminal box (PE)
[5] Line clip
[6] Terminals 4s – 6s

The connection designation of the terminals are as follows:

Terminal	Designation	Description	Color coding
4s	A1	Sensor 1 connection 1	Brown (BN)
5s	GND1	Sensor 1 shield	Black (BK)
6s	B1	Sensor 1 connection 2	White (WH)

Terminal	Designation	Description
4k	OUT1	Analog output working air gap brake
5k	FCT1	Digital output function brake
6k	WEAR1	Digital output wear brake

Terminal	Designation	Description
7k	ZERO	Input calibration zero value
8k	INF	Input calibration infinite value
9k	AGND	Signal ground AGND
10k	GND	Ground potential GND
11k	DC 24 V	DC 24 V supply

The LEDs have the follow meaning:

LEDs	Designation	Description
Green [2]	FCT1	The brake is open. Electromagnet is active. Pressure plate is in contact with magnet body.
Red [2]	WEAR1	The current working air gap of the brake reached or exceeded the preset maximum working air gap.

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5.15 Options

Connect the options as shown in the wiring connection diagrams provided with the motor. You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

INFORMATION

Do not connect any options if the wiring diagram is missing.

5.15.1 Temperature sensor /TF

NOTICE

Impermissible heating of the motor due to defective /TF temperature sensor.

Damage to property.

- Do not connect any voltages > 30 V to the /TF temperature sensor.
- Observe the provided wiring diagram for the connection of the temperature sensor /TF.

The PTC thermistors comply with DIN 44082.

Resistance measurement check (measuring instrument with V ≤ 2.5 V or I < 1 mA):

- Standard measured values: 20 – 500 Ω, hot resistance > 4000 Ω

When using the temperature sensor for thermal monitoring, the evaluation function must be activated to maintain reliable isolation of the temperature sensor circuit. The thermal protection function must become active in case of overtemperature.

If there is a 2nd terminal box for the /TF temperature sensor, this is where you must connect the temperature sensor.

Observe the provided wiring diagram for connecting the temperature sensor /TF. If the wiring diagram is not enclosed, you can obtain it from SEW-EURODRIVE free of charge.

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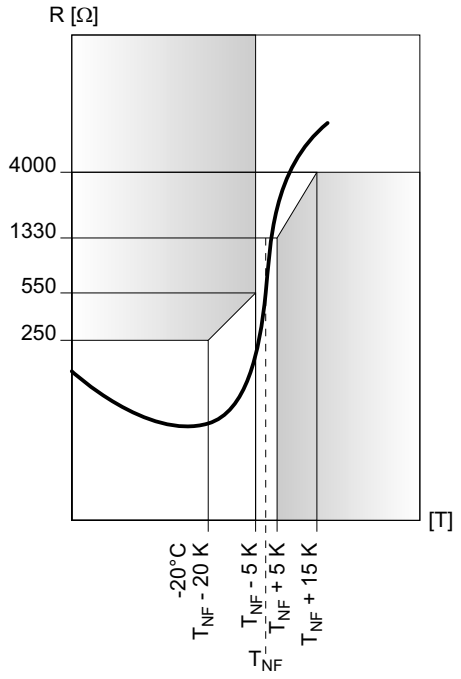
The figure below shows the characteristic curve of /TF with reference to the nominal response temperature (referred to as T_{NF}).



5470153483

5.15.2 /TH winding thermostats

The thermostats are connected in series as standard and open when the permitted winding temperature is exceeded. They can be connected in the drive monitoring loop.

	AC V	DC V	
Voltage U in V	250	60	24
Current (cos ϕ = 1.0) in A	2.5	1.0	1.6
Current (cos ϕ = 0.6) in A	1.6		
Contact resistance max. 1 Ω at DC 5 V/1 mA			

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5.15.3 Temperature detection /KY (KTY84 – 130)

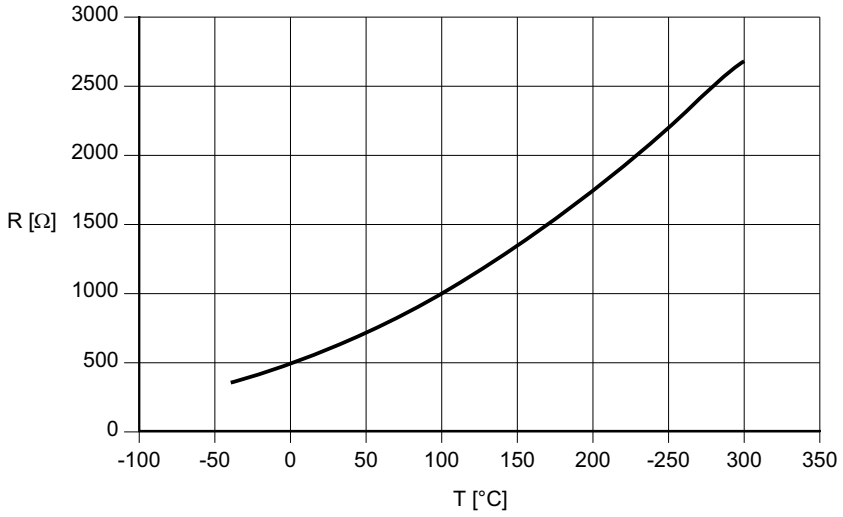
NOTICE

Excessive self-heating of the temperature sensor can damage the insulation of the temperature detection as well as the motor winding.

The drive system might be damaged.

- Use currents > 3 mA in the KTY circuit.
- Observe the correct connection of the KTY to ensure correct evaluation of the temperature detection.
- Observe the polarity during connection.

The characteristic curve in the following figure shows the resistance curve subject to the motor temperature with a measuring current of 2 mA and correct pole connection:



1140975115

Technical data	KTY84 – 130
Connection	Red (+) Blue (−)
Total resistance at 20 – 25 °C	540 Ω < R < 640 Ω
Test current	< 3 mA

5.15.4 Temperature sensor /PT (PT100)

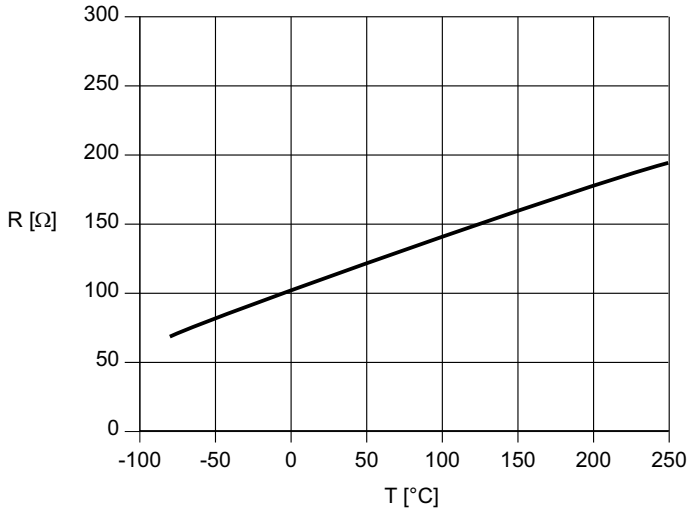
NOTICE

Excessive self-heating of the temperature detection can damage the insulation of the temperature detection as well as the motor winding.

The drive system might be damaged.

- Avoid currents > 3 mA in the circuit of the PT100.
- Observe the correct connection of the PT100 to ensure correct evaluation of the temperature detection.

The characteristic curve in the following figure shows the resistance curve subject to the motor temperature.



1145838347

Technical data	PT100
Connection	Red/white
Resistance at 20 – 25 °C per PT100	107.8 Ω < R < 109.7 Ω
Test current	< 3 mA

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5.15.5 Temperature detection /PK (PT1000)

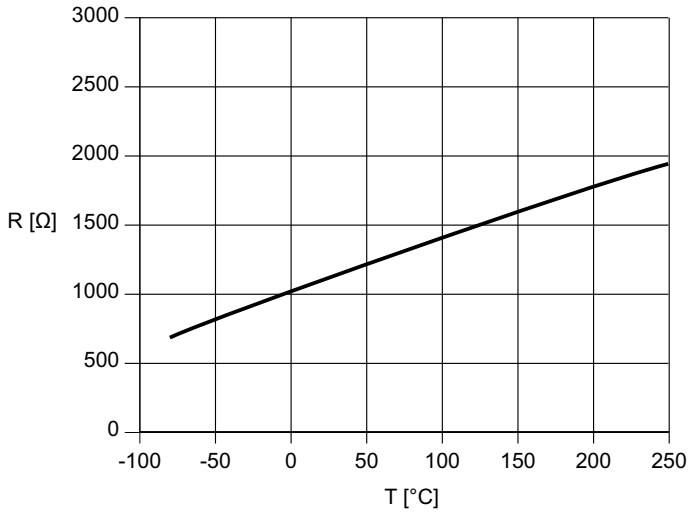
NOTICE

Excessive self-heating of the temperature sensor can damage the insulation of the temperature detection as well as the motor winding.

The drive system might be damaged.

- Avoid currents > 3 mA in the circuit of the PT1000.
- Observe the correct connection of the PT1000 to ensure correct evaluation of the temperature detection.

The characteristic curve in the following figure shows the resistance curve subject to the motor temperature.



17535480203

Technical data	PT1000
Connection	Black/red
Resistance at 20 – 25 °C per PT1000	1077 Ω < R < 1098 Ω
Test current	< 3 mA

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5.15.6 Forced cooling fan /V

- Connection in separate terminal box
- Max. connection cross section 3 × 1.5 mm² (3 × AWG 15)
- Cable gland M16 × 1.5

Motors	Operating mode/connection	Frequency Hz	Voltage V
DR..71 – 132, DRN71 – 132, DR2..71 – 80	1 ~ AC[1] (△)	50	100 – 127
DR..71 – 132, DRN71 – 132, DR2..71 – 80	3 ~ AC ⅄	50	175 – 220
DR..71 – 132, DRN71 – 132, DR2..71 – 80	3 ~ AC △	50	100 – 127
DR..71 – 180, DRN71 – 180, DR2..71 – 80	1 ~ AC[1] (△)	50	230 – 277
DR..71 – 315, DRN71 – 315, DR2..71 – 80	3 ~ AC ⅄	50	346 – 500
DR..71 – 315, DRN71 – 315, DR2..71 – 80	3 ~ AC △	50	200 – 290

1) Steinmetz circuit

Motors	Operating mode/connection	Frequency Hz	Voltage V
DR..71 – 132, DRN71 – 132, DR2..71 – 80	1 ~ AC[1] (△)	60	100 – 135
DR..71 – 132, DRN71 – 132, DR2..71 – 80	3 ~ AC ⅄	60	175 – 230
DR..71 – 132, DRN71 – 132, DR2..71 – 80	3 ~ AC △	60	100 – 135
DR..71 – 180, DRN71 – 180, DR2..71 – 80	1 ~ AC[1] (△)	60	230 – 277
DR..71 – 315, DRN71 – 315, DR2..71 – 80	3 ~ AC ⅄	60	380 – 575
DR..71 – 315, DRN71 – 315, DR2..71 – 80	3 ~ AC △	60	220 – 330

1) Steinmetz circuit

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Motors	Operating mode/connection	Voltage V
DR..71 – 132, DRN80 – 132, DR2..71 – 80	DC 24 V	24

INFORMATION

For information on how to connect the /V forced cooling fan, refer to chapter "Forced cooling fan /V" (→ 🗎 282).

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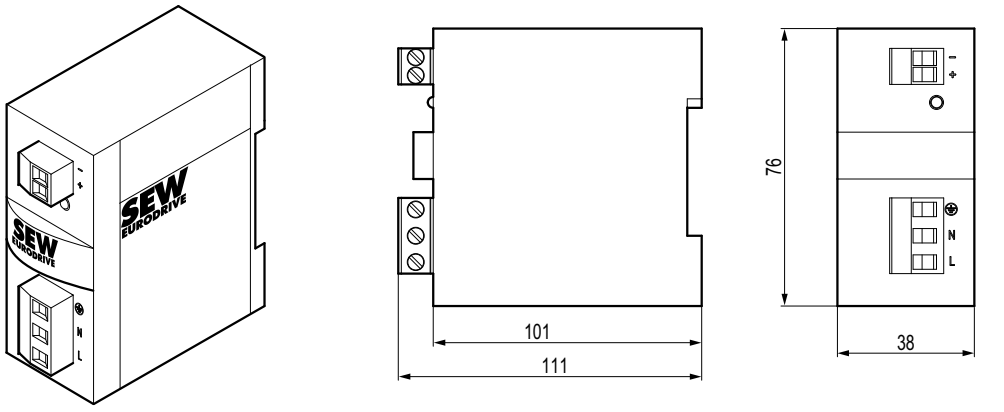
5.15.7 UWU52A switched-mode power supply

The forced cooling fan design V for DC 24 V furthermore includes the UWU52A switched-mode power supply, if you have ordered it. It can be ordered using the part number from SEW-EURODRIVE, even after the order has been placed.

The following figure depicts the UWU52A switched-mode power supply:



576533259

Input	AC 110 – 240 V 1.04 – 0.61 A 50/60 Hz
	DC 110 – 300 V 0.65 – 0.23 A
Output	DC 24 V 2.5 A (40 °C)
	DC 24 V 2.0 A (55 °C)
Connection	Screw terminals 1.5 – 2.5 mm^2, separable
Degree of protection	IP20 Mounting on EN 60715 TH35 mounting rail in the control cabinet
Part number	01881817

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5.15.8 Overview of add-on encoders

Refer to the wiring diagrams for information on how to connect add-on encoders:

Encoder	Motors	Encoder type	Mounting type	Supply DC V	Signal	Wiring diagram
ES7S	DR..71 – 132 DRN80 – 132S	Incremental	Shaft-centered	7 – 30	1 V_{PP} sin/cos	68180xx08
ES7R	DR..71 – 132 DRN80 – 132S	Incremental	Shaft-centered	7 – 30	TTL (RS422)	68179xx08
ES7C	DR..71 – 132 DRN80 – 132S	Incremental	Shaft-centered	4.5 – 30	HTL/TTL (RS422)	68179xx08
AS7W	DR..71 – 132 DRN80 – 132S	Absolute value	Shaft-centered	7 – 30	1 V_{pp} sin/cos+ RS485	68181xx08
AS7Y	DR..71 – 132 DRN80 – 132S	Absolute value	Shaft-centered	7 – 30	1 V_{pp} sin/cos + SSI	68182xx08
EG7S	DR..160 – 280 DRN132M – 280	Incremental	Shaft-centered	7 – 30	1 V_{PP} sin/cos	68180xx08
EG7R	DR..160 – 280 DRN132M – 280	Incremental	Shaft-centered	7 – 30	TTL (RS422)	68179xx08
EG7C	DR..160 – 280 DRN132M – 280	Incremental	Shaft-centered	4.5 – 30	HTL/TTL (RS422)	68179 xx08
AG7W	DR..160 – 280 DRN132M – 280	Absolute value	Shaft-centered	7 – 30	1 V_{pp} sin/cos+ RS485	68181xx08
AG7Y	DR..160 – 280, DRN132M – 280	Absolute value	Shaft-centered	7 – 30	1 V_{pp} sin/cos + SSI	68182xx08
EH7S	DR../DRN315	Incremental	Shaft-centered	10 – 30	1 V_{PP} sin/cos	08511xx08
EH7C	DR../DRN315	Incremental	Shaft-centered	10 – 30	HTL	08511xx08
EH7R	DR../DRN315	Incremental	Shaft-centered	10 – 30	TTL (RS422)	08511xx08
EH7T	DR../DRN315	Incremental	Shaft-centered	5	TTL (RS422)	08511xx08
AH7Y	DR../DRN315	Absolute value	Shaft-centered	9 – 30	TTL (RS422) +SSI	08259xx07
EV7S	DR..71 – 280 DRN80 – 280	Incremental	Flange centered	7 – 30	1 V_{PP} sin/cos	68180xx08
EV7R	DR..71 – 280 DRN80 – 280	Incremental	Flange centered	7 – 30	TTL (RS422)	68179xx08
EV7C	DR..71 – 280 DRN80 – 280	Incremental	Flange centered	4.5 – 30	HTL/TTL (RS422)	68179xx08
AV7W	DR..71 – 280 DRN80 – 280	Absolute value	Flange centered	7 – 30	1 V_{pp} sin/cos+ RS485	68181xx08
AV7Y	DR..71 – 280 DRN80 – 280	Absolute value	Flange centered	7 – 30	1 V_{pp} sin/cos + SSI	68182xx08
EK8S	DRN71 – 315 DR2..71 – 80	Incremental	Shaft-centered	7 – 30	1 V_{PP} sin/cos	63278995
EK8C	DRN71 – 315 DR2..71 – 80	Incremental	Shaft-centered	4.5 – 30	HTL/TTL (RS-422)	63279010

En-coder	Motors	Encoder type	Mounting type	Supply DC V	Signal	Wiring dia-gram
EK8R	DRN71 – 315 DR2..71 – 80	Incremental	Shaft-centered	7 – 30	TTL (RS-422)	63279029
AK8W	DRN71 – 315 DR2..71 – 80	Absolute value	Shaft-centered	7 – 30	1 V_{PP} sin/cos + RS485	63279037
AK8Y	DRN71 – 315 DR2..71 – 80	Absolute value	Shaft-centered	7 – 30	1 V_{PP} sin/cos + SSI	63279045
AK8H	DRN71 – 315 DR2..71 – 80	Absolute value	Shaft-centered	7 – 12	sin/cos + RS485 HIPERFACE®	63279053
EV8S	DRN71 – 280 DR2..71 – 80	Incremental	Flange centered	7 – 30	1 V_{PP} sin/cos	63278995
EV8C	DRN71 – 280 DR2..71 – 80	Incremental	Flange centered	4.5 – 30	HTL / TTL (RS-422)	63279010
EV8R	DRN71 – 280 DR2..71 – 80	Incremental	Flange centered	7 – 30	TTL (RS-422)	63279029
AV8W	DRN71 – 280 DR2..71 – 80	Absolute value	Flange centered	7 – 30	1 V_{PP} sin/cos + RS485	63279037
AV8Y	DRN71 – 280 DR2..71 – 80	Absolute value	Flange centered	7 – 30	1 V_{PP} sin/cos + SSI	63279045
AV8H	DRN71 – 280 DR2..71 – 80	Absolute value	Flange centered	7 – 12	sin/cos + RS485 HIPERFACE®	63279053

INFORMATION

- Maximum oscillation load for encoders ≤ 10 g ≈ 100 m/s² (10 Hz to 2 kHz)
- Shock resistance = 100 g ≈ 1000 m/s² for DR..71 – 132, DRN80 – 132S motors
- Shock resistance = 200 g ≈ 2000 m/s² for DR..160 – 315, DRN132M – 315 motors

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5.15.9 Overview of optical status messages for built-in encoders

INFORMATION

Refer to the wiring diagram for information on how to connect the built-in encoder.

- Observe the information in chapter "Wiring diagrams" (→ 🗎 269) for connection via terminal strip.
- Refer to the enclosed wiring diagram when connecting the EI7. built-in encoder via the M12 connector.
- Refer to the enclosed wiring diagram when connecting the EI8. built-in encoder via the M23 connector.

Encoder	Motors	Supply in DC V	Signals
EI71	DR..71 – 132 DRN71 – 132S DR2..71 – 80 DRN63 (only EI7C)	9 – 30	HTL 1 period/revolution
EI72		9 – 30	HTL 2 periods/revolution
EI76		9 – 30	HTL 6 periods/revolution
EI7C		9 – 30	HTL 24 periods/revolution
EI8R	DRN71 – 132S DR2..71 – 80	7 – 30	TTL (RS-422) 1024 periods/revolution
EI8C	DRN71 – 132S DR2..71 – 80	7 – 30	HTL 1024 periods/revolution

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EI7. B – visual feedback

The EI7. encoders use 2 bi-colored LEDs (red + green each) for visual feedback on the operating state.

LED H1 (at cable output of the encoder) – status and errors

The green LED indicates the status or the configuration of the encoder. It flashes. The flashing frequency indicates the set number of periods.

LED H1 green	
Frequency	**Status/configuration**
LED off	Encoder without voltage or faulty
0.6 Hz	EI71 (1 period per revolution)
1.2 Hz	EI71 (2 periods per revolution)
3 Hz	EI76 (6 periods per revolution)
15 Hz	EI7C (24 periods per revolution)
LED lit continuously	Encoder defective

The red LED is lit when the encoder detects an error.

LED H1 red	
Flash code	**Meaning**
10 s with 1 Hz and 2 s continuous	No valid number of periods can be set
other	Output driver signals a fault (e.g. short circuit or overtemperature)

The H2 LED gives visual feedback on the signal track status.

LED color	Track A	Track B	Track A	Track B
Orange (green and red)	0	0	1	1
Red	0	1	1	0
Green	1	0	0	1
Off	1	1	0	0

EI8. – visual feedback

The EI8. built-in encoders report their operating state visually via a duo LED.

LED light pattern	Meaning
Off	Encoder not supplied or defective
Permanent green light	Encoder operational, no errors
Red/orange, permanent or flashing light	Encoder reports self-diagnostic information or an error. The content depends on the color pattern and frequency.

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Diagnostics LED color orange/red	Meaning and measures
Red	Encoder diagnostics has detected an error. Permanently lit: Error regarding the internal encoder sensors (incremental sensors) Flashes 5 Hz: Error regarding the internal encoder sensors (index sensors): • Check the encoder and pole ring for damage or magnetizable contamination and replace or clean if necessary. • Check the fan to ensure it is seated correctly and check the distance between the pole ring and encoder. If necessary, readjust and resecure the fan and pole ring (see chapter "Removing and mounting built-in encoder EI8." (→ 🗎 167)). Flashes 1 Hz: Error regarding the encoder module electrical interface: • Short circuit/overcurrent of the signal tracks: Eliminate the short circuit or limit the output current of the encoder module. • Interference on the signal tracks: Eliminate the external interference. Observe the information regarding connection technology.
Orange	Encoder diagnostics signals a warning (function of the encoder is given, maintenance may be required) Permanently lit: Warning regarding the internal encoder sensors (incremental sensors). • Implement any necessary measures (see "Diagnostics red") as maintenance measures. Flashes 1 Hz: Warning regarding the internal memory (encoder signal correction). • The encoder signal correction is reinitialized every time the encoder is started.

If none of the measures are successful, please contact the SEW-EURODRIVE Service department in the event of an error. In this case, decommission the built-in encoder.

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5.15.10 Installation notes for encoders

When connecting the encoder to the inverter, observe the provided wiring diagrams and the information in these operating instructions as well as the operating instructions/wiring diagrams of the inverter and the operating instructions/wiring diagrams provided with the third-party encoder.

Proceed as described in chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127) to mount the encoders. Observe the following information:

- Maximum line length (inverter to encoder):
  - 100 m with a capacitance per unit length core – shield ≤ 110 nF/km
  - 100 m with a capacitance per unit length core – core ≤ 85 nF/km
- Core cross-section: 0.20 – 0.5 mm^2; recommendation ≥ 0.25 mm^2
- Use shielded cable with twisted pair cores and apply shield over large area on both ends:
  - In the cable gland of the encoder connection cover or in the encoder connector
  - To the inverter on the electronics shield clamp and to the housing of the D-sub connector
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm.
- Compare the operating voltage with the permitted operating voltage range on the encoder nameplate. Deviations in the operating voltage may overheat and damage the encoder.
- SEW-EURODRIVE recommends the use of stabilized voltage sources and separate supply systems for encoder or other sensor components and active components such as switches and light barriers.
- Supplies with voltage transients and interferences higher than the supply voltage U_B are not permitted.
- Observe the clamping area of 5 to 10 mm of the cable gland of the connection cover. If you use cables with a different cross section, you have to replace the provided cable gland with another suitable EMC-compliant cable gland.
- The cable glands for the cable entry must meet the following conditions:
  - Cramping area is suitable for the used cable(s)
  - The IP degree of protection of the encoder connection is at least as high as the IP degree of protection of the actual encoder
  - The operating temperature range matches the designated ambient temperature range.
- Check the flawless state and the proper seat of the connection cover gasket.
- Tighten the screws of the connection cover with a tightening torque of 2.25 Nm.

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Minimum requirements for encoder cables

Make sure that self-assembled cables fulfill the following requirements:

- Cross section of voltage supply cable:
  - At least 0.25 mm^2 for cable lengths up to 50 m.
  - At least 0.5 mm^2 for cable lengths up to 100 m.
- Cross section of the signal wire:
  - At least 0.25 mm^2.
- Capacitance per unit length:
  - Maximum 70 pF/m – core/core.
  - Maximum 120 pF/m – core/shield.
- The cable must be shielded.
- Differential signals must be routed via twisted wires e.g. Data+ and Data-.

5.15.11 Anti-condensation heating

To protect a shutdown motor from freezing up (rotor blockage) or condensation inside the motor, it can be equipped with an optional anti-condensation heating. The anti-condensation heating consists of strip heaters that are integrated in the winding overhang and supplied with voltage when the motor is switched off. The motor is heated by the current flowing through the strip heaters.

The strip heaters are controlled according to the following principle:

- Motor switched off → anti-condensation heating activated
- Motor switched on → anti-condensation heating deactivated

Observe the permitted voltage according to the nameplate and the enclosed terminal assignment diagram.

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6 Startup

INFORMATION

- It is essential to comply with the safety notes in chapter 2 during installation.
- In case of problems, refer to chapter "Malfunctions" (→ 🗎 263).

If components with functional safety are installed in the motor, observe the following safety note:

⚠ 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.

⚠ WARNING

Electric shock due to incorrect installation.

Severe or fatal injuries.

- Use switch contacts in utilization category AC-3 according to EN 60947-4-1 for switching the motor.
- When motors are powered by inverters, you must adhere to the wiring instructions in the frequency inverter operating instructions.

⚠ 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}) may not be exceeded, not even for acceleration.

The drive system might be damaged.

- Limit the maximum current at the inverter.

INFORMATION

Limit the maximum speed at the inverter. For information on the procedure, refer to the documentation of the inverter.

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INFORMATION

When using DR..250 – 280, DRN250 – 280 motors with BE brake and encoder, observe the following information:

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

6.1 Before startup

Prior to startup make sure that:

- The drive is undamaged and not blocked.
- Any transport locks have been removed.
- The measures stipulated in chapter "Preliminary work after longer periods of storage" (→ 🗎 33) are performed after storage periods longer than 9 months.
- All connections have been made correctly.
- The direction of rotation of the motor/gearmotor is correct.
  - Motor rotating clockwise: U, V, W (T1, T2, T3) to L1, L2, L3
- All protective covers are installed correctly.
- All motor protection equipment is active and set for the rated motor current.
- There are no other sources of danger.
- Loose elements like keys are appropriately secured.
- The brake is not manually released.
  - The set screw of /HF option is loosened correctly.
  - The hand lever of the /HR option has been removed and correctly attached to the stator using the designated clamps.

6.2 Motors with reinforced bearing

NOTICE

Damage to bearings due to impermissible heating of bearing and motor.

Bearing damage.

- Do not operate cylindrical roller bearings without overhung load.

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6.3 Motors with backstop /RS

An /RS backstop is used to block/prevent a direction of rotation of the motor. The direction of rotation is indicated by an arrow on the fan guard of the motor or on the device housing.

Observe the direction of rotation of the end shaft and the number of stages when you mount the motor to the gear unit. Do not start up the motor in blocking direction (note the correct phase angle when connecting the motor). For inspection purposes, you can operate the backstop once with half the motor voltage in blocking direction.

If a conversion is required to change the blocking direction, follow the instructions in chapter "Altering the blocking direction on motors with a backstop" (→ 🗎 219).

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7 Inspection/maintenance

⚠ 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

Inhaling, swallowing brake abrasion when releasing the brake.

Irritation of the respiratory tract and respiratory organs.

- ✓ Wear a respirator of class FFP2 during the maintenance of brakemotors.
- Avoid swirling of the brake abrasion.
- Remove the brake abrasion with suitable extraction systems or damp cloths that bind dust.
- Make sure that there is adequate ventilation in the work environment.

⚠ 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

Damage to the oil seals if the temperature is too low during installation.

Possible damage to the oil seals.

- Before assembly, make sure that ambient temperature and the temperature of the oil seal are not below 0 °C.

INFORMATION

Apply grease with a grease depot to the lip of the oil seal before assembly. For further information on lubricants, refer to chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).

INFORMATION

Friction disks at brakemotors may only be replaced by the SEW-EURODRIVE service.

Repairs

Only SEW-EURODRIVE 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.

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Always perform safety and functional checks following all maintenance and repair work (thermal protection).

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7.1 Inspection and maintenance intervals

The following table lists the inspection and maintenance intervals:

Device/part of device	Time interval	What to do?
Brake BE02	• **If used as a working brake:** At least every 3000 operating hours[1)] • **If used as a holding brake:** Every 0.5 to 4 years, depending on the operating conditions[1)]	Inspect the brake • Measure the brake lining carrier thickness • Inspect the switch contacts and replace them, if necessary (e.g. in case of burnout)
Brake BE03	• **If used as a working brake:** At least every 3000 operating hours[1)] • **If used as a holding brake:** Every 0.5 to 4 years, depending on the operating conditions[1)]	Inspect the brake • Measure the working air gap • Inspect the switch contacts and replace them, if necessary (e.g. in case of burnout)
Brakes BE05 – BE122	• **If used as a working brake:** At least every 3000 operating hours[1)] • **If used as a holding brake:** Every 0.5 to 4 years, depending on the operating conditions[1)]	Inspect the brake: • Measure the brake disk thickness • Brake disk, lining • Measure and set the working air gap • Pressure plate • Driver/gearing • Pressure rings • Suck off any abrasion • Inspect the switch contacts and replace them, if necessary (e.g. in case of burnout)
Motor	• **Every 10000 operating hours**[2)3)]	Motor inspection: • Check rolling bearing and change if necessary • Replace the oil seal • Clean the cooling air ducts
Drive	• Differing[3)]	• Touch up or renew the surface/anti-corrosion coating • Check and clean the air filter. • If applicable, clean condensation drain hole at the bottom of the fan guard • Clean clogged bores
Connection cables	• Regularly	Inspect cables • Check for damages and replace the connection cable if necessary.

1) Wear times are subject to many factors and can be quite short. The system manufacturer must calculate the required inspection/maintenance intervals individually in accordance with the project planning documents.

2) For the DR../DRN225 – 315 motors with relubrication device, note the shortened relubrication periods in chapter "Bearing lubrication".

3) The interval depends on outer influences and can be very short, e.g. in the event of high dust concentration in the environment.

If you open the motor during inspection/maintenance, you have to clean it before you close it.

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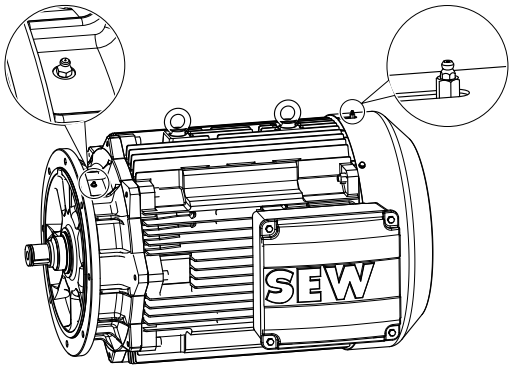
7.2 Bearing lubrication

7.2.1 Bearing lubrication for DR..71 – 280, DRN63 – 280, DR2..56 – 80 motors

In standard design, the bearings are lubricated for life.

7.2.2 Bearing lubrication for DR..250 – 315, DRN225 – 315 motors with relubrication device /NS

Motors of nominal sizes 225, 250, 280, and 315 can be equipped with a relubrication device. The following figure shows the positions of the lubrication devices.



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Under normal operating conditions and at an ambient temperature between -20 °C to +40 °C, SEW-EURODRIVE uses Mobil Polyrex EM (K2P-20 DIN 51825), a polyurea-based mineral high-performance, high-temperature grease for initial lubrication.

For motors in the low temperature range up to -40 °C, SEW-EURODRIVE uses SKF GXN or LGHP2, which are also a polyurea-based mineral greases.

Relubrication

The grease can be purchased from SEW-EURODRIVE in 400 g cartridges. For the relevant order information, refer to chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).

INFORMATION

Only mix lubricants of the same thickness type, the same base oil and the same consistency (NLGI class).

Grease the motor bearings in accordance with the information on the lubricant plate. The used grease collects inside the motor and should be removed every 6 to 8 relubrication cycles during an inspection. Each time you relubricate the bearings, ensure that the bearing is two-thirds full.

Start up the motors slowly after lubrication so that the grease is distributed evenly.

The relubrication channels leading the grease from the grease nipples to the bearings must always be filled with grease. This is usually ensured be adhering to the relubrication intervals. During maintenance work, the grease may remain in the channels and does not need to be removed.

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Re-lubrication period

For the relubrication intervals of the bearings, adhere to the requirements stated in the table:

- Ambient temperature: -20 °C to +40 °C
- Rated speed that corresponds to that of a 4-pole AC motor
- Normal load

In case of higher ambient temperatures, higher speeds, or larger loads, the relubrication intervals are shorter. Use 1.5 times of the stated quantity for the initial filling.

The relubrication channels leading the grease from the grease nipples to the bearings must always be filled with grease. This is usually ensured be adhering to the relubrication intervals. During maintenance work, the grease may remain in the channels and does not need to be removed.

Motors with option	Horizontal mounting position		Vertical mounting position	
	Duration	Quantity	Duration	Quantity
DR../DRN225 – 315 /NS	5000 h	50 g	3000 h	70 g
DR../DRN225 – 315 /ERF /NS	3000 h	50 g	2000 h	70 g

7.3 Reinforced bearings

NOTICE

Damage to bearings due to impermissible heating of bearing and motor.

Bearing damage.

- Do not operate cylindrical roller bearings without overhung load.

In the /ERF (reinforced bearing) option, cylindrical rolling bearings are installed on the A-side. The reinforced bearings must have overhung load applied to them and must never be operated without overhung load.

The reinforced bearings are only offered with the /NS (relubrication) option so as to facilitate optimal lubrication of the bearing.

Observe the notes on bearing lubrication in chapter "Bearing lubrication for DR..250 – 315, DRN225 – 315 motors with relubrication device /NS" (→ 🗎 125).

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7.4 Motor and brake maintenance – preliminary work

⚠ WARNING

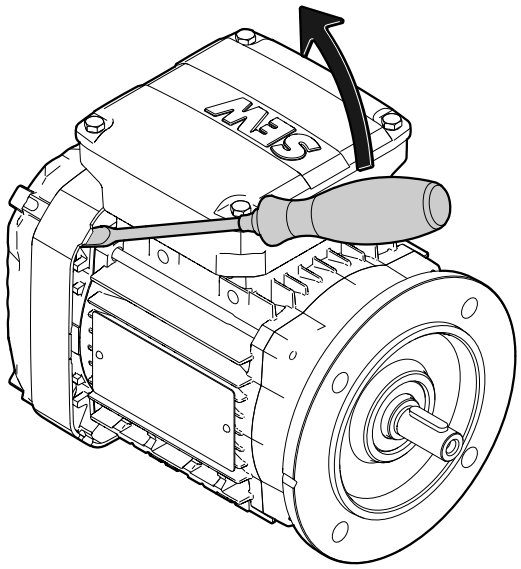
Risk of injury if the drive starts up unintentionally.

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.

7.4.1 Removing/installing the fan guard for DRN63 – 71, DR2..63 – 71 motors

The fan guard for DRN63 – 71, DR2..63 – 71 motors is attached using clips.



9007222099799435

Removing the fan guard

Proceed as follows to remove the fan guard:

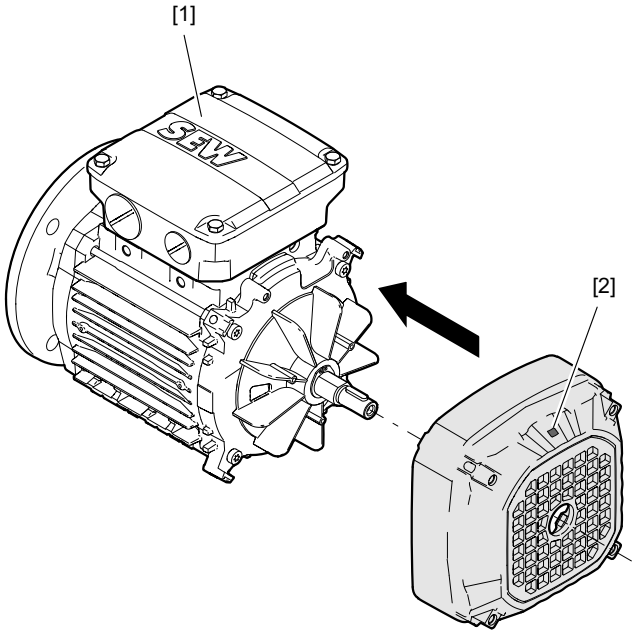
1. Using a suitable tool, lever out at least 2 adjacent detents.
   - ⇨ **With EI.. encoder option**: Lever out the detent pair opposite of the terminal box.
2. Pull the detents over the latching cams of the endshield.
   - ⇨ In case of DRN63, DR2..63, loosening all 4 fan guard connections may be required to remove the fan guard, depending on the option.

To request for a replacement in case the fan guard is damaged, contact SEW-EURODRIVE.

Reassembly

- ✓ The rectangular marking on the fan guard [2] must point in direction of the terminal box [1].

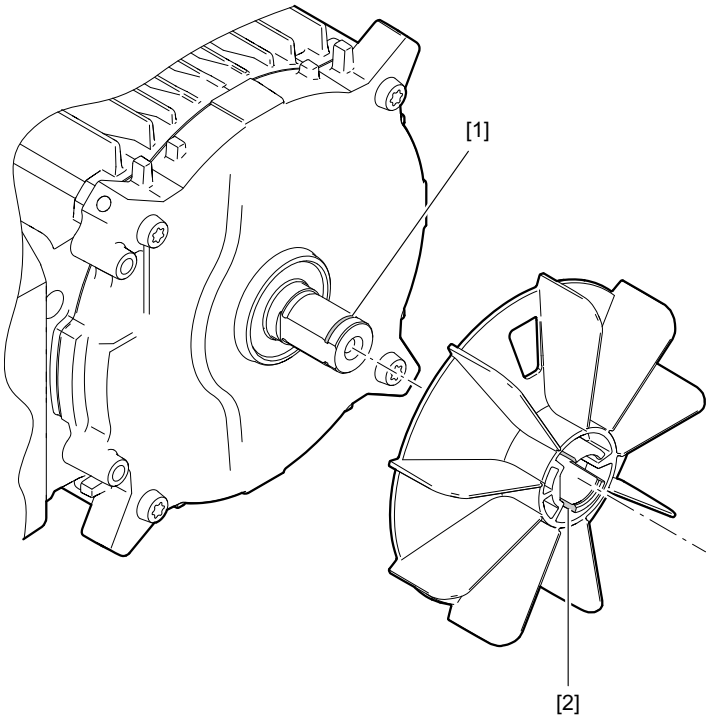
1. Evenly push the detents of the fan guard onto the latching cams until they snap in.



27830526347

7.4.2 Removing/installing the plastic fan for DR..71, DRN63 – 71, DR2..56 – 71 motors

The plastic fan [2] for DR..71, DRN63 – 71, DR2..56 – 71 motors is attached using clips.



23761871115

Removing the fan

Proceed as follows to remove the plastic fan:

✓ Required tools: 1 puller.

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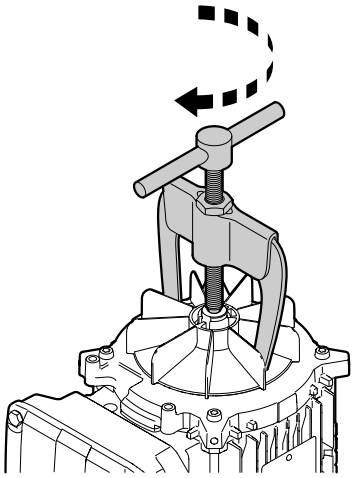
1. Pull off the fan [2] from the shaft [1] using the puller.
   ⇨ The detent is pulled out of the latching groove.
2. Check that the detent of the fan is not damaged.

To request a replacement in case the fan is damaged, please contact SEW-EURODRIVE.

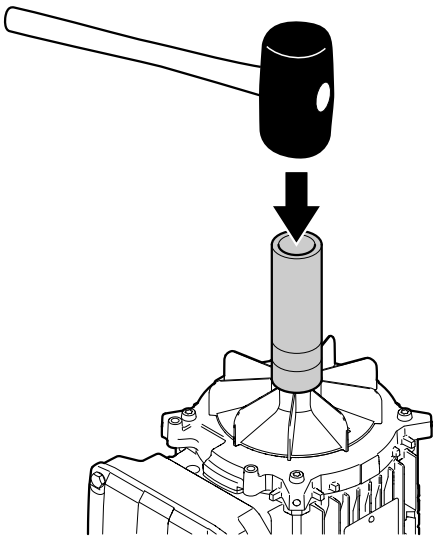


23761866251

Reassembly

✓ Required tools: 1 hammer, 1 hammer insertion tool.

1. Position the fan centrally on the shaft using the precentering.
2. Mount the fan to the shaft using the plain hammer insertion tool and the hammer. The hammer insertion tool must not be placed on the detent but must have a larger diameter.
   ⇨ When the detent snaps into the latching groove, a click can be clearly heard.
3. Check if the detent is snapped into the latching groove.



23761868683

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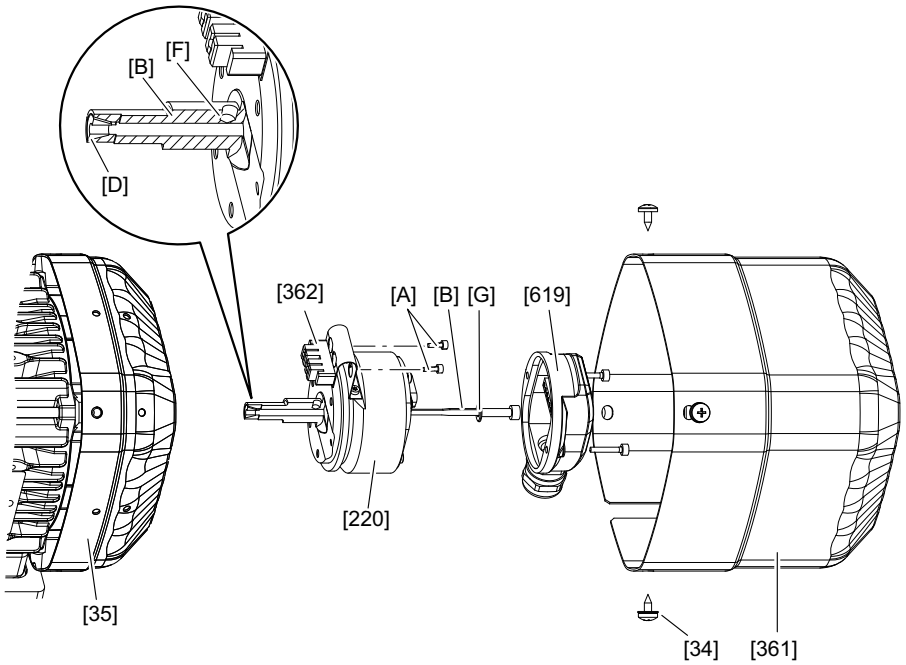
7.4.3 Removing rotary encoders from DR..71 – 132, DRN80 – 132S motors

The following figure illustrates the disassembly procedure using the ES7. rotary encoder as an example:



9007201837842187

[34]	Tapping screw	[A]	Retaining screws for the torque bracket
[35]	Fan guard	[B]	Central retaining screw
[220]	Encoder	[D]	Cone
[361]	Safety cover	[F]	Bore
[362]	Expansion anchor	[G]	Tooth lock washer
[619]	Connection cover		

Disassembling ES7./AS7.encoders

1. Remove the safety cover [361], or the forced cooling fan if required.
2. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
3. Make sure the cone [D] doesn't fall out while the central retaining screw [B] is loosened. Loosen the central retaining screw [B] by 2 – 3 turns. Loosen the cone [D] by tapping lightly onto the screw head.
4. To loosen the expansion anchor [362], remove the retaining screw of the torque bracket [A]. Carefully pull the encoder [220] from the rotor bore.

Reassembly

1. Apply a contact corrosion prevention compound, e.g. NOCO® fluid to the encoder pin.
2. Place the expansion anchor [362] at the torque bracket of the encoder.
3. Push the encoder into the bore in the shaft end to the stop.
4. Tighten the central retaining screw [B] with the inserted tooth lock washer [G].
   ⇨ Tightening torque 2.75 Nm.
5. Press the expansion anchor [362] into the fan guard [35] and check if it is seated correctly.
6. Screw the retaining screws of the torque bracket [A] into the expansion anchor [362] until the stop. Tighten the retaining screws of the torque bracket [A].
   ⇨ Tightening torque 2.25 Nm.
7. Screw on the connection cover [619].
   ⇨ Tightening torque 2.25 Nm.
8. Mount the safety cover [361] onto the forced cooling fan.

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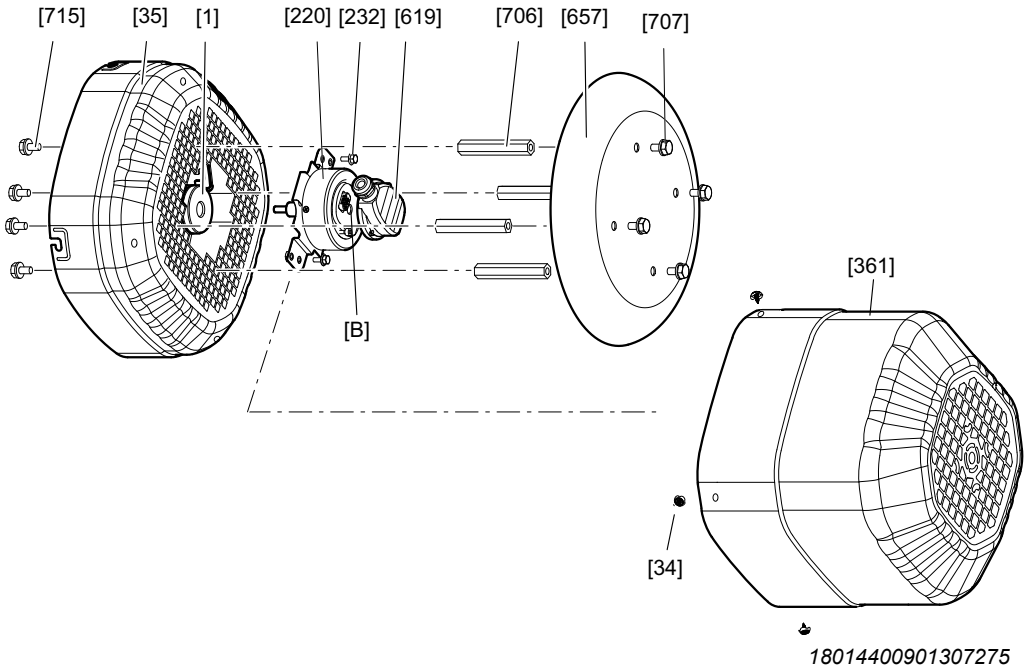
7.4.4 Removing rotary encoders from DR..160 – 280, DRN132M – 280 motors

The following figure illustrates the disassembly procedure using the EG7. rotary encoder as an example:



18014400901307275

[1]	Rotor	[B]	Central retaining screw
[34]	Tapping screw	[619]	Connection cover
[35]	Fan guard	[657]	Canopy
[220]	Encoder	[706]	Spacer bolt
[232]	Screws	[707] [715]	Screws
[361]	Safety cover	[A]	Screws

Removing EG7., AG7. encoders

1. Proceed as follows, depending on the design:
   - ⇨ **With canopy:** Remove the screws [707] to disassemble the canopy [657]. If required, counter using a hexagon wrench SW13 on the spacer bolt [706].
   - ⇨ **Without canopy:** Remove the screws [34] to disassemble the safety cover [361].
2. Remove the forced cooling fan if required.
3. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
4. Remove the retaining screws of the torque bracket [232].
5. Loosen the central retaining screw [B] by 2 – 3 turns to pull off the encoder [220].

Reassembly

1. Apply a contact corrosion prevention compound, e.g. NOCO® fluid to the encoder pin.
2. Push the encoder into the bore in the shaft end to the stop.
3. Tighten the central retaining screw [B] with the inserted tooth lock washer [G].
   ⇨ Tightening torque 8 Nm.
4. Tighten the retaining screws of the torque bracket [232].
   ⇨ Tightening torque 6 Nm.
5. Screw on the connection cover [619].
   ⇨ Tightening torque 2.25 Nm.
6. Mount the safety cover [361] onto the forced cooling fan.
7. Mount the canopy [657] if necessary.

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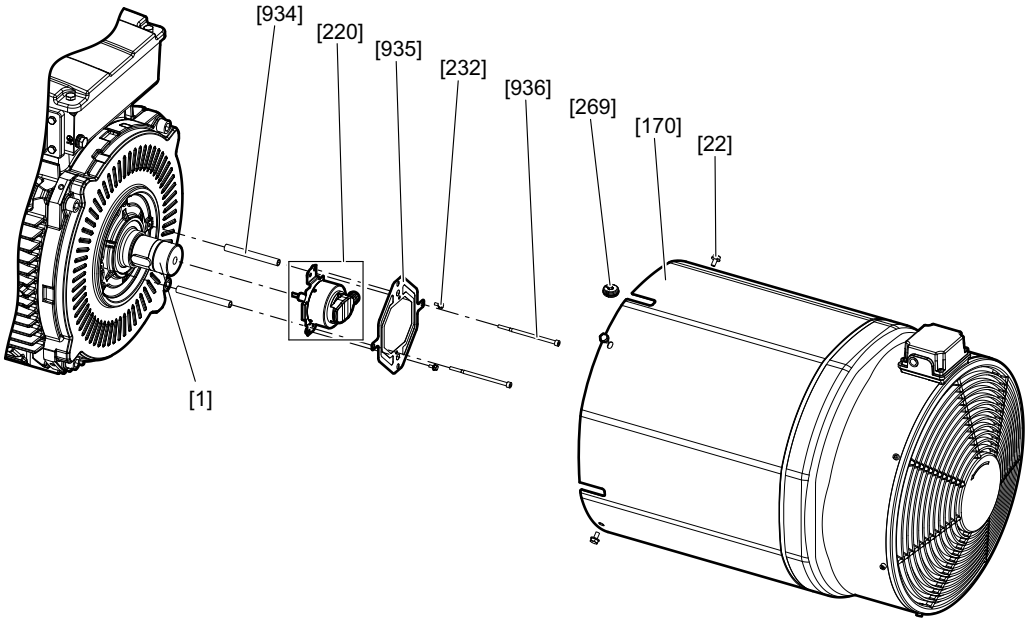
7.4.5 Removing the rotary encoder from DR..160 – 225, DRN132M – 315 motors with /V forced cooling fan option

The following figure illustrates the disassembly procedure using the EG7. rotary encoder as an example:



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[22]	Screw	[935]	Torque bracket
[170]	Forced cooling fan guard	[936]	Screw
[232]	Screws	[934]	Spacer bushing
[269]	Cable grommet	[220]	Encoder

Removing EG7., AG7. encoders

1. Remove the screws [22] to disassemble the forced cooling fan [170].
2. Remove the cable grommet [269] with the encoder cable from the forced cooling fan [170].
3. Remove the screws [232] and [936] to disassemble the torque bracket [935].
4. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
5. Loosen the central retaining screw [B] by 2 – 3 turns to pull off the encoder [220].

Reassembly

1. Apply a contact corrosion prevention compound, e.g. NOCO® fluid to the encoder pin.
2. Push the encoder into the bore in the shaft end to the stop.
3. Tighten the central retaining screw [B] with the inserted tooth lock washer [G].
   ⇨ Tightening torque 8 Nm.
4. Place the torque bracket [935] onto the spacer bushing [934] and tighten the screws [936].
   ⇨ Tightening torque 11 Nm.
5. Tighten the retaining screws of the torque bracket [232].
   ⇨ Tightening torque 6 Nm.
6. Insert the cable grommet [269] into the forced cooling fan [170].
7. Mount the forced cooling fan [170] and tighten the screws [22].
   ⇨ Tightening torque 28 Nm.

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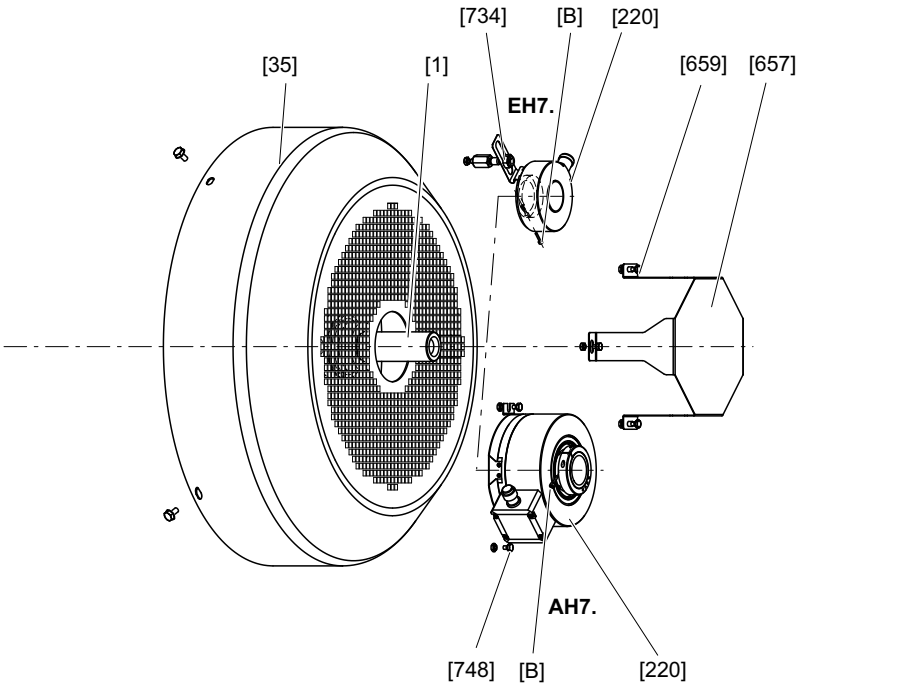
7.4.6 Removing rotary encoders from DR..315, DRN315 motors

The following figure illustrates the disassembly procedure using the EH7. and AH7. rotary encoders as an example:



18014398917111435

[35]	Fan guard	[659]	Screw
[220]	Encoder	[734]	Nut
[B]	Central retaining screw	[748]	Screw
[657]	Cover plate		

Removing EH7., AH7. encoders

1. Remove the screws [659] to disassemble the cover plate [657].
2. Depending on the design, remove the encoder [220] from the fan guard [35] as follows:
   - ⇨ **EH7.:** Remove the nut [734].
   - ⇨ **AH7.:** Remove screw [748].
3. Loosen the central retaining screw [B] by 2 – 3 turns to pull off the encoder [220].

Reassembly

1. Push the encoder into the bore in the shaft end to the stop.
2. Tighten the central retaining screw [B].
   - ⇨ **EH7.:** Tightening torque 3 Nm.
   - ⇨ **AH7.:** Tightening torque 2 Nm.
3. Proceed as follows, depending on encoder:
   - ⇨ **EH7.:** Install the nut [734].
   - ⇨ **AH7.:** Insert and tighten screw [748].
4. Mount the cover plate [657] using the screws [659].

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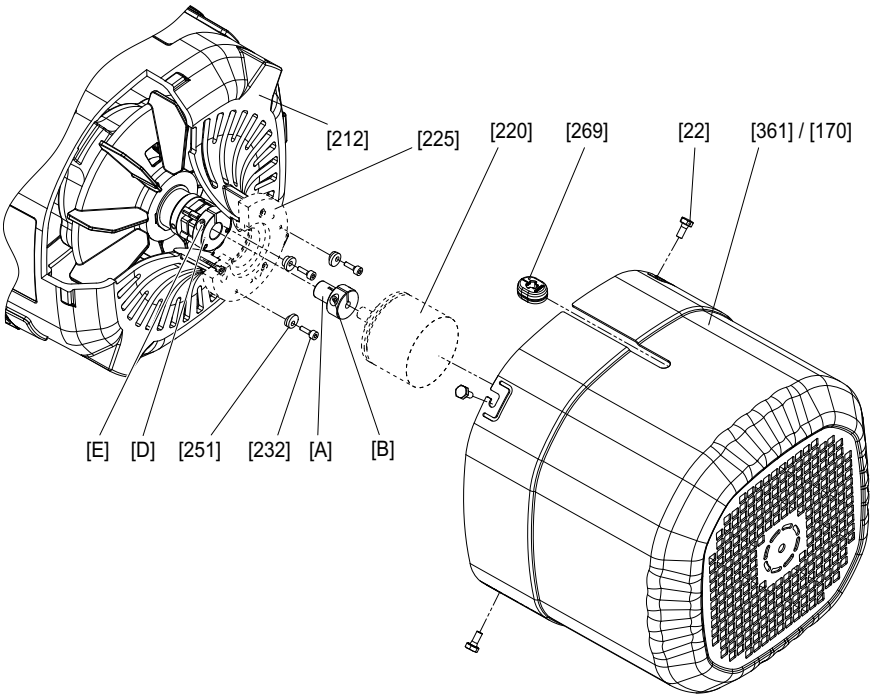
7.4.7 Mounting/removing rotary encoders with XV../EV../AV.. encoder mounting adapter for DR..71 – 225, DRN71 – 225, DR2..71 – 80 motors

The following figure illustrates the disassembly procedure using a third-party encoder as an example:



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[22]	Screw	[361]	Safety cover (normal/long)
[170]	Forced cooling fan guard	[269]	Cable grommet
[212]	Fan guard with encoder mount	[A]	Adapter
[220]	Encoder	[B]	Clamping screw
[225]	Intermediate flange (not with XV1A)	[D]	Coupling (spread- or solid shaft coupling)
[232]	Retaining screws (enclosed with XV1A and XV2A)	[E]	Clamping screw
[251]	Conical spring washers (enclosed with XV1A and XV2A)		

Removing the XV.., EV.., AV.. encoders

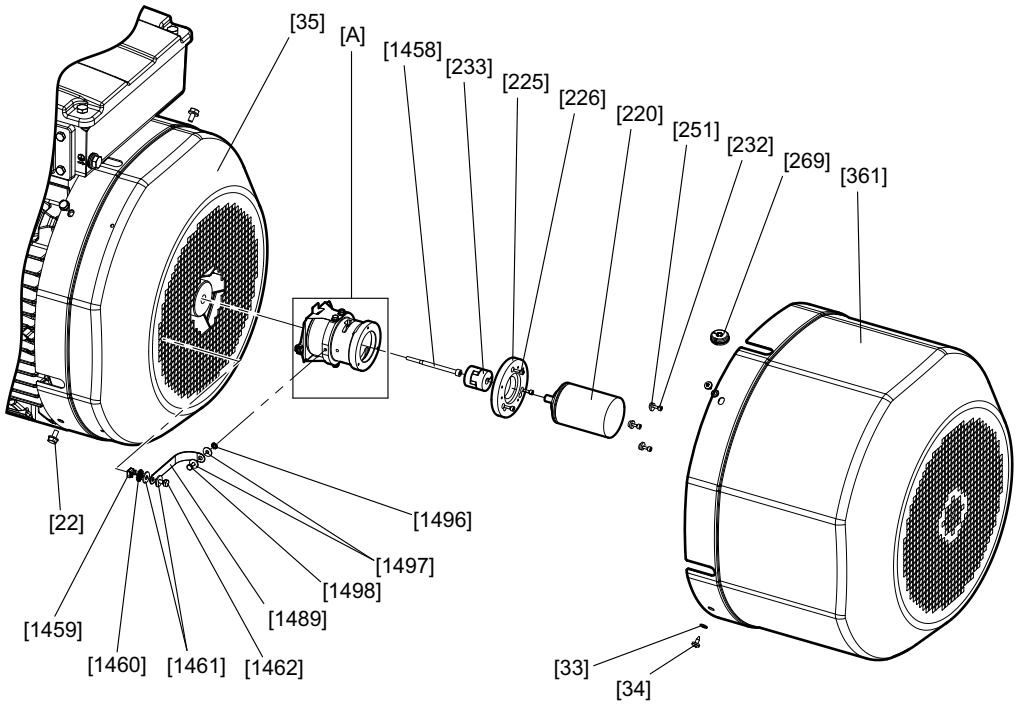
1. Remove the safety cover [361], or the forced cooling fan if required.
2. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
3. Loosen the clamping screw [E] of the coupling.
4. Remove adapter [A] and encoder [220].

Reassembly

1. Proceed as described in chapter "Encoder mounting adapter" (→ 🗎 40) to mount the encoder.

7.4.8 Mounting/removing rotary encoders with XV../EV../AV.. encoder mounting adapter for DR..250 – 280, DRN250 – 280 motors

The following figure illustrates the disassembly procedure using a third-party encoder as an example:



18014406225445899

[22]	Screw	[361]	Safety cover (normal/long)
[33]	Washer	[1458]	Screw
[34]	Screw	[1459]	Cage nut
[35]	Fan guard	[1460]	Serrated lock washer
[220]	Encoder	[1461]	Washer
[225]	Intermediate flange (optional)	[1462]	Screw
[226]	Screw	[1489]	Ground strap
[232]	Screws (enclosed with .V1A and .V2A)	[1496]	Serrated lock washer
[233]	Coupling	[1497]	Washer
[251]	Conical spring washers (enclosed with .V1A and .V2A)	[1498]	Screw
[269]	Cable grommet	[A]	Encoder mounting adapter

Removing the encoder mounting adapter

1. Remove the screws [34] to disassemble the safety cover [361].
2. Remove the encoder [220], see chapter "Removing EV.., AV.. encoders" (→ 🗎 141).
3. In order to remove the ground strap [1489] from the encoder mounting adapter [A], loosen the serrated lock washer [1496], washer [1497], and screw [1498].
4. Remove the screws [22] to disassemble the fan guard [35].
5. Loosen the screw [1458] to remove the encoder mounting adapter [A].
   - ⇨ **If the encoder mounting adapter cannot easily be removed:** Screw an M6 set screw (length 20 – 35 mm) hand tight in the rotor bore. Screw an M8 set screw (length > 10 mm) into the same bore and push the encoder mounting adapter [A] off the rotor [1]. Remove the M6 set screw from the rotor bore.

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Removing EV.., AV.. encoders

1. Remove the screws [34] to disassemble the safety cover [361].
2. Pull out the cable grommet [269] together with the encoder cable from the safety cover [361].
3. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
4. Loosen the screw at the coupling clamping hub [233] at the encoder end, the screw can be accessed through the slots of the encoder mounting adapter [A].
5. Remove the encoder [220] from the encoder mounting adapter [A] or the intermediate flange [225].

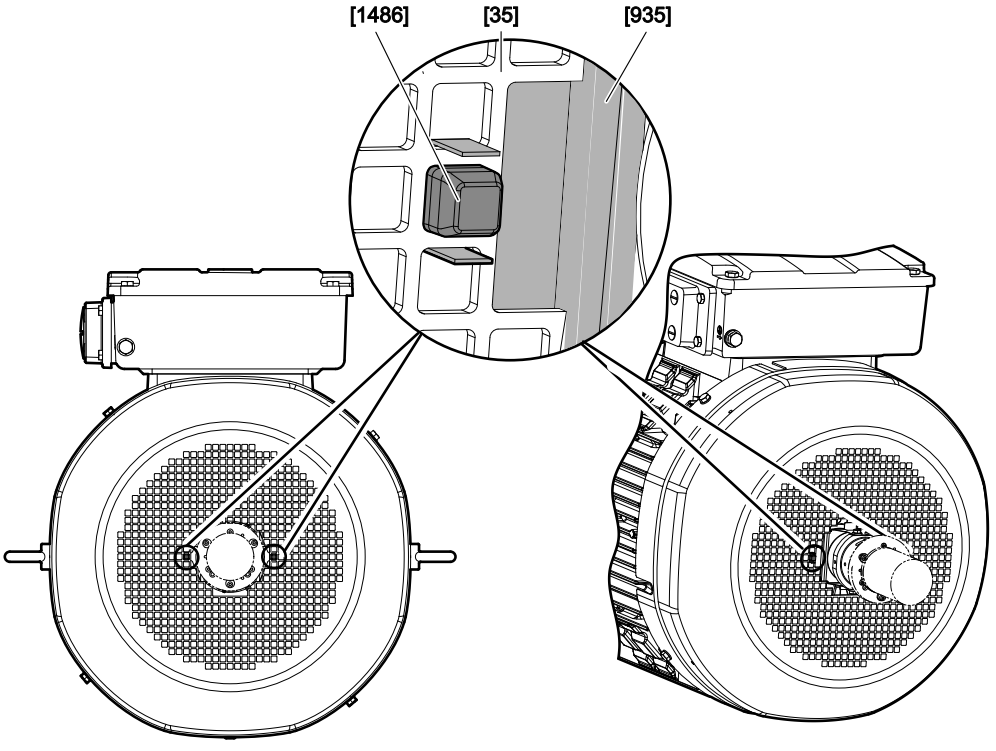
Reassembly

1. Proceed as described in chapter "Encoder mounting adapter" (→ 🗎 40) to mount the encoder.

INFORMATION

When re-installing the fan guard [35], make sure that the torque is supported:

The damping elements [1486] on both sides of the encoder mounting adapter [A] must engage with the ventilation grid (see figure below). The torque plate [935] must protrude from the grid to the left and to the right of the damping element.



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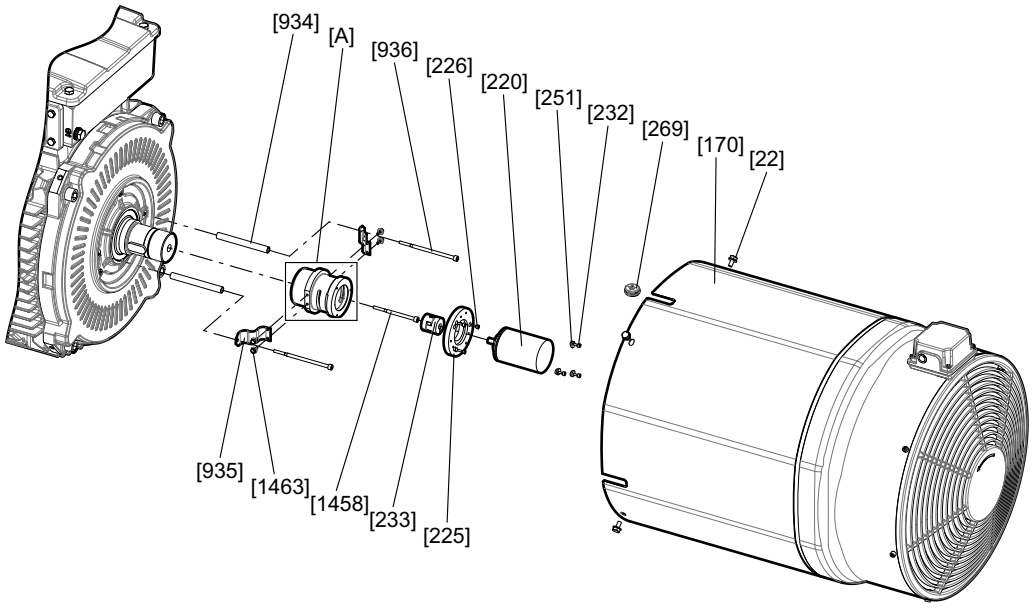
7.4.9 Mounting/removing the rotary encoder with EV../AV../XV.. encoder mounting adapter for DR..250 – 280, DRN250 – 280 motors with /V forced cooling fan option

The following figure illustrates the disassembly procedure using a third-party encoder as an example:



7715965835

[22]	Screw	[269]	Cable grommet
[170]	Forced cooling fan guard	[934]	Spacer bushing
[220]	Encoder	[935]	Torque bracket
[225]	Intermediate flange (optional)	[936]	Screw
[226]	Screw	[1458]	Screw
[232]	Screws (enclosed with .V1A and .V2A)	[1463]	Screw
[233]	Coupling	[A]	Encoder mounting adapter
[251]	Conical spring washers (enclosed with .V1A and .V2A)		

Removing the encoder mounting adapter

1. Remove the screws [22] to disassemble the forced cooling fan [170].
2. Remove the cable grommet [269] with the encoder cable from the forced cooling fan [170].
3. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
4. Loosen the screw at the coupling clamping hub [233] at the encoder end, the screw can be accessed through the slots of the encoder mounting adapter [A].
5. Remove the encoder [220] from the encoder mounting adapter [A] or the intermediate flange [225].
6. Loosen the screws [1458] and [936] to remove the encoder mounting adapter [A]. The torque brackets [935] and screws [1463] can remain at the encoder mounting adapter [A].
   - ⇨ **If the encoder mounting adapter cannot easily be removed:** Screw an M6 set screw (length 20 – 35 mm) hand tight in the rotor bore. Screw an M8 set screw (length > 10 mm) into the same bore and push the encoder mounting adapter [A] off the rotor [1]. Remove the M6 set screw from the rotor bore.

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Removing EV.., AV.., and XV. encoders

1. Remove the screws [22] to disassemble the forced cooling fan [170].
2. Remove the cable grommet [269] with the encoder cable from the forced cooling fan [170].
3. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
4. Loosen the screw at the coupling clamping hub [233] at the encoder end, the screw can be accessed through the slots of the encoder mounting adapter [A].
5. Remove the encoder [220] from the encoder mounting adapter [A] or the intermediate flange [225].

Reassembly

1. Proceed as described in chapter "Encoder mounting adapter" (→ 🗎 40) to mount the encoder.

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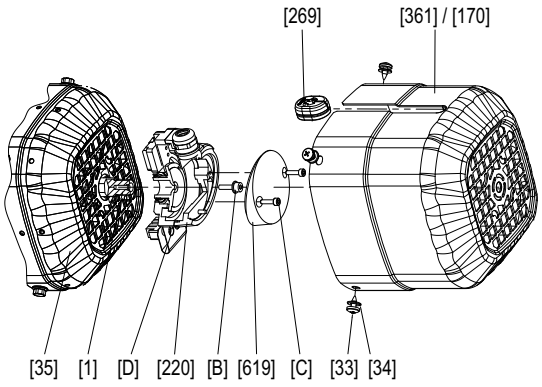
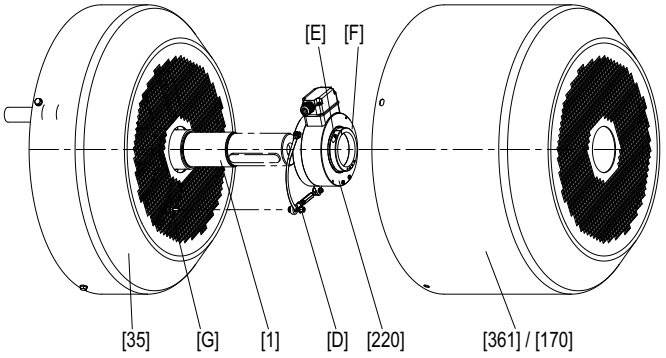
7.4.10 Mounting/removing hollow shaft encoders with XH.A encoder mounting adapter for DR..71 – 225, DRN71 – 225, DR2..71 – 80 motors

The following figure illustrates the disassembly procedure using a third-party encoder as an example:

Encoder mounting with XH1A encoder mounting adapter



Encoder mounting with XH7A and XH8A encoder mounting adapter



9007202887902859

[1]	Rotor	[B]	Central retaining screw
[33]	Tapping screw	[619]	Connection cover
[34]	Washer	[C]	Screw connection cover
[35]	Fan guard	[D]	Torque bracket screws
[170]	Forced cooling fan guard	[E]	Screw
[220]	Encoder	[F]	Clamping ring
[269]	Cable grommet	[G]	Nut of the torque bracket
[361]	Safety cover		

Removing hollow shaft encoders form XH1A encoder mounting adapter

1. Remove the safety cover [361], or the forced cooling fan if required.
2. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
3. Screw out the central retaining screw [B].
4. Remove the torque bracket screws [D].
5. Pull the torque bracket off.
6. Remove the encoder [220] from the shaft end.

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Removing hollow shaft encoders from XH7A and XH8A encoder mounting adapter

1. Remove the safety cover [361], or the forced cooling fan if required.
2. Loosen the screw [E] from clamping ring [F].
3. Remove the torque bracket screws [D].
4. Remove the encoder [220] from the shaft end.

Reassembly of hollow shaft encoders to XH1A encoder mounting adapter

1. Push the encoder [220] on the shaft end.
2. Screw in the screw [D] to mount the torque bracket.
3. Tighten the central retaining screw [B].
   ⇨ Tightening torque 2.9 Nm
4. Screw on the connection cover [619].
   ⇨ Tightening torque 3 Nm.
5. Mount the safety cover [361] onto the forced cooling fan.

Reassembly of hollow shaft encoders to XH7A and XH8A encoder mounting adapter

1. Push the encoder [220] on the shaft end.
2. Screw in the screw [D] to mount the torque bracket.
3. Remove the screw [E] from clamping ring [F].
   ⇨ Tightening torque 5 Nm.
4. Mount the safety cover [361] onto the forced cooling fan.

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7.4.11 Encoder mounting adapter EK8A

The encoder mounting adapter EK8A...

Content of the accessory bag [1634]

- Screws [232] for fastening the torque arm of the encoder [220]
- from size DRN180: Insulation coupling [1891]

Mounting the encoder mounting adapter EK8A

1. Unscrew the screws [22].
2. Remove the fan guard [35] from the motor.
3. Remove the protection cap [1143] from the recess of the fan guard [35].
   ⇨ Dispose of the protection cap [1143].
4. Remove the closing plug [950] from the rotor [1].
   ⇨ Dispose of the closing plug [950].

Then proceed with the installation process as described in chapter "Mounting cone shaft encoders EK8./AK8.".

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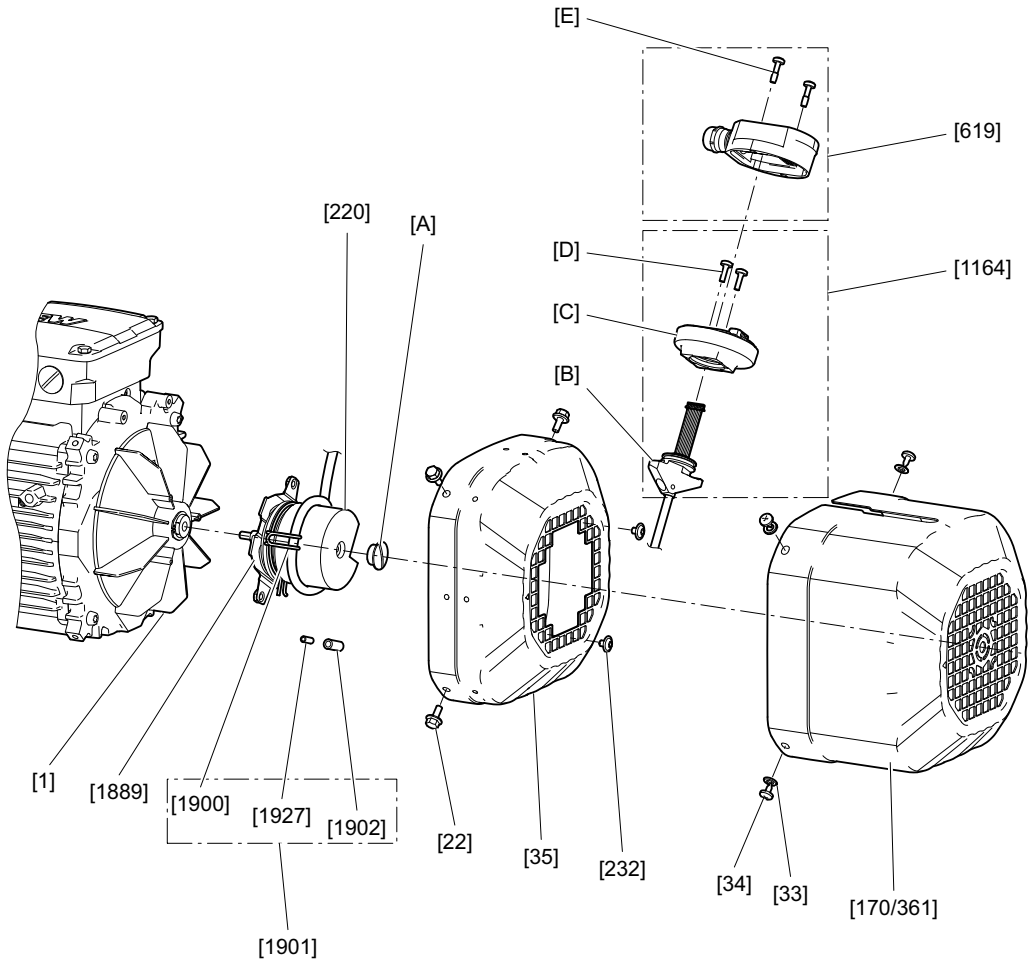
7.4.12 Removing and mounting cone shaft encoders of motors DRN71 – 132S, DR2..17 – 80



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[1]	Rotor	[1889]	Torque arm
[22]	Screw (hexagonal)	[1900]	Cable retainer
[33]	Washer	[1901]	Accessory bag
[34]	Screw (cross recess)	[1902]	Threaded sleeve
[35]	Fan guard	[1927]	Set screw
[170]	Forced cooling fan	[A]	Screw plug
[220]	Encoder	[B]	T-slot nut
[232]	Screw (hexalobular)	[C]	Lower part
[361]	Safety cover	[D]	Screw
[619]	Connection cover	[E]	Screw
[1164]	Connection adapter		

Removing encoder EK8./AK8.

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [1164].
3. Loosen the screws [D] in the lower part [C].
   ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [1164] can be moved in the recess of the safety cover [361].
4. Unscrew the screws [34].
5. Remove the safety cover [361] from the motor. When doing this, slide the connection adapter [1164] out of the recess.

6. Unscrew the screws [232].
7. Unscrew the screws [22].
8. Remove the fan guard [35] over the encoder [220]. Guide the connection adapter [1164] with the signal cable through the cutout of the fan guard [35].
9. Unscrew the central screw plug [A] of the encoder [220].
10. Loosen the central retaining screw of the encoder [220].
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
11. Loosen the cone connection.
    ⇨ Encoder EK8., AK8W, AK8Y: To loosen the cone connection, continue turning the central retaining screw of the encoder [220] counterclockwise.
    ⇨ Encoder AK8H: Continue turning the central retaining screw of the encoder [220] counterclockwise. To loosen the cones, screw an M6 screw (≥ 70 mm long) into the bore.
12. Remove the encoder [220] from the rotor [1].

Mounting encoder EK8./AK8.

1. Clean the cone of the encoder [220] and the rotor [1].
2. Remove the central screw plug [A].
3. Insert the encoder [220] into the conical bore of the rotor [1].
4. To secure the encoder [220] in place, tighten the central retaining screw.
    ⇨ Counter-tighten the spanner flat SW 30 of the insulation coupling.
    ⇨ Tightening torque 3.3 Nm.
5. To seal the encoder [220], screw in the central screw plug [A].
    ⇨ Tightening torque 1.8 Nm.
6. Mount the fan guard [35] over the encoder [220]. When doing this, guide the connection adapter [1164] with the signal line through the central grille cutout of the fan guard [35].
7. Use the screws [22] to secure the fan guard [35] to the rear endshield or brake endshield [42] of the motor.
    ⇨ For metal hoods: Tightening torque 3.3 Nm.
    ⇨ For plastic hoods: Tightening torque 2 Nm.
8. Screw the screws [232] through the grille of the fan guard [35] and into the nuts of the torque arm [1889].
    ⇨ If you need to turn the encoder [220] in order for the screws to reach the nuts of the torque arm, turn the encoder [220] clockwise.
    ⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [1164] can be inserted into the recess of the safety cover [361].
    ⇨ Tightening torque 3.3 Nm.
9. Push the connection adapter [1164] up to the end of the recess facing away from the motor.

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10. Place the safety cover [361] onto the fan guard [35].
    ⇨ The arrow that is cast in the lower part [C] of the connection adapter [1164] indicates the direction of the subsequent cable outlet for the connection cover [619].
    ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.
11. Secure the safety cover [361] in place by using the screws [34].
    ⇨ Tightening torque 2 Nm.
12. Turn the connection adapter [1164] clockwise up to the stop.
13. Secure the connection adapter [1164] in place by tightening the screws [D].
    ⇨ Tightening torque 2 Nm.
14. Place the connection cover [619] onto the connection adapter [1164].
15. Screw the screws [E] through the bore in the connection cover [619] and into the bore in the connection adapter [1164].
    ⇨ Tightening torque 2.5 Nm

Removing encoder EK8./AK8. with optional forced cooling fan

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [1164].
3. Loosen the screws [D] in the lower part [C].
    ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [1164] can be moved in the recess of the forced cooling fan [170].
4. Loosen the screws [22].
5. Unscrew the screws [34].
6. Remove the forced cooling fan [170] from the motor. When doing this, slide the connection adapter [1164] out of the recess.
7. Unscrew the screws [232].
8. Remove the signal cable from the slot of the cable retainer [1900].
9. Unscrew the screws [22].
10. Remove the fan guard [35] over the encoder [220]. Guide the connection adapter [1164] with the signal cable through the cutout of the fan guard [35].
11. Unscrew the central screw plug [A] of the encoder [220].
12. Loosen the central retaining screw of the encoder [220].
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
13. Loosen the cone connection.
    ⇨ Encoder EK8., AK8W, AK8Y: To loosen the cone connection, continue turning the central retaining screw of the encoder [220] counterclockwise.
    ⇨ Encoder AK8H: Continue turning the central retaining screw of the encoder [220] counterclockwise. To loosen the cones, screw an M6 screw (≥ 70 mm long) into the bore.
14. Remove the encoder [220] from the rotor [1].

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Mounting encoder EK8./AK8. with optional forced cooling fan

1. Clean the cone of the encoder [220] and the rotor [1].
2. Remove the central screw plug [A].
3. Insert the encoder [220] into the conical bore of the rotor [1].
4. To secure the encoder [220] in place, tighten the central retaining screw.
   - ⇨ Counter-tighten the spanner flat SW10 of the encoder shaft.
   - ⇨ Tightening torque 3.3 Nm.
5. To seal the encoder [220], screw in the central screw plug [A].
   - ⇨ Tightening torque 1.8 Nm.
6. Mount the fan guard [35] over the encoder [220]. When doing this, guide the connection adapter [1164] with the signal line through the central grille cutout of the fan guard [35].
7. Attach the screws [22] of the fan guard [35] to the rear endshield or brake endshield [42] of the motor.
8. Screw the screws [232] through the grille of the fan guard [35] and into the nuts of the torque arm [1889].
   - ⇨ If you need to turn the encoder [220] in order for the screws to reach the nuts of the torque arm, turn the encoder [220] clockwise.
   - ⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [1164] can be inserted into the recess of the forced cooling fan [170].
   - ⇨ Tightening torque 3.3 Nm.
9. ⚠ **CAUTION!**
   Improper installation can cause damage to the equipment. Risk of damage to the signal cable. Insert the signal cable into the slot of the cable retainer [1900] in such a way that the signal cable does not come into contact with the rotating forced cooling fan.
10. To turn the cable retainer [1900], loosen the set screw [1927].
11. To secure the cable retainer [1900] in place, tighten the set screw [1927].
    - ⇨ Tightening torque 1.8 Nm.
12. Place the forced cooling fan [170] onto the fan guard [35].
13. Insert the connection adapter [1164] into the recess of the forced cooling fan [170]. The standard alignment of the recess points towards the terminal box.
    - ⇨ The arrow that is cast in the lower part [C] of the connection adapter [1164] indicates the direction of the subsequent cable outlet for the connection cover [619].
    - ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.
14. Use the screws [22] to secure the fan guard [35] to the rear endshield or brake endshield [42] of the motor.
    - ⇨ For metal hoods: Tightening torque 3.3 Nm.
    - ⇨ For plastic hoods: Tightening torque 2 Nm.
15. Secure the forced cooling fan with the screws [34].
    - ⇨ Tightening torque 2 Nm.

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16. Push the connection adapter [1164] up to the end of the recess facing away from the motor.
17. Turn the connection adapter [1164] clockwise up to the stop.
18. Secure the connection adapter [1164] in place by tightening the screws [D].
    ⇨ Tightening torque 2 Nm.
19. Place the connection cover [619] onto the connection adapter [1164].
20. Screw the screws [E] through the bore in the connection cover [619] and into the bore in the connection adapter [1164].
    ⇨ Tightening torque 2.5 Nm

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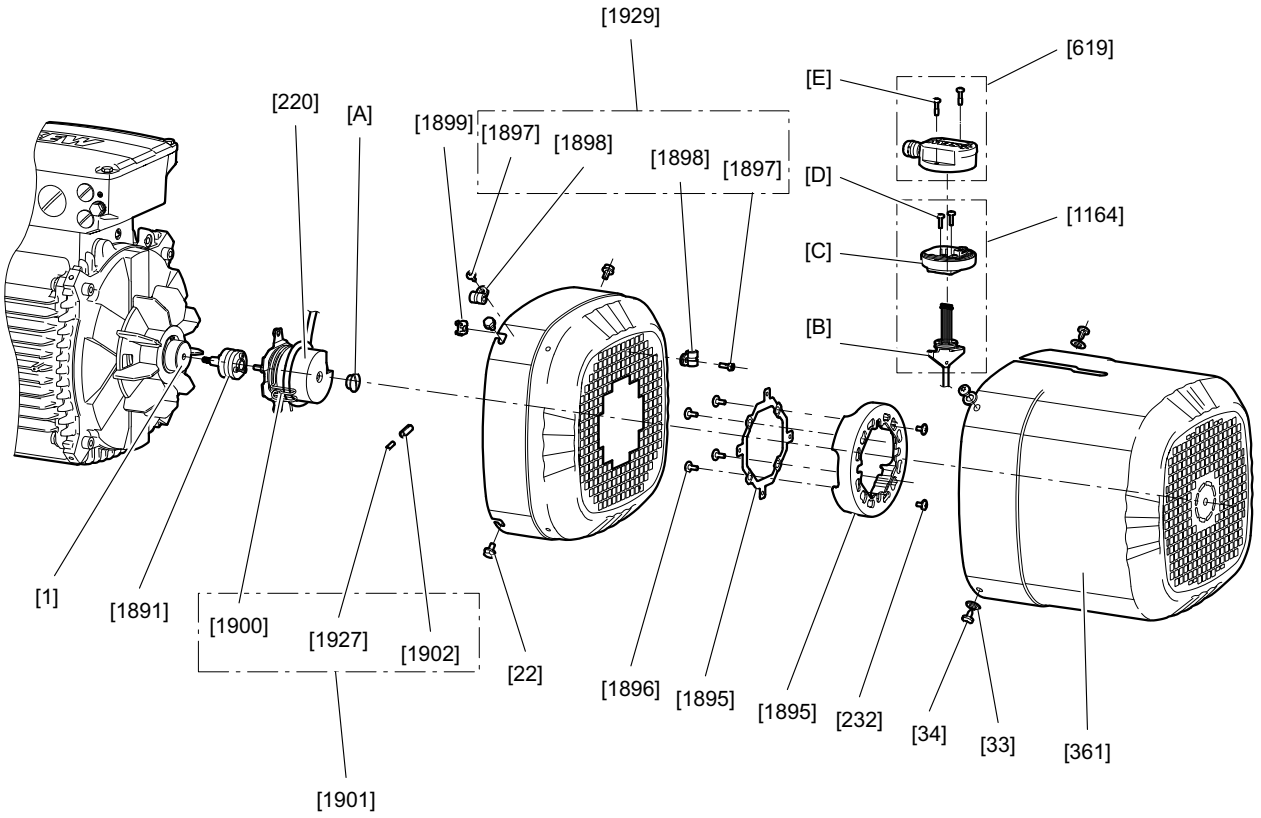
7.4.13 Removing and mounting cone shaft encoders of motors DRN132M – 315



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[1]	Rotor	[1898]	Clamp
[22]	Screw (hexagonal)	[1899]	Cage nut
[33]	Washer	[1900]	Cable retainer
[34]	Screw (cross recess)	[1901]	Accessory bag
[220]	Encoder	[1902]	Threaded sleeve
[232]	Screw (hexalobular)	[1927]	Set screw
[361]	Safety cover	[1929]	Accessory bag
[619]	Connection cover	[A]	Screw plug
[1164]	Connection adapter	[B]	T-slot nut
[1891]	Insulation coupling	[C]	Lower part
[1895]	Support ring/spacer ring	[D]	Screw
[1896]	Screw (hexalobular)	[E]	Screw
[1897]	Screw (hexagon socket)		

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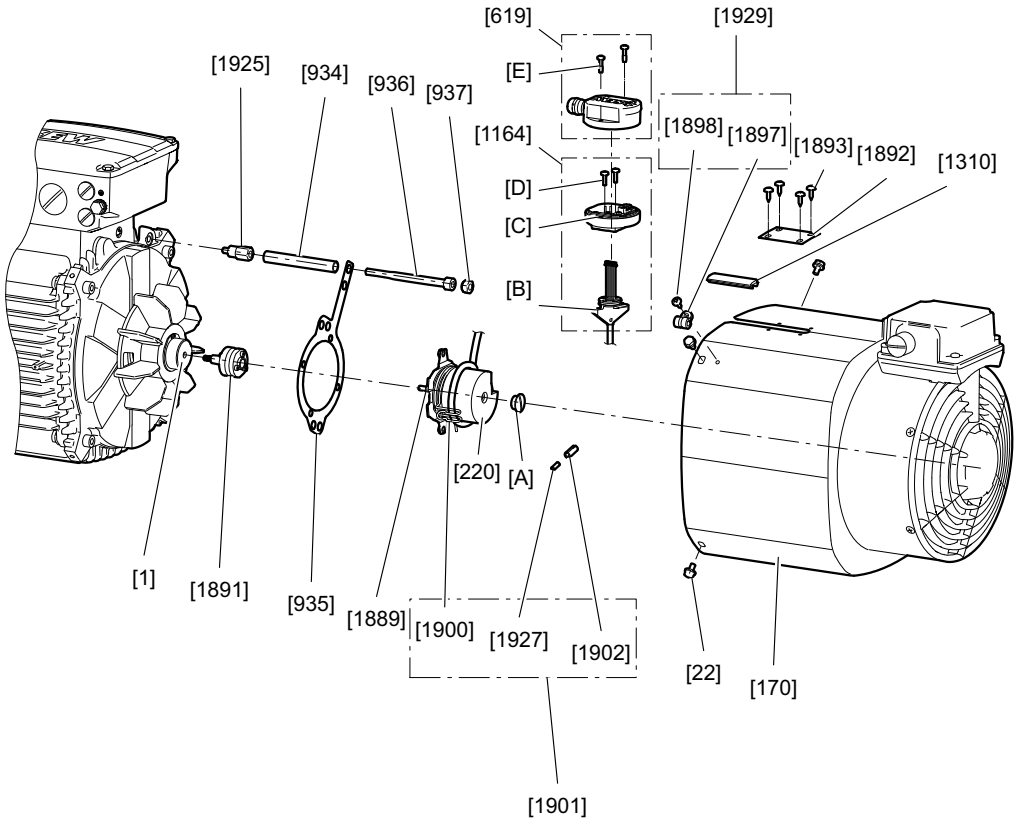

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[1]	Rotor	[1892]	Support plate
[22]	Screw (hexagonal)	[1893]	Screw (cross recess)
[33]	Washer	[1897]	Screw (hexagon socket)
[34]	Screw (cross recess)	[1900]	Cable retainer
[220]	Encoder	[1901]	Accessory bag
[232]	Screw (hexalobular)	[1902]	Threaded sleeve
[361]	Safety cover	[1925]	Spacer bolt
[619]	Connection cover	[1927]	Set screw
[934]	Spacer bushing	[1929]	Accessory bag
[935]	Torque arm	[A]	Screw plug
[936]	Cap screw	[B]	T-slot nut
[937]	Hex nut	[C]	Lower part
[1310]	Sealing strip	[D]	Screw
[1889]	Torque arm	[E]	Screw

Removing encoder EK8./AK8.

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [1164].
3. Loosen the screws [D] in the lower part [C].
   ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [1164] can be moved in the recess of the safety cover [361].
4. Unscrew the screws [34].
5. Remove the safety cover [361] from the motor. When doing this, slide the connection adapter [1164] out of the recess.
6. Unscrew the screws [232].
7. Unscrew the screws [22].

8. Remove the fan guard [35] over the encoder [220]. Guide the connection adapter [1164] with the signal cable through the cutout of the fan guard [35].
9. Unscrew the central screw plug [A] of the encoder [220].
10. Loosen the central retaining screw of the encoder [220].
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
11. Loosen the cone connection.
    ⇨ Encoder EK8., AK8W, AK8Y: To loosen the cone connection, continue turning the central retaining screw of the encoder [220] counterclockwise.
    ⇨ Encoder AK8H: Continue turning the central retaining screw of the encoder [220] counterclockwise. To loosen the cones, screw an M6 screw (≥ 70 mm long) into the bore.
12. Remove the encoder [220] from the rotor [1].
13. For optional insulation coupling: Remove the encoder [220] from the insulation coupling [1891].

Mounting encoder EK8./AK8.

1. Clean the cone of the encoder [220] and the rotor [1].
2. For optional insulation coupling: Clean the cones of the insulation coupling [1891].
3. Remove the central screw plug [A].
4. For optional insulation coupling: The insulation coupling [1891] must be mounted before the encoder is mounted. Insert the insulation coupling [1891] into the conical bore of the rotor [1]. To secure the insulation coupling in place, tighten the central retaining screw.
    ⇨ Counter-tighten the spanner flat SW 30 of the insulation coupling.
    ⇨ Tightening torque 3.3 Nm.
5. Insert the encoder [220] into the conical bore of the rotor [1].
6. For optional insulation coupling: Insert the encoder [220] into the conical opening of the insulation coupling [1891].
7. To secure the encoder [220] in place, tighten the central retaining screw.
    ⇨ Counter-tighten the spanner flat SW10 of the encoder shaft.
    ⇨ Tightening torque 3.3 Nm.
8. To seal the encoder [220], screw in the central screw plug [A].
    ⇨ Tightening torque 1.8 Nm.
9. Mount the fan guard [35] over the encoder [220]. When doing this, guide the connection adapter [1164] with the signal line through the central grille cutout of the fan guard [35].
10. Use the screws [22] to secure the fan guard [35] to the rear endshield or brake endshield [42] of the motor.
    ⇨ DRN132M – L: Tightening torque 11.3 Nm.
    ⇨ DRN160 – 280: Tightening torque 27.3 Nm.
    ⇨ DRN315: Secure the screws [22] in place with medium-strength thread locker. Tightening torque 5 Nm.

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11. Screw the screws [232] through the support ring/spacer ring [1895] and the grille of the fan guard [35] and into the nuts of the torque arm [1889].
    - ⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [1164] can be inserted into the recess of the safety cover [361].
    - ⇨ Tightening torque 3.3 Nm.
12. Place the safety cover [361] onto the fan guard [35].
    - ⇨ The standard alignment of the recess points towards the terminal box.
    - ⇨ The arrow that is cast in the lower part [C] of the connection adapter [1164] indicates the direction of the subsequent cable outlet for the connection cover [619].
    - ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.
13. Secure the safety cover [361] in place by using the screws [34].
    - ⇨ Tightening torque 4.5 Nm
14. Push the connection adapter [1164] up to the end of the recess facing away from the motor.
15. Turn the connection adapter [1164] clockwise up to the stop.
16. Secure the connection adapter [1164] in place by tightening the screws [D].
    - ⇨ Tightening torque 2 Nm.
17. Place the connection cover [619] onto the connection adapter [1164].
18. Screw the screws [E] through the bore in the connection cover [619] and into the bore in the connection adapter [1164].
    - ⇨ Tightening torque 2.5 Nm

Removing encoder EK8./AK8. with optional forced cooling fan

1. For motors EDRN250 – 315: If the screws [1893] are present, unscrew the screws. Remove the support plate [1892]. Slide the sealing strip [1310]**/[1965]** out of the recess.
2. Unscrew the screws [E].
3. Remove the connection cover [619] from the connection adapter [1164].
4. Loosen the screws [D] in the lower part [C].
    - ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [1164] can be moved in the recess of the forced cooling fan [170].
5. Unscrew the screws [22].
6. Remove the forced cooling fan [170] from the motor. When doing this, slide the connection adapter [1164] out of the recess.
7. Unscrew the screws [232].
8. Remove the signal cable from the slot of the cable retainer [1900].
9. To remove the torque arm [935], loosen the screw [936]/hex nut [937]. Guide the connection adapter [1164] with the signal cable through the cutout of the torque arm [935].
10. Loosen the central retaining screw of the encoder [220].
    - ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.

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11. Loosen the cone connection.
    - ⇨ Encoder EK8., AK8W, AK8Y: To loosen the cone connection, continue turning the central retaining screw of the encoder [220] counterclockwise.
    - ⇨ Encoder AK8H: Continue turning the central retaining screw of the encoder [220] counterclockwise. To loosen the cones, screw an M6 screw (≥ 70 mm long) into the bore.
12. Remove the encoder [220] from the rotor [1].
13. For optional insulation coupling: Remove the encoder [220] from the insulation coupling [1891].

Mounting encoder EK8./AK8. with optional forced cooling fan

1. Clean the cone of the encoder [220] and the rotor [1].
2. For optional insulation coupling: Clean the cones of the insulation coupling [1891].
3. Remove the central screw plug [A].
4. For optional insulation coupling: The insulation coupling [1891] must be mounted before the encoder is mounted. Insert the insulation coupling [1891] into the conical bore of the rotor [1]. To secure the insulation coupling in place, tighten the central retaining screw.
    - ⇨ Counter-tighten the spanner flat SW10 of the encoder shaft.
    - ⇨ Tightening torque 3.3 Nm.
5. Insert the encoder [220] into the conical bore of the rotor [1].
6. For optional insulation coupling: Insert the encoder [220] into the conical opening of the insulation coupling [1891].
7. To secure the encoder [220] in place, tighten the central retaining screw.
    - ⇨ Counter-tighten the spanner flat SW10 of the encoder shaft.
    - ⇨ Tightening torque 3.3 Nm.
8. To seal the encoder [220], screw in the central screw plug [A].
    - ⇨ Tightening torque 1.8 Nm.
9. Guide the torque arm [935] over the connection adapter [1164] and the encoder [220].
10. For optional insulation coupling: Mount the spacer bolt [1625].
    - ⇨ M6 screw: Tightening torque 11.3 Nm.
    - ⇨ M8 screw: Tightening torque 27.3 Nm.
11. When mounting the torque arm [935], make sure it is aligned centrally to the encoder [220]. Screw in the screw [936]/hex nut [937] with the spacer bushings [934].
    - ⇨ M6 screw: Tightening torque 11.3 Nm.
    - ⇨ M8 screw: Tightening torque 27.3 Nm.
12. ⚠ **CAUTION!**
    Improper installation can cause damage to the equipment. Risk of damage to the signal cable. Insert the signal cable into the slot of the cable retainer [1900] in such a way that the signal cable does not come into contact with the rotating forced cooling fan.
13. To turn the cable retainer [1900], loosen the set screw [1927].

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14. To secure the cable retainer [1900] in place, tighten the set screw [1927].
    ⇨ Tightening torque 1.8 Nm.
15. To secure the torque arm [1889] of the encoder in place, screw the screws [232] into the bores of the torque arm [935].
    ⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [1164] can be inserted into the recess of the forced cooling fan [170].
16. Place the forced cooling fan [170] onto the rear endshield or brake endshield [42].
17. Insert the connection adapter [1164] into the recess of the forced cooling fan [170]. The standard alignment of the recess points towards the terminal box.
    ⇨ The arrow that is cast in the lower part [C] of the connection adapter [1164] indicates the direction of the subsequent cable outlet for the connection cover [619].
    ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.
18. Use the screws [22] to secure the forced cooling fan [170] to the rear endshield or brake endshield [42] of the motor.
    ⇨ DRN132M – L: Tightening torque 11.3 Nm.
    ⇨ DRN160 – 280: Tightening torque 27.3 Nm.
    ⇨ DRN315: Secure the screws [22] in place with medium-strength thread locker. Tightening torque 5 Nm.
19. Push the connection adapter [1164] up to the end of the recess facing away from the motor.
20. For motors EDRN250 – 315: To secure the support plate [1892] in place, screw in the screws [1893]. Slide the sealing strip [1310]/[1965] into the recess.
21. Secure the connection adapter [1164] in place by tightening the screws [D].
    ⇨ Tightening torque 2 Nm.
22. Place the connection cover [619] onto the connection adapter [1164].
23. Screw the screws [E] through the bore in the connection cover [619] and into the bore in the connection adapter [1164].
    ⇨ Tightening torque 2.5 Nm

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7.4.14 Removing and mounting encoder EV8./AV8. with coupling from motors DRN71 – 225

Removing encoder EV8./AV8. with coupling

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [1164].
3. Loosen the screws [D] in the lower part [C].
   ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [1164] can be moved in the recess of the safety cover [361].
4. Unscrew the screws [22].
5. Remove the safety cover [361] from the motor. When doing this, slide the connection adapter [1164] out of the recess.
6. Unscrew the screws [232].
7. Remove the eccentric disks [251] from the circumferential groove of the encoder [220].
8. Unscrew the central screw plug [A] of the encoder [220].
9. Loosen the central retaining screw of the encoder [220].
   ⇨ If the central retaining screw of the encoder [220] cannot be loosened, exert counter-pressure at the Ø 4.1 mm bore of the rear coupling half.
10. Remove the encoder [220] from the coupling [233].

Mounting encoder EV8./AV8. with coupling

1. Remove the central screw plug [A].
2. If the closing plate [646] is present: Unscrew the screws [232] and remove the closing plate [646].
3. Clean the cone of the rotor [1], the encoder [220] and the coupling [233].
4. Insert the coupling [233] into the conical bore of the rotor.
5. To secure the coupling [233] in place, screw in the central retaining screw [F].
   ⇨ Tightening torque 4 Nm
   ⇨ Exert counter-pressure at the Ø 4.1 mm bore of the rear coupling half.
6. To remove the torque arm [1889] from the encoder, unscrew the screws [1888].
7. Remove the central screw plug [A].
   ⇨ For size DRN132M/L: Place the spacer ring [225] between the encoder [220] and the fan guard with encoder mount [212].
8. Insert the encoder [220] into the coupling half with conical bore [233].
9. To secure the encoder [220] in place, tighten the central retaining screw.
   ⇨ Tightening torque 3.3 Nm.
   ⇨ Exert counter-pressure at the Ø 4.1 mm bore of the rear coupling half.
10. To seal the encoder [220], screw in the central screw plug [A].
    ⇨ Tightening torque 1.8 Nm.
11. To secure the eccentric disks [251], insert the screws [232].
12. Tighten the screws [232] while turning the eccentric disks [251] in clockwise direction into the groove of the encoder [220].
    ⇨ Tightening torque 2.25 Nm.

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⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [1164] can be inserted into the recess of the safety cover [361].

13. Insert the connection adapter [1164] into the recess of the safety cover [361]. The standard alignment of the recess points towards the terminal box.
14. Place the safety cover [361] onto the fan guard [35].
    ⇨ The arrow that is cast in the lower part [C] of the connection adapter [1164] indicates the direction of the subsequent cable outlet for the connection cover [619].
    ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.
15. Secure the safety cover [361] in place by using the screws [22].
    ⇨ DRN71 – 132S: Tightening torque 3.3 Nm
    ⇨ DRN132M – L: Tightening torque 11.3 Nm
    ⇨ DRN160 – 225: Tightening torque 27.3 Nm
16. Push the connection adapter [1164] up to the end of the recess facing away from the motor.
17. Turn the connection adapter [1164] clockwise up to the stop.
18. Secure the connection adapter [1164] in place by tightening the screws [D].
    ⇨ Tightening torque 2 Nm.
19. Place the connection cover [619] onto the connection adapter [1164].
20. Screw the screws [E] through the bore in the connection cover [619] and into the bore in the connection adapter [1164].
    ⇨ Tightening torque 2.5 Nm

Removing encoder EV8./AV8. with coupling and optional forced cooling fan

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [1164].
3. Loosen the screws [D] in the lower part [C].
   ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [1164] can be moved in the recess of the safety cover [361].
4. Loosen the screws [22].
5. Unscrew the screws [34].
6. Remove the forced cooling fan [170] from the motor. When doing this, slide the connection adapter [1164] out of the recess.
7. Remove the signal cable from the slot of the cable retainer [1900].
8. Unscrew the screws [232].
9. Remove the eccentric disks [251] from the circumferential groove of the encoder [220].
10. Unscrew the central screw plug [A] of the encoder [220].
11. Loosen the central retaining screw of the encoder [220].
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, exert counter-pressure at the Ø 4.1 mm bore of the rear coupling half.
12. Remove the encoder [220] from the coupling [233].

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Mounting encoder EV8./AV8. with coupling and optional forced cooling fan

1. Remove the central screw plug [A].
2. If the closing plate [646] is present: Unscrew the screws [232] and remove the closing plate [646].
3. Clean the cone of the rotor [1], the encoder [220] and the coupling [233].
4. Insert the coupling [233] into the conical bore of the rotor.
5. To secure the coupling [233] in place, screw in the central retaining screw [F].
   - ⇨ Tightening torque 3.3 Nm.
   - ⇨ Exert counter-pressure at the Ø 4.1 mm bore of the rear coupling half.
6. To remove the torque arm [1889] from the encoder, unscrew the screws [1888].
7. Remove the central screw plug [A].
   - ⇨ For size DRN132M/L: Place the spacer ring [225] between the encoder [220] and the fan guard with encoder mount [212].
8. Insert the encoder [220] into the coupling half with conical bore [233].
9. To secure the encoder [220] in place, tighten the central retaining screw.
   - ⇨ Tightening torque 3.3 Nm.
   - ⇨ Exert counter-pressure at the Ø 4.1 mm bore of the rear coupling half.
10. To seal the encoder [220], screw in the central screw plug [A].
    - ⇨ Tightening torque 1.8 Nm.
11. To secure the eccentric disks [251], insert the screws [232].
12. Tighten the screws [232] while turning the eccentric disks [251] in clockwise direction into the groove of the encoder [220].
    - ⇨ Tightening torque 2.25 Nm.
    - ⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [1164] can be inserted into the recess of the forced cooling fan [170].
13. ⚠ **CAUTION!**
    Improper installation can cause damage to the equipment. Risk of damage to the signal cable. Insert the signal cable into the slot of the cable retainer [1900] in such a way that the signal cable does not come into contact with the rotating forced cooling fan.
14. To turn the cable retainer [1900], loosen the set screw [1927].
15. To secure the cable retainer [1900] in place, tighten the set screw [1927].
    - ⇨ Tightening torque 1.8 Nm.
16. Place the forced cooling fan [170] onto the fan guard with encoder mount [212].
17. Insert the connection adapter [1164] into the recess of the forced cooling fan [170]. The standard alignment of the recess points towards the terminal box.
    - ⇨ The arrow that is cast in the lower part [C] of the connection adapter [1164] indicates the direction of the subsequent cable outlet for the connection cover [619].
    - ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.

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18. Use the screws [22] to secure the forced cooling fan [170] to the fan guard with encoder mount [212] of the motor.
    - ⇨ DRN71 – 132S: Tightening torque 3.3 Nm
    - ⇨ DRN132M – L: Tightening torque 11.3 Nm
    - ⇨ DRN160 – 225: Tightening torque 27.3 Nm
19. Push the connection adapter [1164] up to the end of the recess facing away from the motor.
20. Turn the connection adapter [1164] clockwise up to the stop.
21. Secure the connection adapter [1164] in place by tightening the screws [D].
    - ⇨ Tightening torque 2 Nm.
22. Place the connection cover [619] onto the connection adapter [1164].
23. Screw the screws [E] through the bore in the connection cover [619] and into the bore in the connection adapter [1164].
    - ⇨ Tightening torque 2.5 Nm

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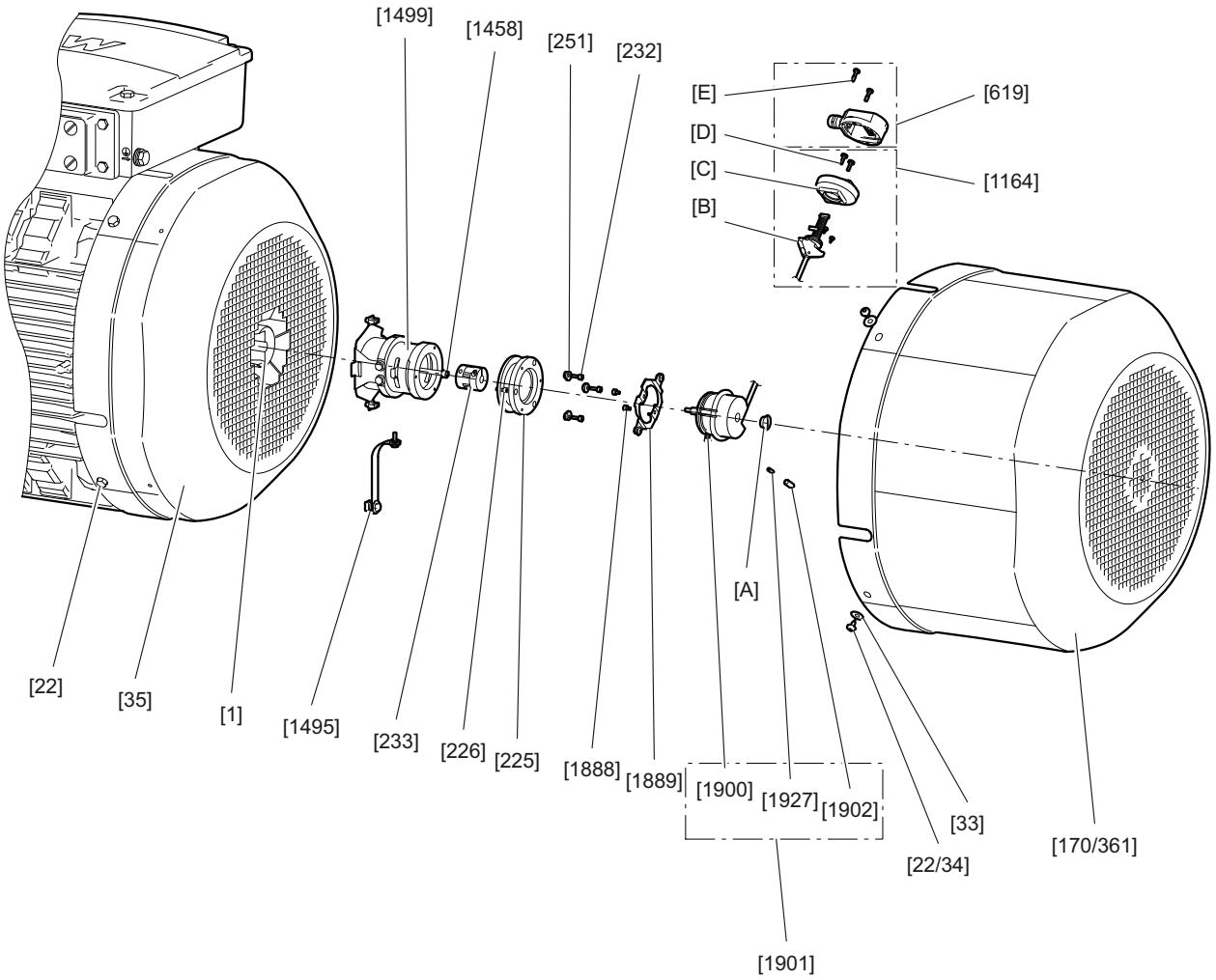
7.4.15 Removing and mounting encoder EV8./AV8. with coupling from motors DRN250 – 280



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[1]	Rotor	[1499]	Encoder mounting adapter
[22]	Screw (hexagonal)	[1495]	Ground strap SET
[33]	Washer	[1888]	
[34]	Screw (cross recess)	[1898]	Clamp
[35]	Fan guard	[1899]	Cage nut
[170]	Forced cooling fan	[1900]	Cable retainer
[225]	Intermediate flange	[1901]	Accessory bag
[226]	Cap screw	[1902]	Threaded sleeve
[232]	Screw (hexalobular)	[1927]	Set screw
[233]	Coupling	[A]	Screw plug
[251]	Conical spring washer	[B]	T-slot nut
[361]	Safety cover	[C]	Lower part
[619]	Connection cover	[D]	Screw
[1164]	Connection adapter	[E]	Screw
[1458]	Cap screw		

Removing encoder EV8./AV8. with coupling

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [1164].

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3. Loosen the screws [D] in the lower part [C].
   ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [1164] can be moved in the recess of the safety cover [361].
4. Unscrew the screws [34].
5. Remove the safety cover [361] from the motor. When doing this, slide the connection adapter [1164] out of the recess.
6. Unscrew the screws [232].
7. Remove the eccentric disks [251] from the circumferential groove of the encoder [220].
8. Remove the encoder [220] from the intermediate flange [225].
9. Unscrew the central screw plug [A] of the encoder [220].
10. Loosen the central retaining screw of the encoder [220].
11. Remove the encoder with the mounted rear coupling half [233] from the mounting adapter [1499].
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
12. Remove the encoder [220] from the coupling [233].

Mounting encoder EV8./AV8. with coupling

1. Clean the cone of the rotor [1], the encoder mounting adapter [1499] and the coupling [233].
2. Insert the encoder mounting adapter [1499] into the conical bore of the rotor [1].
3. To secure the encoder mounting adapter [1499] in place, screw in the central retaining screw [1458].
   ⇨ Tightening torque 3.3 Nm.
4. Use the screws [22] to secure the fan guard [35] to the rear endshield or brake endshield [42] of the motor.
   ⇨ While doing so, the plastic dampers [1486] of the torque arm for the encoder mounting adapter [1499] must engage into the grille of the fan guard [35].
   ⇨ Tightening torque 27.3 Nm.
5. To secure the ground strap [1495] to the encoder mounting adapter [1499], screw in the screw [1498].
   ⇨ Tightening torque 6.5 Nm
6. To secure the ground strap [1495] to the fan guard [35], screw the screw [1462] into the cage nut [1459].
   ⇨ Tightening torque 11.3 Nm.
7. Place the coupling half with cylindrical internal bore [233] onto the inner pin of the encoder mounting adapter [1499].
8. To secure the coupling half with cylindrical internal bore [233] in place, screw the screw into the conical spring washer of the coupling [233].
   ⇨ Tightening torque 3.3 Nm.
9. To secure the intermediate flange [225] to the encoder mounting adapter [1499], screw in the screw [226].
   ⇨ Tightening torque 3.3 Nm.

10. To remove the torque arm [1889] from the encoder, unscrew the screws [1888].
11. Remove the central screw plug [A].
12. Insert the encoder [220] into the coupling half with conical bore [233].
13. To secure the encoder [220] in place, tighten the central retaining screw.
    - ⇨ Tightening torque 3.3 Nm.
    - ⇨ Counter-tighten the spanner flat SW10 of the encoder shaft.
14. To seal the encoder [220], screw in the central screw plug [A].
    - ⇨ Tightening torque 1.8 Nm.
15. Insert the encoder [220] with mounted coupling half into the centering of the intermediate flange [225]. The two coupling halves must interlock via the plastic coupling star.
16. To secure the eccentric disks [251], insert the screws [232].
17. Tighten the screws [232] while turning the eccentric disks [251] in clockwise direction into the groove of the encoder [220].
    - ⇨ Tightening torque 2.25 Nm.
    - ⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [1164] can be inserted into the recess of the safety cover [361].
18. Insert the connection adapter [1164] into the recess of the safety cover [361]. The standard alignment of the recess points towards the terminal box.
19. Place the safety cover [361] onto the fan guard [35].
    - ⇨ The arrow that is cast in the lower part [C] of the connection adapter [1164] indicates the direction of the subsequent cable outlet for the connection cover [619].
    - ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.
20. Secure the safety cover [361] in place by using the screws [34].
    - ⇨ Tightening torque 4.5 Nm
21. Push the connection adapter [1164] up to the end of the recess facing away from the motor.
22. Turn the connection adapter [1164] clockwise up to the stop.
23. Secure the connection adapter [1164] in place by tightening the screws [D].
    - ⇨ Tightening torque 2 Nm.
24. Place the connection cover [619] onto the connection adapter [1164].
25. Screw the screws [E] through the bore in the connection cover [619] and into the bore in the connection adapter [1164].
    - ⇨ Tightening torque 2.5 Nm

Removing encoder EV8./AV8. with coupling and optional forced cooling fan

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [1164].
3. Loosen the screws [D] in the lower part [C].
   - ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [1164] can be moved in the recess of the forced cooling fan [170].

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4. Unscrew the screws [22].
5. Remove the forced cooling fan [170] from the motor. When doing this, slide the connection adapter [1164] out of the recess.
6. If necessary, loosen the set screw [1927].
7. Remove the signal cable from the slot of the cable retainer [1900].
8. Unscrew the screws [232].
9. Remove the eccentric disks [251] from the circumferential groove of the encoder [220].
10. Remove the encoder [220] from the intermediate flange [225].
11. Unscrew the central screw plug [A] of the encoder [220].
12. Loosen the central retaining screw of the encoder [220].
13. Remove the encoder with the mounted rear coupling half [233] from the mounting adapter [1499].
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
14. Remove the encoder [220] from the coupling [233].

Mounting encoder EV8./AV8. with coupling and optional forced cooling fan

1. Clean the cone of the rotor [1], the encoder mounting adapter [1499] and the coupling [233].
2. Insert the encoder mounting adapter [1499] into the conical bore of the rotor [1].
3. To secure the encoder mounting adapter [1499] in place, screw in the central retaining screw [1458].
    ⇨ Tightening torque 3.3 Nm.
4. Use the screws [1485] to secure the torque arm [935] to the mounting adapter [1499].
    ⇨ Tightening torque 6 Nm.
5. Use the sleeves [934], screws [936] and washers [1666] to secure the torque arm [935] to the rear endshield or brake endshield [42].
    ⇨ Tightening torque 11.3 Nm.
6. Use the screws [22] to secure the fan guard [35] to the rear endshield or brake endshield [42] of the motor.
    ⇨ While doing so, the plastic dampers [1486] of the torque arm for the encoder mounting adapter [1499] must engage into the grille of the fan guard [35].
    ⇨ Tightening torque 27.3 Nm.
7. Place the coupling half with cylindrical internal bore [233] onto the inner pin of the encoder mounting adapter [1499].
8. To secure the coupling half with cylindrical internal bore [233] in place, screw the screw into the conical spring washer of the coupling [233].
    ⇨ Tightening torque 3.3 Nm.
9. To secure the intermediate flange [225] to the encoder mounting adapter [1499], screw in the screw [226].
    ⇨ Tightening torque 3.3 Nm.
10. To remove the torque arm [1889] from the encoder, unscrew the screws [1888].

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11. Remove the central screw plug [A].
12. Insert the encoder [220] into the coupling half with conical bore [233].
13. To secure the encoder [220] in place, tighten the central retaining screw.
    - ⇨ Tightening torque 3.3 Nm.
    - ⇨ Counter-tighten the spanner flat SW10 of the encoder shaft.
14. To seal the encoder [220], screw in the central screw plug [A].
    - ⇨ Tightening torque 1.8 Nm.
15. Insert the encoder [220] with mounted coupling half into the centering of the intermediate flange [225]. The two coupling halves must interlock via the plastic coupling star.
16. To secure the eccentric disks [251], insert the screws [232].
17. Tighten the screws [232] while turning the eccentric disks [251] in clockwise direction into the groove of the encoder [220].
    - ⇨ Tightening torque 2.25 Nm.
    - ⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [1164] can be inserted into the recess of the safety cover [361].
18. ⚠ **CAUTION!**
    Improper installation can cause damage to the equipment. Risk of damage to the signal cable. Insert the signal cable into the slot of the cable retainer [1900] in such a way that the signal cable does not come into contact with the rotating forced cooling fan.
19. To turn the cable retainer [1900], loosen the set screw [1927].
20. To secure the cable retainer [1900] in place, tighten the set screw [1927].
    - ⇨ Tightening torque 1.8 Nm.
21. Insert the connection adapter [1164] into the recess of the forced cooling fan [170]. The standard alignment of the recess points towards the terminal box.
    - ⇨ The arrow that is cast in the lower part [C] of the connection adapter [1164] indicates the direction of the subsequent cable outlet for the connection cover [619].
    - ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.
22. Use the screws [22] to secure the forced cooling fan [170] to the rear endshield or brake endshield [42] of the motor.
    - ⇨ Tightening torque 27.3 Nm.
23. Push the connection adapter [1164] up to the end of the recess facing away from the motor.
24. For motors EDRN250 – 315: To secure the support plate [1892] in place, screw in the screws [1893]. Slide the sealing strip [1310]/[1965] into the recess.
25. Secure the connection adapter [1164] in place by tightening the screws [D].
    - ⇨ Tightening torque 2 Nm.
26. Place the connection cover [619] onto the connection adapter [1164].
27. Screw the screws [E] through the bore in the connection cover [619] and into the bore in the connection adapter [1164].
    - ⇨ Tightening torque 2.5 Nm

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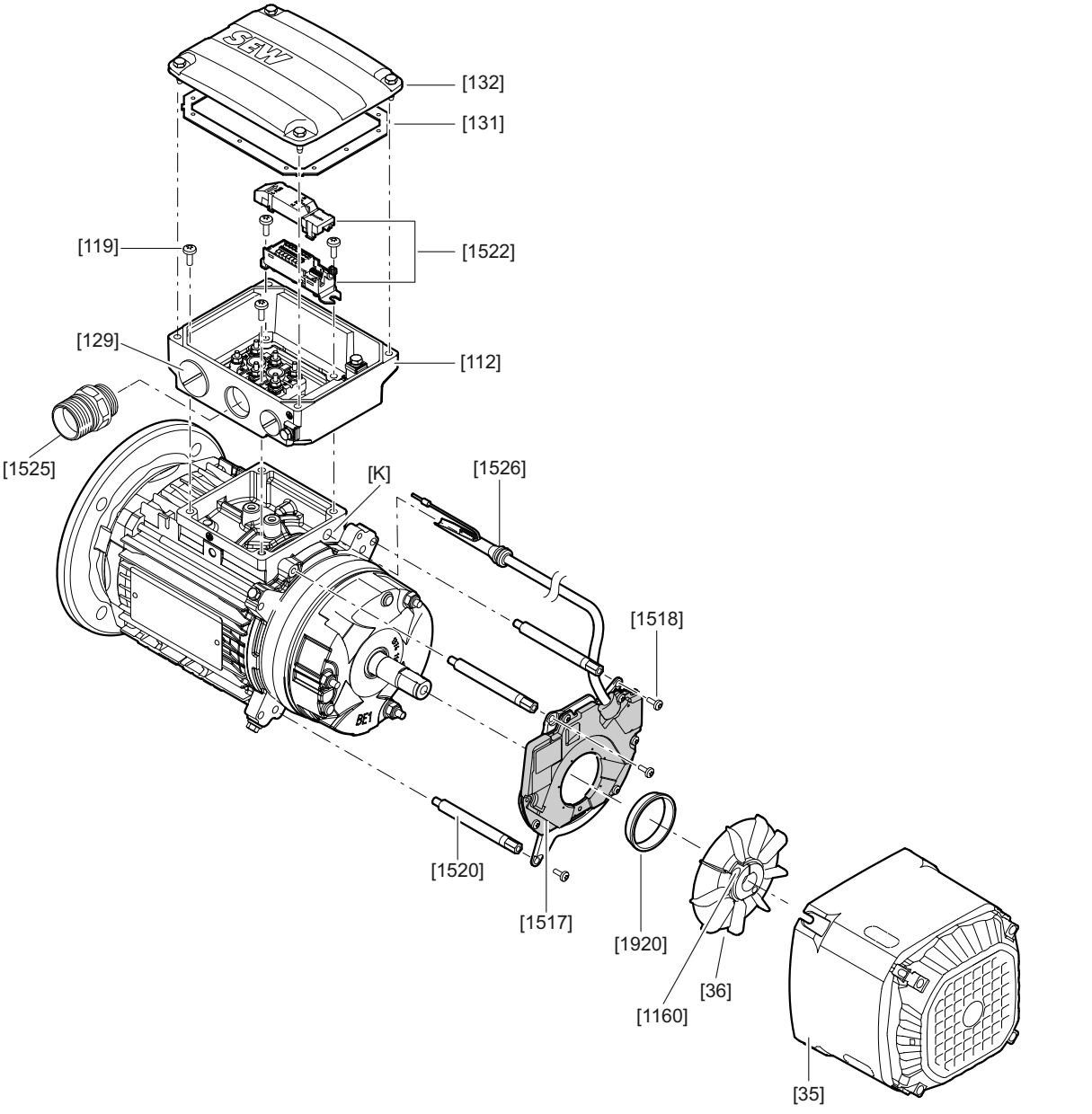
7.4.16 Removing and mounting built-in encoder EI8.

A centering ring is required when mounting the built-in encoder EI8. You can order the centering ring via the following part number:

Motor	Built-in encoder	Part number
DRN71 – 132S DR2..71 – 80	Centering ring EI8.	22659129



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[35]	Fan guard	[132]	Terminal box cover	[1525]	M23 plug connector
[36]	Fan, complete	[1160]	Cap screw	[1526]	Grommet
[112]	Terminal box lower part	[1517]	Encoder module	[1920]	Centering ring (aid)
[119]	Screw	[1518]	Flat head screw	[K]	Knock-out
[129]	Screw plug	[1520]	Spacer		
[131]	Gasket for cover	[1522]	Connection unit		

Removing EI8. with connection unit

✓ Required resources: Screwdriver

1. Remove the forced cooling fan if required.
2. Remove the screws [22] to disassemble the fan guard [35].
3. Loosen the radial clamping screw [1160]:
   - ⇨ DRN71 – 100: M3 with cylinder head
   - ⇨ DRN112/132S: M4 with cylinder head
4. Remove the fan [36] with bushing and pole ring from the shaft end.
5. Remove the 3 x M4 pan head screws [1518] of the encoder module [1517].
6. If present, remove the hexagonal spacers [1520] (SW8).
7. Unscrew the screws [123] to remove the terminal box cover [132].
8. Remove the cover of the connection unit [1522] by pressing the cover on both sides behind the cable entry.
9. Disconnect the 10-pin board connector.
10. Pull the jack of the encoder cable from the connector.
11. Unscrew the grounding element of the encoder cable.
12. **NOTICE!** Possible defect of the encoder module. Physical damage can occur. Do not pull directly on the encoder module.
    To remove the encoder module [1517] from the motor, pull the encoder cable out of the grommet [1526] and the opening of the knock-out [K].

Mounting EI8. with connection unit

- ✓ Required resources: Feeler gauge, screwdriver, centering ring [1920]

1. Unscrew the screws [123] to remove the terminal box cover [132].
2. **NOTICE!** Damage to the terminal box or fragments inside the motor. Possible physical damage. Exercise caution when breaking open the knock-outs.
   Break open the knock-out [K] by using a chisel or screwdriver.
3. **NOTICE!** Damage to the connector. Possible physical damage. Do not subject the connector to excessive tension.
   Pull the grommet [1526] with encoder cable through the knock-out [K].
   - ⇨ The grommet must engage into the opening of the knock-out [K].
4. If necessary, screw the hexagonal spacers [1520] into the brake endshield.
   - ⇨ Tightening torque 5 Nm.
5. Place the centering ring [1920] onto the pole ring.
6. Push the encoder module [1517] onto the shaft end.
7. Push the fan [36] with bushing and pole ring onto the shaft end.
8. Center the encoder module [1517] with the centering ring [1920] radially to the shaft.
9. Use 3 pan head screws [1518] to secure the encoder module [1517] to the brake endshield or, if applicable, to the hexagonal spacers [1520].
   - ⇨ Tightening torque 2.5 Nm
10. Remove the fan [36] with bushing and pole ring from the shaft end and remove the centering ring [1920].
11. Push the fan [36] with bushing and pole ring onto the shaft end.

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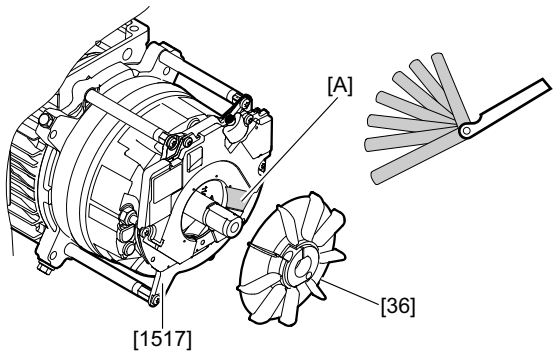
12. To set the distance of 1 mm between the encoder module [1517] and the pole ring, insert a feeler gauge into the designated notch [A].



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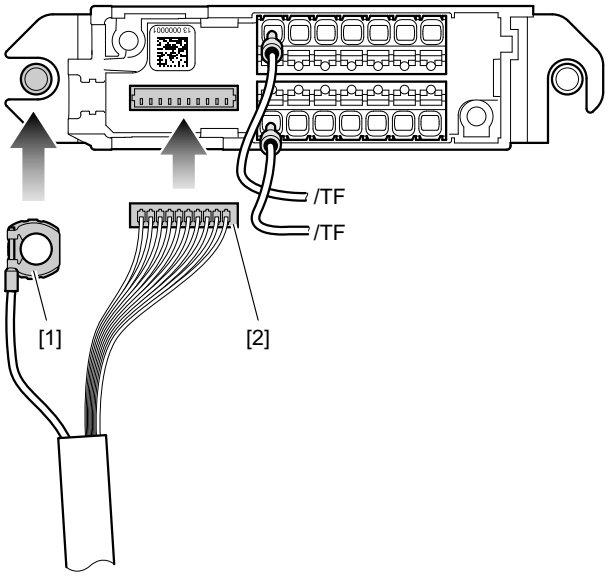
13. Tighten the clamping screw [1160].
    - ⇨ DRN71 – 100, DR2..71 – 80: Tightening torque 1.2 Nm
    - ⇨ DRN112 – 132S: Tightening torque 3.3 Nm
14. Route the encoder cable in the terminal box in such a way that it is not crushed or improperly subjected to stress.
15. Remove the cover of the connection unit [1522] by pressing the cover on both sides behind the cable entry.
16. Apply the shielding of the encoder cable onto the Stocko terminal.
17. Place the connection unit [1522] in the terminal box.
18. To secure the connection unit [1522] in place, screw the Stocko terminal [1] and the shield plate tightly in the terminal box.
    - ⇨ Tightening torque 5 Nm.



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19. Insert the jack of the encoder cable [2] into the connector on the board and insert the encoder cable into the hollow of the connection unit [1522], which serves as strain relief. If applicable, connect the temperature sensor /TF.
20. Connect the customer's evaluation unit for the encoder to the connection unit [1522] with a shield plate.
21. Connect the supply voltage to the encoder module [1517].

22. Attach the cover of the connection unit [1522].
23. Check the visual feedback of the status LED for the encoder module [1517].
    - ⇨ LED lights up green: The encoder module [1517] has been installed correctly and you can continue with the assembly process.
    - ⇨ LED lights up red: Switch off the supply voltage. Set the distance of 1 mm between the encoder module [1517] and the pole ring again. Switch the supply voltage back on. If the status LED still lights up red, please contact the SEW-EURODRIVE Service department.
24. Mount the terminal box cover [132] using the screws [123] (4xM5 SW8).
    - ⇨ Tightening torque 4 Nm
25. Mount the fan guard [35] with the screws [22].
    - ⇨ Tightening torque 2 Nm.
26. Mount the forced cooling fan if applicable.

Removing EI8. with M23 plug connector

- ✓ Required resources: Screwdriver

1. Remove the forced cooling fan if required.
2. Remove the screws [22] to disassemble the fan guard [35].
3. Loosen the radial clamping screw [1160]:
   - ⇨ DRN71 – 100: M3 with cylinder head
   - ⇨ DRN112/132S: M4 with cylinder head
4. Remove the fan [36] with bushing and pole ring from the shaft end.
5. Remove the 3 x M4 pan head screws [1518] of the encoder module [1517].
6. If present, remove the hexagonal spacers [1520] (SW8).
7. Unscrew the screws [123] to remove the terminal box cover [132].
8. Remove the protective cover of the M23 plug connector [1525] on the inside of the terminal box.
9. Pull the jack of the encoder cable from the connector.
10. Remove the grounding element of the encoder.
11. **NOTICE!** Possible defect of the encoder module. Physical damage can occur. Do not pull directly on the encoder module.
    To remove the encoder module [1517] from the motor, pull the encoder cable out of the grommet [1526] and the opening of the knock-out [K].

Mounting EI8. with M23 plug connector

- ✓ Required resources: Feeler gauge, screwdriver, centering ring [1920]

1. Unscrew the screws [123] to remove the terminal box cover [132].
2. **NOTICE!** Damage to the terminal box or fragments inside the motor. Possible physical damage. Exercise caution when breaking open the knock-outs.
   Break open the knock-out [K] by using a chisel or screwdriver.
3. **NOTICE!** Damage to the connector. Possible physical damage. Do not subject the connector to excessive tension.
   Pull the grommet [1526] with encoder cable through the knock-out [K].
   - ⇨ The grommet must engage into the opening of the knock-out [K].

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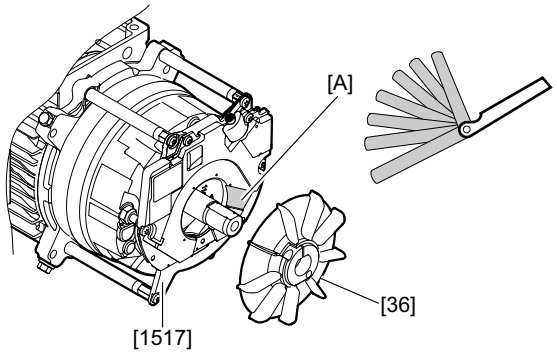
4. If necessary, screw the hexagonal spacers [1520] into the brake endshield.
   ⇨ Tightening torque 5 Nm.
5. Place the centering ring [1920] onto the pole ring.
6. Push the encoder module [1517] onto the shaft end.
7. Push the fan [36] with bushing and pole ring onto the shaft end.
8. Center the encoder module [1517] with the centering ring [1920] radially to the shaft.
9. Use 3 pan head screws [1518] to secure the encoder module [1517] to the brake endshield or, if applicable, to the hexagonal spacers [1520].
   ⇨ Tightening torque 2.5 Nm
10. Remove the fan [36] with bushing and pole ring from the shaft end and remove the centering ring [1920].
11. Push the fan [36] with bushing and pole ring onto the shaft end.
12. To set the distance of 1 mm between the encoder module [1517] and the pole ring, insert a feeler gauge into the designated notch [A].



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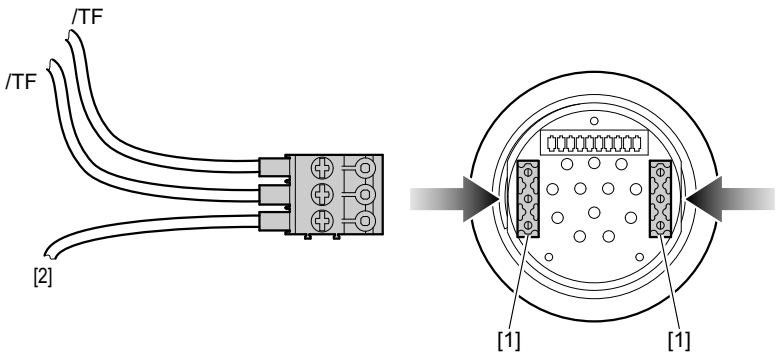
13. Tighten the clamping screw [1160].
    ⇨ DRN71 – 100, DR2..71 – 80: Tightening torque 1.2 Nm
    ⇨ DRN112 – 132S: Tightening torque 3.3 Nm
14. Route the encoder cable in the terminal box in such a way that it is not crushed or improperly subjected to stress.
15. Remove the protective cover of the M23 plug connector [1525] on the inside of the terminal box.
16. Insert the jack of the encoder cable into the connector on the board.
17. Connect the shielding of the encoder cable [2] and, if applicable, the temperature sensor /TF to the screw terminal.



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18. Insert the screw terminal (with the connection side facing outwards) into one of the two plug connectors [1] on the printed circuit board.
19. Attach the protective cover of the M23 plug connector [1525] to the inside of the terminal box.
20. Connect the evaluation unit for the encoder via the M23 plug connector [1525].
21. Connect the supply voltage to the encoder module [1517].
22. Check the visual feedback of the status LED for the encoder module [1517].
    - ⇨ LED lights up green: The encoder module [1517] has been installed correctly and you can continue with the assembly process.
    - ⇨ LED lights up red: Switch off the supply voltage. Set the distance of 1 mm between the encoder module [1517] and the pole ring again. Switch the supply voltage back on. If the status LED still lights up red, please contact the SEW-EURODRIVE Service department.
23. Mount the terminal box cover [132] using the screws [123] (4xM5 SW8).
    - ⇨ Tightening torque 4 Nm
24. Mount the fan guard [35] with the screws [22].
    - ⇨ Tightening torque 2 Nm.
25. Mount the forced cooling fan if applicable.

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7.5 Inspection/maintenance work for DR..71 – 315, DRN63 – 315, DR2..56 – 80 motors

For the position numbers used in the following descriptions, refer to chapter "Motor structure" (→ 🗎 15).

7.5.1 Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..56 – 80 motors

1. Before starting to perform any work on the motor, disconnect the motor and all mounted options from the power supply before and secure the motor against unintentional power-up.
2. With gearmotors: Remove the motor from the gear unit.

   Remove pinion and oil flinger [107].
3. Remove the forced cooling fan and rotary encoder, if installed (see chapter "Preliminary work for motor and brake maintenance" (→ 🗎 127)).
4. Remove fan guard [35] and fan [36].
5. Remove stator:
   - **DRN63, DR2..63 motors**: Removing the cap screw [19].
   - **DR..71 – 132, DRN71 – 132S, DR2..56, 71 – 80 motors:** Remove cap screws [13] from flanged endshield [7] and rear endshield [42]. Remove stator [16] from flanged endshield [7].
   - **DR..160 – 180, DRN132M – 180 motors:** Loosen cap screw [19] and remove rear endshield [42]. Loosen hex head screw [15] and remove stator from flanged endshield.
   - **DR..200 – 225, DRN200 – 225 motors**
     - Loosen hex head screw [15] and remove flanged endshield [7] from stator.
     - Loosen cap screws [19] and remove the complete rotor [1] together with the rear endshield [42].
     - Loosen cap screws [25] and remove the complete rotor [1] from the rear endshield [42].
   - **DR..250 – 280, DRN250 – 280 motors** without option /ERF or /NS
     - Loosen cap screws [15] and remove the flange [7].
     - Loosen cap screws [19] and remove the rear endshield [42] together with the rotor [1].
     - Loosen cap screws [25] and remove the rear endshield [42] from the rotor [1].
   - **DR..250 – 280, DRN250 – 280 motors with** option /ERF or /NS, or **DR../ DRN315**
     - Loosen cap screws [19] and [25] and remove the rear endshield [42].
     - Loosen cap screws [15] and remove the flange [7] together with the rotor [1].

       Apply tension or pressure mainly via the rotor [1], carry the flange [7] evenly.
     - Loosen hex head screws [609] and remove the flange [7] from the rotor [1].
     - Before disassembly, preferably protect the oil seal seat from damage using adhesive tape or a protective sleeve.
6. Visual inspection: Is there any moisture or gear unit oil inside the stator?
   - If not, proceed with step 9.
   - If there is moisture, proceed with step 7.

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- If there is gear oil, have the motor repaired by a specialist workshop

7. If there is moisture inside the stator:
   - With gearmotors: Remove the motor from the gear unit.
   - With motors without a gear unit: Remove the A-flange.
   - Remove the rotor [1].
8. Clean the winding, dry it and check it electrically, see chapter "Drying the motor" (→ 🗎 35).
9. Replace the rolling bearing [11], [44] with permitted rolling bearing types, see chapter "Permitted rolling bearings" (→ 🗎 242).

   Apply tension or pressure to the inner ring of the bearings.
10. **DR..250 – 280, DRN225 – 280 motors with** option /ERF or /NS, or for **DR../ DRN315**
    - Fill the rolling bearing with grease until it is two-thirds full, see chapter "Bearing lubrication" (→ 🗎 125)
    - Notice: Place the oil seal flange [608] and [21] onto the rotor shaft before installing the bearings.
    - Mount the motor vertically starting on the A-side.
    - Place the springs [105] and lubrication ring [604] into the bearing bore of the flange [7].
    - Hang the rotor [1] onto the B-side thread, and guide it into the flange [7].
    - Fasten the oil seal flange [608] to the flange [7] using the hex head screws [609].
11. Reseal the shaft:
    - A-side: Replace the oil seal [106].
    - B-side: Replace the oil seal [30].

      Coat the sealing lip with grease (Klüber Petamo GHY 133).
12. Reseal the stator seat:
    - Seal the sealing surface with duroplastic sealing compound (operating temperature -40 °C to +180 °C), such as "SEW L Spezial".
    - **DR..71 – 132, DRN71 – 132S, DR2..71 – 80 motors**: Replace the seal [392].
    - **DR..71 – 132, DRN63 – 132S, DR2..56 – 80 motors**: Replace the O-ring [1480] if it is deformed or damaged. As an alternative, use e.g. "SEW L Spezial" instead of the O-ring.
    - **DRN63, DR2..56 – 63 motors**: Replace the O-ring [392] if it is deformed or damaged. As an alternative, use a duroplastic sealing compound, e.g. "SEW L Spezial" instead of the O-ring.
13. Install the motor and options.

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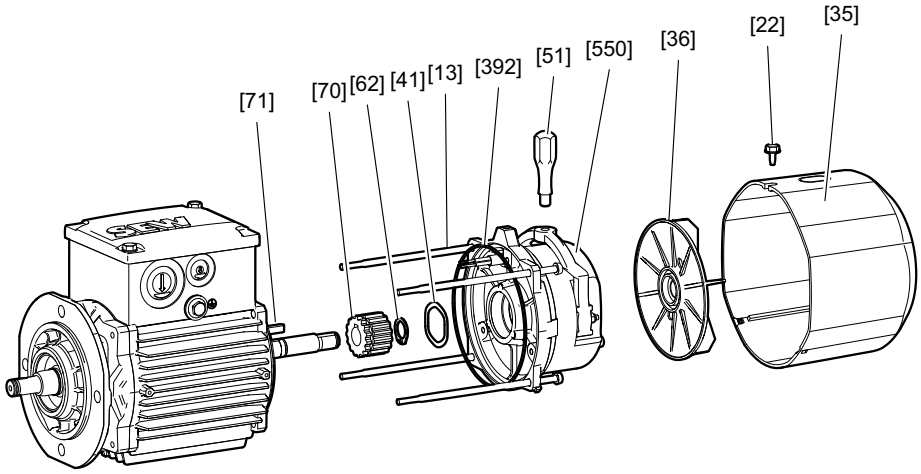
7.6 Inspection/maintenance work for DR..71 – 315, DRN63 – 315, DR2..56 – 80 brakemotors

7.6.1 Basic structure of DR2..56 brakemotors



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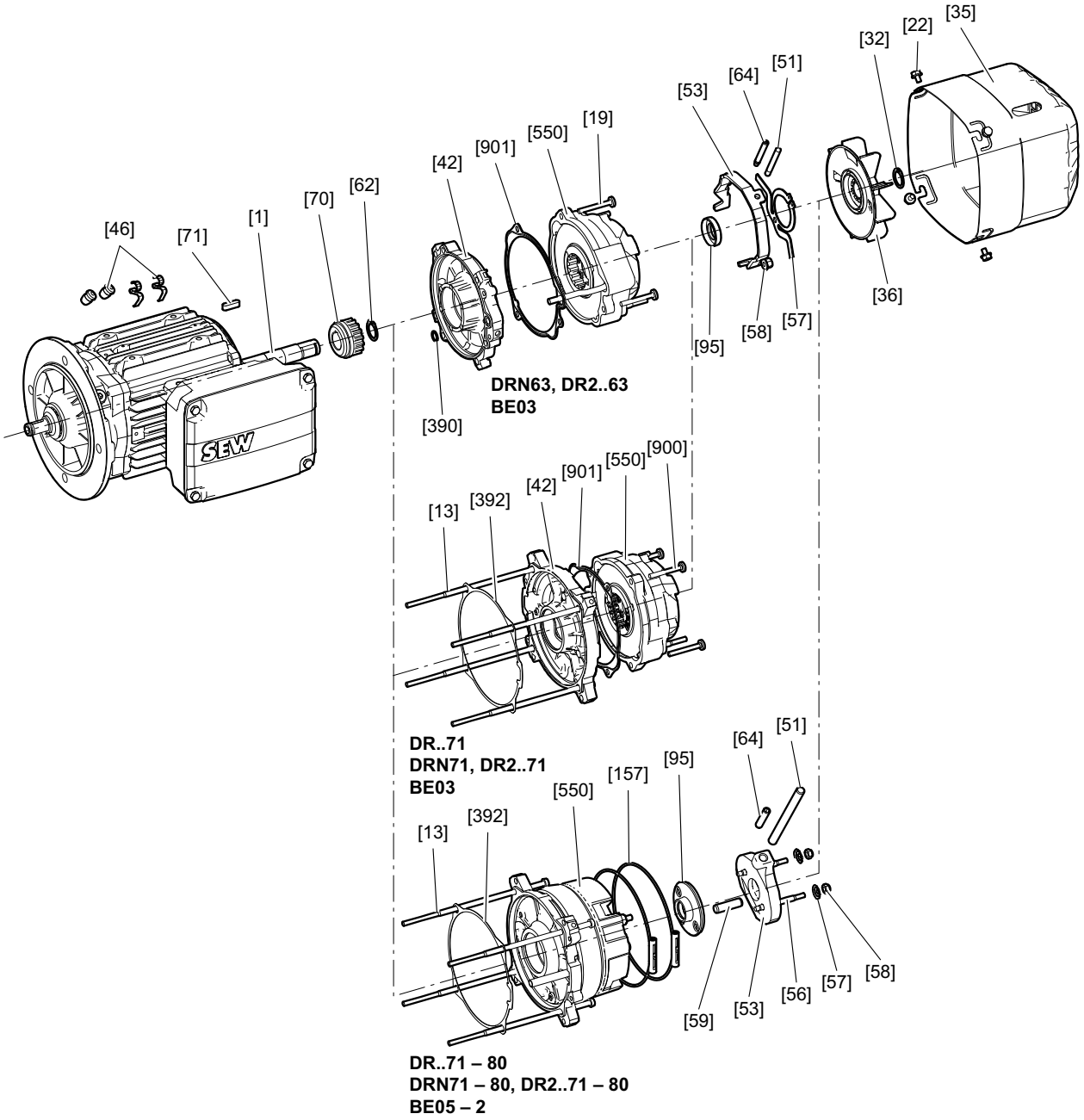
[13]	Cap screw	[41]	Equalizing ring	[71]	Key
[22]	Hex head screw	[51]	Hand lever (/HR)	[392]	Gasket
[35]	Fan guard	[62]	Retaining ring	[550]	Pre-assembled brake
[36]	Fan wheel	[70]	Driver		

7.6.2 General structure of DR..71 – 80, DRN63 – 80, DR2..63 – 80 brakemotors



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[1]	Motor	[51]	Hand lever (/HR)	[70]	Driver
[13]	Cap screw	[53]	Releasing lever	[71]	Key
[19]	Screw	[56]	Stud	[95]	Sealing ring
[22]	Hex head screw	[57]	Conical spring	[157]	Clamping strap (optional)
[32]	Retaining ring	[58]	Hex nut	[392]	Gasket
[35]	Fan guard	[59]	Parallel pin	[550]	Pre-assembled brake
[36]	Fan wheel	[62]	Retaining ring	[900]	Screw
[42]	Brake endshield	[64]	Set screw (/HF)	[901]	Flat gasket
[46]	Clip				

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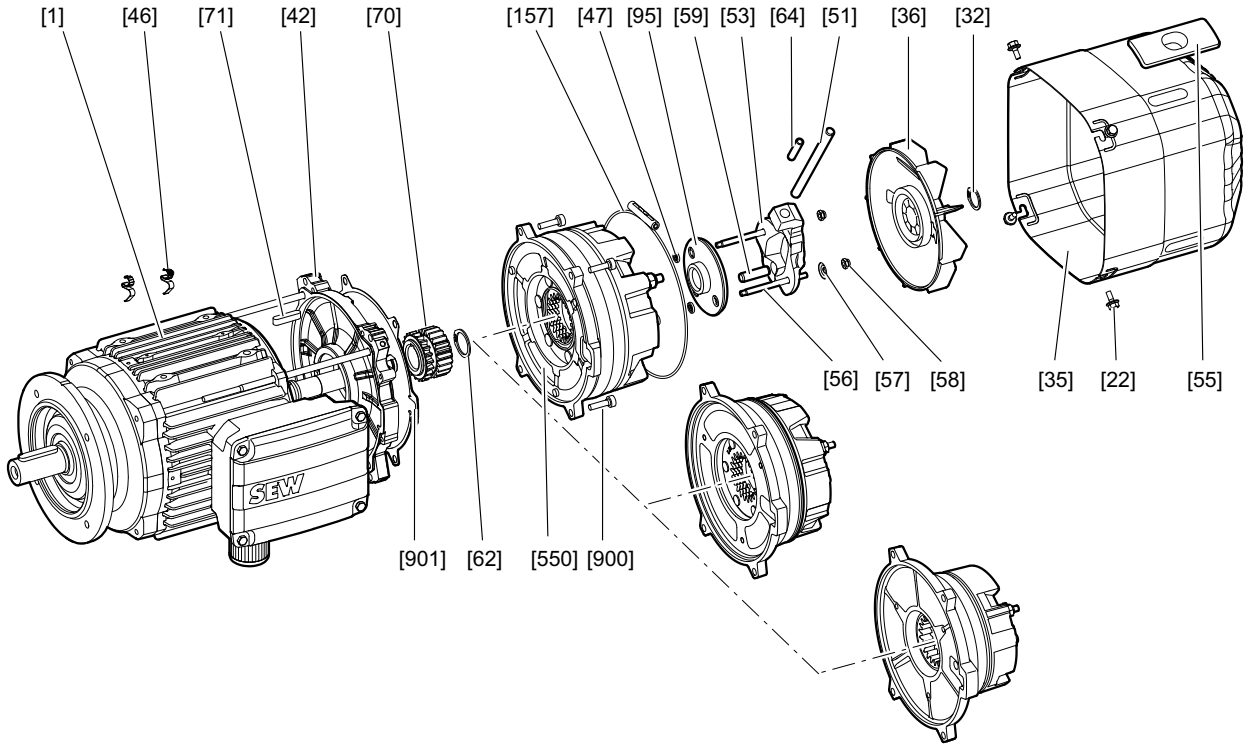
7.6.3 Basic structure of DR..90 – 132, DRN90 – 132S brakemotors



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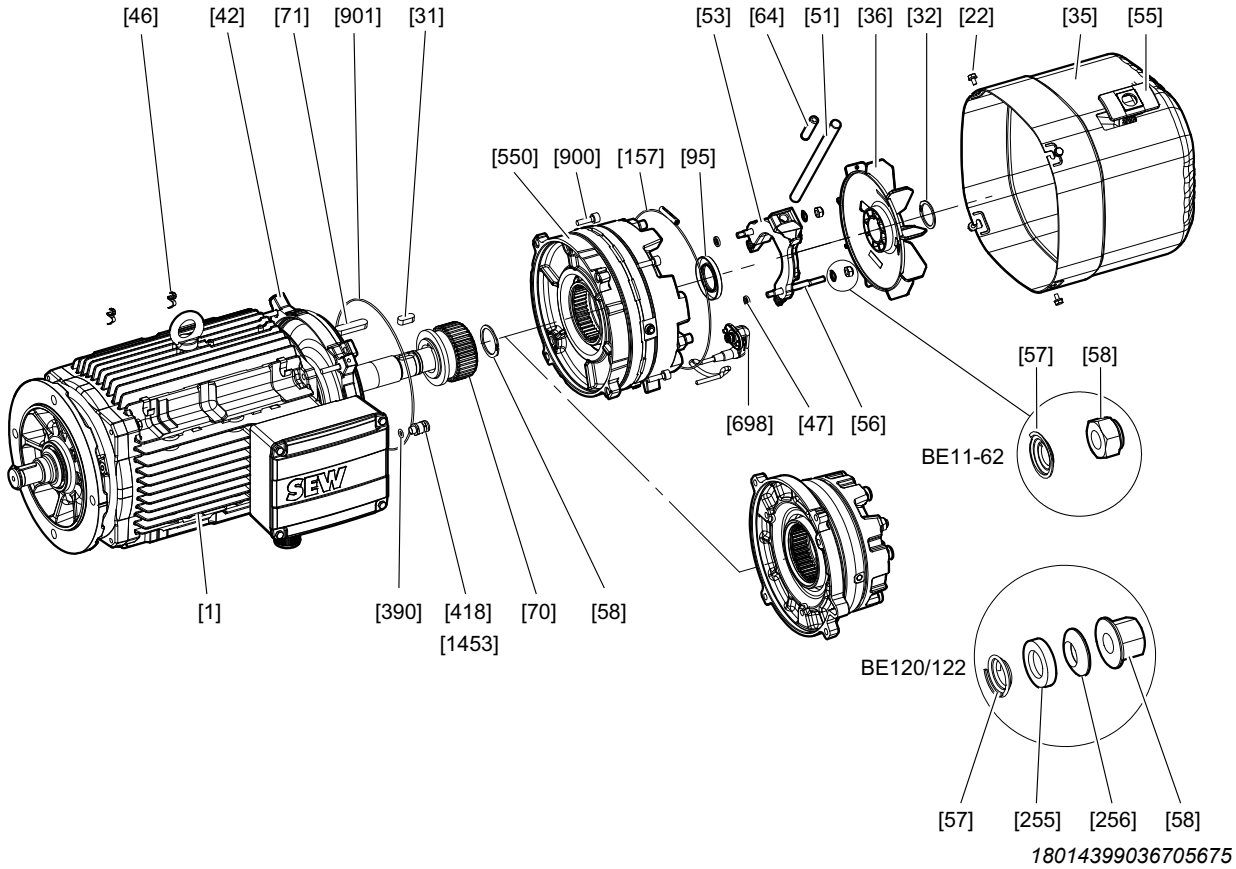
[1]	Motor	[56]	Stud	[71]	Key
[22]	Hex head screw	[57]	Conical spring	[95]	Sealing ring
[32]	Retaining ring	[58]	Hex nut	[157]	Clamping strap (optional)
[35]	Fan guard	[59]	Parallel pin	[550]	Pre-assembled brake
[36]	Fan wheel	[62]	Retaining ring	[900]	Screw
[42]	Brake endshield	[64]	Set screw (/HF)	[901]	Gasket
[46]	Bracket	[70]	Driver		
[47]	O-ring				
[51]	Hand lever (/HR)				
[53]	Releasing lever				
[55]	Closing piece fan guard (DR..112 – 132, DRN112 – 132S)				

7.6.4 Basic structure of DR..160 – 315, DRN132M – 315 brakemotors



[1]	Motor with brake endshield	[53]	Releasing lever	[95]	Sealing ring
[22]	Hex head screw	[55]	Closing piece	[157]	Clamping strap (optional)
[31]	Key	[56]	Stud	[255]	Conical seat
[32]	Retaining ring	[57]	Conical spring	[256]	Spherical washer
[35]	Fan guard	[58]	Hex nut	[390]	O-ring (DR..160 – 225, DRN132M – 225)
[36]	Fan	[58]	Adjusting nut	[418]	Cable gland
[42]	Brake endshield	[62]	Retaining ring	[550]	Pre-assembled brake
[46]	Bracket	[64]	Set screw (/HF)	[698]	Connector complete (BE20-BE122)
[47]	O-ring	[70]	Driver	[900]	Screw
[51]	Hand lever	[71]	Key	[901]	O-ring/seal (DR..160 – 225, DRN132M – 225)
				[1453]	Grommet (for DRN180 instead of [418])
				[1607]	O-ring (DR..250 –280/DRN250 – 280)

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7.6.5 Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors

1. Before starting to perform any work on the motor, disconnect the motor and all mounted options from the power supply before and secure the motor against unintentional power-up.
2. With gearmotors: Remove the motor from the gear unit. Remove pinion and oil flinger [107].
3. Remove forced cooling fan and rotary encoder, if installed. See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
4. Remove the fan guard with encoder mount or fan guard [35] and the fan wheel [36].
5. If applicable, disassemble the sensors of the /DUE option, see chapter "Removing the /DUE diagnostic unit" (→ 🗎 209).
6. **DR..90 – 315, DRN63– 315, DR2..56 – 80 motors**: Remove the brake cpl. [550] (if applicable) with mounted /HR, /HF option manual brake release.
   - **BE02 – 11**: Remove terminal box cover, loosen brake cable and microswitch supply cable of the /DUB option from the terminals.
   - **BE20 – 122**: Loosen locking screws of the brake plug connector [698] and remove plug connector.
   - Loosen screws [13]/[19]/[900], press brake [550] off the endshield [42], and carefully lift off the brake.
7. Remove stator:
   - **DR..71 – 132, DRN63 – 132S, DR2..63 – 80 motors:** Remove cap screws [13] from flanged endshield [7] and rear endshield [42]. Remove stator [16] from flanged endshield [7].
   - **DR..160 – 180, DRN132M – 180 motors:** Loosen cap screw [19] and remove rear endshield [42]. Loosen hex head screw [15] and remove stator from flanged endshield.
   - **DR..200 – 225, DRN200 – 225 motors**
     – Loosen hex head screw [15] and remove flanged endshield [7] from stator.
     – Loosen cap screws [19] and remove the complete rotor [1] together with the rear endshield [42].
     – Loosen cap screws [25] and remove the complete rotor [1] from the rear endshield [42].
   - **DR..250 – 280, DRN250 – 280 motors** without option /ERF or /NS
     – Loosen cap screws [15] and remove the flange [7].

       Apply tension or pressure to the rotor [1], carry the flange [7] evenly.
     – Loosen cap screws [19] and remove the rear endshield [42] together with the rotor [1].
     – Loosen cap screws [25] and remove the rear endshield [42] from the rotor [1].
   - **DR..250 – 280, DRN250 – 280 motors** with option /ERF or /NS, or **DR../ DRN315 motors**
     – Loosen cap screws [19] and [25] and remove the rear endshield [42].
     – Loosen cap screws [15] and remove the flange [7] together with the rotor [1].
     – Loosen hex head screws [609] and remove the flange [7] from the rotor [1].

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– Before disassembly, preferably protect the oil seal seat from damage using adhesive tape or a protective sleeve.

8. Pull the stator back by approx. 3 to 4 cm.
9. Visual inspection: Is there any moisture or gear unit oil inside the stator?
   - If not, proceed with step 11.
   - If there is moisture, proceed with step 10.
   - If there is gear oil, have the motor repaired by a specialist workshop.
10. If there is moisture inside the stator:
    - With gearmotors: Remove the motor from the gear unit
    - With motors without a gear unit: Remove the A-flange
    - Remove the rotor [1]
    - Clean the winding, dry it and check it electrically, see chapter "Drying the motor" (→ 🗎 35).
11. Remove the driver from the shaft.
12. Replace the rolling bearing [11], [44] with permitted rolling bearing types, see chapter "Permitted rolling bearings" (→ 🗎 242).

    Apply tension or pressure to the inner ring of the bearings.
13. Install key [71] and driver [70]:
    - Preheat the driver to allow for easier installation (joining temperature +85 °C to +115 °C).
    - **DR..71, DRN63 – 71, DR2..63 – 71 motors**: Clean the driver seat at the rotor [1] before installation. Glue in the driver using Loctite 649. Join the retaining ring [62] flush to the driver. Protect the sealing surface for the oil seal against scratches.
    - **DR..80 – 315, DRN80 – 315, DR2..56, 80 motors**: Clean the driver at the rotor [1] and coat with anti-corrosion agent NOCO® fluid before fitting. Next, mount the retaining ring [62].
14. Seal the stator again and install it:
    - **DR..71 – 132, DRN63 – 132S, DR2..56 – 80 motors**: Replace the seal [392].
    - **DRN63, DR2..63, DRN132M – 225 and DR..160-225 motors:** Replace O-ring [390].
    - **DR..160 – 315, DRN132M – 315 motors**: Seal the sealing surfaces with duroplastic sealing compound (operating temperature -40 °C to +180 °C), such as "SEW-L-Spezial".
15. **DR..250 – 280, DRN225 – 280 motors with** option /ERF or /NS, or with **DR../ DRN315 motors**
    - Fill the rolling bearing with grease until it is two-thirds full, see chapter "Bearing lubrication" (→ 🗎 125).
    - Notice: Place the oil seal flange [608], [21] onto the rotor shaft before installing the bearings.
    - Mount the motor vertically starting on the A-side.
    - Place the springs [105] and lubrication ring [604] into the bearing bore of the flange [7].
    - Hang the rotor [1] onto the B-side thread, and guide it into the flange [7].

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- Fasten the oil seal flange [608] to the flange [7] using the hex head screws [609].
- Screw in the stator [16] and flange [7] with screws [15].

  Notice: Protect the winding overhang from damage.
- Before mounting the rear endshield, screw in the M8 set screw (approximately 200 mm) into the oil seal flange [21].
- Before mounting the rear endshield [42], insert the set screw in through a bore for the screw [25]. Screw rear endshield to stator [16] using cap screws [19] and hex nuts [17]. Lift the oil seal flange [21] with the set screw, and fasten using 2 screws [25]. Remove the set screw and screw in the remaining screws [25].

16. Reseal the shaft:
    - Replace the oil seal [106] on the A-side.
    - **DR..315, DRN315 motors with /FG option:** Replace the oil seal [250] on the A-side.
    - **DR..250 – 315, DRN250 – 315, DRN225 motors with /NS option:** Replace the oil seal [30] on B-side
    - Apply suitable grease to the sealing lip, see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🖹 245).
17. Seal the friction disk of the brake [550] again at the brake endshield [42]:
    - **DRN63 – 71, DR2..63– 71 motors with BE03 brake:** Replace flat gasket [901].
    - **DR..90 – 132, DRN90 – 132S motors:** Replace gasket [901]
    - **DR..160 – 280, DRN132M – 280 motors**: Replace O-ring [901] or [1607].
    - **DR..315, DRN315 motors**: Seal the sealing surface with duroplastic sealing compound (operating temperature -40 °C to +180 °C), such as "SEW L Spezial".
18. Reinstall the brake [550]: Insert the brake cable into the terminal box when installing the brake. Install the brake. Observe the alignment of the brake. (Cams at the endshield, manual brake release position).
    - **BE03 brake**: The self-tapping screws must be distributed and tightened around the brake evenly to prevent the mounted brake from being tilted.
    - **DRN63, DR2..63/BE03 motors**: Tighten screw [19] M5x35 (self-tapping) with a tightening torque of 5 Nm. The screws can be reused.
    - **DRN71, DR2..71/BE03 motors**: Tighten screw [900] M5x20 (self-tapping) with a tightening torque of 5 Nm. New screws must be used each time the brake is mounted again.
    - **DR..71 – 80, DRN71 – 80, DR2..56, 71– 80 motors**: Install cap screws [13]. Tightening torque: 5 Nm
    - **DR..90 – 315, DRN90 – 315 motors**: Install cap screws [900].

Motors	DR..90 – 100, DRN90 – 100	DR..112 – 160, DRN112 – 132	DR..180, DRN160 – 180	DR..200 – 225, DRN200 – 225	DR..250 – 315, DRN250 – 315
Tightening torque	10.3 Nm	25.5 Nm	50 Nm	87.3 Nm	230 Nm

19. Connect the brake connection cable.
    - **BE02 – 11**: Reconnect the brake cable according to the wiring diagram.

- **BE20 – 122**: Plug in the brake plug connector [698] again. Tighten the retaining screws again (tightening torque: 3 Nm)

20. **DR..71 – 315, DRN63 – 315, DR2..63 – 80 motors:** Apply suitable grease to the sealing ring [95], see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).
21. If applicable: Install sensors of the /DUE option and recalibrate the zero value. See chapter "Retrofitting the /DUE diagnostic unit for function and wear monitoring" (→ 🗎 209).
22. Install the fan wheel [36] and the fan guard [35]. Install available optional equipment.
23. With gearmotors: Replace oil flinger [107] and install the pinion.

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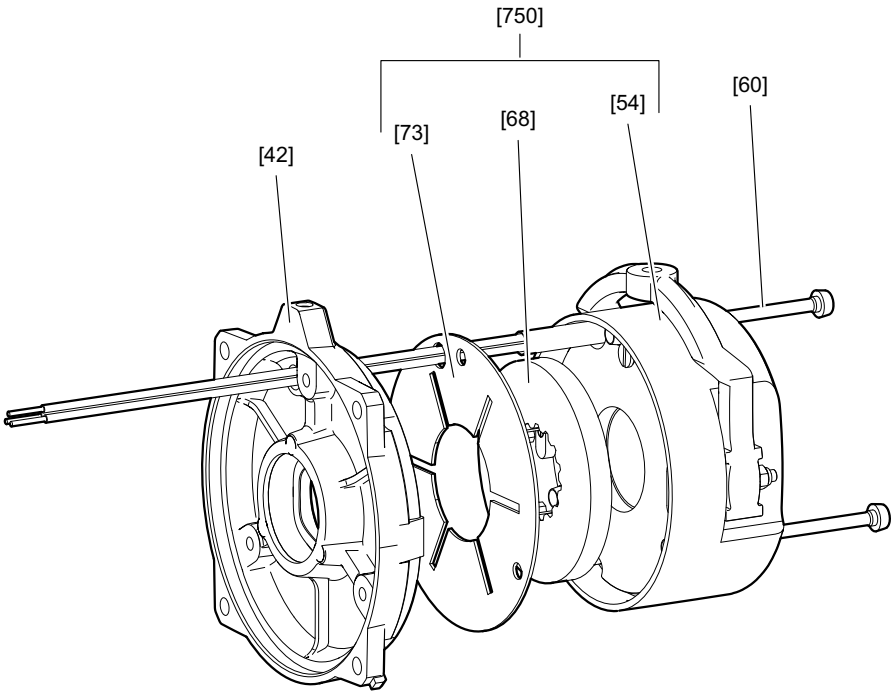
7.6.6 Basic structure of BE02 brakes



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[42]	Brake endshield	[68]	Brake lining
[54]	Magnet body, complete	[73]	Friction plate
[60]	Cap screw	[750]	Pre-assembled brake

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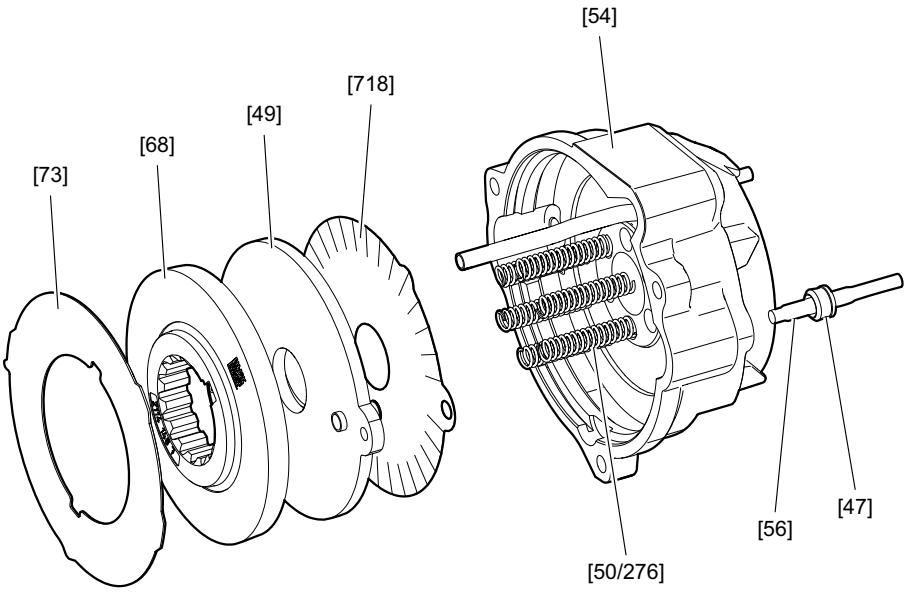
7.6.7 Basic structure of BE03 brakes



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[47]	Sealing element	[54]	Magnet body, complete	[73]	Friction plate
[49]	Pressure plate	[56]	Stud	[276]	Brake spring
[50]	Brake spring	[68]	Brake disk (complete)	[718]	Damping plate

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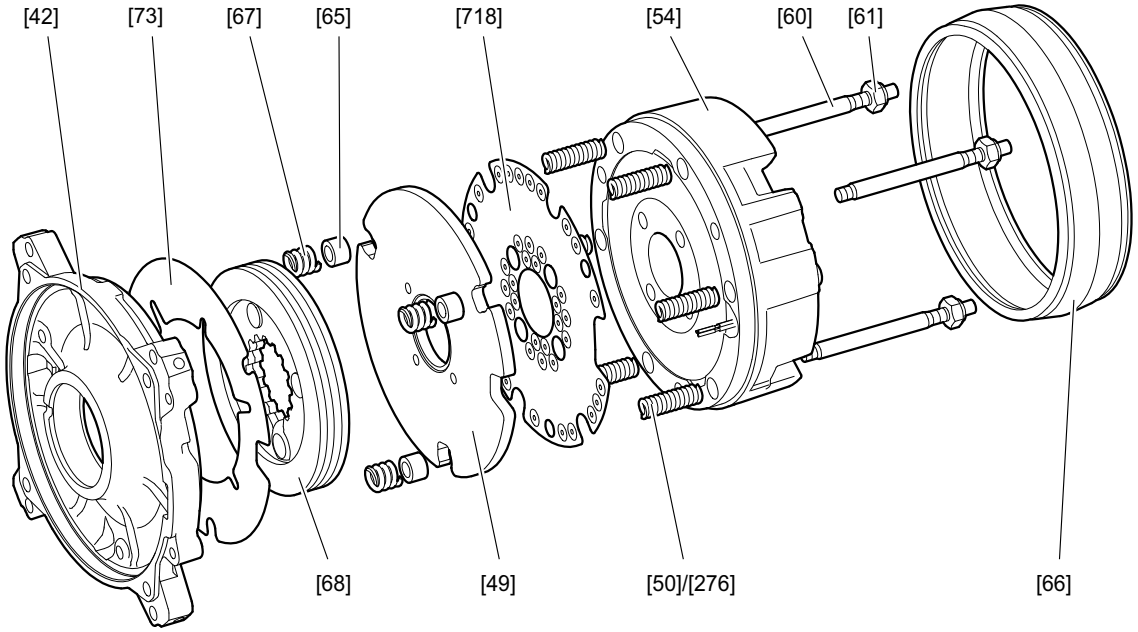
7.6.8 Basic structure of BE05 – 2 brakes



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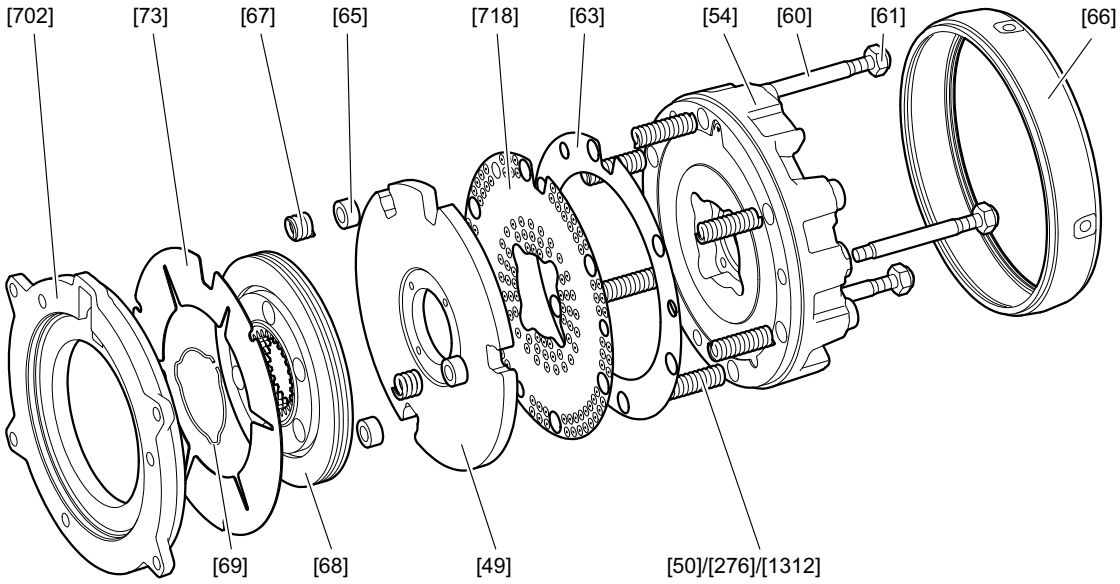
[42]	Brake endshield	[61]	Hex nut	[73]	Niro sheet metal
[49]	Pressure plate	[65]	Pressure ring	[276]	Brake spring (blue)
[50]	Brake spring (normal)	[66]	Sealing strip	[718]	Damping plate
[54]	Magnet body, complete	[67]	Counter spring		
[60]	Stud	[68]	Brake lining carrier		

7.6.9 Basic structure of BE05 – 20 brakes



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[49]	Pressure plate	[65]	Pressure ring	[276]	Brake spring (blue)
[50]	Brake spring (normal)	[66]	Sealing strip	[702]	Friction disk
[54]	Magnet body, complete	[67]	Counter spring	[718]	Damping plate (BE05 – 11)
[60]	Stud	[68]	Brake lining carrier	[1312]	Brake spring (white)
[61]	Hex nut	[69]	Circular spring/clasp (BE5 – 20)		
[63]	Pole sheet	[73]	Niro sheet metal		

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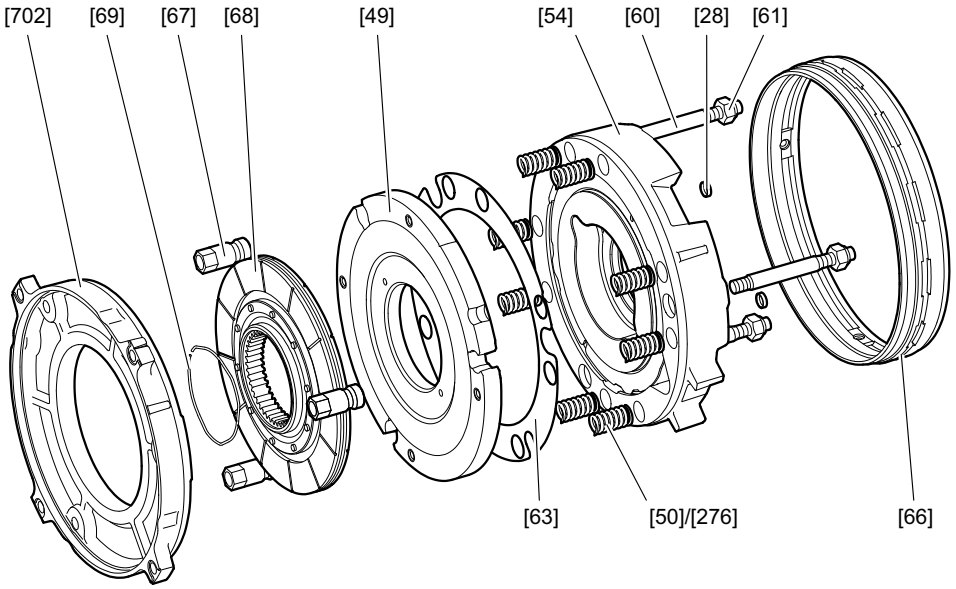
7.6.10 Basic structure of BE30, 60, 120 brakes



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[28]	Closing cap	[61]	Hex nut	[69]	Circular spring
[49]	Pressure plate	[63]	Pole sheet	[276]	Brake spring (blue)
[50]	Brake spring (normal)	[66]	Sealing strip	[702]	Friction disk
[54]	Magnet body, complete	[67]	Setting sleeve		
[60]	Stud	[68]	Complete brake disk		

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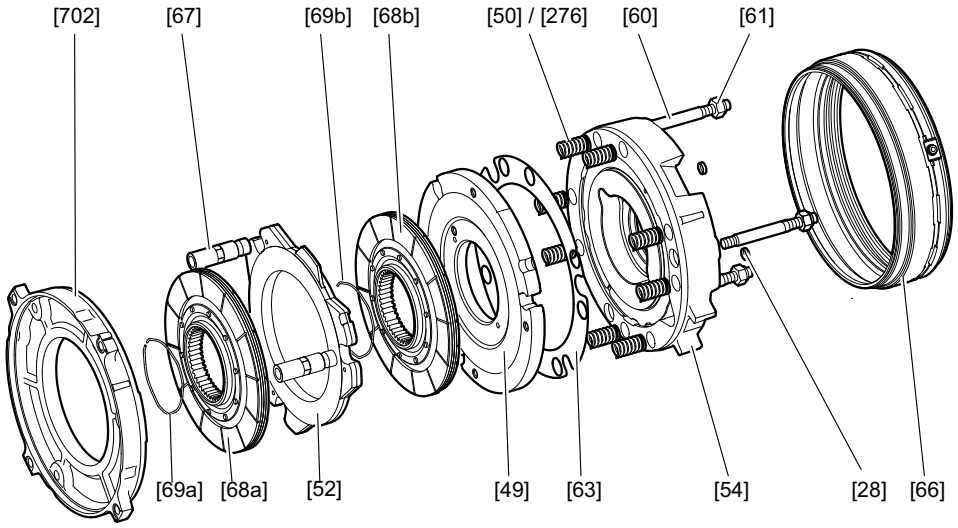
7.6.11 Basic structure of BE32, 62, 122 brakes



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[28]	Closing cap	[61]	Hex nut	[69a]	Circular spring
[49]	Pressure plate	[63]	Pole sheet	[69b]	Circular spring
[50]	Brake spring (normal)	[66]	Sealing strip	[276]	Brake spring (blue)
[52]	Brake plate complete	[67]	Setting sleeve	[702]	Friction disk
[54]	Magnet body, complete	[68a]	Complete brake disk		
[60]	Stud	[68b]	Complete brake disk		

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7.6.12 Measuring the wear of the BE02 brake

The working air gap of BE02 brakes cannot be adjusted. Check the brake lining carrier thickness during maintenance.

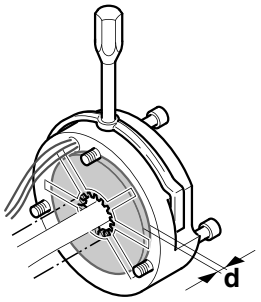
Replacing individual parts of the brake is not permitted.

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Loosen the screws [60].
2. Remove the complete magnet body [54] with pressure plate and, if applicable, installed manual brake release from the brake endshield [42].
3. Make sure the brake springs [50]/[276] and friction plates [73] do not fall out.
4. Remove the brake lining carrier [68] and measure its thickness "d".

⇨ Replace the brake if the lining thickness is below the minimum permitted value. For the values, refer to chapter "Braking work, working air gap, and brake lining carrier thickness" (→ 🗎 225).



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7.6.13 Measuring the wear of BE03 brakes

The working air gap of BE03 brakes cannot be adjusted. Check the stroke of the pressure plate during maintenance.

Replacing individual parts of the brake is not permitted.

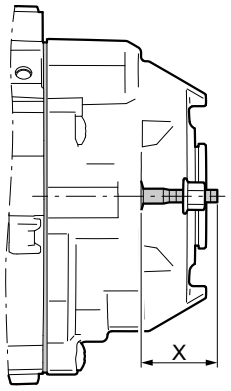
✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Measure the dimension "X" at the stroke of the studs when the brake is released or applied using a depth gauge or slide gauge.

   ⇨ The difference between both values is the working air gap.

⇨ The maximum permitted working air gap is 0.65 mm. Replace the brake in case this value is exceeded.



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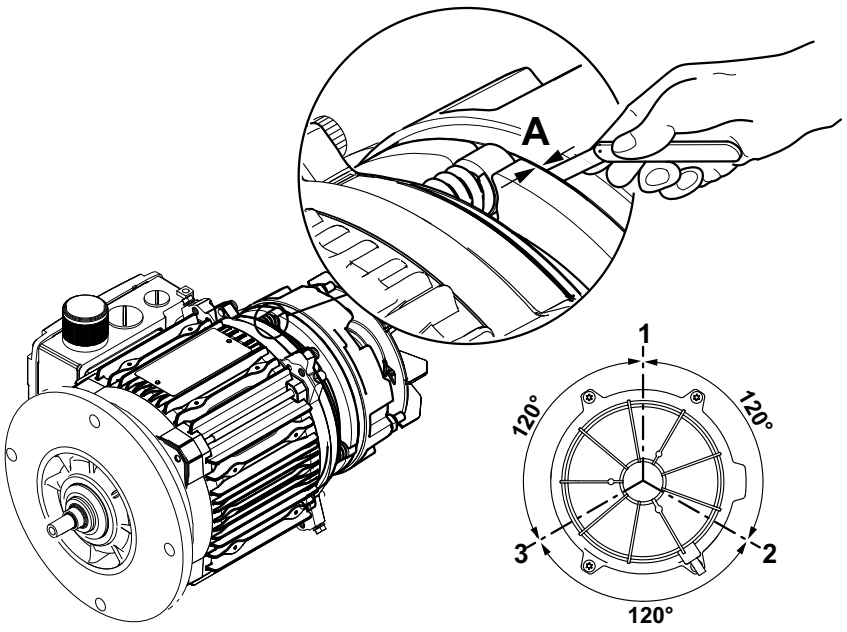
7.6.14 Setting the working air gap of BE05 – BE122 brakes

1. Before starting to perform any work on the motor, disconnect the motor and all mounted options from the power supply before and secure the motor against unintentional power-up.
2. Remove the following:
   - Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - Fan guard with encoder mount or fan guard [35]
3. Push the sealing strip [66] aside,
   - Loosen the clamping strap [157] to do this, if necessary
   - Vacuum any abrasion
4. Measure the brake lining carrier [68]:
   - For the minimum thickness of the brake lining carrier, see chapter "Technical data" (→ 🗎 222).
   - If necessary, replace the brake lining carrier according to chapter "Replacing the brake lining carrier of BE05 – BE122 brakes" (→ 🗎 193).
5. **BE30 – 122:** Loosen the setting sleeve [67] by turning it towards the rear end-shield.
6. Measure the working air gap A (see the following figure)

   (use a feeler gauge and measure at three points offset by 120°):
   - **BE05 – 11**: between pressure plate [49] and damping plate [718]
   - **BE20 – 122**: between pressure plate [49] and magnet body [54]



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   - **BE05 – 20:** Tighten the hex nuts [61] until the working air gap is set correctly, see chapter "Braking work, working air gap, and brake lining carrier thickness" (→ 🗎 225).

- **BE30 – 122:** Tighten the hex nuts [61] until the working air gap is initially 0.05 – 0.1 mm larger than the desired setting value (for default values, see chapter "Braking work, working air gap, and brake lining carrier thickness" (→ 🗎 225)). For example, with a desired air gap of 0.4 mm, the preset value must be 0.45 – 0.5 mm.

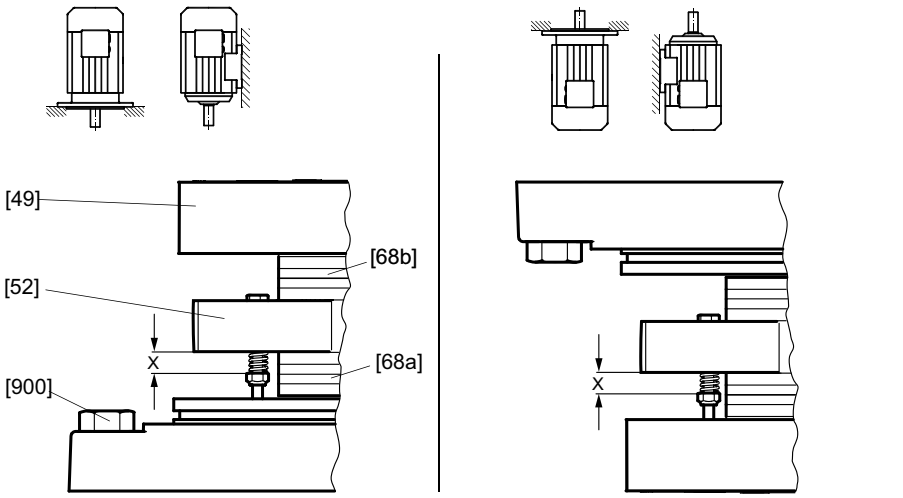
7. **BE30 – 122:** Evenly apply the setting sleeves [67] to the friction disk [900] by screwing them out of the magnet body.

   Tighten the hex nut [61] with the following tightening torque. Lastly, check the settings of the working air gap and adjust it if necessary.

Brake	Tightening torque
BE30 – BE32	93 Nm
BE60 – BE62	40 Nm
BE120 – BE122	230 Nm

8. If you are mounting the **BE32, BE62, BE122** to a motor with vertical motor axis, set the 3 springs of the brake plate [52] to the following dimension:

Brake	Dimension X in mm
BE32	7.3
BE62	10.0
BE122	10.0



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9. Refit the sealing strip [66] and reinstall the dismantled parts.

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7.6.15 Replacing the brake lining carrier of BE05 – BE122 brakes

In addition to the brake elements listed in column "BE brake", see chapter "Inspection and maintenance intervals" (→ 🗎 123), check the hex nuts [61] for wear when you replace the brake lining carrier. You must always replace the hex nuts [61] when you replace the brake lining carrier.

INFORMATION

- With DR..71 – 80, DRN71 – 80 motors with BE05 – 2 brake, the brake cannot be removed from the motor because the BE brake is directly installed on the brake endshield of the motor.

1. Disconnect the motor and all mounted options from the power supply before starting to work, and secure the motor against unintentional power-up.
2. Remove the following:
   - Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - Fan guard with encoder mount or fan guard [35], retaining ring [32]/[62] and fan [36]
3. Remove the brake cable
   - **BE05 – 11:** Loosen the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – 122:** Loosen locking screws of the brake plug connector [698] and remove plug connector.
4. Remove the rubber sealing collar [66]
5. Remove manual brake release if necessary.
   - Adjusting nuts [58], conical springs [57], studs [56], releasing lever [53], conical seat [255], spherical washer [256]
6. Loosen the hex nuts [61], carefully pull off the magnet body [54] (brake cable!) and take out the brake springs [50]/[276]/[1312].
7. **BE05 – 11:** Remove the damping plate [718], pressure plate [49] and brake lining carrier [68]

   BE20, BE30, BE60, BE120: Remove the pressure plate [49], pole sheet [63] and brake lining carrier [68]

   BE32, BE62, BE122: Remove the pressure plate [49], brake lining carrier [68a] and [68b], and the brake plate [52].
8. Clean the brake components.
9. Install new brake lining carrier(s).
10. Brake parts are installed as described in chapter "Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors" (→ 🗎 179).
    - Except for the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of BE05 – BE122 brakes" (→ 🗎 191).
11. In case of manual brake release: Use the adjusting nuts to adjust the floating clearance "s" between the conical springs (pressed flat) and the adjusting nuts (see chapter "Retrofitting the /HR, /HF manual brake release" (→ 🗎 203).

⚠ WARNING

No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Make sure the floating clearance "s" is correctly set, so that the pressure plate can move up as the brake lining wears.

12. Put the sealing strip [66] in place and re-install the dismantled parts.

INFORMATION

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

7.6.16 Changing the braking torque of BE05 – BE122 brakes

You can alter the braking torque in stages. This can be done in various ways:

- By changing the type and number of brake springs
- By changing the complete magnet (only possible for BE05 and BE1)
- By changing the brake (from motor size 90)
- By changing to a double disk brake (only possible for BE30, BE60, BE120)

For possible braking torque steps, refer to chapter "Technical data" (→ 🗎 222).

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7.6.17 Changing the brake spring of BE05 – BE122 brakes

1. Disconnect the motor and all mounted options from the power supply before starting to work, and secure the motor against unintentional power-up.
2. Remove the following:
   - Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - Fan guard with encoder mount or fan guard [35], retaining ring [32]/[62] and fan [36]
3. Remove the brake cable.
   - **BE05 – 11:** Remove the terminal box cover. Remove the brake cable from the rectifier.
   - **BE20 – 122:** Loosen the locking screws of the brake plug connector [698]. Remove the plug connector.
4. Remove the sealing strip [66] and (if necessary) the manual brake release:
   - Setting nuts [58], conical springs [57], studs [56], releasing lever [53], conical seat [255], spherical washer [256]
5. Unfasten the hex nuts [61] and pull off the magnet body [54]
   - By approx. 50 mm (watch the brake cable!)
6. Replace or add brake springs [50/276/1312]
   - Arrange brake springs symmetrically
7. Brake parts are installed as described in chapter "Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors" (→ 🗎 179).
   - Except for the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of BE05 – BE122 brakes" (→ 🗎 191).
8. In case of manual brake release: Use the adjusting nuts to adjust the floating clearance "s" between the conical springs (pressed flat) and the adjusting nuts (see chapter "Retrofitting the /HR, /HF manual brake release" (→ 🗎 203).

⚠ WARNING

No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Make sure the floating clearance "s" is correctly set, so that the pressure plate can move up as the brake lining wears.

9. Put the sealing strip [66] in place and re-install the dismantled parts.

INFORMATION

Replace the setting sleeves [58] if the removal procedure is repeated.

7.6.18 Changing the magnet body of BE05 – BE122 brakes

1. Disconnect the motor and all mounted options from the power supply before starting to work, and secure the motor against unintentional power-up.
2. Remove the following:
   - Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - Fan guard with encoder mount or fan guard [35], retaining ring [32]/[62] and fan [36]
3. Remove the rubber sealing collar [66] and the manual brake release:
   - Setting nuts [58], conical coil springs [57], studs [56], releasing lever [53], parallel pin [59].
4. Remove the brake cable
   - **BE05 – 11:** Loosen the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – 122:** Loosen locking screws of the brake plug connector [698] and remove plug connector.
5. Loosen hex nuts [61], remove complete magnet body [54], remove brake springs [50]/[276]/[1312].
6. Install new magnet body with brake springs. For the possible braking torque steps, refer to chapter "Technical data" (→ 🗎 222).
7. Brake parts are installed as described in chapter "Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors" (→ 🗎 179).
   - Except for the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of BE05 – BE122 brakes" (→ 🗎 191).
8. In case of manual brake release: Use the adjusting nuts to adjust the floating clearance "s" between the conical springs (pressed flat) and the adjusting nuts (see chapter "Retrofitting the /HR, /HF manual brake release" (→ 🗎 203).

⚠ WARNING

No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Make sure the floating clearance "s" is correctly set, so that the pressure plate can move up as the brake lining wears.

9. Put the sealing strip [66] in place and re-install the dismantled parts.
10. Replace the brake control in the event of an interturn short circuit or a short circuit to frame.

INFORMATION

Replace the setting sleeves [58] if the removal procedure is repeated.

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7.6.19 Replacing BE02 brakes with DR2..56 motors

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Disassemble the following parts:
   - ⇨ Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - ⇨ Fan guard with encoder mount [212] or fan guard [35], retaining ring [32]/[62] and fan [36]
2. Remove the terminal box cover and loosen the brake cable from the brake control/ terminals. Attach trailing wire to brake cables, if necessary.
3. Remove the screws and brake (with brake endshield if necessary) from the stator.
   - ⇨ DR2..56: Screws [13]
4. Replace gasket [392]. Observe the alignment of the gasket.
5. If necessary, replace driver [70], key [71], and retaining ring [62], see chapter "Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors" (→ 🗎 179).
6. Insert the brake cable of the new brake into the terminal box.
7. Position the new brake. Make sure the cable outlet and brake lining carrier gearing are correctly aligned.
8. Refasten the brake using the screws.
   - ⇨ Cap screws [13]
   - ⇨ Tightening torque 3.3 Nm.
   - ⇨ Tolerance ±10%.
9. Install the disassembled parts of the motor.

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7.6.20 Replacing BE03 brakes for DRN63 – 71 and DR2..63 – 71 motors

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Disassemble the following parts:
   - ⇨ Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - ⇨ Fan guard with encoder mount [212] or fan guard [35], retaining ring [32]/[62] and fan [36]
2. Remove the terminal box cover and loosen the brake cable from the brake control/ terminals. Attach trailing wire to brake cables, if necessary.
3. Remove the screws and brake (with brake endshield if necessary) from the stator.
   - ⇨ DRN63, DR2..63 motors: Screws [19]
   - ⇨ DRN71, DR2..71 motors: Screws [900]
4. Replace the gasket [901]. Observe the alignment of the gasket, if necessary.
5. If necessary, replace driver [70], key [71], and retaining ring [62], see chapter "Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors" (→ 🗎 179).
6. Insert the brake cable of the new brake into the terminal box.
7. Position the new brake. Make sure the cable outlet and brake lining carrier gearing are correctly aligned.
8. Fasten the brake using screws [19] or [900]. Distribute the screws around the brake and tighten them one after the other.
   - ⇨ DRN63, DR2..63 motors: The screws [19] can be reused. Tightening torque 5 Nm, tolerance ±10%
   - ⇨ DRN71, DR2..71 motors: Use new screws [900]. Tightening torque 5 Nm, tolerance ±10%
9. Seal the shaft.
10. Replace the sealing ring [95].
11. Apply grease to the sealing lip, see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).
12. ⚠ **DANGER!** No braking due to incorrectly set floating clearance "s". Severe or fatal injuries. Make sure the floating clearance "s" is set correctly so that the pressure plate can move up as the brake lining wears.
    Manual brake release option: Set the floating clearance "s" using the adjusting nuts, see chapter "Retrofitting the /HR, /HF manual brake release" (→ 🗎 203).
13. Install the disassembled parts of the motor.

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7.6.21 Replacing BE05 – 2 brakes for DR..71 – 80, DRN80, DR2..80 motors

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Disassemble the following parts:
   - ⇨ Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - ⇨ Fan guard with encoder mount [212] or fan guard [35], retaining ring [32]/[62] and fan [36]
2. Remove the terminal box cover and loosen the brake cable from the brake control/ terminals. Attach trailing wire to brake cables, if necessary.
3. Remove the screws and brake (with brake endshield if necessary) from the stator.
   - ⇨ DR..71 – 80, DRN80, DR2..80: Screws [13]
4. Replace gasket [392]. Observe the alignment of the gasket.
5. If necessary, replace driver [70], key [71], and retaining ring [62], see chapter "Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors" (→ 🗎 179).
6. Insert the brake cable of the new brake into the terminal box.
7. Position the new brake. Make sure the cable outlet and brake lining carrier gearing are correctly aligned.
8. Refasten the brake using the screws.
   - ⇨ Cap screws [13]
   - ⇨ Tightening torque 5 Nm.
   - ⇨ Tolerance ±10%.
9. Seal the shaft.
10. Replace the sealing ring [95].
11. Apply grease to the sealing lip, see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).
12. For designs with corrosion protection /KS and/or IP56/66, the clamping straps of the disassembled brake have to be mounted to the new brake [550]. Seal studs with SEW-L-Spezial, see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).
13. ⚠ **DANGER!** No braking due to incorrectly set floating clearance "s". Severe or fatal injuries. Make sure the floating clearance "s" is set correctly so that the pressure plate can move up as the brake lining wears.
    Manual brake release option: Set the floating clearance "s" using the adjusting nuts, see chapter "Retrofitting the /HR, /HF manual brake release" (→ 🗎 203).
14. Diagnostic unit option /DUE: Insert the sensor [1151] into the magnet body [54] of the new brake using the screw fitting. Fasten the cable with the terminal [1152/1153] at the magnet body in a way that the sensor cable cannot touch the fan wheel [36]. Then calibrate the zero value, see chapter "Zero value calibration" (→ 🗎 217).
15. Install the disassembled parts of the motor.

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7.6.22 Replacing BE05 – 62 brakes for DR..90 – 225, DRN90 – 225 motors

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Disassemble the following parts:
   - ⇨ Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - ⇨ Fan guard with encoder mount [212] or fan guard [35], retaining ring [32]/[62] and fan [36]
2. Loosen the brake cable.
   - ⇨ BE05 – 11: Remove the terminal box cover and loosen the brake cable from the brake control/terminals.
   - ⇨ BE20 – 62: Loosen locking screws of the brake plug connector [698] and remove plug connector.
3. Remove the screws and brake (with brake endshield if necessary) from the stator.
4. Replace the gasket [901]. Observe the alignment of the gasket, if necessary.
5. If necessary, replace driver [70], key [71], and retaining ring [62], see chapter "Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors" (→ 🗎 179).
6. BE05 – 11: Insert the brake cable of the new brake into the terminal box.
7. Position the new brake. Make sure the cable outlet and brake lining carrier gearing are correctly aligned.
   - ⇨ BE20 – 62 with manual brake release option: It is important that the manual brake release is positioned properly.
8. Refasten the brake using the screws.
   - ⇨ Cap screws [900]
   - ⇨ Tightening torque for DR..90 – 100, DRN90 – 100: 10.3 Nm
   - ⇨ Tightening torque for DR..112 – 160, DRN112 – 132: 25.5 Nm
   - ⇨ Tightening torque for DR..180, DRN160 – 180: 50 Nm
   - ⇨ Tightening torque for DR..200 – 225, DRN200 – 225: 87.3 Nm
   - ⇨ Tolerance ±10%.
9. Seal the shaft.
10. Replace the sealing ring [95].
11. Apply grease to the sealing lip, see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).
12. BE20 – 62: Insert the plug connector [698] into the brake and fasten using screws.
    - ⇨ Tightening torque 3 Nm.
13. For designs with corrosion protection /KS and/or IP56/66, the clamping straps of the disassembled brake have to be mounted to the new brake [550]. Seal studs with SEW-L-Spezial, see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).
14. ⚠ **DANGER!** No braking due to incorrectly set floating clearance "s". Severe or fatal injuries. Make sure the floating clearance "s" is set correctly so that the pressure plate can move up as the brake lining wears.
    Manual brake release option: Set the floating clearance "s" using the adjusting nuts, see chapter "Retrofitting the /HR, /HF manual brake release" (→ 🗎 203).

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15. Diagnostic unit option /DUE: Insert the sensor [1151] into the magnet body [54] of the new brake using the screw fitting. Fasten the cable with the terminal [1152/1153] at the magnet body in a way that the sensor cable cannot touch the fan wheel [36]. Then calibrate the zero value, see chapter "Zero value calibration" (→ 🗎 217).
16. Install the disassembled parts of the motor.

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7.6.23 Replacing BE60 – 122 brakes for DR..250 – 315, DRN250 – 315 motors

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Disassemble the following parts:
   - ⇨ Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - ⇨ Fan guard with encoder mount [212] or fan guard [35], retaining ring [32]/[62] and fan [36]
2. Unscrew the locking screws of the brake plug connector [698] and remove the plug connector.
3. Remove the screws and brake (with brake endshield if necessary) from the stator.
   - ⇨ DR..250 – 280, DRN250 – 280 motors: Replace the O-ring [1607].
4. If necessary, replace driver [70], key [71], and retaining ring [62], see chapter "Working steps for inspecting DR..71 – 315, DRN63 – 315, DR2..63 – 80 brakemotors" (→ 🗎 179).
5. Seal the shaft.
6. Replace the sealing ring [95].
7. Apply grease to the sealing lip, see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).
8. Position the new brake. Make sure the cable outlet and brake lining carrier gearing are correctly aligned.
   - ⇨ Manual brake release option: It is important that the manual brake release is positioned properly.
9. Refasten the brake using the screws.
   - ⇨ Cap screws [900]
   - ⇨ Tolerance ±10%.
10. For designs with corrosion protection /KS and/or IP56/66, the clamping straps of the disassembled brake have to be mounted to the new brake [550]. Seal studs with SEW-L-Spezial, see chapter "Order information for lubricants, anti-corrosion agents and sealants" (→ 🗎 245).
11. Insert plug connector [698] in the brake and fasten using screws.
    - ⇨ Tightening torque 3 Nm.
12. ⚠ **DANGER!** No braking due to incorrectly set floating clearance "s". Severe or fatal injuries. Make sure the floating clearance "s" is set correctly so that the pressure plate can move up as the brake lining wears.
    Manual brake release option: Set the floating clearance "s" using the adjusting nuts, see chapter "Retrofitting the /HR, /HF manual brake release" (→ 🗎 203).
13. Diagnostic unit option /DUE: Insert the sensor [1151] into the magnet body [54] of the new brake using the screw fitting. Fasten the cable with the terminal [1152/1153] at the magnet body in a way that the sensor cable cannot touch the fan wheel [36]. Then calibrate the zero value, see chapter "Zero value calibration" (→ 🗎 217).
14. Install the disassembled parts of the motor.

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7.6.24 Retrofitting the /HR, /HF manual brake release

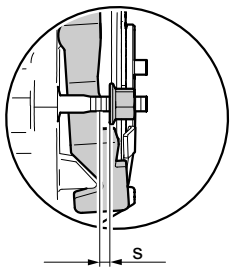
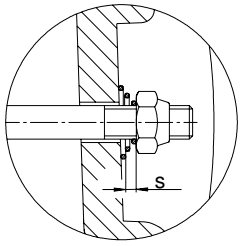
INFORMATION

With BE02 brakes, the manual brake release can only be retrofitted if the brake is completely replaced.

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Disassemble the following parts:
   - ⇨ Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - ⇨ Fan guard with encoder mount [212] or fan guard [35], retaining ring [32]/[62] and fan [36]
2. Mount the manual brake release.
   - ⇨ BE03: Position the releasing lever [53] and the spring plate [53] correctly. Mount the flange nut [58]. Attach the hand lever [51]/set screw [64] to the stator using the grommets.
   - ⇨ BE05 – BE11: Remove the old sealing ring [95]. Screw in the studs [56] and glue them. Insert the sealing rings for the manual brake release [95]. Hammer in the parallel pin [59]. Install the releasing lever [53], the conical springs [57] and the adjusting nuts [58].
   - ⇨ BE20 – BE62: Insert O-rings [47] into the magnet body. Screw in the studs [56] and glue them. Install the releasing lever [53], the conical springs [57] and the adjusting nuts [58].
   - ⇨ BE120 – BE122: Insert O-rings [47] in the magnet body. Screw in the studs [56] and glue them.
3. ⚠ **DANGER!** No braking due to incorrectly set floating clearance "s". Severe or fatal injuries. Make sure the floating clearance "s" is set correctly so that the pressure plate can move up as the brake lining wears.
   Set the floating clearance "s" using the adjusting nuts or flange nuts.
   - ⇨ BE03: Between releasing lever and flange nut (see following illustration).
   - ⇨ BE05 – 122: Between conical springs (pressed flat) and adjusting nuts (see following illustration).

BE03	BE05 – 122
	

Brake	Floating clearance s mm
BE03	2.2
BE05, BE1, BE2	1.5

Brake	Floating clearance s mm
BE5	1.7
BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122	2

4. Install the disassembled parts of the motor.

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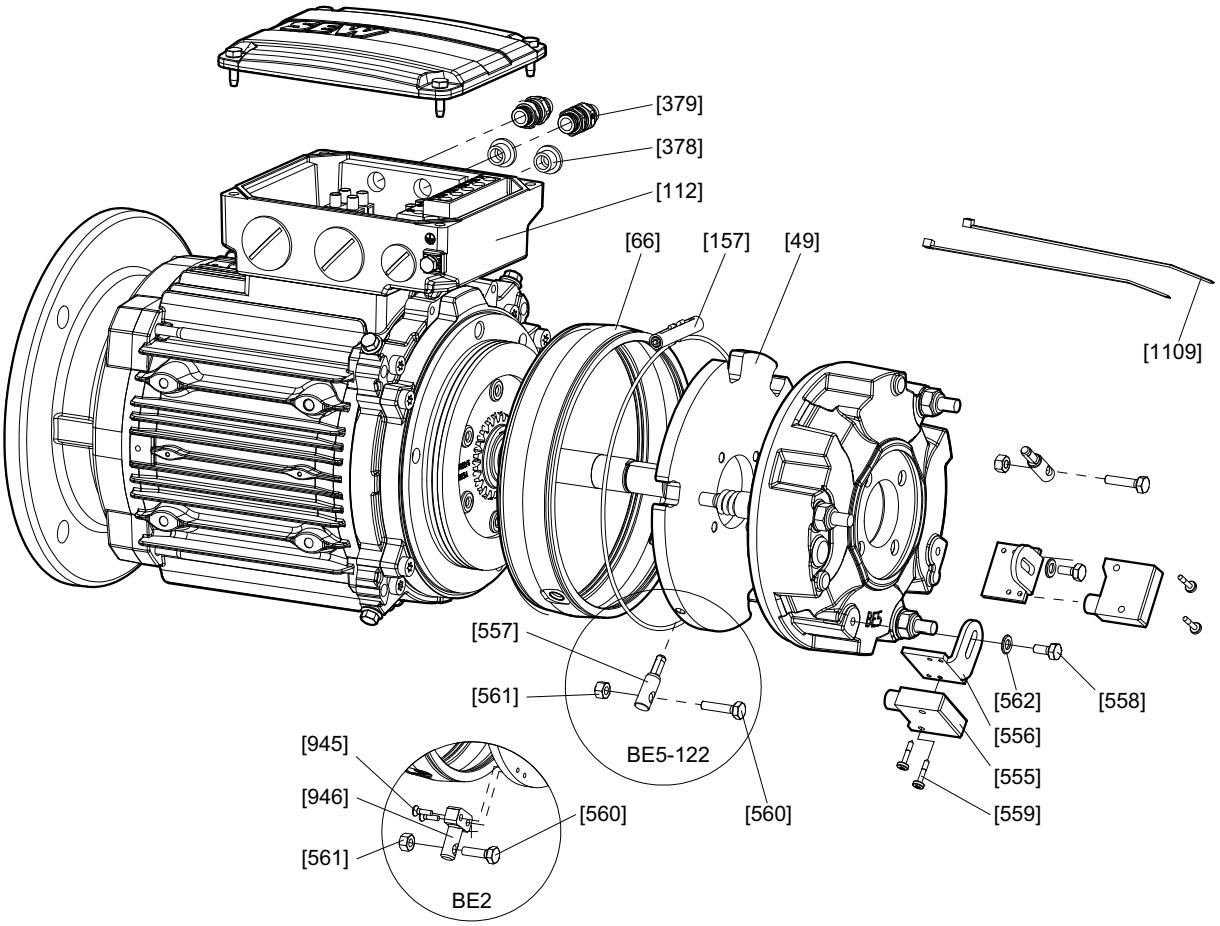
7.7 Inspection/maintenance work diagnostic unit /DUB

7.7.1 Basic structure of diagnostic unit /DUB on DR..90 – 315 motors with BE..



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[49]	Pressure plate for DUB	[555]	Microswitch	[561]	Hex nut
[66]	Sealing strip for DUB	[556]	Angle bracket	[562]	Shim
[112]	Terminal box lower part	[557]	Bolt (BE5 and larger)	[945]	Hex head screw (BE2)
[157]	Clamping strap (BE2 – 11)	[558]	Hex head screw	[946]	Mounting plate (BE2)
[378]	Screw plug	[559]	Pan head screw	[1109]	Cable ties
[379]	Screw fitting	[560]	Hex head screw		

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7.7.2 Inspection/maintenance work diagnostic unit /DUB

⚠ 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.

INFORMATION

Brakes equipped with the /DUB option have at least one microswitch. These can be used for function monitoring or setting a wear monitoring. If 2 microswitches are mounted to one brake, both monitoring statuses can be realized. In this case, first set the switch for wear monitoring, then the switch for function monitoring.

INFORMATION

The specifications provided in the tables on setting the wear monitoring refer to the maximum permitted working air gap for brakemotors without safety options at brake and encoder, see chapter "Braking work, working air gap, and brake lining carrier thickness" (→ 🗎 225). Deviating values apply to brakemotors with the specified safety options. Observe the information in the addendum to the operating instructions "Safety Encoders and Safety Brakes – AC Motors DR.., DRN.., DR2.., EDR.., EDRN.. – Functional Safety".

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7.7.3 Inspection/maintenance work at the /DUB diagnostic unit with microswitch for function monitoring

1. Check the working air gap according to chapter "Setting the working air gap of BE05 – BE122 brakes" (→ 🗎 191) and adjust it if necessary.
2. Screw the hex head screw [560] against the actuator of the microswitch [555] until it trips (brown, blue contacts closed).

   While screwing, install hex nut [561] to eliminate the longitudinal play from the thread.
3. Turn the hex head screw [560] back until the microswitch [555] switches back (contacts brown-blue open). Depending on the brake size, screw out the hex head screw [560] by the specified angle to set the switching hysteresis.

Brake	Angle
BE2, BE5, BE11, BE20, BE30, BE60	60°
BE32, BE62	90°
BE120, BE122	105°

- After reaching the respective end position, tighten the hex nut [561] against the bolts [557]/[945] while holding the hex head screw [560] to keep it in the correct position.
- Switch the brake on and off several times. Check whether the microswitch opens and closes reliably in any motor shaft position. Therefore, change the position of the motor shaft manually several times. In case of incorrect switching, the setting procedure may require to be repeated.
- Check if the cables are routed firmly and if they require additional fastening in form of cable ties [1109]. Make sure the cables are routed in a sufficient distance to the fan wheel of the motor.
- Install the previously removed motor parts again.

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7.7.4 Inspection/maintenance of the diagnostic unit /DUB with microswitch for wear monitoring

1. Check the working air gap according to chapter "Setting the working air gap of BE05 – BE122 brakes" (→ 🗎 191) and adjust it if necessary.
2. Screw the hex head screw [560] against the actuator of the microswitch [555] until it trips (brown, blue contacts closed).

   While screwing, install hex nut [561] to eliminate the longitudinal play from the thread.
3. Screw the hex head screw [560] further in from the actuated switching point, so that the microswitch [555] remains activated (contact brown-blue closed). Depending on the brake size, screw the hex head screw [560] further in by the specified angle to set the wear point:

Brake	Standard brake without safety encoder	With safety brake or safety encoder
BE2	135°	135°
BE5	270°	180°
BE11, BE20, BE30, BE32, BE60, BE62	360°	
BE120	270°	135°
BE122	180°	90°

- After reaching the respective end position, tighten the hex nut [561] against the bolts [557]/[945] while holding the hex head screw [560] to keep it in the correct position.
- Check if the cables are routed firmly and if they require additional fastening in form of cable ties [1109]. Make sure the cables are routed in a sufficient distance to the fan wheel of the motor.
- Install the previously removed motor parts again.

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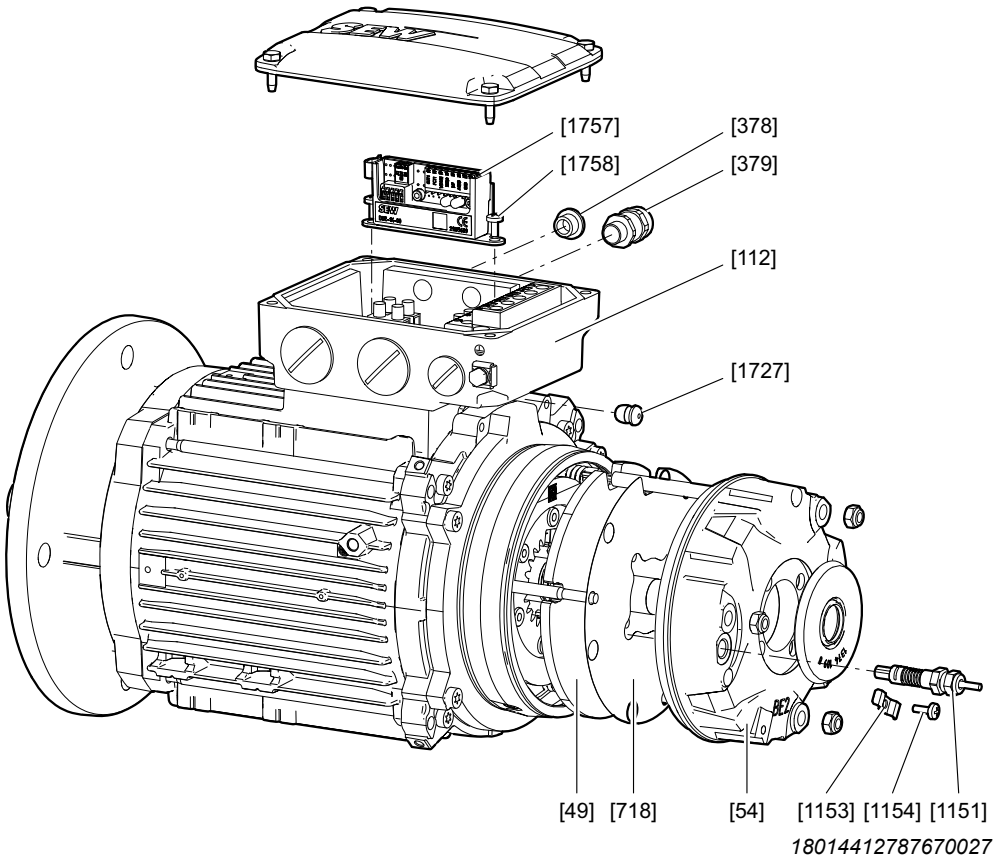
7.8 Inspection/maintenance work diagnostic unit /DUE

7.8.1 Basic structure of diagnostic unit /DUE



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[49]	Pressure plate for /DUE (BE20 and higher)	[1151]	Distance sensor
[54]	Magnet body complete for /DUE	[1153]	Spring (BE20 – 122)
[112]	Terminal box lower part	[1154]	Mushroom head screw (BE20 – 122)
[378]	Screw plug (DRN200 – 315)	[1757]	Evaluation unit
[379]	Screw fitting (DRN200 – 315)	[1758]	Screw
[718]	Dampening plate (BE1 – 11)	[1727]	Grommet (DRN80 – 180)

7.8.2 Removing the /DUE diagnostic unit

1. Remove forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
2. Remove the fan guard [35] / fan guard with encoder mount [212], or the forced cooling fan [170] by loosening the retaining screws [22].
3. If applicable: Remove the retaining ring [32] and the fan wheel [36] using a suitable tool.
4. Loosen the screw [1154] for the cable fixture clamp [1153].
5. Loosen the union nut of the sensor screw fitting. The sensor cable is free.
6. Loosen the sensor [1151] on the mounting flange. Remove the sensor.

7.8.3 Retrofitting the /DUE diagnostic unit for function and wear monitoring

Designation

For the component designation of the evaluation unit, refer to chapter "Designation of the components" (→ 🗎 101).

Conditions

The /DUE diagnostic unit can only be retrofitted for motor sizes 80 – 315 with brakes BE1 – 122 under the following conditions:

- Exchange of the existing brake without /DUE preparation for a new brake with /DUE preparation.
- Conversion of the terminal box to create room for the evaluation unit of the /DUE diagnostic unit.
- Retrofitting of the evaluation and sensor unit, see chapter "Evaluation unit" (→ 🗎 210).

Whether and to what extent the first two measures in the list are to be carried out depends greatly on the respective motor design. To identify the components that need to be replaced, please contact SEW-EURODRIVE.

Evaluation unit

The evaluation unit has a 5-pin DIP switch that is labeled with the numbers 1 to 5. Use it to set the measuring range and the maximum permitted wear limit (maximum working air gap).

If the brake is used in combination with a safety encoder, or if the brake is designed as safety brake, the setting values for the wear limit are reduced. For the new values, refer to the addendum to the operating instructions for safety brakes and safety encoders.

To activate the DIP switch ≙1, push the switch upwards. To deactivate the DIP switch ≙ 0, push the switch downwards.

The following table shows the DIP switch settings of the evaluation unit for the maximum working air gap.

S1	S2	S3	S4	S5	Wear limit	BE1 – 2 brake	BE5 brake
Sensor Ø 6 mm							
0	**0**	**0**	**0**	**0**	1.2 mm		
0	**0**	**0**	**0**	**1**	1.1 mm		
0	**0**	**0**	**1**	**0**	1.0 mm		
0	**0**	**0**	**1**	**1**	0.9 mm		X
0	**0**	**1**	**0**	**0**	0.8 mm		
0	**0**	**1**	**0**	**1**	0.7 mm		
0	**0**	**1**	**1**	**0**	0.6 mm	X	
0	**0**	**1**	**1**	**1**	0.5 mm		
S1	**S2**	**S3**	**S4**	**S5**	**Wear limit**	**BE11 – 122 brake**	
Sensor Ø 8 mm							
1	**0**	**0**	**0**	**0**	1.2 mm	X	
1	**0**	**0**	**0**	**1**	1.1 mm		
1	**0**	**0**	**1**	**0**	1.0 mm		
1	**0**	**0**	**1**	**1**	0.9 mm		
1	**0**	**1**	**0**	**0**	0.8 mm		
1	**0**	**1**	**0**	**1**	0.7 mm		
1	**0**	**1**	**1**	**0**	0.6 mm		
1	**0**	**1**	**1**	**1**	0.5 mm		

X Factory setting
Setting possible in addition

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Setting and mounting the evaluation unit

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Set the wear limit using the DIP switches.
2. Screw the evaluation unit into the terminal box after consultation with SEW-EURODRIVE.
3. Connect the sensor, see chapter "Connecting the sensor" (→ 🗎 213).
4. Calibrate the infinite value, see chapter "Calibrating the infinite value" (→ 🗎 215).
5. Install the sensor in the brake, see chapter "Installing the sensor" (→ 🗎 216).
6. Route the cable, see chapter "Cable routing" (→ 🗎 217).
7. Calibrate the zero value, see chapter "Zero value calibration" (→ 🗎 217).
8. To check the function, measure the voltage via terminal 5k to 10k. Switch the brake and check if 24 V are applied.
9. To check if the working air gap is within the permitted range, measure the current between terminals 4k and 10k. Compare the value to the range in the diagram in chapter "Output signals for function and wear monitoring" (→ 🗎 214).

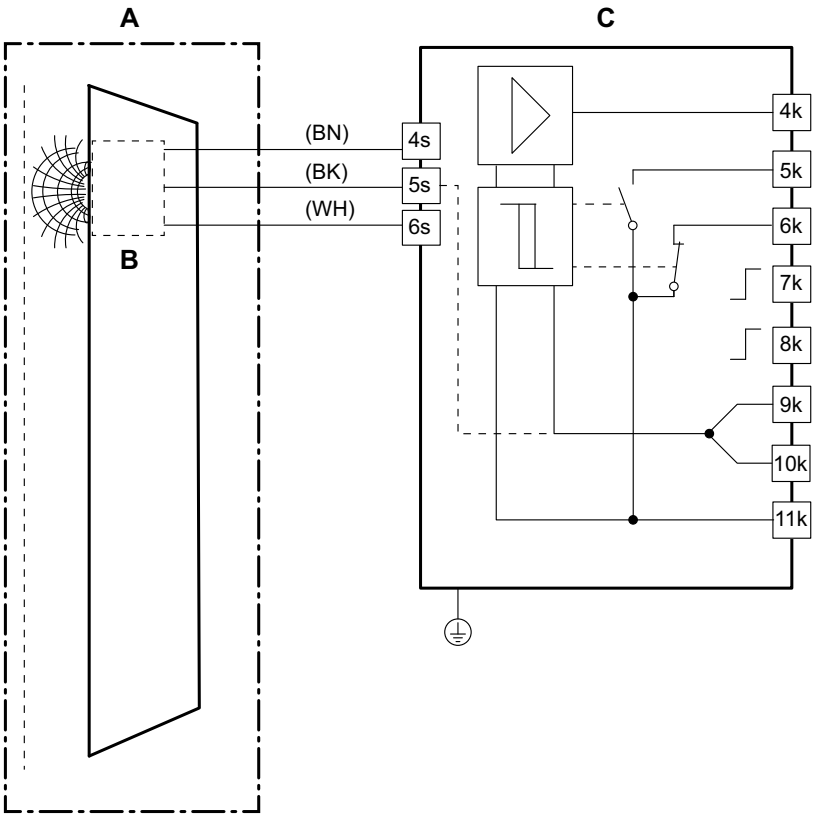
Connecting electronics

The function and wear monitoring is connected according to the following wiring diagram. The maximum permitted cable cross section at terminals "k" is 1.5 mm² with conductor end sleeve without plastic collar, 0.75 mm² with plastic collar. The recommended cable cross section at terminal "k" is 0.5 mm² with conductor end sleeve with plastic collar.

INFORMATION

Use shielded cables to wire the evaluation unit. Connect the shield to the GND potential, or use the shield plate at the user's signal evaluation.

- Unless they are shielded, sensor cables must always be routed separately from other power cables with phased currents.
- Provide for a suitable equipotential bonding between drive and control cabinet.



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[A]	Brake	[4k]	Analog output wear 1 (air gap)
[B]	Eddy current sensor	[5k]	Digital output function 1 (NO contact)
[C]	Evaluation unit	[6k]	Digital output wear 1 (NC contact)
		[7k]	Input calibration zero value
[4s]	Connection sensor A1 (brown cable)	[8k]	Input calibration infinite value
[5s]	Connection sensor GND 1 (black cable)	[9k]	Signal ground AGND
[6s]	Connection sensor B1 (white cable)	[10k]	Ground potential GND
		[11k]	DC 24 V supply

The evaluation unit is supplied with DC 24 V via the terminals GND [10k] and DC 24 V [11k].

Brake monitoring provides digital signals for:

- Function FCT1 [5k] and wear WEAR1 [6k] of the brake.

The working air gap can be monitored continuously via the analog signal (4 – 20 mA) regarding the signal ground [9k]:

- Terminal OUT1 [4k]

Use terminals ZERO [7k] and INF [8k] for calibration.

INFORMATION

If values deviate from the factory setting, the wear point setting must be adjusted. See chapter "Evaluation unit" (→ 🗎 210).

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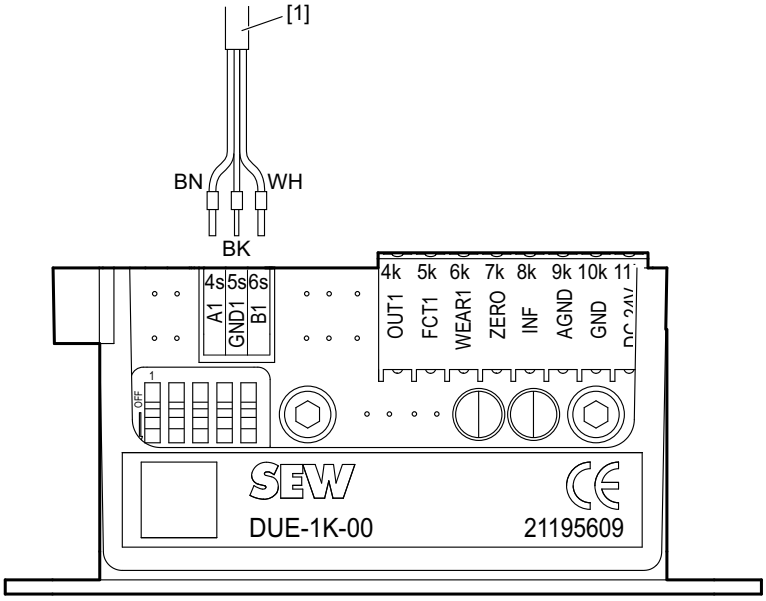
Connecting the sensor



9007214229800843

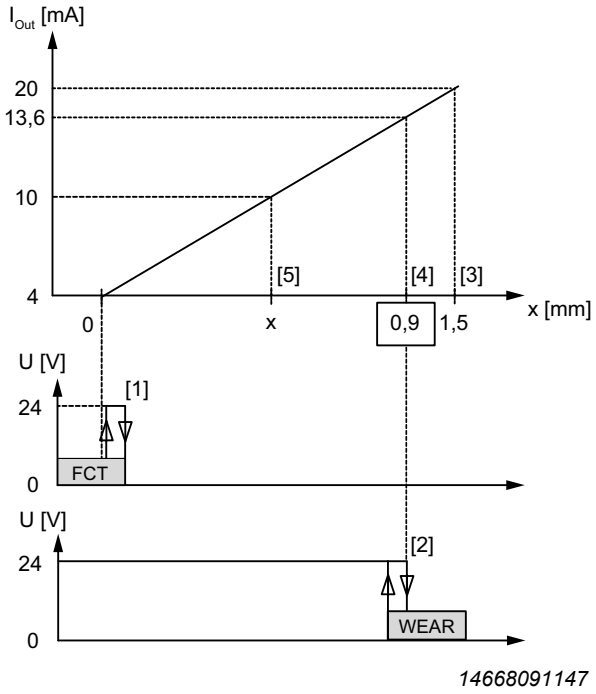
[1] Brake sensor

The connection cross section of the sensor is 0.14 mm². The litz wires of the sensor cables must be equipped with conductor end sleeves. The cable shield must be isolated against other potentials using a heat shrink tubing. The litz wires can be pushed into the terminals without using tools. Put the sensor cables in the provided line clip, see figure in chapter "Calibrating the infinite value" (→ 🗎 215). To remove the sensor cables, use an electronic screwdriver to disengage the clips.

Output signals for function and wear monitoring

The diagnostic unit /DUE provides an analog signal (4 – 20 mA, DIN IEC 60381-1) for the current working air gap of the brake.

D6



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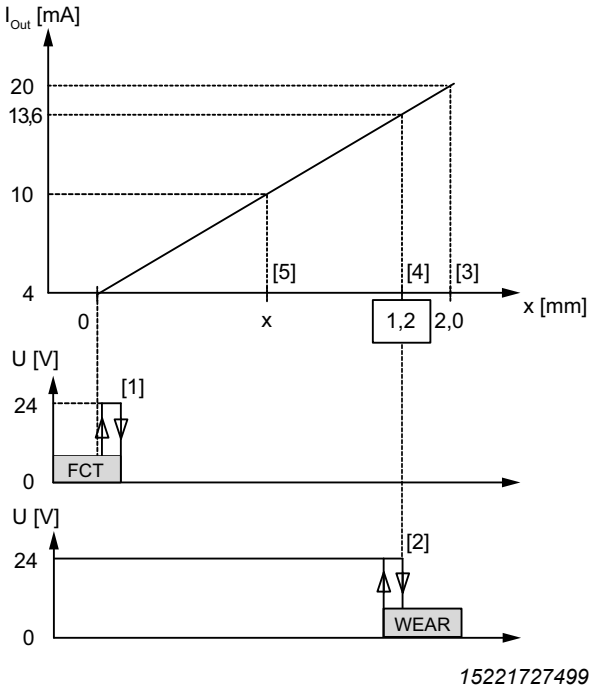
D8



15221727499

[1] FCT: Digital output function (DC 24 V, DIN EN 61131-2)
[2] WEAR: Digital output wear (DC 24 V, DIN EN 61131-2)
[3] Measuring range of the sensor
[4] Max. working air gap of the brake (exemplary)
[5] Currently measured working air gap (exemplary)

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Calibrating the infinite value

Before you can install the sensor in the brake, the electronics must be calibrated to the actual cable length. During calibration of the infinite value, electronics is adjusted to the sensor cable length. Electronics is reset and previous settings are overwritten.

The sensor must be removed from the brake for the following steps.

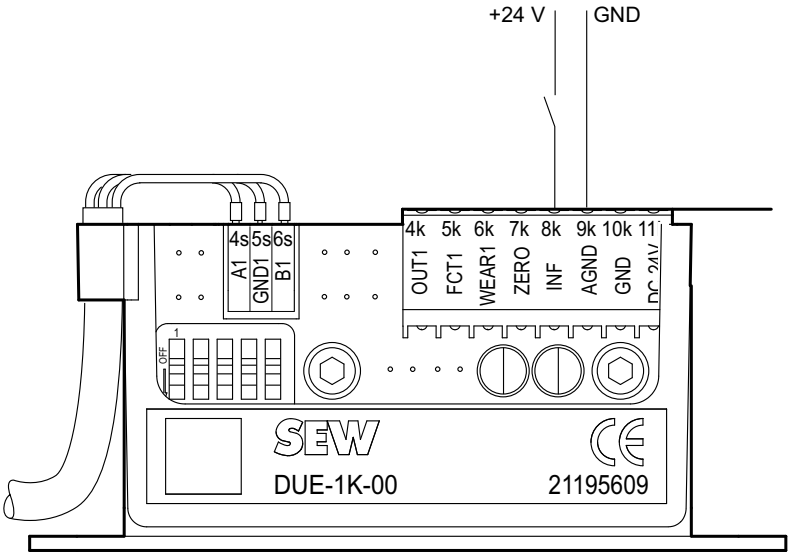
Procedure to calibrate the infinite value for the sensor:

1. Make sure that no metallic objects are within a 10 cm radius from the sensor head. The mounting springs may be in contact with the back of the sensor head during calibration.
2. Connect the supply voltage to INF (8k) and AGND (9k) for approx. 5 s. You can use GND (10k) as reference potential instead of AGND (9k). The evaluation unit is supplied via the calibration input during calibration.

The analog output OUT1 signals 0 mA during the calibration procedure.

The infinite value was successfully calibrated when OUT1 (4k) displays 20 mA. The red LED briefly flashes once per second as visual signal.

The corresponding wiring diagram for the calibration process.



14975067787

During calibration, the digital outputs WEAR1 (6k), FCT1 (5k) send a 0 signal which may lead to error messages (wear limit reached).

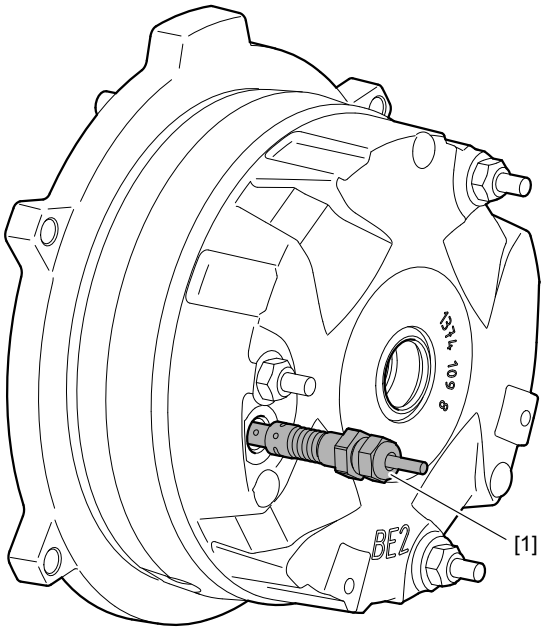
Installing the sensor

After calibration, the eddy current sensor can be installed in the magnet body of the brake. When installing the sensor, make sure that the sensor head can be inserted in the stepped bore without pressure being applied.

First install the lower part of the cable gland. Then mount the upper part of the cable gland.

INFORMATION

To ensure that the sensor is correctly inserted in the stepped bore, twist the sensor carefully with the cable before screwing in the cable gland. Protect the sensor cable against damage.



15126940043

[1] Brake sensor

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Cable routing

Prevent the cable from colliding with the fan cable. If necessary, attach the cable to the included clamping strap [157] on the brake using cable ties.

Zero value calibration

During calibration of the zero value, the current working air gap with released (open) brake is written to the evaluation unit. The electronics are reset and previous settings are overwritten. You can save the zero value again at any time without changing the infinite value.

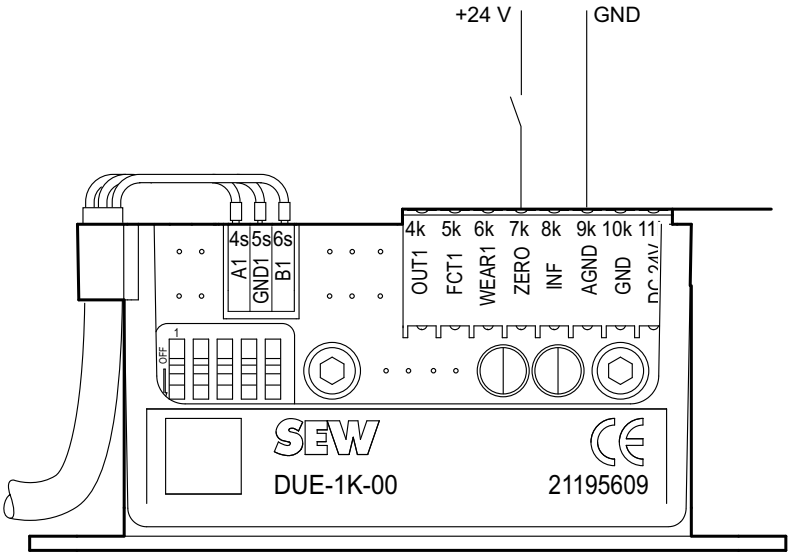
Procedure for calibrating the zero value:

1. Open the brake.
2. Apply the supply voltage to ZERO (7k) and AGND (9k) for approx. 3 seconds. Electronics is in calibration mode. You can use GND (10k) as reference potential instead of AGND (9k). The evaluation unit is supplied via the calibration input during calibration.

The evaluation unit saves the smallest working air gap of the brake. Each write process is indicated by a brief flashing of the red LED.

The activated calibration mode is indicated by the following LED state:

LED	State
Green [6]	Off
Red [6]	Flashing (2 Hz)



14977696651

During calibration, the digital outputs WEAR1 (6k), FCT1 (5k) send a 0 signal which may lead to error messages (wear limit reached).

The analog output OUT1 (4k) signals 0 mA during the calibration procedure. After successful calibration, the value is saved. The output has 4 mA with released brake. If a smaller value is available within 3 seconds, the last value is deleted and the new value is saved. The 4 mA at the output remain unchanged.

Status messages of the evaluation unit

Brake	Sensor	Calibration		LEDs and outputs					State
		ZERO	INF	Green	Red	FCT	WEAR	OUT	
Open	Installed	–	–	To	Off	HI	HI	3.6 – 5.6 mA	Brake open, no wear
Go to	Installed	–	–	Off	Off	LO	HI	6 – 20 mA	Brake closed, no wear
Go to	Installed	–	–	Off	To	LO	LO	6 – 20 mA	Brake closed, set wear limit of brake reached
–	–	–	–	Off	To	LO	LO	>20 mA	Measuring range exceeded or sensor not connected correctly
–	Not installed	–	HI	Off	Blinking 1 Hz	LO	LO	0 mA	Infinite value calibration active
–	Not installed	–	HI	Off	Flashing 1 Hz	LO	LO	20 mA	Infinite calibration successful
–	–	–	–	Blinking 1 Hz	Blinking 1 Hz	Clock 1 Hz	Clock 1 Hz	0 mA	Not completely calibrated: • ZERO calibration missing • Delivery state (both calibrations missing)
Open	Installed	HI	–	Off	Blinking 2 Hz	LO	LO	0 mA	Zero value calibration active
Open	Installed	HI	–	Off	Blinking 2 Hz	LO	LO	4 mA	First zero value calibration successful
Open	Installed	HI	–	Off	Flickering	LO	LO	4 mA	Smaller zero value detected and saved

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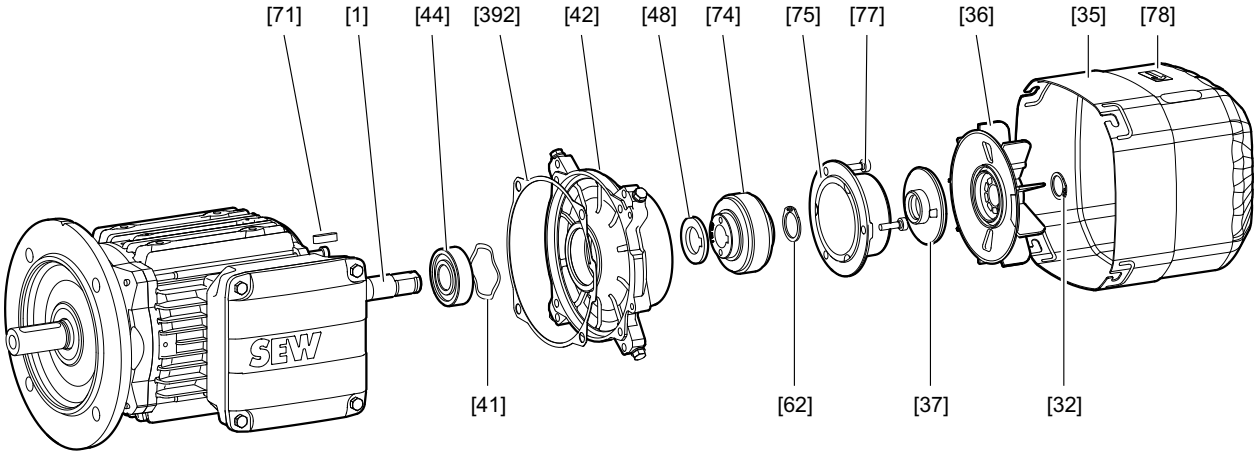
7.9 Altering the blocking direction on motors with a backstop

7.9.1 Basic structure of DR..71 – 80, DRN71 – 80, DR2..71 – 80 motors with backstop



18014399652340235

[1]	Motor with brakemotor	[48]	Spacing ring (only DR../DRN/DR2..80)
[32]	Retaining ring	[62]	Retaining ring (only DR../DRN/ DR2..80)
[35]	Fan guard	[71]	Key
[36]	Fan wheel	[74]	Backstop
[37]	Sealing ring	[75]	Sealing flange
[41]	Equalizing ring	[77]	Cap screw
[42]	Backstop endshield, complete	[78]	Direction of rotation information sign
[44]	Deep groove ball bearing	[392]	Gasket

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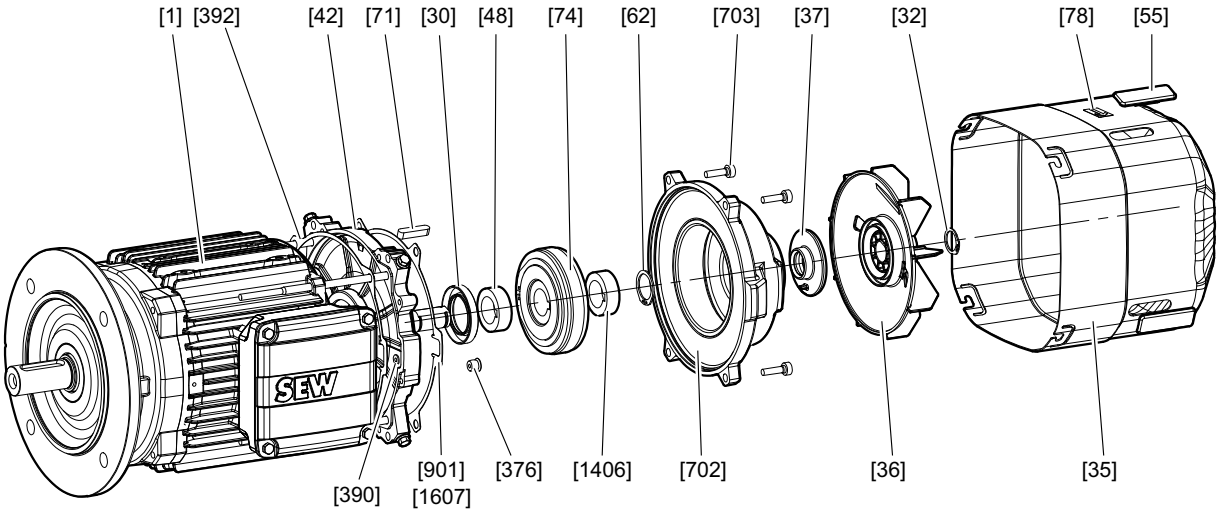
7.9.2 Basic structure of DR..90 – 315, DRN63, 90 – 315, DR2..63 motors with backstop



18014399652338315

[1]	Motor	[74]	Backstop
[30]	Sealing ring (DR../DRN250-315)	[78]	Information sign for direction of rotation
[32]	Retaining ring		
[35]	Fan guard	[702]	Backstop housing
[36]	Fan wheel	[703]	Cap screw
[37]	Sealing ring	[376]	Screw plug (DR..160 – 315, DRN132M – 315)
[42]	Brake endshield	[392]	O-ring (with DRN63, DR..63) Seal (DR..90 – 132, DRN90 – 132S)
[48]	Spacing ring	[901]	Seal (DR..90 – 225, DRN90 – 225)
[55]	Closing piece (from DR../ DRN112)	[1406]	Spacing ring (DR..250 – 315, DRN250 – 315)
[62]	Retaining ring (from DR../DRN90)	[1607]	O-ring (DR..250 – 280, DRN250 – 280)
[71]	Key		

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7.9.3 Changing the blocking direction

Proceed as follows to change the blocking direction:

✓ The motor and all connected options are disconnected from the power supply.

✓ The motor is protected against unintended restart.

1. Disassemble the following parts:
   - ⇨ Forced cooling fan and rotary encoder, if installed, see chapter "Motor and brake maintenance – preliminary work" (→ 🗎 127).
   - ⇨ Fan guard with encoder mount [212] or fan guard [35], retaining ring [32]/[62] and fan [36]
   - ⇨ **DR..71 – 80, DRN71 – 80, DR2..71 – 80 motors:** Sealing flange [75].
   - ⇨ **DR..90 – 315, DRN63, 90 – 315, DR2..63 motors:** Backstop housing, complete [702].
2. Remove the retaining ring [62] and, if necessary, the spacing ring [1406].
3. Dismount the backstop [74] using a puller.
4. To alter the blocking direction, turn around the backstop [74].
5. Check the old grease. If necessary, replace the grease as specified below.
   - ⇨ **DRN63 – 71, DR2..63 – 71 motors**: Glue in the backstop [74] with Loctite 648/649.
   - ⇨ **DR..71 – 315, DRN80 – 315, DR2..80 motors:** Press on the backstop [74].
6. Mount the retaining ring [62].
7. Mount the following parts:
   - ⇨ **DR..71 –80, DRN71 – 80, DR2..71 – 80 motors:** Apply SEW-L-Spezial sealant to the sealing flange [75]. Mount the sealing flange [75].
   - ⇨ **DR..90 – 315, DRN63, 90 – 315, DR2..63 motors:** Replace the gasket [901], O-ring [1607], and if necessary sealing ring [37]. Mount the complete backstop housing [702].
8. Install the disassembled parts of the motor.
9. Replace the label [78] indicating the direction of rotation.

Lubricating the backstop

The backstop is greased at the factory with the corrosion protection low-viscosity grease LBZ 1. If you want to use another grease, make sure it complies with NLGI class 00/000 with a base oil viscosity of 42 mm^2/s at 40 °C on a lithium saponified and mineral oil base. The application temperature range is from -50 °C to +90 °C. See the following table for the amount of grease required:

DR.. motors	**71**	**80**	**90/100**	**112/132**	**160**	**180**	**200/225**	**250/280**	**315**
DRN.. motors	**63/71**	**80**	**90/100**	**112/132S**	**132M/L**	**160/180**	**200/225**	**250/280**	**315**
DR2.. motors	**63/71**	**80**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
Amount of grease in g	9	11	15	20	30	45	80	80	120

The tolerance regarding the grease level is ± 30%.

8 Technical data

8.1 Braking torques

The following table shows the possible braking torque combinations for various sizes of the BE05 – 122 brake. For BE02 and BE03 brakes, the braking torques of each brake are preset at the factory and cannot be adjusted.

⚠ WARNING

Insufficient or excessive braking torque due to impermissible spring pack.

Severe or fatal injuries.

- Maintenance work may only be performed by a trained specialist.
- In case of a conversion, make sure the selected spring set generates nominal braking torques that are permitted for your drive combination and are suitable for the application.
- Observe the project planning note in the manual "Project Planning for BE.. Brakes – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake", or contact SEW-EURODRIVE.

Brake	Part number Damping plate [718] Pole sheet [63]	Braking torque settings					
		Braking torque	Type and number of brake springs			Purchase order numbers for brake springs	
		Nm	Normal [50]	Blue [276]	White [1312]	Normal	Blue/white
BE05	13740563	5.0	3	–	–	0135017X	13741373
		3.5	–	6	–		
		2.5	–	4	–		
		1.8	–	3	–		
BE1	13740563 13749862[1)]	10	6	–	–	0135017X	13741373
		7.0	4	2	–		
		5.0	3	–	–		
BE2	13740199 13749870[1)]	20	6	–	–	13740245	13740520
		14	2	4	–		
		10	2	2	–		
		7.0	–	4	–		
		5.0	–	3	–		
BE5	13740695 13749889[1)]	55	6	–	–	13740709	13740717
		40	2	4	–		
		28	2	2	–		
		20	–	–	6		13747738
		14	–	–	4		
BE11	13741713 13749854[1)]	110	6	–	–	13741837	13741845
		80	2	4	–		
		55	2	2	–		
		40	–	4	–		
	13741713 + 13746995 13749854[1)] + 13746995	28	–	3	–		
	13741713 + 13746995 13749854[1)] + 13746995	20	–	–	4		13747789

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Brake	Part number Damping plate [718] Pole sheet [63]	Braking torque settings					
		Braking torque	Type and number of brake springs			Purchase order numbers for brake springs	
		Nm	Normal [50]	Blue [276]	White [1312]	Normal	Blue/white
BE20	–	200	6	–	–	13743228	13742485
	–	150	4	2	–		
	–	110	3	3	–		
	–	80	3	–	–		
	13749307	55	–	4	–		
	13746758	40	–	3	–		
BE30	–	300	8	–	–	01874551	13744356
	–	200	4	4	–		
	–	150	4	–	–		
	–	100	–	8	–		
	13749455	75	–	6	–		
BE32	–	600	8	–	–	01874551	13744356
	–	500	6	2	–		
	–	400	4	4	–		
	–	300	4	–	–		
	–	200	–	8	–		
	13749455	150	–	6	–		
	13749455	100	–	4	–		
BE60	–	600	8	–	–	01868381	13745204
	–	500	6	2	–		
	–	400	4	4	–		
	–	300	4	–	–		
	–	200	–	8	–		
BE62	–	1200	8	–	–	01868381	13745204
	–	1000	6	2	–		
	–	800	4	4	–		
	–	600	4	–	–		
	–	400	–	8	–		
BE120	–	1000	8	–	–	13608770	13608312
	–	800	6	2	–		
	–	600	4	4	–		
	–	400	4	–	–		
BE122	–	2000	8	–	–	13608770	13608312
	–	1600	6	2	–		
	–	1200	4	4	–		
	–	800	4	–	–		

1) For option /DUE

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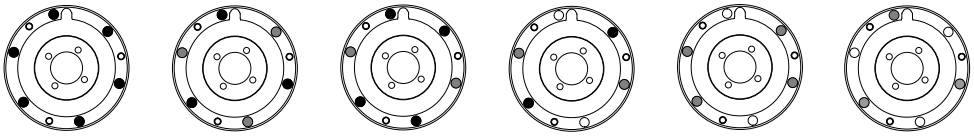
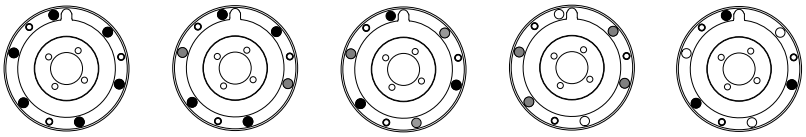
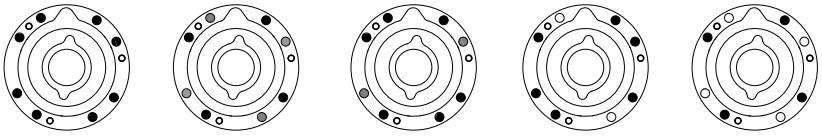
8.1.1 Brake spring layout

The following table shows the brake spring layout:

BE05 – 11:					
6 springs	3 + 3 springs	4 + 2 springs	2 + 2 springs	4 springs	3 springs
					
BE20:					
6 springs	4 + 2 springs	3 + 3 springs	4 springs	3 springs	
					
BE30 – 122:					
8 springs	4 + 4 springs	6 + 2 springs	6 springs	4 springs	
					

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8.2 Braking work, working air gap, and brake lining carrier thickness

If the brake is used in combination with a safety encoder, or if the brake is designed as safety brake, the maximum values for the working air gap and for the braking work until maintenance are reduced. For the new values, refer to the addendum to the operating instructions for safety brakes and safety encoders.

Brake	Braking work until maintenance[1]	Working air gap		Brake lining carrier
		min.[2]	maximum	minimum
	10^6 J	mm	mm	mm
BE02	15	–[3]	–[3]	min. 5.4 for 0.8 Nm min. 5.6 for 1.2 Nm
BE03	200	0.25	0.65	–[3]
BE05	120	0.25	0.6	11.0
BE1	120	0.25	0.6	11.0
BE2	180	0.25	0.6	11.0
BE5	390	0.25	0.9	11.0
BE11	640	0.3	1.2	12.5
BE20	1000	0.3	1.2	12.5
BE30	1500	0.3	1.2	12.5
BE32	1500	0.4	1.2	12.5
BE60	2500	0.3	1.2	14.0
BE62	2500	0.4	1.2	14.0
BE120	390	0.6	1.2	14.0
BE122	390	0.8	1.2	14.0

1) The specified values are nominal values that were determined during rating operation. The actual braking work that can be reached before maintenance may vary depending on the actual load during operation.
2) When checking the working air gap, note: After a test run, parallelism tolerances on the brake lining carrier may give rise to deviations of ±0.15 mm.
3) The brake lining carrier cannot be replaced. When the minimum brake lining carrier thickness/maximum working air gap is reached, the brake must be replaced.

INFORMATION

In case of drives with BE32, BE62, or BE122 brake in pivoted mounting position, the specified value may be reduced by up to 50%, depending on the pivoting angle.

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8.3 Operating currents

8.3.1 General information on determining operating currents

The tables in this chapter list the operating currents of BE.. brakes at different voltages.

The acceleration current I_B (= inrush current) flows only for a short time (approx. 160 ms for BE02 – BE62, 400 ms for BE60 – BE122 with BMP3.1 brake control) when the brake is released. No increased inrush current occurs when using BG.., BS24 or BMS.. brake control and direct DC voltage supply without control unit (only possible with brake size BE02 – BE2).

The values for the holding currents I_H are rms values. Only use current measurement units that are designed to measure rms values.

INFORMATION

The following operating currents and power consumption values are nominal values. They refer to a coil temperature of +20 °C.

Operating currents and power consumption usually decrease during normal operation due to heating of the brake coil.

Note that the actual operating currents can be higher by up to 25% depending on the ambient temperature and with coil temperatures below +20 °C.

8.3.2 Legend

The following tables list the operating currents of the brakes at different voltages.

The following values are specified:

P_B	Nominal value of the electric power consumption in the brake coil in watt.
U_N	Nominal voltage (rated voltage range) of the brake in V (AC or DC).
I_H	Nominal holding current in A (AC). rms value of the braking current in the supply cable to the SEW-EURODRIVE brake control.
I_{DC}	Nominal holding current in A (DC) in the brake cable with direct DC voltage supply or Nominal holding current in A (DC) in the brake cable with DC 24 V supply via BS24, BSG, or BMV.
I_B	Acceleration current in ampere (AC or DC) when operated with SEW brake control for high-speed excitation.
I_B/I_H	Inrush current ratio ESV.
I_B/I_{DC}	Inrush current ratio ESV for DC 24 V supply with BSG or BMV.

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8.3.3 BE02, BE03, BE05, BE1, BE2 brakes

	BE02	BE03	BE05, BE1	BE2
Nominal power brake coil in W	25	25	30	41
Inrush current ratio ESV	4	4	4	4

Nominal voltage (rated voltage range) V_N		BE02		BE03		BE05, BE1		BE2	
		I_H	I_{DC}	I_H	I_{DC}	I_H	I_{DC}	I_H	I_{DC}
AC V	DC V	AC A	DC A	AC A	DC A	AC A	DC A	AC A	DC A
24 (23 – 26)	10	–	–	2.18	2.83	2.25	2.90	2.95	3.80
60 (57 – 63)	24	–	0.72	0.8	1.08	0.90	1.17	1.18	1.53
120 (111 – 123)	48	–	–	0.41	0.54	0.45	0.59	0.59	0.77
184 (174 – 193)	80	–	–	0.27	0.35	0.29	0.37	0.38	0.49
208 (194 – 217)	90	–	–	0.24	0.31	0.26	0.33	0.34	0.43
230 (218 – 243)	96	0.14	0.18	0.22	0.28	0.23	0.30	0.30	0.39
254 (244 – 273)	110	–	–	0.20	0.26	0.20	0.27	0.27	0.35
290 (274 – 306)	125	–	–	0.18	0.23	0.18	0.24	0.24	0.31
330 (307 – 343)	140	–	–	0.16	0.20	0.16	0.21	0.21	0.28
360 (344 – 379)	160	–	–	0.13	0.18	0.14	0.19	0.19	0.25
400 (380 – 431)	180	0.08	0.10	0.11	0.15	0.13	0.17	0.17	0.22
460 (432 – 484)	200	0.07	0.09	0.10	0.13	0.11	0.15	0.15	0.19
500 (485 – 542)	220	–	–	0.09	0.12	0.10	0.13	0.14	0.18
575 (543 – 600)	250	–	–	0.08	0.11	0.09	0.12	0.12	0.16

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8.3.4 Brakes BE5, BE11, BE20, BE30, BE32, BE60, BE62

	BE5	BE11	BE20	BE30, BE32	BE60, BE62
Nominal power brake coil in W	50	70	95	120	195
Inrush current ratio ESV	5.9	6.6	7.5	8.5	9.2

Nominal voltage (rated voltage range) V_N		BE5	BE11	BE20	BE30, BE32	BE60, BE62
		I_H	I_H	I_H	I_H	I_H
AC V	DC V	AC A	AC A	AC A	AC A	AC A
60 (57 – 63)	24	1.28	2.05	2.55	–	–
120 (111 – 123)	–	0.64	1.04	1.28	1.66	–
184 (174 – 193)	–	0.41	0.66	0.81	1.05	–
208 (194 – 217)	–	0.37	0.59	0.72	0.94	1.50
230 (218 – 243)	–	0.33	0.52	0.65	0.84	1.35
254 (244 – 273)	–	0.29	0.47	0.58	0.75	1.20
290 (274 – 306)	–	0.26	0.42	0.51	0.67	1.12
330 (307 – 343)	–	0.23	0.37	0.46	0.59	0.97
360 (344 – 379)	–	0.21	0.33	0.41	0.53	0.86
400 (380 – 431)	–	0.18	0.30	0.37	0.47	0.77
460 (432 – 484)	–	0.16	0.27	0.33	0.42	0.68
500 (485 – 542)	–	0.15	0.24	0.29	0.38	0.60
575 (543 – 600)	–	0.13	0.22	0.26	0.34	0.54

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8.3.5 Brake BE120, BE122

	BE120, BE122
Nominal power brake coil in W	220
Inrush current ratio ESV	6

Nominal voltage (rated voltage range) V_N	BE120, BE122
	I_H
AC V	AC A
230 (218 – 243)	1.45
254 (244 – 273)	1.30
290 (274 – 306)	1.16
360 (344 – 379)	0.92
400 (380 – 431)	0.82
460 (432 – 484)	0.73
500 (485 – 542)	0.65
575 (543 – 600)	0.58

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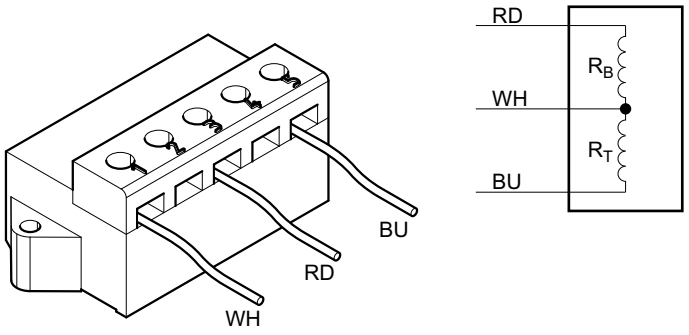
8.4 Resistors

The depicted values apply to the standard temperature range of -20 to +40 °C. Deviating resistances may occur in other temperature ranges, especially in case of drives with permitted temperature above +60 °C, or in case of non-ventilated drives, due to modified winding configurations. The values are available from SEW-EURODRIVE on request.

8.4.1 Resistance measurement BE02, BE03, BE05, BE1, BE2, BE5, BE30, BE32, BE60, BE62

Cut-off in the AC circuit

The following illustration shows how to measure resistance with cut-off in the AC circuit.



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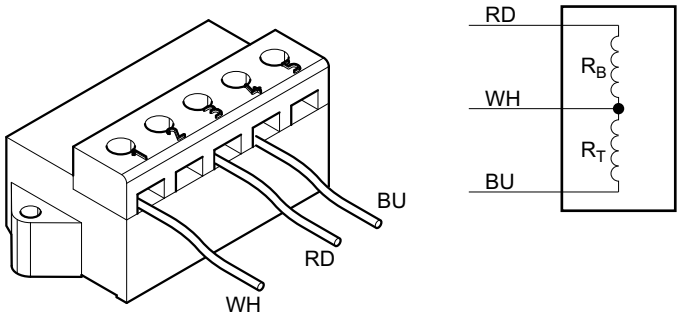
Cut-off in the DC and AC circuits

The following illustration shows how to measure resistance with cut-off in the DC and AC circuits.



18014398752093451

BS	Accelerator coil	RD	Red
TS	Coil section	WH	White
R_B	Accelerator coil resistance at 20 °C in Ω	BU	Blue
R_T	Coil section resistance at 20 °C in Ω		
U_N	Nominal voltage (rated voltage range)		

INFORMATION

When measuring the resistance of the coil section (R_{Sec}) or the acceleration coil (R_{Acc}), remove the white conductor from the brake rectifier; if it remains connected, the internal resistance of the brake rectifier will cause erroneous results.

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8.4.2 Brakes BE02, BE03, BE05, BE1, BE2

	BE02	BE03	BE05, BE1	BE2
Nominal power brake coil in W	25	25	32	43
Inrush current ratio ESV	4	4	4	4

Nominal voltage (rated voltage range) V_N		BE02		BE03		BE05, BE1		BE2	
AC V	DC V	R_B	R_T	R_B	R_T	R_B	R_T	R_B	R_T
60 (57 – 63)	24	8.5	24	6	20	4.85	14.8	3.60	11.0
120 (111 – 123)	48	–	–	25	78	19.4	59.0	14.4	44.0
184 (174 – 193)	80	–	–	62	191	48.5	148	36.0	110
208 (194 – 217)	90	–	–	78	241	61.0	187	45.5	139
230 (218 – 243)	96	121	345	96	296	77.0	235	58.0	174
254 (244 – 273)	110	–	–	119	367	97.0	296	72.0	220
290 (274 – 306)	125	–	–	150	462	122	372	91	275
330 (307 – 343)	140	–	–	191	589	154	469	115	350
360 (344 – 379)	160	–	–	247	762	194	590	144	440
400 (380 – 431)	180	375	1070	326	1004	244	743	182	550
460 (432 – 484)	200	580	1650	412	1270	308	935	230	690
500 (485 – 542)	220	–	–	512	1580	387	1178	290	870
575 (543 – 600)	250	–	–	645	1989	488	1483	365	1100

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8.4.3 Brakes BE5, BE11, BE20, BE30, BE32, BE60, BE62

	BE5	BE11	BE20	BE30, BE32	BE60, BE62
Nominal power brake coil in W	49	77	95	120	195
Inrush current ratio ESV	5.9	6.6	7.5	8.5	9.2

Nominal voltage (rated voltage range) V_N	**BE5**		**BE11**		**BE20**		**BE30, BE32**		**BE60, BE62**	
AC V	**R_B**	**R_T**	**R_B**	**R_T**	**R_B**	**R_T**	**R_B**	**R_T**	**R_B**	**R_T**
60 (57 – 63)	2.20	10.5	1.22	7.0	0.9	5.7	–	–	–	–
120 (111 – 123)	8.70	42.0	4.90	28.0	3.4	22.8	2.3	17.2	–	–
184 (174 – 193)	22.0	105	12.3	70	8.5	57.2	5.8	43.2	–	–
208 (194 – 217)	27.5	132	15.5	88	10.7	72.0	7.3	54.4	4.0	32.6
230 (218 – 243)	34.5	166	19.5	111	13.5	90.6	9.2	68.5	5.0	41.0
254 (244 – 273)	43.5	210	24.5	139	17.0	114.1	11.6	86.2	6.3	51.6
290 (274 – 306)	55.0	265	31.0	175	21.4	143.6	14.6	108.6	7.9	65.0
330 (307 – 343)	69.0	330	39.0	220	26.9	180.8	18.4	136.7	10.0	81.8
360 (344 – 379)	87.0	420	49	280	33.2	223	23.1	172.1	12.6	103
400 (380 – 431)	110	530	62	350	42.7	287	29.1	216.6	15.8	130
460 (432 – 484)	138	660	78	440	53.2	357	35.1	261.8	19.9	163
500 (485 – 542)	174	830	98	550	67.7	454	45.2	336.4	25.1	205
575 (543 – 600)	220	1050	123	700	83.5	559	56.3	419.2	31.6	259

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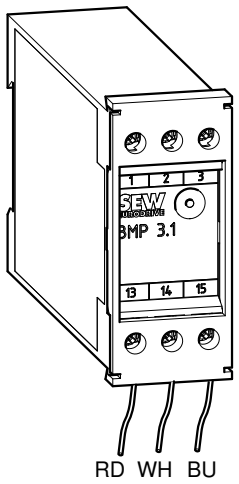
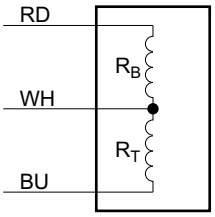
8.4.4 Resistance measurement BE120, BE122

The following illustration shows how to measure resistance with BMP 3.1.





BS	Accelerator coil	RD	Red
TS	Coil section	WH	White
R_B	Accelerator coil resistance at 20 °C in Ω	BU	Blue
R_T	Coil section resistance at 20 °C in Ω		
V_N	Nominal voltage (rated voltage range)		

INFORMATION

When measuring the resistance of the coil section (R_{Sec}) or the acceleration coil (R_{Acc}), remove the white conductor from the brake rectifier; if it remains connected, the internal resistance of the brake rectifier will cause erroneous results.

8.4.5 Brake BE120, BE122

	BE120, BE122
Nominal power brake coil in W	220
Inrush current ratio ESV	6

Nominal voltage (rated voltage range) V_N	BE120, BE122	
AC V	**R_B**	**R_T**
230 (218 – 243)	7.6	37.9
254 (244 – 273)	9.6	47.7
290 (274 – 306)	12.1	60.1
360 (344 – 379)	19.2	95.2
400 (380 – 431)	24.2	119.9
460 (432 – 484)	30.4	150.9
500 (485 – 542)	38.3	189.9
575 (543 – 600)	48.2	239.1

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8.5 Brake control

The depicted combinations apply to drives in insulation class B or F, and to the standard temperature range of -20 °C to +40 °C.

For the brake control assigned to your drive, refer to the specifications on the motor nameplate.

INFORMATION

The depicted combinations may be limited depending in the present drive configuration (e.g. insulation class H, deviating temperature ranges, etc.). In case of a conversion, check if brake control is permitted for your drive combination. Contact SEW-EURODRIVE if necessary.

8.5.1 Permitted combinations

The table below shows the standard and optional combinations of brakes and brake rectifiers.

		BE02	BE03 with DRN63	BE03	BE05	BE1	BE2
BG..	BG 1.2	X	X	–	–	–	–
	BG 1.4	–	–	X[3]	X[3]	X[3]	X[3]
	Size 1.5	–	–	X[1]	X[1]	X[1]	X[1]
	BG 2.4	X	X	–	–	–	–
	BG 3	–	–	X[2]	X[2]	X[2]	X[2]
BGE..	BGE 1.4	–	–	o	o	o	o
	BGE 1.5	–	–	•	•	•	•
	BGE 3	–	–	•	•	•	•
BS..	BS 24	–	–	X	X	X	X
BMS..	BMS 1.4	o	o	o	o	o	o
	BMS 1.5	•	•	•	•	•	•
	BMS 3	•	•	•	•	•	•
BME..	BME 1.4	o	o	o	o	o	o
	BME 1.5	•	•	•	•	•	•
	BME 3	•	•	•	•	•	•
BMH..	BMH 1.4	o	o	o	o	o	o
	BMH 1.5	•	•	•	•	•	•
	BMH 3	•	•	•	•	•	•
BMK..	BMK 1.4	o	o	o	o	o	o
	BMK 1.5	•	•	•	•	•	•
	BMK 3	•	•	•	•	•	•
BMKB..	BMKB 1.5	•	•	•	•	•	•
BMP..	BMP 1.4	o	o	o	o	o	o
	BMP 1.5	•	•	•	•	•	•
	BMP 3	•	•	•	•	•	•
	BMP 3.1	–	–	–	–	–	–
BMV..	BMV 5	•	•	•	•	•	•
BSG..	BSG	–	–	•	•	•	•

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		BE02	BE03 with DRN63	BE03	BE05	BE1	BE2
BSR..	BG 1.2 + SR10	•	•	–	–	–	–
	BG 2.4 + SR10	•	•	–	–	–	–
	BGE1.5 + SR10	–	–	•	•	•	–
	BGE 1.4 + SR 15	–	–	o	o	o	o
	BGE 3 + SR 11	–	–	•	•	•	•
	BGE 3 + SR 15	–	–	•	•	•	•
	BGE3 + SR10	–	–	•	•	•	–
	BGE 1.5 + SR 11	–	–	•	•	•	•
	BGE 1.5 + SR 15	–	–	•	•	•	•
BUR..	BG 1.2 + UR10	•	•	–	–	–	–
	BG 2.4 + UR10	•	•	–	–	–	–
	BGE 3 + UR 11	–	–	•	•	•	•
	BGE 1.5 + UR 15	–	–	•	•	•	•
BST..	BST 0.6S	•	•	•	•	•	•
	BST 0.7S	•	•	•	•	•	•
	BST 1.2S	•	•	•	•	•	•
		BE5	**BE11**	**BE20**	**BE30, BE32**	**BE60, BE62**	**BE120, BE122**
BG..	BG 1.2	–	–	–	–	–	–
	BG 1.4	–	–	–	–	–	–
	Size 1.5	–	–	–	–	–	–
	BG 2.4	–	–	–	–	–	–
	BG 3	–	–	–	–	–	–
BGE..	BGE 1.4	X[3]	X[3]	X[3]	X[3]	X[3]	–
	BGE 1.5	X[1]	X[1]	X[1]	X[1]	X	–
	BGE 3	X[2]	X[2]	X[2]	X[2]	X	–
BS..	BS 24	–	–	–	–	–	–
BMS..	BMS 1.4	–	–	–	–	–	–
	BMS 1.5	–	–	–	–	–	–
	BMS 3	–	–	–	–	–	–
BME..	BME 1.4	o	o	o	o	o	–
	BME 1.5	•	•	•	•	X	–
	BME 3	•	•	•	•	X	–
BMH..	BMH 1.4	o	o	o	o	–	–
	BMH 1.5	•	•	•	•	–	–
	BMH 3	•	•	•	•	–	–
BMK..	BMK 1.4	o	o	o	o	–	–
	BMK 1.5	•	•	•	•	–	–
	BMK 3	•	•	•	•	–	–
BMKB..	BMKB 1.5	•	•	•	•	–	–
BMP..	BMP 1.4	o	o	o	o	–	–
	BMP 1.5	•	•	•	•	–	–
	BMP 3	•	•	•	•	–	–
	BMP 3.1	–	–	–	–	•	X
BMV..	BMV 5	•	•	•	–	–	–
BSG..	BSG	X	X	X	–	–	–

		BE5	BE11	BE20	BE30, BE32	BE60, BE62	BE120, BE122
BSR..	BG 1.2 + SR10	–	–	–	–	–	–
	BG 2.4 + SR10	–	–	–	–	–	–
	BGE1.5 + SR10	–	–	–	–	–	–
	BGE 1.4 + SR 15	o	o	o	o	–	–
	BGE 3 + SR 11	•	•	–	–	–	–
	BGE 3 + SR 15	•	•	•	•	–	–
	BGE3 + SR10	–	–	–	–	–	–
	BGE 1.5 + SR 11	•	•	–	–	–	–
	BGE 1.5 + SR 15	•	•	•	•	–	–
BUR..	BG 1.2 + UR10	–	–	–	–	–	–
	BG 2.4 + UR10	–	–	–	–	–	–
	BGE 3 + UR 11	•	–	–	–	–	–
	BGE 1.5 + UR 15	•	•	•	•	–	–
BST..	BST 0.6S	•	•	•	•	–	–
	BST 0.7S	•	•	•	•	–	–
	BST 1.2S	•	•	•	•	–	–

X Standard version

X^1 Standard design with nominal brake voltage of 150 – 500 V_{AC}

X^2 Standard design with nominal brake voltage of 24/42 – 150 V_{AC}

X^3 Standard design with nominal brake voltage of 575 V_{AC}

• Can be selected

o Optional with AC 575 V nominal brake voltage

– Not permitted

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8.5.2 Motor terminal box

The following table shows the technical data of the brake controls for installation in the terminal box. The different housings have different colors (= color code) to make them easier to distinguish.

BG..

Half-wave rectifier without electronic switching.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BG1.4	AC 230 – 575 V	DC 1.0 A	08278814	Jet black
BG1.2	AC 90 – 500 V	DC 1.2 A	08269920	Jet black
BG1.5	AC 150 – 500 V	DC 1.5 A	08253846	Jet black
BG2.4	AC 24 – 90 V	DC 2.4 A	08270198	Mahogany brown
BG3	AC 24 – 500 V	DC 2.8 A	08253862	Mahogany brown

BGE..

Half-wave rectifier with electronic switching.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BGE1.4	AC 230 – 575 V	DC 1.0 A	08278822	Vermilion
BGE1.5	AC 150 – 500 V	DC 1.5 A	08253854	Vermilion
BGE3	AC 42 – 150 V	DC 2.8 A	08253870	Light blue

BSR..

Half-wave rectifier + current relay for switch-off in the DC circuit.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BGE1.5 + SR10	AC 150 – 500 V	DC 1.0 A	08253854 0826760X	Jet black Gray
BGE1.5 + SR11	AC 150 – 500 V	DC 1.0 A	08253854 08267618	Jet black Gray
BGE1.5 + SR15	AC 150 – 500 V	DC 1.0 A	08253854 08267626	Jet black Gray
BG1.2 + SR10	AC 90 – 500 V	DC 1.0 A	08269920 0826760X	Jet black Gray
BG1.2 + SR11	AC 90 – 500 V	DC 1.0 A	08269920 08267618	Jet black Gray

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Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BG2.4 + SR10	AC 42 – 90 V	DC 1.0 A	08270198 0826760X	Mahogany brown Gray
BGE3 + SR11	AC 42 – 150 V	DC 1.0 A	20253870 08267618	Mahogany brown Gray
BGE3 + SR15	AC 42 – 150 V	DC 1.0 A	08253870 08267626	Mahogany brown Gray

BUR..

Half-wave rectifier with voltage relay for switch-off in the DC circuit.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BG1.2 + UR15	AC 150 – 500 V	DC 1.0 A	08269920 0826760X	Jet black Gray
BGE1.5 + UR15	AC 150 – 500 V	DC 1.0 A	08253854 08267596	Vermilion Gray
BG2.4 + UR11	AC 42 – 150 V	DC 1.0 A	08270198 08267588	Mahogany brown Gray
BGE3 + UR11	AC 42 – 150 V	DC 1.0 A	08253870 08267588	Light blue Gray

BS24

Varistor overvoltage protection.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BS24	DC 24 V	DC 5.0 A	08267634	Water blue

BSG..

Electronic switching.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BSG	DC 24 V	DC 5.0 A	08254591	Pure white

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BMP..

Half-wave rectifier with electronic switching and integrated voltage relay for cut-off in the DC circuit.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BMP3.1[1)]	AC 230 – 575 V	DC 2.8 A	08295077	–

1) Only sizes 250 – 315

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8.5.3 Control cabinet

The following tables list the technical data of brake control systems for installation in the control cabinet. The different housings have different colors (= color code) to make them easier to distinguish.

BMS..

Half-wave rectifier without electronic switching.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BMS1.4	AC 230 – 575 V	DC 1.0 A	08298300	Tar black
BMS1.5	AC 150 – 500 V	DC 1.5 A	08258023	Tar black
BMS3	AC 42 – 150 V	DC 3.0 A	08258031	Mahogany brown

BME..

Half-wave rectifier with electronic switching.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BME1.4	AC 230 – 575 V	DC 1.0 A	08298319	Vermilion
BME1.5	AC 150 – 500 V	DC 1.5 A	08257221	Vermilion
BME3	AC 42 – 150 V	DC 3.0 A	0825723X	Light blue

BMH..

Half-wave rectifier with electronic switching and heating function

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BMH1.4	AC 230 – 575 V	DC 1.0 A	08298343	Signal green
BMH1.5	AC 150 – 500 V	DC 1.5 A	0825818X	Signal green
BMH3	AC 42 – 150 V	DC 3.0 A	08258198	Zinc yellow

BMP..

Half-wave rectifier with electronic switching and integrated voltage relay for cut-off in the DC circuit.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BMP1.4	AC 230 – 575 V	DC 1.0 A	08298327	Light gray
BMP1.5	AC 150 – 500 V	DC 1.5 A	08256853	Light gray
BMP3	AC 42 – 150 V	DC 3.0 A	08265666	Light green

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Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BMP3.1	AC 230 – 575 V	DC 2.8 A	08295077	–

BMK..

Half-wave rectifier with electronic switching, DC 24 V control input, and cut-off in the DC circuit.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BMK1.4	AC 230 – 575 V	DC 1.0 A	08298335	Water blue
BMK1.5	AC 150 – 500 V	DC 1.5 A	08264635	Water blue
BMK3	AC 42 – 150 V	DC 3.0 A	08265674	Light pink

BMKB..

Half-wave rectifier with electronic switching, DC 24 V control input, rapid cut-off and LED status display.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BMKB1.5	AC 150 – 500 V	DC 1.5 A	08281602	Water blue

BMV..

Brake control unit with electronic switching, DC 24 V control input and fast cut-off.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BMV5	DC 24 V	DC 5.0 A	13000063	Pure white

BST..

Safe brake control with electronic switching, DC 24 V control input and safe DC 24 V control input. Supply via the DC link of the inverter.

Type	Nominal voltage	Nominal output current I_L	Part number	Color code
BST0.6S	AC 460 V	DC 0.6 A	08299714	–
BST0.7S	AC 400 V	DC 0.7 A	13000772	–
BST1.2S	AC 230 V	DC 1.2 A	13001337	–

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8.6 Permitted rolling bearings

8.6.1 Rolling bearing for DR..71 – 280 motors

Motors	A-side bearing		B-side bearing	
	AC motor	Gearmotor	AC motor	Brakemotor
DR..71	6204-2Z-C3	6303-2Z-C3	6203-2Z-C3	6203-2RS-C3
DR..80	6205-2Z-C3	6304-2Z-C3	6304-2Z-C3	6304-2RS-C3
DR..90 – 100	6306-2Z-C3		6205-2Z-C3	6205-2RS-C3
DR..112 – 132	6308-2Z-C3		6207-2Z-C3	6207-2RS-C3
DR..160	6309-2Z-C3		6209-2Z-C3	6209-2RS-C3
DR..180	6312-2Z-C3		6213-2Z-C3	6213-2RS-C3
DR..200 – 225	6314-2Z-C3		6314-2Z-C3	6314-2RS-C3
DR..250 – 280	6317-2Z-C4		6315-2Z-C3	6315-2RS-C3

8.6.2 Rolling bearings for DRN63 – 280, DR2..56 – 80 motors

Motors	A-side bearing		B-side bearing	
	AC motor	Gearmotor	AC motor	Brakemotor
DR2..56	–	6302-2Z-C3	6002-2Z-C3	6002-2RS-C3
DRN63 **DR2..63**	6202-2Z-C3	6303-2Z-C3	6203-2Z-C3	6203-2Z-C3
DRN71 **DR2..71**	6204-2Z-C3		6203-2Z-C3	
DRN80 **DR2..80**	6205-2Z-C3	6304-2Z-C3	6304-2Z-C3	6304-2RS-C3
DRN90	6305-2Z-C3		6205-2Z-C3	6205-2RS-C3
DRN100	6306-2Z-C3		6205-2Z-C3	6205-2RS-C3
DRN112	6308-2Z-C3		6207-2Z-C3	6207-2RS-C3
DRN132S	6308-2Z-C3	6308-2Z-C3	6207-2Z-C3	6207-2RS-C3
DRN132M/L	6308-2Z-C3	6309-2Z-C3	6209-2Z-C3	6209-2RS-C3
DRN160	6310-2Z-C3	6312-2Z-C3	6212-2Z-C3	6212-2RS-C3
DRN180	6311-2Z-C3	6312-2Z-C3	6212-2Z-C3	6212-2RS-C3
DRN200	6312-2Z-C3	6314-2Z-C3	6314-2Z-C3	6314-2RS-C3
DRN225	6314-2Z-C3		6314-2Z-C3	6314-2RS-C3
DRN250 – 280	6317-2Z-C4		6315-2Z-C3	

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8.6.3 Rolling bearing for DR..315, DRN315 motors

Motors	A-side bearing		B-side bearing	
	AC motor	Gearmotor	AC motor	Gearmotor
DR..315K, DRN315S	6319-C3	6319-C3	6319-C3	6319-C3
DR..315S, DRN315M				
DR..315M, DRN315L	6319-C3	6322-C3	6319-C3	6322-C3
DR..315L, DRN315H				

8.6.4 Rolling bearing for DR..250 – 315, DRN250 – 315 motors, with reinforced bearings /ERF

Motors	A-side bearing	B-side bearing	
		AC motor	Gearmotor
DR..250 – 280, DRN250 – 280	NU317E-C3	6315-C3	
DR..315K, DRN315S	NU319E	6319-C3	6319-C3
DR..315S, DRN315M			
DR..315M, DRN315L			6322-C3
DR..315L, DRN315H			

8.6.5 Rolling bearing for DR..200 – 315, DRN200 – 315 motors, with current-insulated rolling bearings /NIB

Motors	B-side bearing	
	AC motor	Gearmotor
DR..200 – 225, DRN200 – 225	6314-C3-EI	6314-C3-EI
DR..250 – 280, DRN250 – 280	6315-Z-C3-EI	6315-Z-C3-EI
DR..315K, DRN315S	6319-C3-EI	6319-C3-EI
DR..315S, DRN315M		
DR..315M, DRN315L		6322-C3-EI
DR..315L, DRN315H		

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8.7 Lubricant tables

8.7.1 Lubricant table for rolling bearings

INFORMATION

Use of wrong bearing grease can damage the bearings.

Motors with sealed bearings

The bearings are 2Z or 2RS closed bearings and cannot be relubricated. They are used for DR..71 – 280, DRN63 – 280, DR256 – 80 motors.

	Ambient temperature	Manufacturer	Type	DIN designation
Motor rolling bearings	-20 °C to +80 °C	Mobil	Polyrex EM[1)]	K2P-20
	+20 °C to +100 °C	Klüber	Barrierta L55/2[2)]	KX2U
	-40 °C to +60 °C	Kyodo Yushi	Multemp SRL[2)]	KE2N-40
	-20 °C to +60 °C	SKF	LHT23[2)]	KE2N-40

1) Mineral lubricant (= mineral-based bearing grease)

2) Synthetic lubricant (= synthetic-based bearing grease)

Motors with open bearings

Motors in the sizes DR..315 and DRN315 always have open bearings. If DR..250 – 280 and DRN225 – 280 motors have the relubrication option /NS, these sizes also have open bearings.

	Ambient temperature	Manufacturer	Type	DIN designation
Rolling bearing	-20 °C to +80 °C	Mobil	Polyrex EM[1)]	K2P-20
	-40 °C to +60 °C	SKF	LGHP 2[1)]	K2N-40

1) Mineral lubricant (= mineral-based bearing grease)

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8.7.2 Order information for lubricants, anti-corrosion agents and sealants

Lubricants, anti-corrosion agents, and sealants may be obtained directly from SEW-EURODRIVE using the following order numbers.

Usage	Manufacturer	Type	Quantity	Order number
Lubricant for rolling bearings	Mobil	Polyrex EM	400 g	09101470
	SKF	LGHP2	400 g	09101276
Lubricant for sealing rings				
Material: NBR/FKM	Klüber	Petamo GHY 133N	10 g	04963458
	FUCHS LUBRITECH	Gleitmo 100 S	1 kg	03258092
Material: EPDM/EPP	Klüber	Klübersynth BLR 46-122	10 g	03252663
Corrosion protection and lubricant	SEW-EURODRIVE	NOCO® fluid	5.5 g	09107819
Sealant	Marston Domsel	SEW-L-Spezial	80 g	09112286

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8.8 Encoders

8.8.1 Incremental encoder E.7S – sin/cos

Encoder		ES7S	EV7S	EG7S	EH7S
Supply voltage	U_B	DC 7 V – 30 V			
Max. current consumption	I_{in}	140 mA_{RMS}			
Max. pulse frequency	f_{max}	150 kHz			180 kHz
Incremental tracks, periods per revolution	A, B	1024 (10 bits)			
	C	1			
Position resolution, increments per revolution	A, B				
Output amplitude per track	U_{high}	1 V_{PP}			
	U_{low}				
Signal output		sin/cos			
Output current per track	I_{out}	10 mA_{RMS}			
Pulse duty factor according to IEC 60469-1, n = constant		–			
Phase offset A: B n = constant		90° ± 3°			90° ± 10°
Accuracy[1)]		0.0194°	–	0.0194°	–
Vibration resistance according to EN 60088-2-6		≤ 100 m/s^2			
Shock resistance according to EN 60088-2-27		≤ 1000 m/s^2		≤ 2000 m/s^2	
Maximum speed	n_{max}	6000 min^{-1}			
Duration until fault message (disabled outputs)[2)]		25 ms	–	25 ms	–
Activation time of rotary encoder internal diagnostics after switching on		–			
Degree of protection in accordance with EN 60529		IP66			IP65
Connection		Terminal box on incremental encoder			12-pin plug connector
Ambient temperature	°C	-30 to +60	-30 to +80	-30 to +60	-40 to +60

1) Due to the stiffness of the torque arm, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.

2) Sin/cos encoders have a self-diagnostics function. If an error is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

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8.8.2 Incremental encoder E.7R – TTL (RS422), 9 V ≤ U_B ≤ 30 V

Encoder		ES7R	EV7R	EG7R	EH7R
Supply voltage	U_B	DC 7 V – 30 V			DC 10 V – 30 V
Max. current consumption	I_{in}	160 mA_{RMS}			140 mA_{RMS}
Max. pulse frequency	f_{max}	120 kHz			300 kHz
Incremental tracks, periods per revolution	A, B	1024 (10 bits)			
	C	1			
Position resolution, increments per revolution	A, B	4096 (12 bits)			
Output amplitude per track	U_{high}	≥ DC 2.5 V			
	U_{low}	≤ DC 0.5 V			
Signal output		TTL (RS422)			
Output current per track	I_{out}	25 mA_{RMS}			20 mA_{RMS}
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 10%			
Phase offset A: B n = constant		90° ± 20°			
Vibration resistance according to EN 60088-2-6		≤ 100 m/s^2			
Shock resistance according to EN 60088-2-27		≤ 1000 m/s^2		≤ 2000 m/s^2	
Maximum speed	n_{max}	6000 min^{-1}			6000 min^{-1} 2500 min^{-1} at 60 °C
Degree of protection in accordance with EN 60529		IP66			IP65
Connection		Terminal box on incremental encoder			12-pin plug connector
Ambient temperature	°C	-30 to +60	-30 to +60		-40 to +60

8.8.3 Incremental encoder E.7C – HTL

Encoder		ES7C	EV7C	EG7C	EH7C
Supply voltage	U_B	DC 4.75 V – 30 V			DC 10 V – 30 V
Max. current consumption	I_{in}	240 mA_{RMS}			225 mA_{RMS}
Max. pulse frequency	f_{max}	120 kHz			300 kHz
Incremental tracks, periods per revolution	A, B	1024 (10 bits)			
	C	1			
Position resolution, increments per revolution	A, B	4096 (12 bits)			
Output amplitude per track	U_{high}	V_B -2.5 V		V_B -2.5 V	V_B -2 V
	U_{low}	≤ DC 1.1 V			≤ DC 2.5 V
Signal output		HTL/TTL (RS422)		HTL/TTL (RS422)	HTL
Output current per track	I_{out}	60 mA_{RMS}			30 mA_{RMS}
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 10%			50% ± 20%
Phase offset A: B n = constant		90° ± 20°			
Vibration resistance according to EN 60088-2-6		≤ 100 m/s^2			
Shock resistance according to EN 60088-2-27		≤ 1000 m/s^2		≤ 2000 m/s^2	
Maximum speed	n_{max}	6000 min^{-1}			6000 min^{-1} 2500 min^{-1} at 60 °C
Degree of protection in accordance with EN 60529		IP66			IP65
Connection		Terminal box on incremental encoder			12-pin plug connector
Ambient temperature	°C	-30 to +60		-30 to +60	-40 to +60

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8.8.4 Incremental encoder E.7T – TTL (RS422) at U_B = 5 V

Encoder		EH7T
Supply voltage	U_B	DC 5 V
Max. current consumption	I_{in}	140 mA
Max. pulse frequency f_{max}	kHz	300
Incremental tracks, periods per revolution	A, B	1024 (10 bits)
	C	1
Position resolution, increments per revolution	A, B	4096 (12 bits)
Output amplitude	U_{high}	≥ DC 2.5 V
	U_{low}	≤ DC 0.5 V
Signal output		TTL (RS422)
Output current per track	I_{out}	20 mA
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 20%
Phase offset A: B n = constant		90° ± 20°
Vibration resistance according to EN 60088-2-6 at 10 Hz – 2 kHz		≤ 100 m/s^2
Shock resistance according to EN 60088-2-27		≤ 2000 m/s^2
Maximum speed	n_{max}	6000 min^{-1} 2500 min^{-1} at 60 °C
Degree of protection according to EN 60529		IP65
Connection		12-pin plug connector
Ambient temperature	°C	-40 to +60

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8.8.5 Incremental encoder E.8.

Encoder		EK8S EV8S 1)	EK8R EV8R 2)	EK8C EV8C
Supply voltage	U_B	DC 7 V – 30 V		DC 4.75 V – 30 V
Supply voltage for functional safety applications	U_{B_FS}	DC 7 V – 30 V	–	
Maximum current consumption, free of load	I_{in}	100 mA (at U_B = 7 V)		
Max. pulse frequency	f_{pulse_max}	150 kHz	120 kHz	
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	1024 (10 bits)		
	C	1		
Position resolution, increments per revolution	A, B	4096 (12 bits)		
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$)	U_{t_diff}	1 V ± 10%	–	
Voltage output signal non-differential (peak-to-peak)	U_t	0.5 V ± 10%	U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V	U_B ≤ 6 V: U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V U_B > 6 V: U_{Low} ≤ 3 V U_{High} ≥ U_B - 2.5 V
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)V	U_{t_o}	2.5 V ± 0.3 V	–	
Signal output		sin/cos	TTL (RS422)	HTL
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%		U_B 6 V: 120 Ω ± 10% UB > 6 V: 1 – 3 kΩ
Resistance between tracks and reference ground	R_{gnd}	≥ 1 kΩ	–	
Load capacitance, output	C_o	≤ 20 nF	–	–
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e	0.3 – 1.4 V	–	–
C track offset	g	192 mV ± 5 mV	–	–
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	U_{t_C}	–	U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V	U_B ≤ 6 V: U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V U_B > 6 V: U_{Low} ≤ 3 V U_{High} ≥ U_B - 2.5 V
Phase angle track C', n = constant	k, l	k = 180° ± 90° l = 180° ± 90°	–	–
Signal width track C	W_C	see figure	90° electrical	
Signal logic track C		see figure	C = log 1, when A = B = log 1	
Pulse duty factor according to IEC 60469-1, n = constant		–	50 % ± 10%	
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 2°	90° ± 20°	
Accuracy of the incremental section[3)]		0.0194° (70 ")	0.033° (120 ")	
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)		
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)		
Maximum speed	n_{max}	6000 min^{-1}		
Maximum line length		100 m	300 m	100 m

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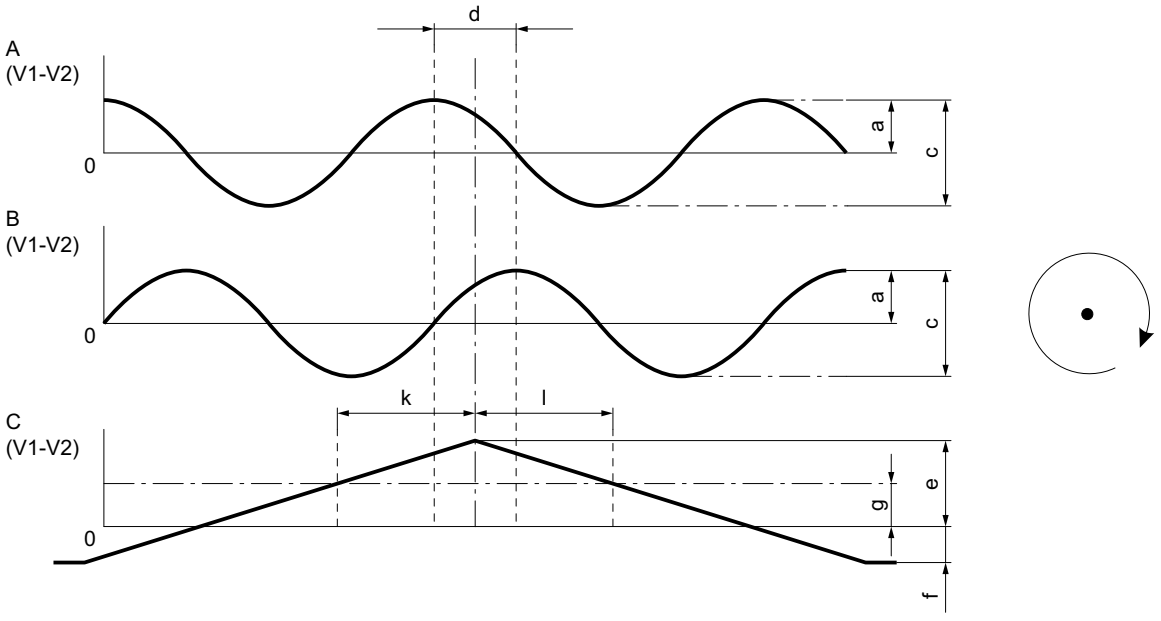
Encoder		EK8S EV8S 1)	EK8R EV8R 2)	EK8C EV8C
Duration until fault message (disabled outputs)[4]		≤ 25 ms	–	
Activation time of rotary encoder internal diagnostics after switching on		≤ 200 ms	–	
Degree of protection in accordance with EN 60529		IP66		
Installation altitude	h	≤ 4000 m above sea level		
Corrosion protection, surface protection		KS, OS1 – OS4, OSG		
Connection		Integrated encoder plug connector on the fan guard (can be pre-assembled and plugged in the field)		
Ambient temperature of motor	T_{amb}	-30 to +60 °C		
Electronic nameplate		RS485 (serial, asynchronous); 1920 bytes	–	–

1) see figure "Sin/cos signals and phase relationship"
2) see figure "HTL/TTL signals and phase relationship"
3) Due to the stiffness of the torque arm, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.
4) Sin/cos encoders have a self-diagnostics function. If an error is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

Sin/cos signals and phase relationship



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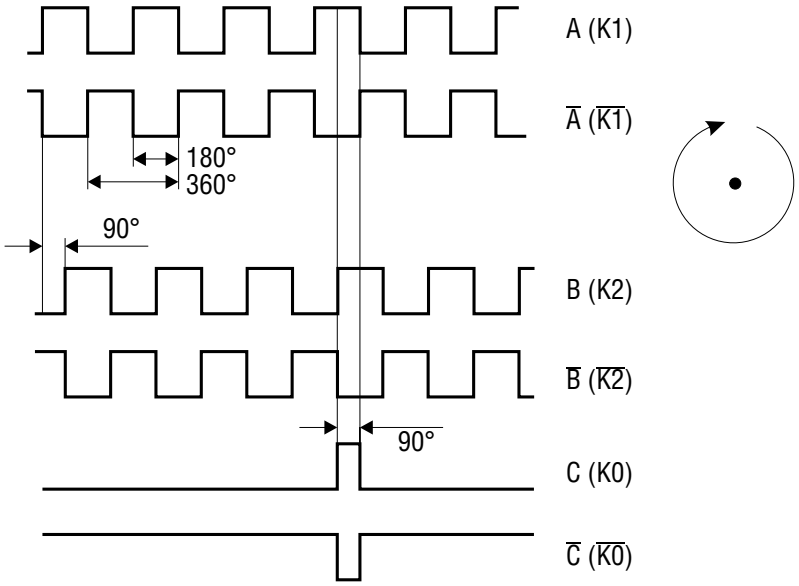
HTL/TTL signals and phase relationship



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8.8.6 Incremental encoder EI.7

Encoder		EI71 EI72 EI76 EI7C	EI8R	EI8C
Supply voltage	U_B	DC 9 V – 30 V	DC 7 V – 30 V	
Supply voltage for FS applications	U_{B_FS}	DC 19.2 V – 30 V	–	
Max. current consumption, free of load	I_{in}	120 mA	100 mA	
Max. pulse frequency	f_{pulse_max}	1.44 kHz	102.4 kHz	
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	1, 2, 6, 24 (size 63: 24 only) (EI7C FS: 24 only)	1024 (10 bits)	
	C	–	1	
Position resolution, increments per revolution	A, B	4, 8, 24, 96 (size 63: 96 only) (EI7C FS: 96 only)	4096 (12 bits)	
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$)	U_{t_diff}	–	–	
Voltage output signal non-differential (peak-to-peak)	U_t	$U_{Low} \le 3$ V $U_{High} \ge U_B - 3.5$ V	$U_{Low} \le 0.5$ V $U_{High} \ge 2.5$ V	$U_{Low} \le 3$ V $U_{High} \ge U_B - 3.5$ V
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)V	U_{t_o}	–	–	
Signal output		HTL	TTL (RS422)	HTL
Load resistance/load current differential	R_L/I_L	60 mA	25 mA	60 mA
Resistance between tracks and reference ground	R_{gnd}	–	–	–
Load capacitance, output	C_o	–	–	–
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e[1)]	–	–	–
C track offset	g[1)]	–	–	–
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	U_{t_C}	–	$U_{Low} \le 0.5$ V $U_{High} \ge 2.5$ V	$U_{Low} \le 3$ V $U_{High} \ge U_B - 2.5$ V
Phase angle track C', n = constant	k, l[1)]	–	–	–
Signal width track C	W_C[1)]	–	90° electrical	
Signal logic track C		–	C = log 1 when A = B = log 1	
Pulse duty factor according to IEC 60469-1, n = constant		50 % ± 20%	50 % ± 10%	
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d[1)]	90° ± 20°	90° ± 20°	
Accuracy of the incremental section		3.75° (225 ")	0.2° (720 ")	
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)		
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)		
Maximum permissible external magnetic field (outer contour of motor)		25 mT/20 kA/m		
Maximum speed	n_{max}	3600 min^{-1}	6000 min^{-1}	
Maximum line length		100 m		
Duration until error message (disabled outputs)		–	–	

Encoder		EI71 EI72 EI76 EI7C	EI8R	EI8C
Activation time of rotary encoder internal diagnostics after switching on		–	–	
Degree of protection in accordance with EN 60529		IP66		
Installation altitude	h	≤ 4000 m above sea level		
Corrosion protection, surface protection		KS, OS1 – OS4, OSG		
Connection		Size 63: M12 (8-pin) Size 71 – 132S: M12 (8- or 4-pin) or connection unit (can be pre-assembled in the field) in a terminal box	M23 or connection unit (can be pre-assembled in the field) in a terminal box	
Ambient temperature of motor	T_{amb}	-30 to +60 °C		
Electronic nameplate		–	–	–
Other technical data		On request		

1) relating to measurements in figure "Sin/cos signals and phase relationship"

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8.8.7 Multi-turn absolute encoder A.7Y – SSI (multi-turn) + sin/cos or TTL (RS422)

Encoder		AS7Y	AV7Y	AG7Y	AH7Y
Supply voltage	U_B	DC 7 V – 30 V			DC 9 V – 30 V
Max. current consumption	I_{in}	140 mA			150 mA
Max. pulse frequency	f_{limit}	200 kHz			120 kHz
Incremental tracks, periods per revolution	A, B	2048 (11 bits)			
	C	–			–
Output amplitude per track	U_{high}	1 V_{PP}			≥ DC 2.5 V_{PP}
	U_{low}				≤ DC 0.5 V_{PP}
Signal output		sin/cos			TTL (RS422)
Output current per track	I_{out}	10 mA			20 mA
Pulse duty factor according to IEC 60469-1, n = constant		–			50 ± 20%
Phase offset A: B n = constant		90° ± 3°			90° ± 20°
Accuracy of the incremental section[1]		0.0194°			–
Accuracy of the absolute section		±1 LSB (Least Significant Bit)			–
Scanning code		Gray code			
Position resolution, increments per revolution	A, B	8192 (13 bits)			
Position resolution of the absolute section, increments per revolution		4096 (12 bits)			
Multi-turn resolution		4096 revolutions (12 bits)			
Data transmission		Synchronous, serial (SSI)			
Serial data output		Driver to EIA RS422			Driver to EIA RS485
Serial pulse input		Recommended receiver to EIA RS422			Optocoupler, recommended driver to EIA RS485
Clock frequency		Permitted range: 100 – 2000 kHz (max. 100 m cable length with 300 kHz)			
Clock-pulse space period		12 – 30 µs			
Vibration resistance according to EN 60088-2-6		≤ 100 m/s^2			
Shock resistance according to EN 60088-2-27		≤ 1000 m/s^2			≤ 2000 m/s^2
Maximum speed	n_{max}	6000 min^{-1}		6000 min^{-1} at T_U to 40 °C 4500 min^{-1} at T_U > 40 °C	3500 min^{-1}
Duration until fault message (disabled outputs)[2]		25 ms + 3/4 revolution			–
Activation time of rotary encoder internal diagnostics after switching on		–			
Degree of protection in accordance with EN 60529		IP66			IP56
Connection		Terminal strip in pluggable connection cover			Terminal strip on encoder
Ambient temperature	°C	-30 to +60			-20 to +40

1) Due to the stiffness of the torque arm, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.

2) Absolute encoders AS7Y, AV7Y, and AG7Y have a self-diagnostics function. If an error is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

8.8.8 Multi-turn absolute encoder A.7W – RS485 (multi-turn) + sin/cos

Encoder		AS7W	AV7W	AG7W
Supply voltage	U_B	DC 7 V – 30 V		
Max. current consumption	I_{in}	150 mA		
Max. pulse frequency	f_{max}	200 kHz		
Incremental tracks, periods per revolution	A, B	2048 (11 bits)		
	C	–		
Output amplitude per track	U_{high} / U_{low}	1 V_{PP}		
Signal output		sin/cos		
Output current per track	I_{out}	10 mA		
Pulse duty factor according to IEC 60469-1, n = constant		–		
Phase offset A: B n = constant		90° ± 3°		
Accuracy of the incremental section[1)]		0.0194°		
Accuracy of the absolute section		±1 LSB (Least Significant Bit)		
Scanning code		Binary code		
Position resolution, increments per revolution	A, B	8192 (13 bits)		
Multi-turn resolution		65536 revolutions (16 bits)		
Data transmission		RS485		
Serial data output		Driver to EIA RS485		
Serial pulse input		Recommended driver to EIA RS485		
Clock frequency		9600 baud		
Clock-pulse space period		–		
Vibration resistance according to EN 60088-2-6		≤ 100 m/s²		
Shock resistance according to EN 60088-2-27		≤ 1000 m/s²		≤ 2000 m/s²
Maximum speed	n_{max}	6000 min^{-1}	6000 min^{-1} at T_U to 40 °C 4500 min^{-1} at T_U > 40 °C	6000 min^{-1}
Duration until fault message (disabled outputs)[2)]		25 ms + 3/4 revolution		
Activation time of rotary encoder internal diagnostics after switching on		–		
Degree of protection in accordance with EN 60529		IP66		
Connection		Terminal strip in pluggable connection cover		
Ambient temperature	°C	-30 to +60		

1) Due to the stiffness of the torque arm, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.

2) Absolute encoders AS7W, AV7W, and AG7W have a self-diagnostics function. If an error is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

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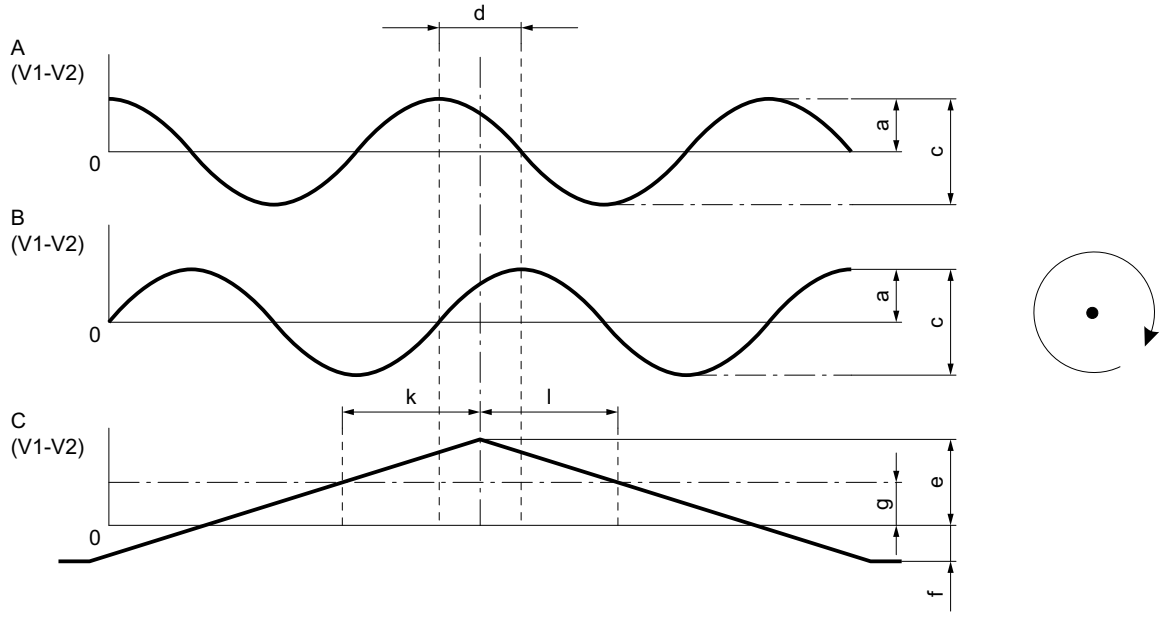
8.8.9 Multi-turn absolute encoder A.8.

Encoder		AK8Y AV8Y 1)	AK8W AV8W 1)	AK8H AV8H 1)2)
Supply voltage	U_B	DC 7 V – 30 V		DC 7 V – 12 V
Supply voltage for FS applications	U_{B_FS}	DC 7 V – 30 V		–
Max. current consumption, free of load	I_{in}	100 mA (at U_B = 7 V)		80 mA
Max. pulse frequency	f_{pulse_max}	200 kHz		
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	2048 (11 bits)		1024 (10 bits)
	C	–		
Position resolution, increments per revolution	A, B	4096 (12 bits) (SSI, RS422)	65536 (16 bits) (RS485)	32768 (15 bits) HIPERFACE®
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$	U_{t_diff}	1 V ± 10%		HIPERFACE®
Voltage output signal non-differential (peak-to-peak)	U_t	0.5 V ± 10%		
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)V	U_{t_o}	2.5 V ± 0.3 V		
Signal output		sin/cos + SSI, RS422	sin/cos + RS485	
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%		
Resistance between track and reference ground	R_{gnd}	≥ 1 kΩ		
Load capacitance, output		≤ 20 nF		
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e	–	–	
C track offset	g	–	–	
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	U_{t_C}	–	–	
Phase angle track C', n = constant	k, l	–	–	
Signal width track C	W_C	–	–	–
Signal logic track C		–	–	–
Pulse duty factor according to IEC 60469-1, n = constant		–		–
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant		90° ± 2°		HIPERFACE®
Accuracy of the incremental section[3)]		0.0194° (70 ")		± 0.0144° (± 52 ")
Accuracy of the absolute section		±1 LSB (Least Significant Bit)		
Scanning code/counting direction		Gray code, ascending with the direction of rotation specified above	Binary code, ascending with the direction of rotation specified above	–
Multi-turn resolution		4096 revolutions (12 bits)	65536 revolutions (16 bits)	4096 revolutions (12 bits)
Communication, interface		SSI (synchronous, serial)	RS485 (asynchronous, serial)	HIPERFACE®
Communication, modules		Driver to EIA RS422	Driver to EIA RS485	
Clock frequency/bandwidth		100 – 800 kHz (100 m cable length with maximum 300 kHz)	9600 baud	HIPERFACE®
Clock-pulse space period		12 – 30 µs	–	
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)		

Encoder		AK8Y AV8Y 1)	AK8W AV8W 1)	AK8H AV8H 1)2)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)		
Maximum speed	n_{max}	6000 min^{-1}		
Maximum line length		100 m		
Duration until fault message (disabled outputs)[4]		≤ 25 ms + 3/4 revolution		HIPERFACE®
Activation time of rotary encoder internal diagnostics after switching on		200 ms		HIPERFACE®
Degree of protection in accordance with EN 60529		IP66		
Installation altitude	h	≤ 4000 m above sea level		≤ 2000 m above sea level
Corrosion protection, surface protection		KS, OS1 – OS4, OSG		
Connection		Integrated encoder plug connector on the fan guard (can be pre-assembled and plugged in the field)		
Ambient temperature of motor	T_{amb}	-30 to +60 °C		
Electronic nameplate		–	RS485 (serial, asynchronous); 1920 bytes	HIPERFACE®; 1792 bytes
Other technical data		On request		

1) see figure "Sin/cos signals and phase relationship"
2) Please observe the specification for the HIPERFACE® interface, Sick AG
3) Due to the stiffness of the torque arm, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.
4) Absolute encoders A.8. and AG7Y have a self-diagnostics function. If an error is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

Sin/cos signals and phase relationship



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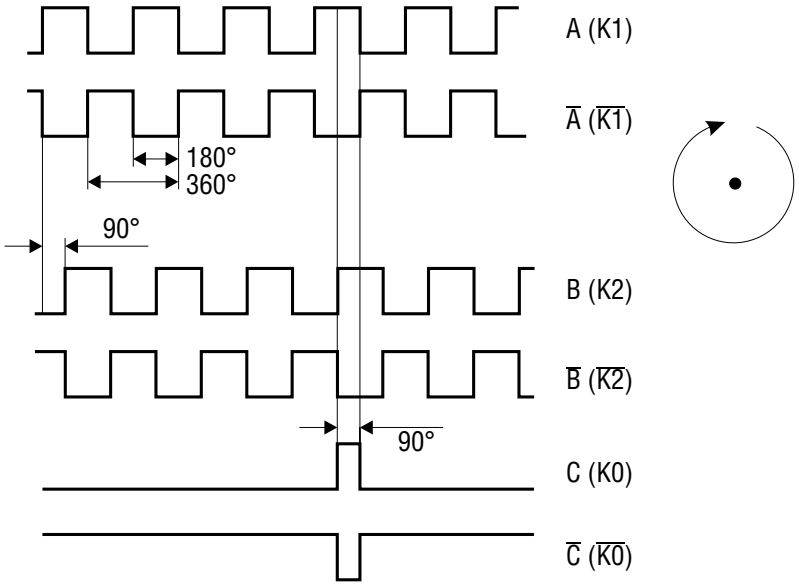
HTL/TTL signals and phase relationship



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8.9 Diagnostic unit /DUE

Sensors		Ø 6 mm	Ø 8 mm
		DUE-d6-00	DUE-d8-00
Measuring range (MB)	mm	1.5	2.0
Protection class		IP66	IP66
Operating temperature (sensor and cable)		-50 to +150 °C	-50 to +150 °C

Evaluation unit			DUE-1K-00
Part number			21195609
Signal outputs (1 channel)			OUT1: 4 – 20 mA FCT1: DC 24 V (150 mA) WEAR1: DC 24 V (150 mA)
Current consumption	Max.	mA	320
	Min.	mA	40
Supply voltage			DC 24 V (±15%)
Electromagnetic compatibility			DIN EN 61800-3
Operating temperature (evaluation unit)			-40 to +105 °C
Humidity			≤ 90% rF
Protection class			IP20 (in the closed terminal box up to IP66)

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8.10 Characteristic safety values

8.10.1 Characteristic safety values for BE.. brakes

The values specified in the following table apply to BE.. 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	BE02	1.5×10^6
	BE03	20×10^6
	BE05	16×10^6
	BE1	12×10^6
	BE2	8×10^6
	BE5	6×10^6
	BE11	3×10^6
	BE20	2×10^6
	BE30	1.5×10^6
	BE32	1.5×10^6
	BE60	1×10^6
	BE62	1×10^6
	BE120	0.25×10^6
	BE122	0.25×10^6

SEW-EURODRIVE offers BE.. brakes also as safety brakes up to size BE32. For more information, consult the addendum to the operating instructions "Safety Encoders and Safety Brakes – AC Motors DR.., DRN.., DR2.., EDR.., EDRN.. – Functional Safety".

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8.11 S1 duty cycle DRK.. single-phase motor

The following section describes the data for DRK.. single-phase motor in S1 continuous duty.

The specified starting torques result from the connection of a running capacitor or a running capacitor with start-up capacitor connected in parallel, respectively.

S1 operation at 1500/1800 min^{-1} 230 V)									
							M_A/M_N with C_B	C_A for M_A/M_N	
Motors		P_N	n_N	I_N	cos φ	C_B		100%	150%
	Hz	kW	min^{-1}	A		µF	%	µF	µF
DRK71S4	50	0.18	1450	1.53	0.81	20	50	14	25
	60		1755	1.38	0.87	18	45	14	25
DRK71M4	50	0.25	1455	2.05	0.80	25	45	16	35
	60		1760	1.80	0.89	25	50	14	30
DRK80S4	50	0.37	1420	2.40	0.98	18	50	12	25
	60		1730	2.45	0.94	15	45	12	20
DRK80M4	50	0.55	1430	3.45	0.97	25	50	12	30
	60		1740	3.45	0.94	20	50	12	25
DRK90M4	50	0.75	1430	4.75	0.93	15+15	50	20	40
	60		1740	4.80	0.90	25	50	18	35
DRK90L4	50	1.1	1415	6.6	0.97	20+25	50	30	70
	60		1725	6.8	0.93	15+20	55	30	50

C_B Running capacitor

C_A Start-up capacitor

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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

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

Improper troubleshooting measures may damage the drive.

The drive system might be damaged.

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

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9.2 Motor malfunctions

Fault	Possible cause	Measure
Motor does not start up	Supply cable interrupted	Check the connections and (intermediate) terminal points, correct if necessary
	Brake does not release	See chapter "Brake malfunctions"
	Supply cable fuse has blown	Replace fuse
	Motor protection (switch) has triggered	Check that the motor protection (switch) is set correctly; current specification is on the nameplate
	Motor protection does not trip	Check motor protection control
	Error in control or in the control process	Observe the switching sequence; correct if necessary
Motor only starts with difficulty or does not start at all	Motor power designed for delta connection but connected in star	Correct the connection from star to delta; Observe wiring diagram
	Motor power designed for star-star connection but only connected in star	Correct the connection from star to star-star; Observe wiring diagram
	Voltage or frequency differs considerably from the setpoint, at least when switching on the motor	Provide better power supply system; reduce the power supply load; Check cross section of supply cable, replace with cable of larger cross section if necessary
Motor does not start in star connection, only in delta connection	Star connection does not provide sufficient torque	If the delta inrush current is not too high (observe the regulations of the power supplier), start up directly in delta; Check the project planning and use a larger motor or special design if necessary. Contact SEW-EURODRIVE.
	Contact fault on star/delta switch	Check the switch, replace if necessary; Check the connections
Incorrect direction of rotation	Motor connected incorrectly	Swap 2 phases of the motor supply cable
Motor hums and has high current consumption	Brake does not release	See chapter "Brake malfunctions"
	Winding defective	Send motor to specialist workshop for repair
	Rotor rubbing	Send motor to specialist workshop for repair
Fuses blow or motor protection trips immediately	Short circuit in the motor supply cable	Eliminate short circuit
	Supply cables connected incorrectly	Correct the connection; Observe wiring diagram
	Short circuit in the motor	Send motor to specialist workshop for repair
	Ground fault on motor	Send motor to specialist workshop for repair

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Fault	Possible cause	Measure
Severe speed loss under load	Motor overload	Measure power, check project planning and use larger motor or reduce load if necessary
	Voltage drops	Check cross section of supply cable, replace with cable of larger cross section if necessary
Motor heats up excessively (measure temperature)	Overload	Measure power, check project planning and use larger motor or reduce load if necessary
	Insufficient cooling	Provide a cooling air supply or clear cooling air passages, retrofit forced cooling fan if necessary. Check the air filter, clean or replace if necessary
	Ambient temperature too high	Observe the permitted temperature range, reduce the load if necessary
	Motor in delta connection instead of star connection as intended	Correct the wiring, observe the wiring diagram
	Loose contact in supply cable (one phase missing)	Tighten loose contact, check connections, observe wiring diagram
	Fuse defective	Look for and rectify cause; replace fuse
	Line voltage deviates from the rated motor voltage by more than 5% (range A) / 10% (range B)	Adjust motor to line voltage
	Operating mode (S1 to S10, DIN 57530) exceeded, e.g. caused by excessive switching frequency	Adjust the operating mode of the motor to the required operating conditions; consult a professional to determine the proper drive, if necessary
Loud noises	Ball bearing compressed, dirty or damaged	Realign motor and the driven machine, inspect rolling bearing and replace if necessary.
	Vibration of rotating parts	Look for the cause, possibly an imbalance; correct the cause, observe method for balancing
	Foreign bodies in cooling air ducts	Clean cooling air ducts
	For DR.. motors with rotor designation "J": Load too high	Reduce the load

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9.3 Brake malfunctions

Fault	Possible cause	Measure
Brake does not release	Incorrect voltage on brake control unit	Apply the correct voltage; brake voltage specified on the nameplate.
	Brake control unit failed	Renew brake control, check resistors and isolation of the brake coils. Check switchgear, replace if necessary.
	Maximum permitted working air gap exceeded because brake lining worn down.	Measure and set working air gap. If the brake disk is too thin, replace the brake disk.
	Voltage drop along supply cable > 10%	Provide correct connection voltage: brake voltage specifications on the nameplate. Check the cross section of the brake supply cable, increase cross section if necessary.
	Inadequate cooling, brake overheating	Provide for cooling air supply or clear cooling air passages, check air filter, clean or replace if necessary. Replace type BG brake rectifier with type BGE.
	Brake coil has interturn short circuit or a short circuit to frame	Check resistors and isolation of the brake coils; Replace complete brake and brake control (specialist workshop); Check switchgear, replace if necessary.
	Rectifier defective	Replace rectifier and brake coil; it may be more economical to replace the complete brake.
Brake does not brake	Working air gap not correct	Measure and set working air gap. If the brake disk is too thin, replace the brake disk.
	Brake lining worn	Replace entire brake lining carrier.
	Incorrect braking torque	Check the dimensioning and, if necessary, change braking torque by type and number of brake springs, or by selecting a different brake.
Brake does not brake	Working air gap so large that setting nuts for the manual release come into contact	Set the working air gap.
	Manual brake release device not set correctly	Set the setting nuts for the manual release correctly.
	Brake locked by manual brake release HF	Loosen the set screw, remove if needed.
Brake is applied with time lag	Brake is switched only on AC voltage side	Switch both the DC and AC circuits (e.g. by retrofitting a SR current relay to BSR or a UR voltage relay to BUR); Observe wiring diagram.

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Fault	Possible cause	Measure
Noises in vicinity of brake	Gearing wear on the brake disk or the driver caused by jerky start-up	Check the project planning, replace the brake disk if necessary. Have a specialist workshop replace the carrier.
	Alternating torques due to incorrectly set inverter	Check correct setting of inverter according to its operating instructions, correct if necessary.

9.4 Malfunctions when operated with a frequency inverter

The symptoms described in chapter "Motor malfunctions" (→ 🗎 264) can also occur when the motor is operated with a frequency inverter. Refer to the frequency inverter operating instructions for the meaning of the problems that occur and to find information about rectifying the problems.

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9.5 Disposal

Dispose of the motors in accordance with the material structure and the regulations in force:

- Iron
- Aluminum
- Copper
- Plastics
- Electronic parts
- Oil and grease (not mixed with solvents)

9.6 Customer service

Have the following information available if you require customer service assistance:

- Nameplate data (complete)
- Nature and extent of the problem
- Time the failure occurred and any accompanying circumstances
- Assumed cause
- Ambient conditions e.g.:
  - Ambient temperature
  - Humidity
  - Installation altitude
  - Dirt
  - etc.

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10 Appendix

10.1 Wiring diagrams

INFORMATION

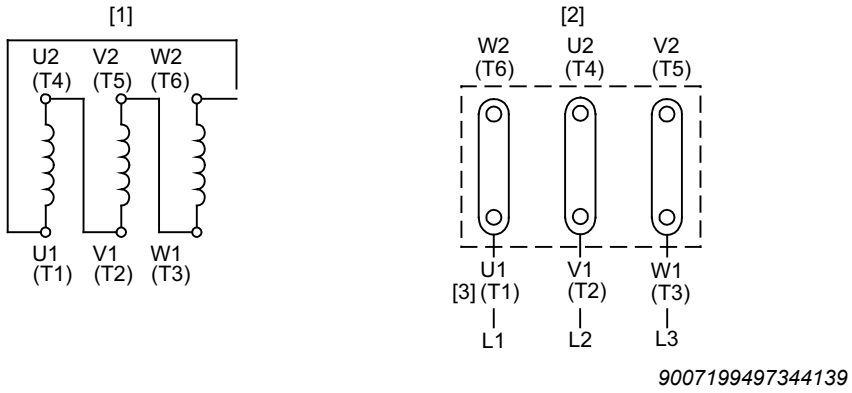
The motor should be connected as shown in the connection wiring diagram or the terminal assignment diagram, which are supplied with the motor. The following section only shows a selection of the common types of connections. You can obtain the relevant wiring diagrams free of charge from SEW-EURODRIVE.

10.1.1 Delta and star connection in wiring diagram R13 (68001 xx 06)

For all motors with one speed, direct on-line, or ⅄/△ start-up.

Delta connection

The following illustration shows the △ connection for lower voltage.



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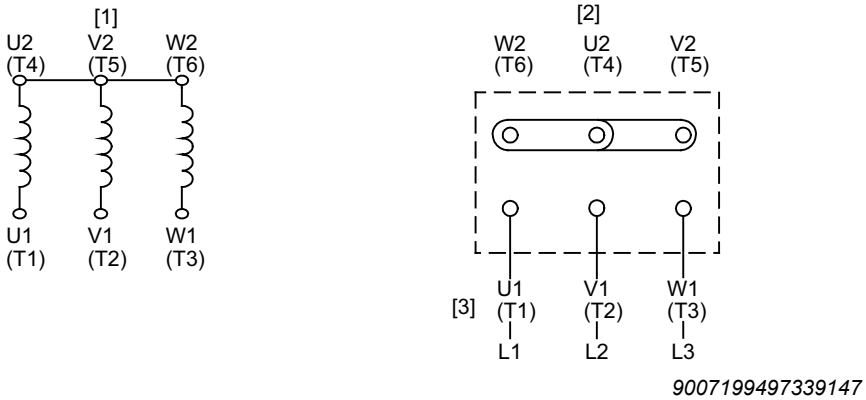
[1] Motor winding
[2] Motor terminal board
[3] Supply cables

Star connection

The following illustration shows the ⅄ connection for high voltage.



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[1] Motor winding
[2] Motor terminal board
[3] Supply cables

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Proceed as follows to reverse the direction of rotation:

1. Swap the supply cables L1 – L2.

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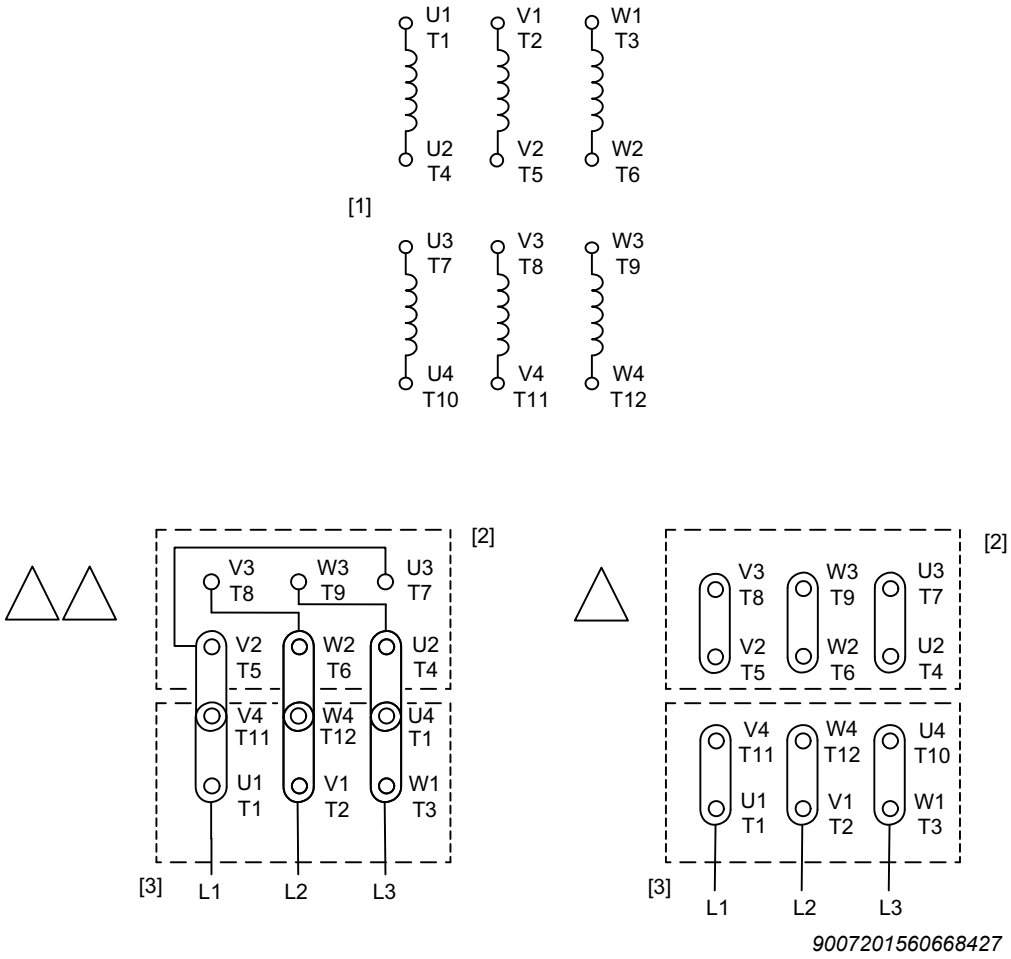
10.1.2 Delta connection with wiring diagram R72 (68192 xx 09)

For all motors with one speed and direct power-on.

Delta connection, Double-delta connection

The following figure shows the △ connection for high voltages and the △△ connection for lower voltages.



[1] Motor winding
[2] Motor terminal board
[3] Supply cables

Proceed as follows to reverse the direction of rotation:

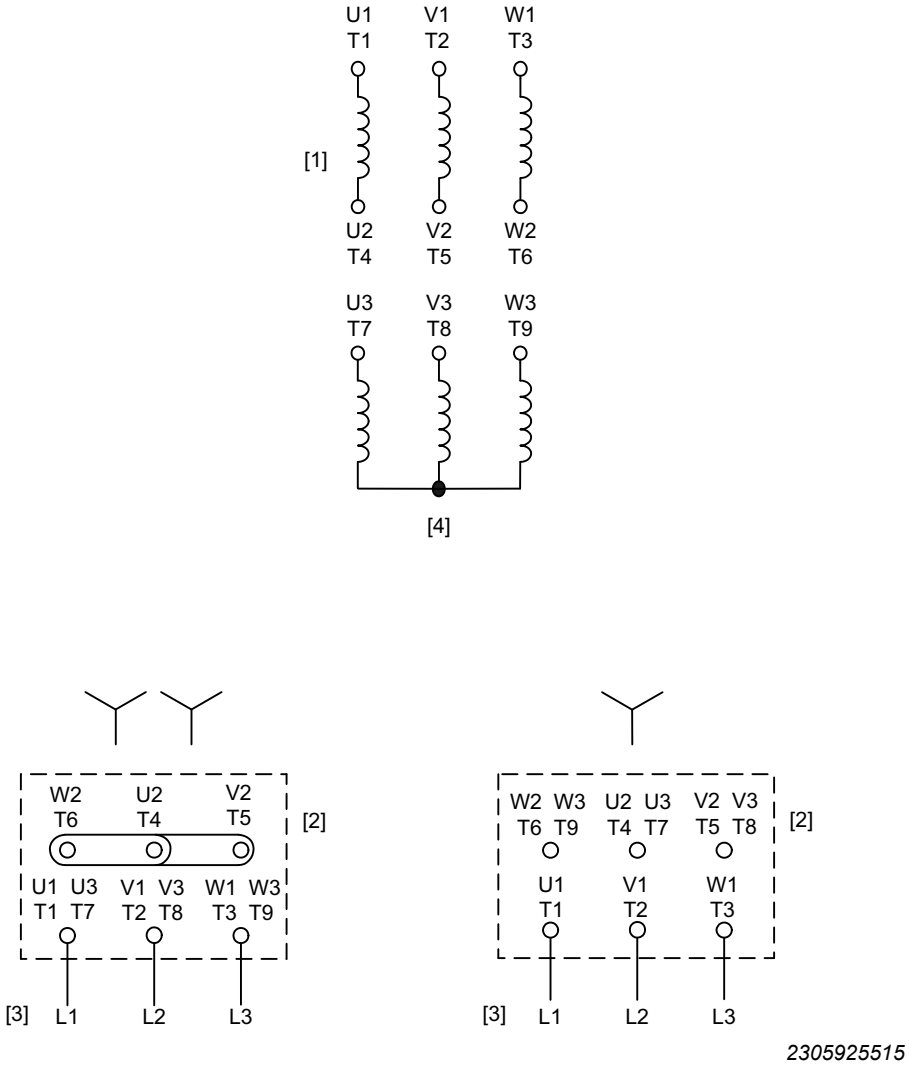
1. Swap the supply cables L1 – L2.

10.1.3 Star connection with wiring diagram R76 (68043 xx 06)

For all motors with one speed and direct power-on.

Star connection, double-star connection

The following figure shows the ⅄ connection for high voltages and the ⅄ ⅄ connection for lower voltages.



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[1] Motor winding
[2] Motor terminal board
[3] Supply cables
[4] Star point connected in motor

Proceed as follows to reverse the direction of rotation:

1. Swap the supply cables L1 – L2.

10.1.4 Motor protection with /TF or /TH for DR..71 – 280, DRN63 – 280, DR2..63 – 80 motors

INFORMATION

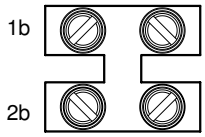
The following shows an example terminal assignment. The actual terminal assignment is included in the motor delivery as wiring diagram.

/TF, /TH

The following figures show examples for connection of motor protection with /TF PTC thermistor sensors or /TH bimetallic thermostats.

Either a two-pole connection terminal or a five-pole terminal strip is available for connecting to the trip switch.

Example: /TF, /TH to 2-pin terminal strip



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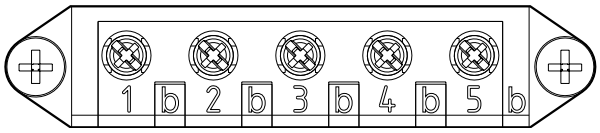
1b	2b
TF/TH	TF/TH

Example: 2 × /TF, /TH to 5-pin terminal strip

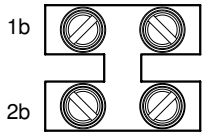


18014398983427083

1b	2b	3b	4b	5b
1.TF/TH	1.TF/TH	2.TF/TH	2.TF/TH	–

2 × /TF, /TH with anti-condensation heating

The following illustration shows the connection of the motor protection with 2 /TF PTC thermistor sensors or /TH bimetallic thermostats and Hx anti-condensation heating.



9007199728684427

1b	2b
Hx	Hx

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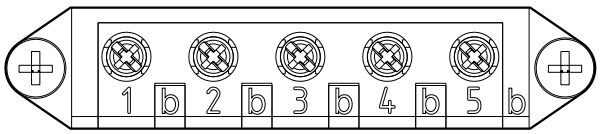


18014398983427083

1b	2b	3b	4b	5b
1.TF/TH	1.TF/TH	2.TF/TH	2.TF/TH	–

10.1.5 Motor protection with /TF or /TH for DR..315, DRN315 motors

INFORMATION

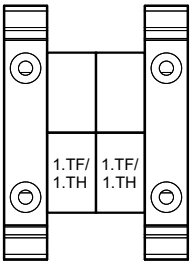
The following shows an example terminal assignment. The actual terminal assignment is included in the motor delivery as wiring diagram.

/TF, /TH

The following figures show examples for connection of motor protection with /TF PTC thermistor sensors or /TH bimetallic thermostats.

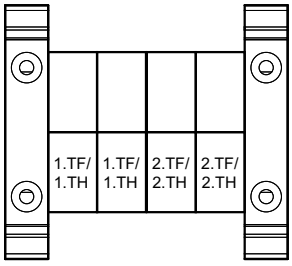
Depending on the version, an "x-pin" terminal strip is available for connection to the trip switch.

Example: /TF, /TH to terminal strip



473405707

Example: 2x /TF, /TH to terminal strip



473410187

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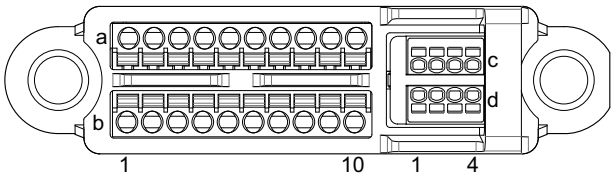
10.1.6 EI7.B built-in encoder

Connection via terminal strip

The encoder is equipped with a 10-pole terminal strip for connection:



9007207579353739

INFORMATION

The ranges 1a – 10a, 1c – 4c and 1d – 4d have been pre-configured by SEW-EURODRIVE. The must not be changed.

Range 1b – 10b is intended for customer adjustments.

Basic connection:

Connections 1a – 10a, 1c – 4c and 1d – 4d lead to the encoder or to the motor.

Connections 1b – 10b lead to the cable gland.

	1	2	3	4	5	6	7	8	9	10	1	2	3	4	
a	TF1[1]	TF1[1]	TF2[1] Opt.	TF2[1] Opt.	+UB[1] (GY)	GND[1] (PK)	A[1] (BN)	$\overline{A}$[1] (WH)	$\overline{B}$[1] (YE)	B[1] (GN)	see below				c
b	TF1	TF1	TF2 Opt.	TF2 Opt.	+UB	GND	A	$\overline{A}$	B	$\overline{B}$	see below				d

1) Pre-configured by SEW-EURODRIVE. Do not alter the setting!

Pin assignment EI7**C** B				
1	2	3	4	
GND_ Config (BU)[1]	n. c.[1]	n. c.[1]	n. c.[1]	c
EI7C[1] (RD)	n. c.[1]	n. c.[1]	n. c.[1]	d

Pin assignment EI7**6** B				
1	2	3	4	
GND_ Config (BU)[1]	n. c.[1]	n. c.[1]	n. c.[1]	c
n. c.[1]	EI76[1] (RD)	n. c.[1]	n. c.[1]	d

1) Pre-configured by SEW-EURODRIVE. Do not alter the setting!

Pin assignment EI7**2** B				
1	2	3	4	
GND_ Config (BU)[1]	n. c.[1]	n. c.[1]	n. c.[1]	c
n. c.[1]	n. c.[1]	EI72[1] (RD)	n. c.[1]	d

Pin assignment EI7**1** B				
1	2	3	4	
GND_ Config (BU)[1]	n. c.[1]	n. c.[1]	n. c.[1]	c
n. c.[1]	n. c.[1]	n. c.[1]	EI71[1] (RD)	d

1) Pre-configured by SEW-EURODRIVE. Do not alter the setting!

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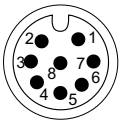
Connection via M12 plug connector

A 8-pin or a 4-pin M12 plug connector is available for the connection.

4-pin M12 plug connector AVSE		8-pin M12 plug connector AVRE	
• A coded • Male 	Pin 1: $+U_B$ Pin 2: B Pin 3: GND Pin 4: A	• A coded • Male 	Pin 1: $+U_B$ Pin 2: GND Pin 3: A Pin 4: $\overline{A}$ Pin 5: B Pin 6: $\overline{B}$ Pin 7: TF1 Pin 8: TF1

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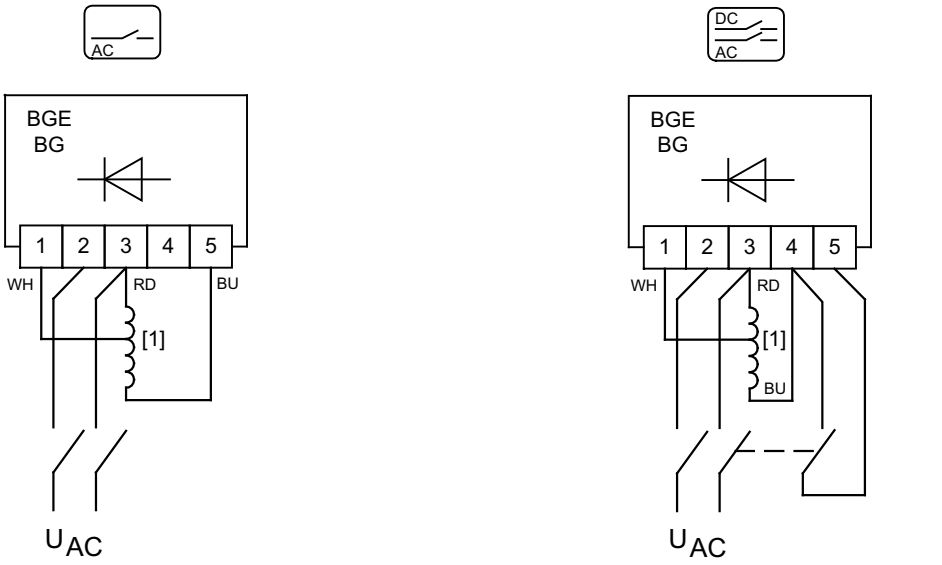
10.1.7 BGE..; BS..; BSG..; BUR.. brake control

BG../BGE..

Wiring diagram B100

The following illustration shows the wiring for BG.. and BGE.. brake rectifiers for the AC-side shut-off as well as the DC and AC-side shutoff.



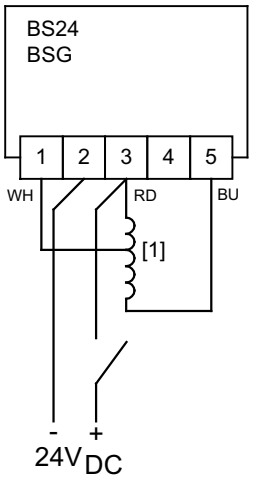
242604811

[1] Brake coil

BS24/BSG..

Wiring diagram B100

The following illustration shows the DC 24 V connection of the BS24 brake protection or BSG.. control unit.



9007199497347467

[1] Brake coil

BUR

NOTICE

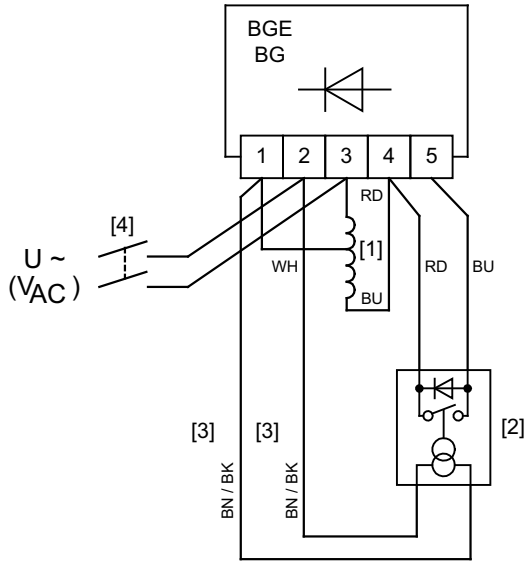
Malfunction caused by incorrect brake connection for frequency inverter operation.

The drive system might be damaged.

- Do not connect the brake to the terminal board of the motor.

Wiring diagram B100

The following figure shows the wiring for BUR.. brake control



242608139

[1] Brake coil
[2] UR11/UR15 voltage relay

BN = UR 11 (42 – 150 V)
BK = UR 15 (150 – 500 V)

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10.1.8 BSR.. brake control

Brake voltage = phase-to-neutral voltage

BSR.. brake control for single speed drives in line operation (basic wiring diagram R13)

Wiring diagram R13A/R13B

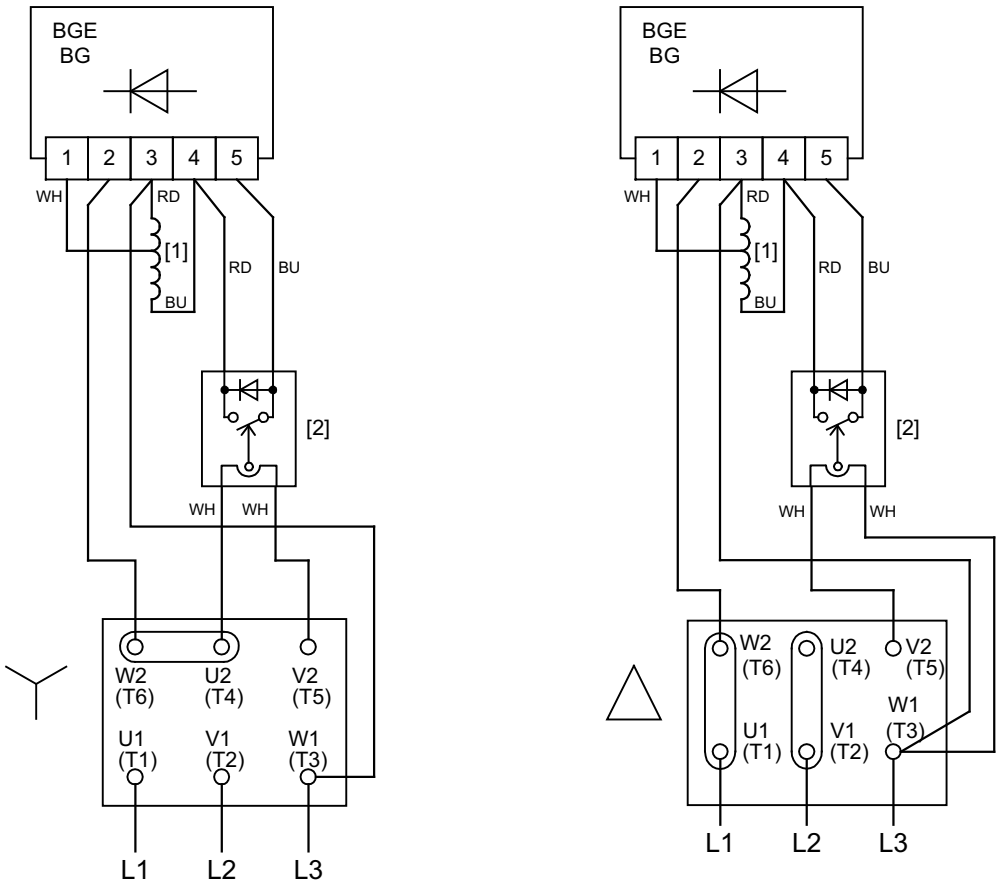
The white interconnecting wires are the ends of a converter loop and, depending on the motor connection, must be connected to the motor terminal block instead of the △ or ⅄ bridge.

The following figure shows the factory wiring for BSR.. brake control.

For example

Motor: AC 230 V/AC 400 V

Brake: AC 230 V



18014398752081803

[1] Brake coil
[2] SR10/11/15/19 current relay

Brake voltage = Line voltage

Wiring diagram R13C

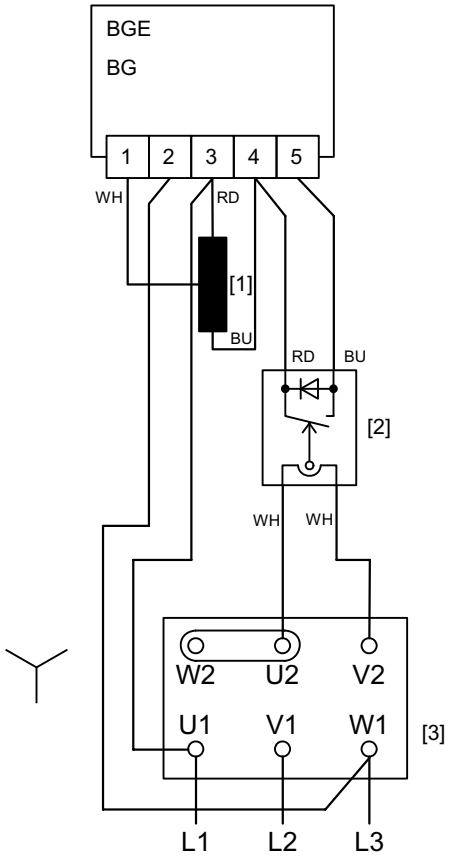
The white interconnecting wires are the ends of a converter loop and, depending on the motor connection, must be connected to the motor terminal block instead of one of the ⅄ bridges before startup.

The following figure shows the factory wiring for BSR.. brake control:

Example

Motor: AC 400 V

Brake: AC 400 V



17564599179

[1] Brake coil
[2] SR10/11/15/19 current relay
[3] Terminal board

Further wiring diagrams for BSR.. brake control

Wiring diagrams for BSR.. brake control in combination with the following drives are available from SEW-EURODRIVE upon request.

- Multi-voltage motors according to basic wiring diagram R76 or R72
- Single speed drive with cage clamp terminal /KCC (basic wiring diagram A13 or C13)

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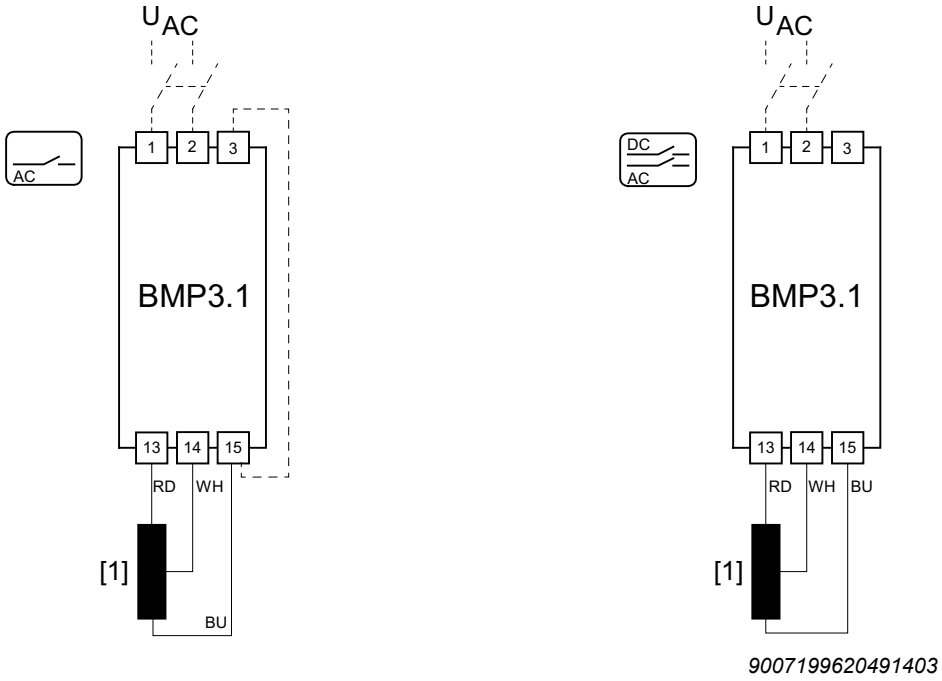
10.1.9 BMP3.1 brake control in the terminal box

INFORMATION

Separate supply cables are required for the voltage supply.

BMP3.1

The following illustration shows the wiring for the BMP3.1 brake rectifier for cut-off in the AC circuit and cut-off in the DC and AC circuit.



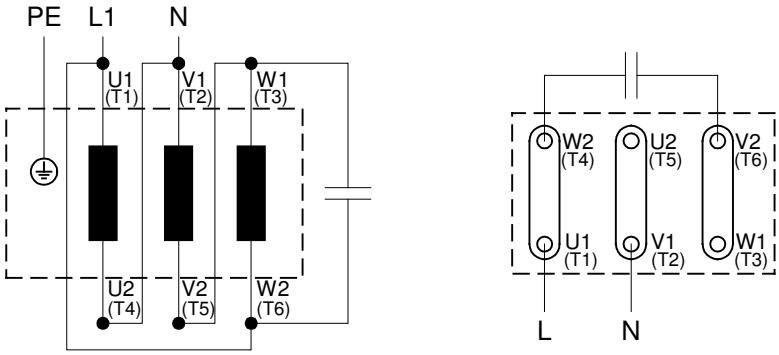
9007199620491403

[1] Brake coil

10.1.10 Forced cooling fan /V

Delta Steinmetz

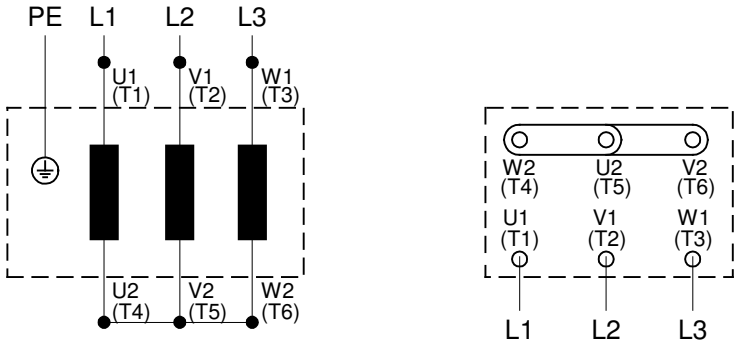
The following figure shows the wiring of the V forced cooling fan for delta-Steinmetz connection for 1-phase operation.



9007199778089483

Star connection

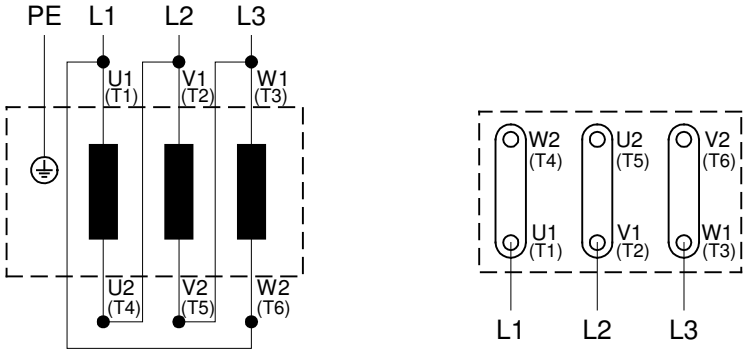
The following figure shows the wiring of the /V forced cooling fan for star connection.



9007199778091147

Delta connection

The following figure shows the wiring of the /V forced cooling fan for delta connection.



18014399032833803

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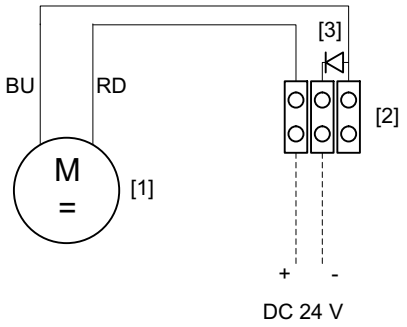
DC 24 V connection

The following figure shows the wiring of the /V forced cooling fan for DC 24 V.



9007201648125067

[1] Forced cooling fan
[2] Terminal strip
[3] Polarity reversal protection diode

NOTICE

Damage to the forced cooling fan due to incorrect connection.

The drive system might be damaged.

- Observe the polarity when connecting the forced cooling fan.

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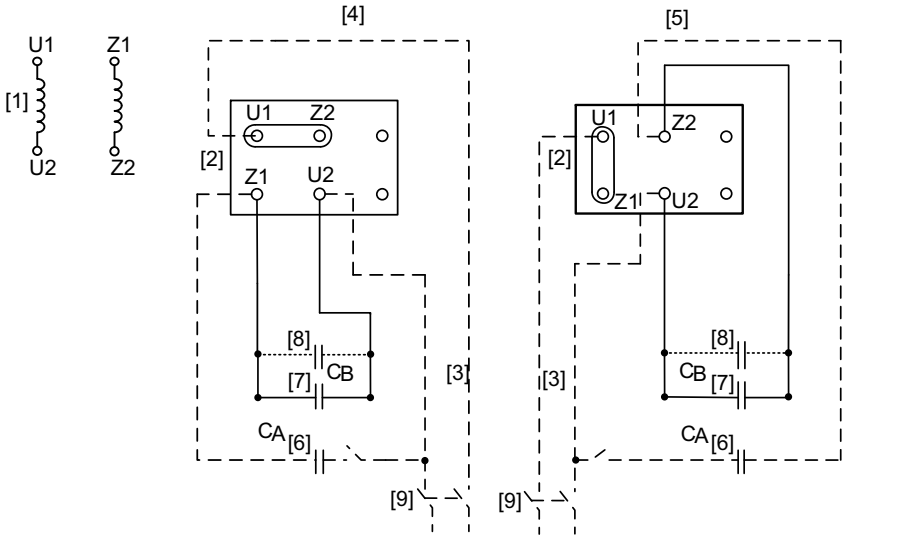
10.1.11 DRK... single-phase motor

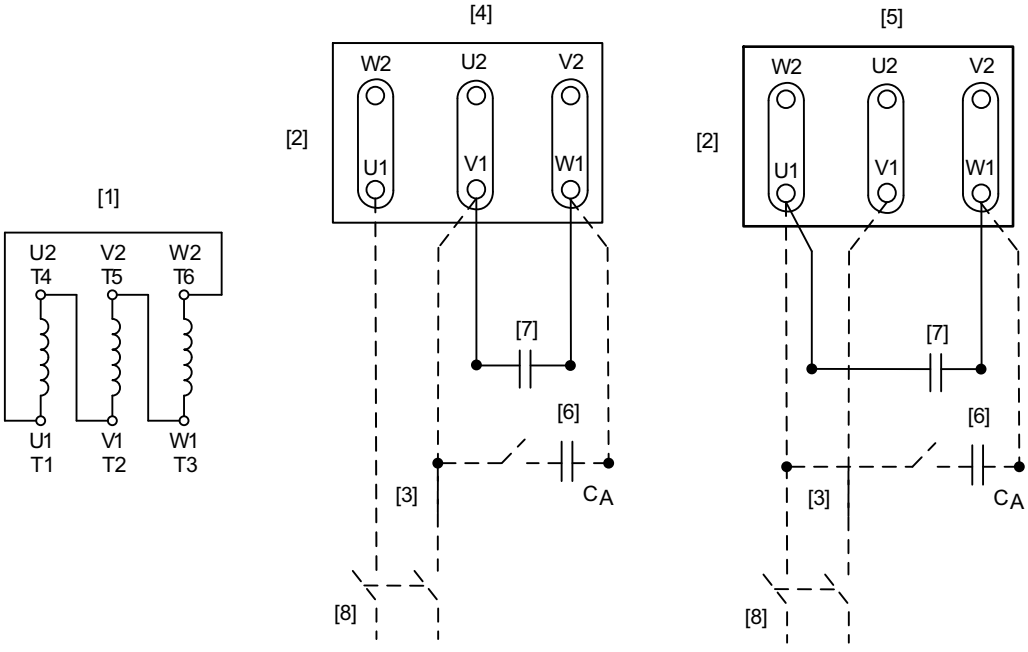
ER10 wiring diagram



11919510027

[1]	Motor winding	[6]	Starting capacitor, switchable
[2]	Motor terminal	[7]	Running capacitor
[3]	Incoming cables	[8]	Further running capacitors (if available)
[4]	Counterclockwise rotation		
[5]	CW rotation, connected at factory	[9]	All-pole power switch

ER11 wiring diagram



11919511947

[1]	Motor winding	[5]	CW rotation, connected at factory
[2]	Motor terminal board	[6]	Starting capacitor, switchable
[3]	Incoming cables	[7]	Running capacitor
[4]	Counterclockwise rotation	[8]	All-pole power switch

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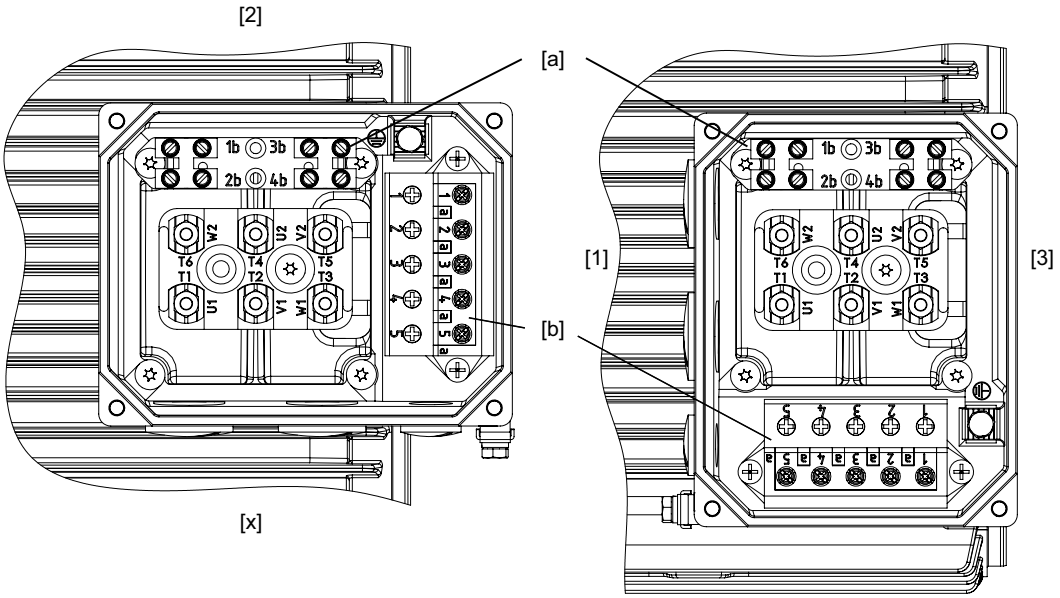
10.2 Auxiliary terminals

The following figure shows the arrangement of the auxiliary terminals for the different terminal box positions.

Terminal box position 2 and X, here X[1)]

Terminal box position 1 and 3, here 3



9007202826949515

1) If auxiliary terminal 2 is not provided, you can install auxiliary terminal 1 in the same position.

[1]	Terminal box position 1	[X]	Terminal box position X
[2]	Terminal box position 2	[a]	Auxiliary terminal 1
[3]	Terminal box position 3	[b]	Auxiliary terminal 2

Regardless of the terminal box position, auxiliary terminal 1 must always be mounted parallel to the terminal board.

The terminal structure can vary depending on the terminal box design.

11 Address list

Argentina			
Assembly Sales	Buenos Aires	SEW EURODRIVE ARGENTINA S.A. Ruta Panamericana Km 37.5, Lote 35 (B1619IEA) Centro Industrial Garín Prov. de Buenos Aires	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 http://www.sew-eurodrive.com.ar sewar@sew-eurodrive.com.ar
Australia			
Assembly Sales Service	Melbourne	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
Austria			
Assembly Sales Service	Vienna	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Straße 24 1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at
Bangladesh			
Sales	Bangladesh	SEW-EURODRIVE INDIA PRIVATE LIMITED 345 DIT Road East Rampura Dhaka-1219, Bangladesh	Tel. +88 01729 097309 salesdhaka@seweurodrivebangladesh.com
Belarus			
Sales	Minsk	Foreign unitary production enterprise SEW-EURODRIVE RybalkoStr. 26 220033 Minsk	Tel. +375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by
Belgium			
Assembly Sales Service	Brussels	SEW-EURODRIVE n.v./s.a. Researchpark Haasrode 1060 Evenementenlaan 7 3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Competence Center	Industrial Gears	SEW-EURODRIVE n.v./s.a. Rue du Parc Industriel, 31 6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-IG@sew-eurodrive.be
Brazil			
Production Sales Service	São Paulo	SEW-EURODRIVE Brasil Ltda. Estrada Municipal José Rubim, 205 – Rodovia Santos Dumont Km 49 Indaiatuba – 13347-510 – SP	Tel. +55 19 3835-8000 sew@sew.com.br
Assembly Sales Service	Rio Claro	SEW-EURODRIVE Brasil Ltda. Rodovia Washington Luiz, Km 172 Condomínio Industrial Conpark Caixa Postal: 327 13501-600 – Rio Claro / SP	Tel. +55 19 3522-3100 Fax +55 19 3524-6653 montadora.rc@sew.com.br
	Joinville	SEW-EURODRIVE Brasil Ltda. Jvl / Ind Rua Dona Francisca, 12.346 – Pirabeiraba 89239-270 – Joinville / SC	Tel. +55 47 3027-6886 Fax +55 47 3027-6888 filial.sc@sew.com.br
Bulgaria			
Sales	Sofia	BEVER-DRIVE GmbH Bogdanovetz Str.1 1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg

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Cameroon			
Sales	Douala	SEW-EURODRIVE S.A.R.L. Ancienne Route Bonabéri P.O. Box B.P 8674 Douala-Cameroun	Tel. +237 233 39 02 10 Fax +237 233 39 02 10 sew@sew-eurodrive-cm
Canada			
Assembly Sales Service	Toronto	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2001 Ch. de l'Aviation Dorval Quebec H9P 2X6	Tel. +1 514 367-1124 Fax +1 514 367-3677 n.paradis@sew-eurodrive.ca
Chile			
Assembly Sales Service	Santiago de Chile	SEW-EURODRIVE CHILE LTDA Las Encinas 1295 Parque Industrial Valle Grande LAMPA Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 2757 7000 Fax +56 2 2757 7001 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl
China			
Production Assembly Sales Service	Tianjin	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 78, 13th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 http://www.sew-eurodrive.cn info@sew-eurodrive.cn
Assembly Sales Service	Suzhou	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Taiyuan	SEW-EURODRIVE (Taiyuan) Co,. Ltd. No.3, HuaZhang Street, TaiYuan Economic & Technical Development Zone ShanXi, 030032	Tel. +86-351-7117520 Fax +86-351-7117522 taiyuan@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
Sales Service	Hong Kong	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

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Colombia			
Assembly Sales Service	Bogota	SEW-EURODRIVE COLOMBIA LTDA. Calle 17 No. 132-18 Interior 2 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sew@sew-eurodrive.com.co
Croatia			
Sales Service	Zagreb	KOMPEKS d. o. o. Zeleni dol 10 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr
Czech Republic			
Assembly Sales Service	Hostivice	SEW-EURODRIVE CZ s.r.o. Floriánova 2459 253 01 Hostivice	Tel. +420 255 709 601 Fax +420 235 350 613 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
	Drive Service Hotline / 24 Hour Service	+420 800 739 739 (800 SEW SEW)	Service Tel. +420 255 709 632 Fax +420 235 358 218 servis@sew-eurodrive.cz
Denmark			
Assembly Sales Service	Copenhagen	SEW-EURODRIVEA/S Geminivej 28-30 2670 Greve	Tel. +45 43 95 8500 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk
Egypt			
Sales Service	Cairo	Copam Egypt for Engineering & Agencies Building 10, Block 13005, First Industrial Zone, Obour City Cairo	Tel. +202 44812673 / 79 (7 lines) Fax +202 44812685 http://www.copam-egypt.com copam@copam-egypt.com
Estonia			
Sales	Tallin	ALAS-KUUL AS Reti tee 4 75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 http://www.alas-kuul.ee veiko.soots@alas-kuul.ee
Finland			
Assembly Sales Service	Hollola	SEW-EURODRIVE OY Vesimäentie 4 15860 Hollola	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Service	Hollola	SEW-EURODRIVE OY Keskikankaantie 21 15860 Hollola	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
	Tornio	SEW-EURODRIVE Oy Lossirannankatu 5 95420 Tornio	Tel. +358 201 589 300 Fax +358 3 780 6211 http://www.sew-eurodrive.fi sew@sew.fi
Production Assembly	Karkkila	SEW Industrial Gears Oy Santasalonkatu 6, PL 8 03620 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 http://www.sew-eurodrive.fi sew@sew.fi
France			
Production Sales Service	Hagenau	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	Forbach	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 57604 Forbach Cedex	Tel. +33 3 87 29 38 00
	Brumath	SEW-USOCOME 1 Rue de Bruxelles 67670 Mommenheim Cedex	Tel. +33 3 88 37 48 00

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France			
Assembly Sales Service	Bordeaux	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan – B. P. 182 33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME 75 rue Antoine Condorcet 38090 Vaulx-Milieu	Tel. +33 4 74 99 60 00 Fax +33 4 74 99 60 15
	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles 44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin 77390 Verneuil l'Étang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
Gabon			
Sales	Libreville	SEW-EURODRIVE SARL 183, Rue 5.033.C, Lalala à droite P.O. Box 15682 Libreville	Tel. +241 03 28 81 55 +241 06 54 81 33 http://www.sew-eurodrive.cm sew@sew-eurodrive.cm
Germany			
Headquarters Production Sales	Bruchsal	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Production / Industrial Gears	Bruchsal	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str. 10 76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Production	Graben	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 76676 Graben-Neudorf	Tel. +49 7251 75-0 Fax +49 7251-2970
	Östringen	SEW-EURODRIVE GmbH & Co KG, Werk Östringen Franz-Gurk-Straße 2 76684 Östringen	Tel. +49 7253 9254-0 Fax +49 7253 9254-90 oestringen@sew-eurodrive.de
Service Competence Center	Mechanics / Mechatronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 scc-mechanik@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 scc-elektronik@sew-eurodrive.de
Drive Technology Center	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 30823 Garbsen (Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 dtc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 08393 Meerane (Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 dtc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 85551 Kirchheim (München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 dtc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 40764 Langenfeld (Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 dtc-west@sew-eurodrive.de
Drive Center	Berlin	SEW-EURODRIVE GmbH & Co KG Alexander-Meißner-Straße 44 12526 Berlin	Tel. +49 306331131-30 Fax +49 306331131-36 dc-berlin@sew-eurodrive.de
	Hamburg	SEW-EURODRIVE GmbH & Co KG Hasselbinnen 11 22869 Schenefeld	Tel. +49 40 298109-60 Fax +49 40 298109-70 tb-hamburg@sew-eurodrive.de
	Ludwigshafen	SEW-EURODRIVE GmbH & Co KG c/o BASF SE Gebäude W130 Raum 101 67056 Ludwigshafen	Tel. +49 7251 75 3759 Fax +49 7251 75 503759 dc-ludwigshafen@sew-eurodrive.de

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Germany			
	Saarland	SEW-EURODRIVE GmbH & Co KG Gottlieb-Daimler-Straße 4 66773 Schwalbach Saar – Hülzweiler	Tel. +49 6831 48946 10 Fax +49 6831 48946 13 dc-saarland@sew-eurodrive.de
	Ulm	SEW-EURODRIVE GmbH & Co KG Dieselstraße 18 89160 Dornstadt	Tel. +49 7348 9885-0 Fax +49 7348 9885-90 dc-ulm@sew-eurodrive.de
	Würzburg	SEW-EURODRIVE GmbH & Co KG Nürnbergerstraße 118 97076 Würzburg-Lengfeld	Tel. +49 931 27886-60 Fax +49 931 27886-66 dc-wuerzburg@sew-eurodrive.de
Drive Service Hotline / 24 Hour Service			0 800 SEWHELP 0 800 7394357
Great Britain			
Assembly Sales Service	Normanton	SEW-EURODRIVE Ltd. DeVilliers Way Trident Park Normanton West Yorkshire WF6 1GX	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911
Greece			
Sales	Athens	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr
Hungary			
Sales Service	Budapest	SEW-EURODRIVE Kft. Csillaghegyí út 13. 1037 Budapest	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 http://www.sew-eurodrive.hu office@sew-eurodrive.hu
Iceland			
Sales	Reykjavik	Varma & Vélaverk ehf. Knarrarvogi 4 104 Reykjavík	Tel. +354 585 1070 Fax +354 585)1071 http://www.varmaverk.is vov@vov.is
India			
Registered Office Assembly Sales Service	Vadodara	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200 Fax +91 265 3045300 http://www.seweurodriveindia.com salesvadodara@seweurodriveindia.com
Assembly Sales Service	Chennai	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com
	Pune	SEW-EURODRIVE India Private Limited Plant: Plot No. D236/1, Chakan Industrial Area Phase- II, Warale, Tal- Khed, Pune-410501, Maharashtra	Tel. +91 21 35 628700 Fax +91 21 35 628715 salespune@seweurodriveindia.com
Sales Service	Gurgaon	SEW-EURODRIVE India Private Limited Drive Center Gurugram Plot no 395, Phase-IV, UdyogVihar Gurugram , 122016 Haryana	Tel. +91 99588 78855 salesgurgaon@seweurodriveindia.com
Indonesia			
Sales	Medan	PT. Serumpun Indah Lestari Jl.Pulau Solor no. 8, Kawasan Industri Medan II Medan 20252	Tel. +62 61 687 1221 Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041 sil@serumpunindah.com serumpunindah@yahoo.com http://www.serumpunindah.com

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Indonesia			
	Jakarta	PT. Cahaya Sukses Abadi Komplek Rukan Puri Mutiara Blok A no 99, Sunter Jakarta 14350	Tel. +62 21 65310599 Fax +62 21 65310600 csajkt@cbn.net.id
	Jakarta	PT. Agrindo Putra Lestari JL.Pantai Indah Selatan, Komplek Sentra Industri Terpadu, Pantai indah Kapuk Tahap III, Blok E No. 27 Jakarta 14470	Tel. +62 21 2921-8899 Fax +62 21 2921-8988 aplindo@indosat.net.id http://www.aplindo.com
	Surabaya	PT. TRIAGRI JAYA ABADI Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11 Surabaya 60111	Tel. +62 31 5990128 Fax +62 31 5962666 sales@triagri.co.id http://www.triagri.co.id
	Surabaya	CV. Multi Mas Jl. Raden Saleh 43A Kav. 18 Surabaya 60174	Tel. +62 31 5458589 Fax +62 31 5317220 sianhwa@sby.centrin.net.id http://www.cvmultimas.com
Ireland			
Sales Service	Dublin	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 http://www.alperton.ie info@alperton.ie
Israel			
Sales	Tel Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly Sales Service	Milan	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 20020 Solaro (Milano)	Tel. +39 02 96 980229 Fax +39 02 96 980 999 http://www.sew-eurodrive.it milano@sew-eurodrive.it
Ivory Coast			
Sales	Abidjan	SEW-EURODRIVE SARL Ivory Coast Rue des Pêcheurs, Zone 3 26 BP 916 Abidjan 26	Tel. +225 21 21 81 05 Fax +225 21 25 30 47 info@sew-eurodrive.ci http://www.sew-eurodrive.ci
Japan			
Assembly Sales Service	Iwata	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp hamamatsu@sew-eurodrive.co.jp
Kazakhstan			
Sales Service	Almaty	SEW-EURODRIVE LLP 291-291A, Tole bi street 050031, Almaty	Tel. +7 (727) 350 5156 Fax +7 (727) 350 5156 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz
	Tashkent	SEW-EURODRIVE LLP Representative office in Uzbekistan 96A, Sharaf Rashidov street, Tashkent, 100084	Tel. +998 71 2359411 Fax +998 71 2359412 http://www.sew-eurodrive.uz sew@sew-eurodrive.uz
	Ulaanbaatar	IM Trading LLC Olympic street 28B/3 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Fax +976-77109997 imt@imt.mn
Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C 1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.lv info@alas-kuul.com

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Lebanon			
Sales (Lebanon)	Beirut	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Sales (Jordan, Kuwait , Saudi Arabia, Syria)	Beirut	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 http://www.medrives.com info@medrives.com
Lithuania			
Sales	Alytus	UAB Irseva Statybininku 106C 63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 http://www.irseva.lt irmantas@irseva.lt
Luxembourg			
Representation: Belgium			
Macedonia			
Sales	Skopje	Boznos DOOEL Dime Anicin 2A/7A 1000 Skopje	Tel. +389 23256553 Fax +389 23256554 http://www.boznos.mk
Malaysia			
Assembly Sales Service	Johor	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Mexico			
Assembly Sales Service	Quéretaro	SEW-EURODRIVE MEXICO S.A. de C.V. SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Querétaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Sales Service	Puebla	SEW-EURODRIVE MEXICO S.A. de C.V. Calzada Zavaleta No. 3922 Piso 2 Local 6 Col. Santa Cruz Buenavista C.P. 72154 Puebla, México	Tel. +52 (222) 221 248 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Mongolia			
Technical Office	Ulaanbaatar	IM Trading LLC Olympic street 28B/3 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Tel. +976-99070395 Fax +976-77109997 http://imt.mn/ imt@imt.mn
Morocco			
Sales Service	Bouskoura	SEW-EURODRIVE Morocco Parc Industriel CFCIM, Lot 55 and 59 Bouskoura	Tel. +212 522 88 85 00 Fax +212 522 88 84 50 http://www.sew-eurodrive.ma sew@sew-eurodrive.ma
Namibia			
Sales	Swakopmund	DB MINING & INDUSTRIAL SUPPLIES CC Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 anton@dbminingnam.com
Netherlands			
Assembly Sales Service	Rotterdam	SEW-EURODRIVE B.V. Industrieweg 175 3044 AS Rotterdam Postbus 10085 3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl

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New Zealand			
Assembly Sales Service	Auckland	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 30 Lodestar Avenue, Wigram Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Nigeria			
Sales	Lagos	Greenpeg Nig. Ltd Plot 296A, Adeyemo Akapo Str. Omole GRA Ikeja Lagos-Nigeria	Tel. +234-701-821-9200-1 http://www.greenpegltd.com bolaji.adekunle@greenpegltd.com
Norway			
Assembly Sales Service	Moss	SEW-EURODRIVE A/S Solgaard skog 71 1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no
Pakistan			
Sales	Karachi	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk
Paraguay			
Sales	Fernando de la Mora	SEW-EURODRIVE PARAGUAY S.R.L De la Victoria 112, Esquina nueva Asunción Departamento Central Fernando de la Mora, Barrio Bernardino	Tel. +595 991 519695 Fax +595 21 3285539 sewpy@sew-eurodrive.com.py
Peru			
Assembly Sales Service	Lima	SEW EURODRIVE DEL PERU S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe
Philippines			
Sales	Makati	P.T. Cerna Corporation 4137 Ponte St., Brgy. Sta. Cruz Makati City 1205	Tel. +63 2 519 6214 Fax +63 2 890 2802 mech_drive_sys@ptcerna.com http://www.ptcerna.com
Poland			
Assembly Sales Service	Łódź	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 92-518 Łódź	Tel. +48 42 293 00 00 Fax +48 42 293 00 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 293 0030 Fax +48 42 293 0043	24 Hour Service Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl
Portugal			
Assembly Sales Service	Coimbra	SEW-EURODRIVE, LDA. Av. da Fonte Nova, n.º 86 3050-379 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Romania			
Sales Service	Bucharest	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro
Russia			
Assembly Sales Service	St. Petersburg	ЗАО «СЕВ-ЕВРОДРАЙФ» а. я. 36 195220 Санкт-Петербург	Tel. +7 812 3332522 / +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

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Senegal			
Sales	Dakar	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 http://www.senemeca.com senemeca@senemeca.sn
Serbia			
Sales	Belgrade	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor 11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
Singapore			
Assembly Sales Service	Singapore	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Slovakia			
Sales	Bratislava	SEW-Eurodrive SK s.r.o. Rybničná 40 831 06 Bratislava	Tel.+421 2 33595 202, 217, 201 Fax +421 2 33595 200 http://www.sew-eurodrive.sk sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 Mobile +421 907 671 976 sew@sew-eurodrive.sk
Slovenia			
Sales Service	Celje	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net
South Africa			
Assembly Sales Service	Johannesburg	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 248-7289 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 48 Prospecton Road Isipingo Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 902 3815 Fax +27 31 902 3826 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PROPRIETARY) LIMITED 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za
South Korea			
Assembly Sales Service	Ansan	SEW-EURODRIVE KOREA CO., LTD. 7, Dangjaengi-ro, Danwon-gu, Ansan-si, Gyeonggi-do, Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-eurodrive.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA CO., LTD. 28, Noksansandan 262-ro 50beon-gil, Gangseo-gu, Busan, Zip 618-820	Tel. +82 51 832-0204 Fax +82 51 832-0230

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Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sri Lanka			
Sales	Colombo	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
Swaziland			
Sales	Manzini	C G Trading Co. (Pty) Ltd Simunye street Matsapha, Manzini	Tel. +268 7602 0790 Fax +268 2 518 5033 charles@cgtrading.co.sz www.cgtradingswaziland.com
Sweden			
Assembly Sales Service	Jönköping	SEW-EURODRIVE AB Gnejsvägen 6-8 553 03 Jönköping Box 3100 S-550 03 Jönköping	Tel. +46 36 34 42 00 Fax +46 36 34 42 80 http://www.sew-eurodrive.se jonkoping@sew.se
Switzerland			
Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Taiwan			
Sales	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Huw S. Road Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
	Nan Tou	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
Tanzania			
Sales	Daressalam	SEW-EURODRIVE PTY LIMITED TANZANIA Plot 52, Regent Estate PO Box 106274 Dar Es Salaam	Tel. +255 0 22 277 5780 Fax +255 0 22 277 5788 http://www.sew-eurodrive.co.tz info@sew.co.tz
Thailand			
Assembly Sales Service	Chonburi	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Tunisia			
Sales	Tunis	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn
Turkey			
Assembly Sales Service	Kocaeli-Gebze	SEW-EURODRİVE Hareket Sistemleri San. Ve TIC. Ltd. Sti Gebze Organize Sanayi Böl. 400 Sok No. 401 41480 Gebze Kocaeli	Tel. +90 262 9991000 04 Fax +90 262 9991009 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Ukraine			
Assembly Sales Service	Dnipropetrovsk	SEW-EURODRIVE, LLC Robochya str., bld. 23-B, office 409 49008 Dnipro	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

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United Arab Emirates			
Drive Technology Center	Dubai	SEW-EURODRIVE FZE PO Box 263835 Jebel Ali Free Zone – South, P.O. Box Dubai, United Arab Emirates	Tel. +971 (0)4 8806461 Fax +971 (0)4 8806464 info@sew-eurodrive.ae
Uruguay			
Assembly Sales	Montevideo	SEW-EURODRIVE Uruguay, S. A. Jose Serrato 3569 Esqina Corumbe CP 12000 Montevideo	Tel. +598 2 21181-89 Fax +598 2 21181-90 sewuy@sew-eurodrive.com.uy
USA			
Production Assembly Sales Service	Southeast Region	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Production +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly Sales Service	Northeast Region	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Wellford	SEW-EURODRIVE INC. 148/150 Finch Rd. Wellford, S.C. 29385	Tel. +1 864 439-7537 Fax +1 864 661 1167 IGOrders@seweurodrive.com
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Sales	Ho Chi Minh City	SEW-EURODRIVE PTE. LTD. RO at Hochiminh City Floor 8, KV I, Loyal building, 151-151 Bis Vo Thi Sau street, ward 6, District 3, Ho Chi Minh City, Vietnam	Tel. +84 937 299 700 huytam.phan@sew-eurodrive.com
	Hanoi	MICO LTD Quảng Trị - North Vietnam / All sectors except Construction Materials 8th Floor, Ocean Park Building, 01 Dao Duy Anh St, Ha Noi, Viet Nam	Tel. +84 4 39386666 Fax +84 4 3938 6888 nam_ph@micogroup.com.vn http://www.micogroup.com.vn
Zambia			
Representation: South Africa			

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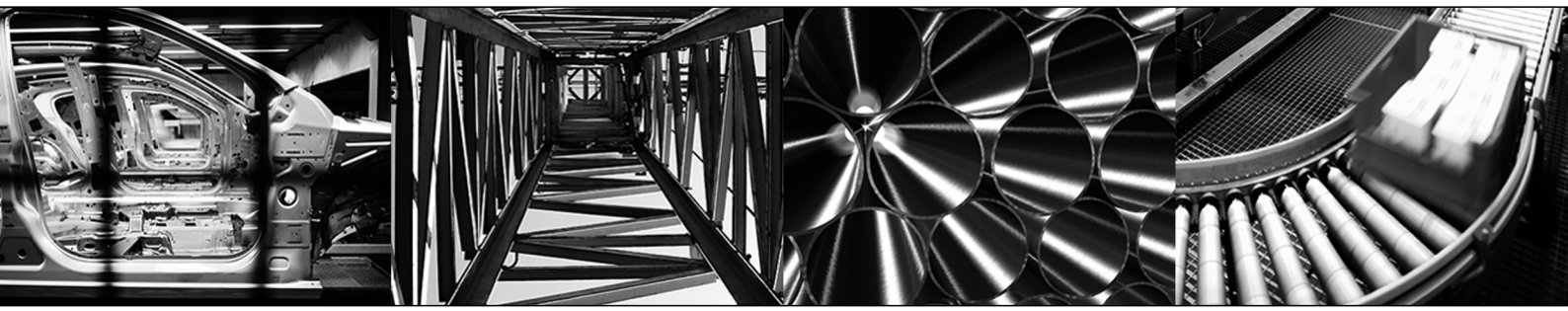

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