SEW EURODRIVE

# Operating Instructions




## AC Motors

DR..71 – 315, DRN80 – 315

Edition 07/2015

21927189/EN



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# 1 General information

## 1.1 About this documentation

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

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

## 1.2 Structure of the safety notes

### 1.2.1 Meaning of signal words

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

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

### 1.2.2 Structure of section-related safety notes

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

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



**SIGNAL WORD**

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

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**Meaning of the hazard symbols**

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

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

### 1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

- ⚠ **SIGNAL WORD** Type and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the hazard.

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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 unit!

## 1.4 Exclusion of liability

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

## 1.5 Product names and trademarks

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

## 1.6 Copyright notice

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Unauthorized reproduction, modification, distribution or any other use of the whole or any part of this documentation is strictly prohibited.

## 1.7 Designation convention

| | |
|---|---|
| DR.. | Stands for all motors of the DRS, DRE, DRP, DRL, DRK, DRM series |
| DRN.. | Stand for all motors of the DRN series |
| .. | Stands for 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315<br>**or**<br>S, E, P, L, K, M, N |

The ".." after "DR" is an omission and stands for either the motor type "S, E, P, L, K, M, etc." and/or the omitted size.

- Examples: DR..80, DRS71

The ".." after "DRN" is an omission and stands for the omitted size.

- Examples: DRN80, DRN..

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# 2 Safety notes

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

## 2.1 Preliminary information

The following safety notes are primarily concerned with the use of the following components: DR../DRN.. AC motors. If you use gearmotors, also refer to the safety notes in the corresponding operating instructions for: Gear units

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

## 2.2 General information

**⚠ WARNING**



During operation, the motors or gearmotors can have live, bare (in the event of open connectors/terminal boxes) and movable or rotating parts as well as hot surfaces, depending on their degree of protection.

Severe or fatal injuries.

- All work related to transportation, storage, installation, assembly, connection, startup, maintenance and repair may only be carried out by qualified personnel, in strict observance of the following points:
  - The applicable detailed documentation(s)
  - Warning and safety signs on the motor/gearmotor
  - All the project planning documents, startup instructions and wiring diagrams related to the drive
  - System-specific regulations and requirements
  - National/regional safety and accident prevention regulations.
- Never install damaged drives.
- Report any damage to the shipping company immediately.

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

Refer to the following chapters for more information.

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## 2.3 Target group

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

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

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

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

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately.

All qualified personnel must wear appropriate protective clothing.

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## 2.4 Functional safety (FS)

Drives from SEW-EURODRIVE can optionally be supplied with safety-related components.

MOVIMOT®, encoders or brakes, or other accessories, can be integrated in the AC motor as safety-related components either individually or in combination.

SEW-EURODRIVE indicates such an integration by the FS logo and a number on the nameplate (→ 🗎 20).




The number is a code that indicates which components in the drive are safety-related. See the following code table for all products:

| Functional safety | Inverter (e.g. MOVIMOT®) | Brake | Manual brake release monitoring | Brake monitoring | Motor protection | Encoder |
|---|---|---|---|---|---|---|
| 02 | | x | | | | |
| 04 | | | | | | x |
| 11 | | x | | | | x |

If the drive bears the FS logo on the nameplate, you must adhere to the information in the following documents:

- "MOVIMOT® MM..D – Functional Safety" manual
- Addendum to the operating instructions "Safety-Rated Encoders – DR..71 – 315, DRN80 – 315 AC Motors – Functional Safety"
- Addendum to the operating instructions "Safety-Rated Brakes – DR..71 – 315, DRN80 – 315 AC Motors – Functional Safety"

You find the characteristic safety values of the following components in the technical data (→ 🗎 183) section so you can determine the security level for systems and machines yourself:

- Characteristic safety values for brakes: $B10_d$ values
- Characteristic safety values for encoders: $MTTF_d$ values

The characteristic safety values of SEW-EURODRIVE components are also available on the homepage at www.sew-eurodrive.de and in the SEW-EURODRIVE library for the BGIA Sistema software.

## 2.5 Designated use

DR../DRN.. AC motors are intended for industrial systems.

When installed in machines, startup (i.e. start of designated operation) is prohibited until it is determined that the machine complies with the local laws and directives. In the individual area of application, you must especially observe the Machinery Directive 2006/42/EC as well as the EMC Directive 2004/108/EC. The EMC test specifications EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-6 and EN 61000-6-2 must be taken into account during startup.

Using these products in potentially explosive atmospheres is prohibited, unless specifically designated otherwise.

Air-cooled motors/gearmotors are dimensioned for ambient temperatures of -20 °C to +40 °C and installation altitudes ≤ 1000 m above sea level. Any differing specifications on the nameplate must be observed. The ambient conditions must comply with all the specifications on the nameplate.

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## 2.6 Other applicable documentation

### 2.6.1 DR..71 – 315, DRN80 – 315 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
- "AC Motors" catalog and/or
- "DRN.. AC Motors" catalog
- "DR.. Gearmotors" catalogs.
- Addendum to the operating instructions "Safety-Rated Brakes – DR..71 – 315, DRN80 – 315 AC Motors – Functional Safety" if necessary
- Addendum to the operating instructions "Safety-Rated Encoders – DR..71 – 315, DRN80 – 315 AC Motors – Functional Safety" if necessary
- "MOVIMOT® MM..D – Functional Safety" manual if necessary

## 2.7 Transport/storage

Inspect the shipment for damage as soon as you receive the delivery. Report any transport damage to the shipping company immediately. If necessary, suspend startup.

Tighten the eyebolts securely. They are designed to only carry the weight of the gear unit/motor/gearmotor; do not attach any additional loads.

The installed lifting eyebolts are in accordance with DIN 580. The loads and regulations specified in that document must always be observed. If two or four lifting eyes or eyebolts are attached to the gear unit/motor/gearmotor, all lifting eyes or eyebolts must be used during transport. In this case, the tension force vector of the slings must not exceed a 45° angle in accordance with DIN 580.

Use suitable, sufficiently rated handling equipment if necessary. Reattach these in the case of further transportation.

If the gear unit/motor/gearmotor is not installed immediately, it must be stored in a dry and dust-free storage location. You must not store the gear unit/motor/gearmotor outdoors or on the fan guard. The gear unit/motor/gearmotor can be stored for up to 9 months without requiring any special measures before startup.

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## 2.8 Installation

Make sure that the supports are even, the foot and flange mounting is correct and if there is direct coupling, align with precision. Resonances between the rotational frequency and the double line frequency caused by the structure are to be avoided. Release the brake (if installed), turn rotor manually, check 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) and cover with a touch guard. Avoid improper belt tension.

Make the pipe connections that may eventually be required. Mounting positions with shaft ends pointing upwards should be equipped with a cover to prevent foreign objects from falling into the fan. Ensure that ventilation openings are not obstructed and that exhaust air, including air from adjacent units, cannot be drawn in again straight away.

Observe the notes in the "Mechanical installation" chapter.

## 2.9 Electrical connection

All work may only be carried out by qualified specialists. During work, the low-voltage machine must be at standstill, enabled and safeguarded against an accidental restart. This also applies to auxiliary circuits (e.g. anti-condensation heating or forced cooling fan).

Ensure that the unit is de-energized.

Exceeding the tolerances in EN 60034-1 (VDE 0530, part 1) – voltage + 5%, frequency + 2%, curve shape, symmetry – increases heating and influences electromagnetic compatibility. Also observe the standard EN 50110 (and, if applicable, other national regulations, such as DIN VDE 0105 for Germany).

Observe the wiring information and differing data on the nameplate as well as the wiring diagram in the terminal box.

The connection should be a permanent, secure electrical connection (no protruding wire ends); use the cable end pieces intended for this purpose. Establish a secure protective earth connection. When the motor is connected, the distances to non-insulated and live parts must not be shorter than the minimum values according to IEC 60664 and 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 connection box must be free from foreign objects, dirt and moisture. Close unused cable entry openings and the box itself so they are dust and water proof. Secure key for test run without output elements. When operating low-voltage machines with brakes, check that the break is functioning correctly before startup.

Observe the notes in the "Electrical installation" chapter.

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## 2.10 Startup/operation

Whenever changes to normal operation occur in the gear unit/motor/gearmotor, such as increased temperatures, noise, vibrations, determine the cause. Consult the manufacturer if required. Never deactivate protection devices, even in test mode. Switch off the motor if you are not sure.

Regularly clean air ducts in dusty or dirty environments.

### 2.10.1 Surface temperature during operation



**⚠ CAUTION**

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

Risk of burns.

- Make sure that hot surfaces cannot be touched unintentionally or during normal operation. Install covers or warning signs according to regulations.
- Let the unit cool down before you start working on it.

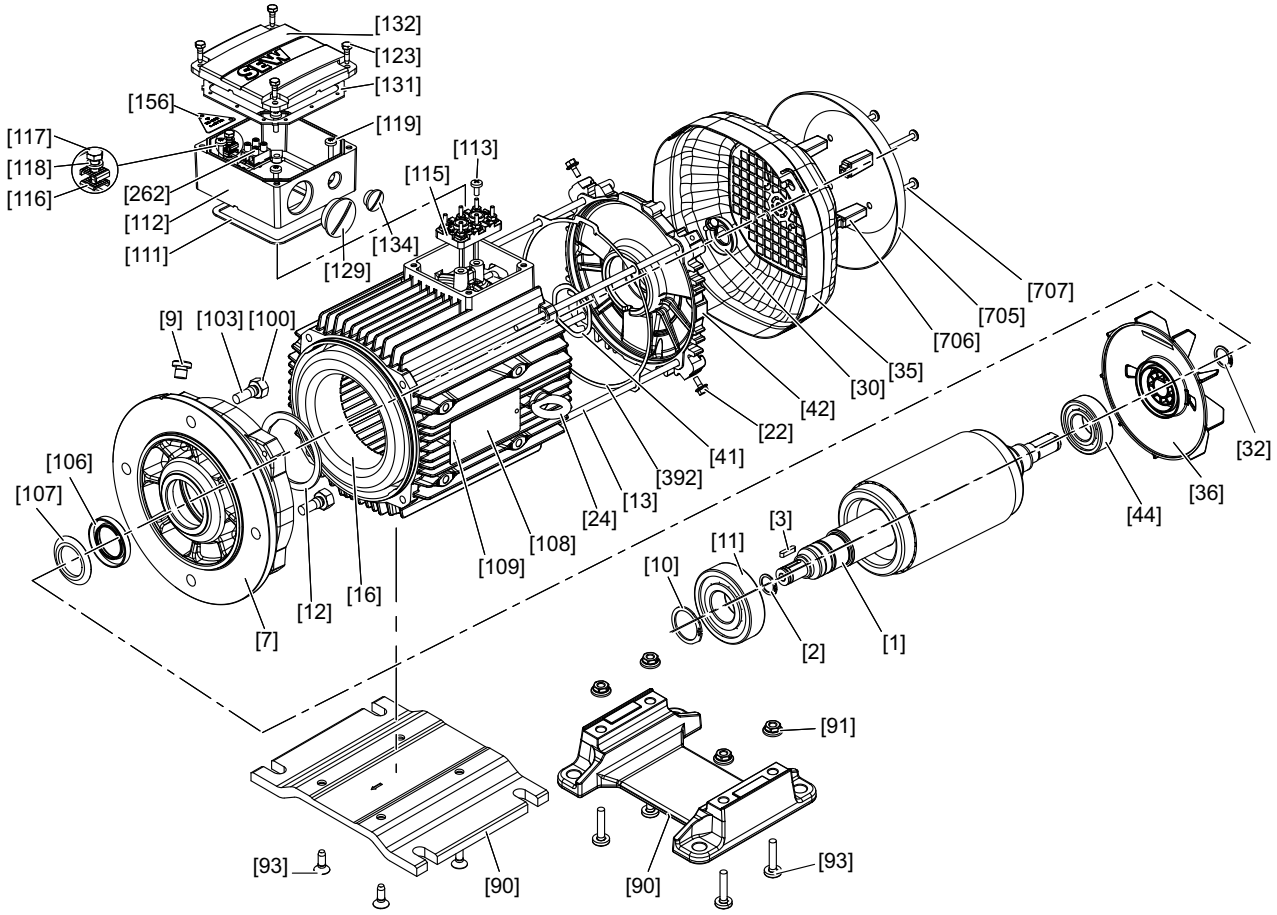
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# 3 Motor structure

## INFORMATION

The following figures are block diagrams. Their purpose is to make it easier to assign components to the spare parts lists. Deviations are possible depending on the motor size and version.

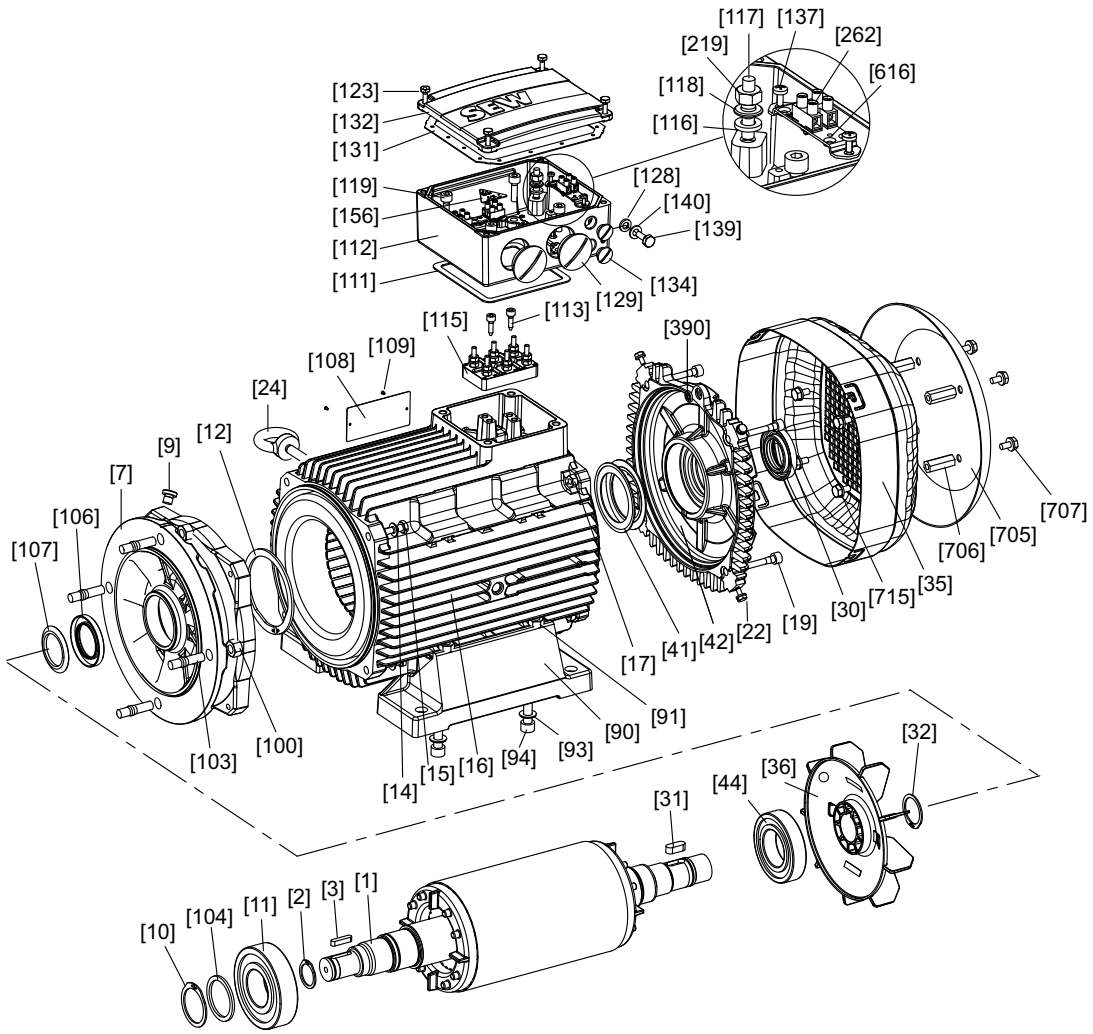
## 3.1 Basic structure of DR..71 – 132/DRN80 – 132S




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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [1] | Rotor | [30] | Oil seal | [106] | Oil seal | [123] | Hex head screw |
| [2] | Retaining ring | [32] | Retaining ring | [107] | Oil flinger | [129] | Screw plug with O-ring |
| [3] | Key | [35] | Fan guard | [108] | Nameplate | [131] | Gasket for cover |
| [7] | Flanged endshield | [36] | Fan | [109] | Grooved pin | [132] | Terminal box cover |
| [9] | Screw plug | [41] | Shim washer | [111] | Gasket for lower part | [134] | Screw plug with O-ring |
| [10] | Retaining ring | [42] | B-side endshield | [112] | Terminal box lower part | [156] | Information sign |
| [11] | Deep groove ball bearing | [44] | Deep groove ball bearing | [113] | Pan head screw | [262] | Connection terminal, complete |
| [12] | Retaining ring | [90] | Bed plate | [115] | Terminal board | [392] | Gasket |
| [13] | Cap screw | [91] | Hex nut | [116] | Terminal yoke | [705] | Canopy |
| [16] | Stator | [93] | Pan head screw | [117] | Hex head screw | [706] | Spacer |
| [22] | Hex head screw | [100] | Hex nut | [118] | Lock washer | [707] | Pan head screw |
| [24] | Eyebolt | [103] | Stud | [119] | Pan head screw | | |

## 3.2 Basic structure of DR..160 – 180, DRN132M – 180

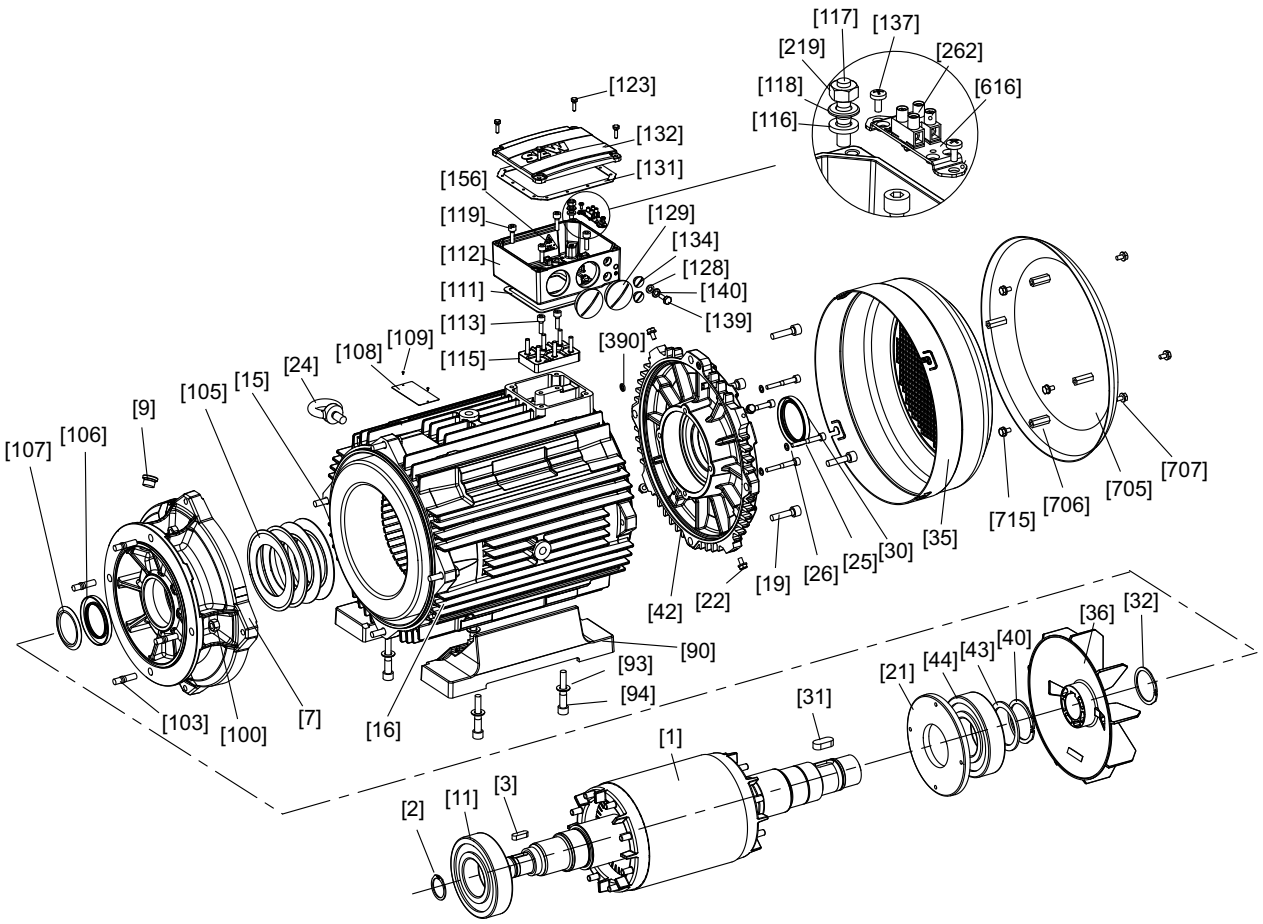



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [1] | Rotor | [31] | Key | [108] | Nameplate | [132] | Terminal box cover |
| [2] | Retaining ring | [32] | Retaining ring | [109] | Grooved pin | [134] | Screw plug with O-ring |
| [3] | Key | [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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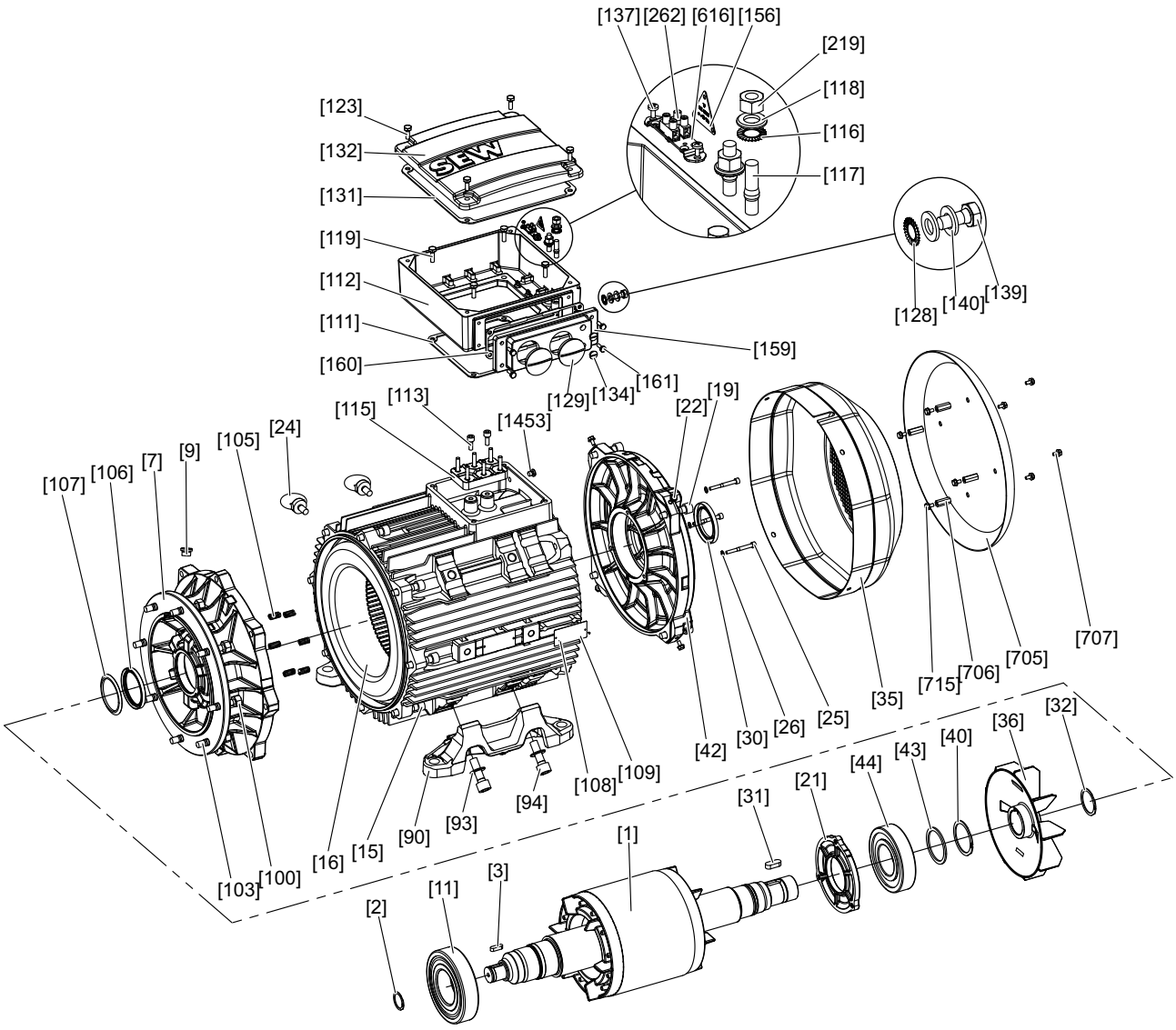
## 3.3 Basic structure of DR..200 – 225, DRN200 – 225




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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [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 | | |

## 3.4 Basic structure of DR..250 – 280, DRN250 – 280

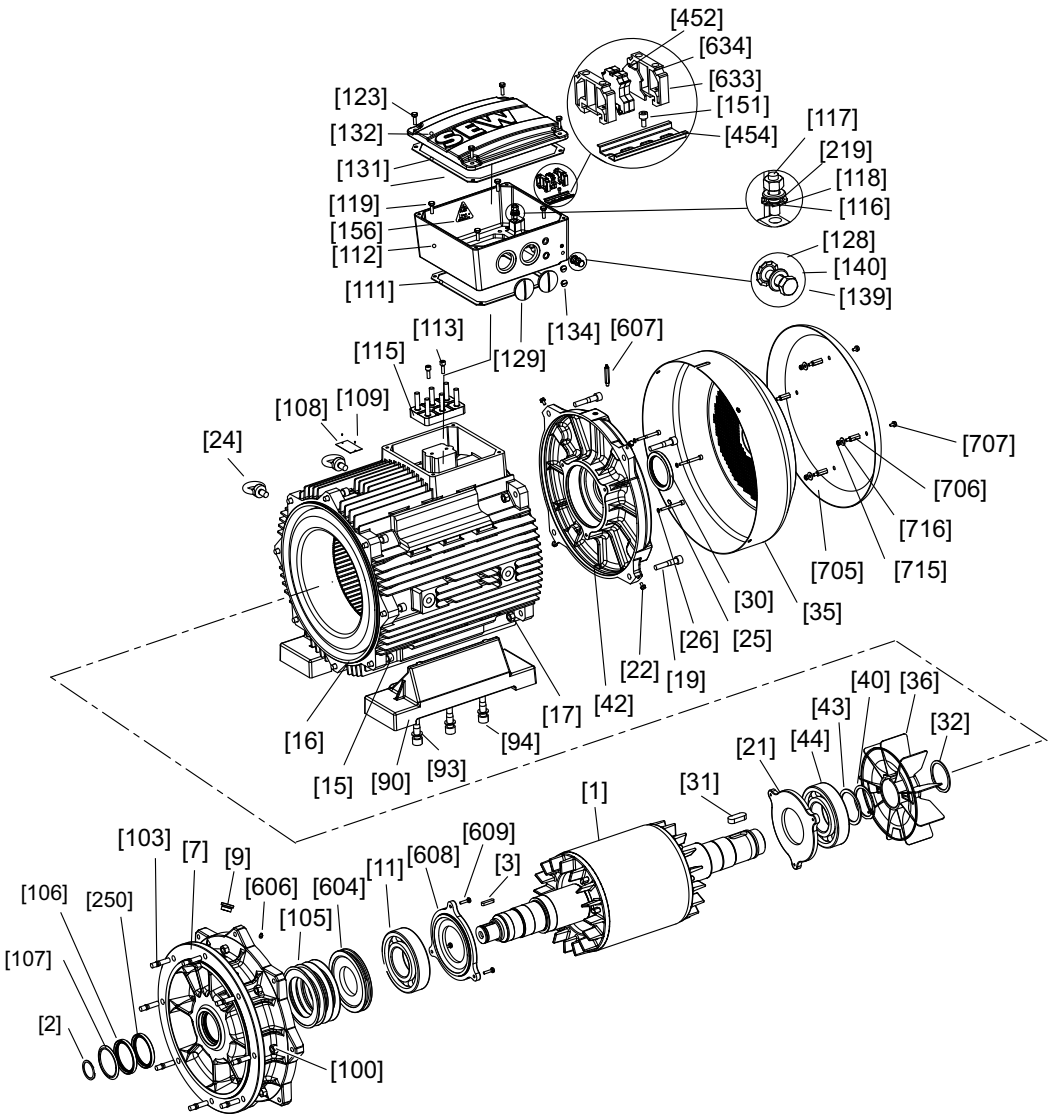



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [1] | Rotor | [32] | Retaining ring | [108] | Nameplate | [134] | Screw plug |
| [2] | Retaining ring | [35] | Fan guard | [109] | Grooved pin | [137] | Screw |
| [3] | Key | [36] | Fan | [111] | 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 gasket |
| [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 | [705] | Canopy |
| [24] | Eyebolt | [103] | Stud | [128] | Serrated lock washer | [706] | Spacer bolt |
| [25] | Cap screw | [105] | Compression spring | [129] | Screw plug | [707] | Hex head screw |
| [26] | Shield ring | [106] | Oil seal | [131] | Gasket for cover | [715] | Hex head screw |
| [30] | Oil seal | [107] | Oil flinger | [132] | Terminal box cover | [1453] | Screw plug |
| [31] | Key | | | | | | |

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## 3.5 Basic structure of DR..315, DRN315




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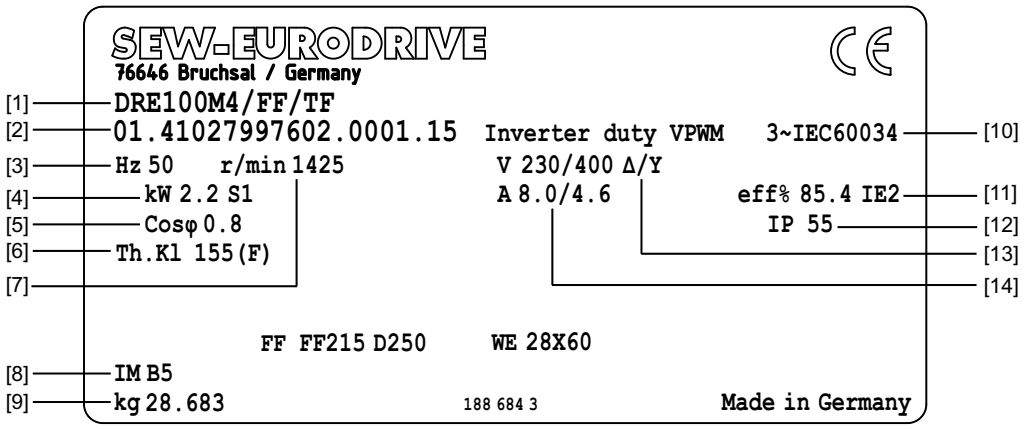
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [1] | Rotor | [32] | Retaining ring | [111] | Gasket for lower part | [156] | Information sign |
| [2] | Retaining ring | [35] | Fan guard | [112] | Terminal box lower part | [219] | Hex nut |
| [3] | Key | [36] | Fan | [113] | Cap screw | [250] | 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 |

## 3.6 Nameplate

The marks on the upper edge of the nameplate are only present when the motor has been certified accordingly or when it includes the relevant components.

### 3.6.1 DRE.. motor nameplate

The following figure shows an example of a nameplate:

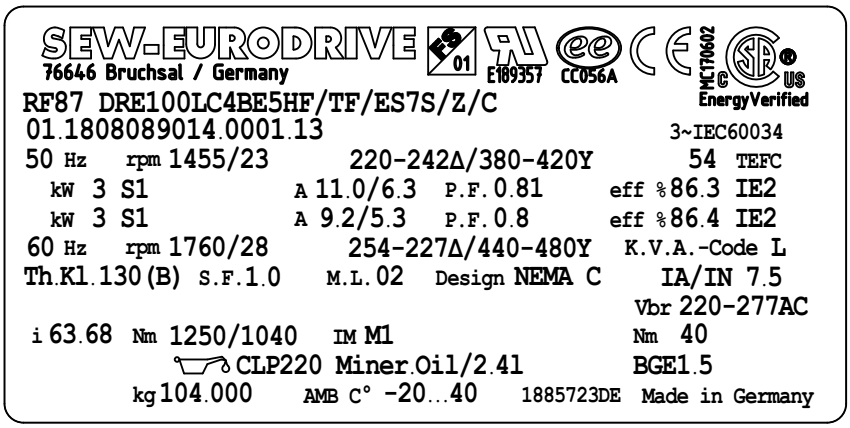



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[1] Type designation
[2] Serial number
[3] Nominal frequency
[4] Nominal power/duty type
[5] Power factor for AC motors
[6] Thermal class
[7] Nominal speed
[8] Mounting position
[9] Weight
[10] Number of phases and underlying rating and performance standards (IEC 60034-X and/or equivalent national standard)
[11] IE class and nominal efficiency for motors included in the scope of the IEC 60034-30-1 standard
[12] Degree of protection according to IEC 60034-5
[13] Nominal voltage
[14] Nominal current

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### 3.6.2 DRE.. global nameplate




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### 3.6.3 Markings

The following table lists all marks that can occur on a nameplate or on the motor and an explanation of what they mean.

| Mark | Meaning |
|---|---|
| CE | CE mark to state compliance with European guidelines, such as the Low Voltage Directive |
| Ex | ATEX mark to state compliance with the European Directive 94/9/EC |
| UR | UR logo to confirm that UL (Underwriters Laboratory) is informed about the registered components; register number by UL: E189357 |
| ee 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 |
| CSA | CSA mark to confirm the Canadian Standard Association (CSA) and the market conformity of AC motors |
| MC170602 C SA US EnergyVerified | 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.) |

| Mark | Meaning |
|---|---|
|  | FS mark with code number to identify functional safety relevant components |
|  | EAC mark (EurAsian Conformity)<br>Confirms compliance with the technical regulations of the economic and customs union of Russia, Belarus, Kazakhstan, Armenia. |
|  | UkrSEPRO mark (Ukrainian Certification of Products)<br>Confirms compliance with the technical regulations of the country Ukraine. |
|  | Motors with this mark may only be operated with frequency inverter (VSD = Variable Speed Drive) according to regulation 640/2009. |

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### 3.6.4 Type designation

#### DR.., DRN.. AC brakemotor type designation

The following diagram shows a type designation example:

| **DRN132M4/BE11/HR/FI/TF** | |
|---|---|
| **DR** | Series |
| **N** | Type designation |
| **132** | Size |
| **M** | Length |
| **4** | Number of poles |
| /**BE11** | Brake |
| **/HR** | Manual brake release |
| **FI** | Output option |
| **TF** | Thermal motor protection |

#### Designation of the motors

| **Designation** | |
|---|---|
| DRS.. | Standard motor, Standard efficiency IE1 |
| DRE.. | Energy-efficient motor, High Efficiency IE2 |
| DRP.. | Energy-efficient motor, Premium Efficiency IE3 |
| DRN.. | Energy-efficient motor, Premium Efficiency IE3 |
| DRL.. | Asynchronous servomotor |
| DRK.. | Single-phase operation with running capacitor |
| DRM.. | Torque motor: AC motor for operation at speed n = 0 |
| DR..J | Line start permanent magnet motor |
| 71 – 315 | Sizes:<br>71 / 80 / 90 / 100 / 112 / 132 / 160 / 180 / 200 / 225 / 315 |
| K, S, M, L,<br>MC, LC,<br>ME, H, LS | Lengths |
| 2, 4, 6, 8/2, 8/4, 4/2, 12 | Number of poles |

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## 3.7 Designs and options

### 3.7.1 Output variants

| Designation | Option |
|---|---|
| /FI | IEC foot-mounted motor |
| /F.A, /F.B | Universal foot-mounted motor |
| /FG | 7-series integral motor, as stand-alone motor |
| /FF | IEC flange-mounted motor with bore holes |
| /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 |

### 3.7.2 Mechanical attachments

| Designation | Option |
|---|---|
| /BE.. | Spring-loaded brake with specification of size |
| /HR | Manual brake release of the brake, automatic re-engaging function |
| /HF | Manual brake release, lockable |
| /RS | Backstop |
| /MSW | MOVI-SWITCH® |
| /MM03 – MM40 | MOVIMOT® |
| /MO | MOVIMOT® option(s) |
| /MI | Motor identification module for MOVIMOT® |

### 3.7.3 Temperature sensor / temperature detection

| Designation | Option |
|---|---|
| /TF | Temperature sensor (PTC thermistor or PTC resistor) |
| /TH | Thermostat (bimetallic switch) |
| /KY | 1 KTY84 – 130 sensor |
| /PT | 1 / 3 PT100 sensor(s) |

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### 3.7.4 Encoder

| Designation | Option |
|---|---|
| /ES7S /EG7S /EH7S /EV7S | Add-on speed sensor with Sin/Cos interface |
| /ES7R /EG7R /EH7R | Add-on speed sensor with TTL (RS-422) interface, V = 9 – 26 V |
| /EI7C /EI76 /EI72 /EI71 | Built-in incremental encoder with HTL interface and 6 / 2 / 1 period(s) |
| /EI7C FS.. | Safety-rated incremental encoder (marked with FS logo on the motor nameplate)<br>For information, refer to the addendum to the operating instructions "Safety-Rated Encoders – DR..71 – 315, DRN80 315 AC Motors – Functional Safety" |
| /AS7W /AG7W | Add-on absolute encoder, RS-485 interface (multi-turn) |
| /AS7Y /AG7Y / AH7Y | Add-on absolute encoder, SSI interface (multi-turn) |
| /ES7A /EG7A | Mounting adapter for speed sensors |
| /EV2T /EV2R /EV2S /EV2C | Add-on incremental encoder with solid shaft |
| /XV.A | Mounting adapter for non-SEW speed sensors |
| /XV.. | Mounted non-SEW speed sensor |
| /XH.. | Mounting adapter for non-SEW hollow-shaft encoders |

### 3.7.5 Connection alternatives

| Designation | Option |
|---|---|
| /IS | Integrated 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 system drive (VDI guideline 3643). Alternatively for more compact connection area. |
| /IV | Other industrial plug connectors according to customer specifications |

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### 3.7.6 Ventilation

| Designation | Option |
|---|---|
| /V | Forced cooling fan |
| /VH | Radial fan on fan guard |
| /Z | Additional inertia (flywheel fan) |
| /AL | Metal fan |
| /U | Non-ventilated (without fan) |
| /OL | Non-ventilated (closed B-side) |
| /C | Protection canopy for fan guard |
| /LF | Air filter |
| /LN | Low noise fan guard |

### 3.7.7 Bearing

| Designation | Option |
|---|---|
| /NS | Lubrication device |
| /ERF | Reinforced bearings on A-side with roller bearing |
| /NIB | Insulated bearing B-side |

### 3.7.8 Condition monitoring

| Designation | Option |
|---|---|
| /DUB | Diagnostic unit brake = brake monitoring |
| /DUE | Diagnostic Unit Eddy Current = Function and wear monitoring of the brake |

### 3.7.9 Other additional features

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

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# 4 Mechanical installation

## INFORMATION

Observe the safety notes in chapter 2 of these operating instructions for the mechanical installation.

If the nameplate of the drive bears the FS mark, also comply with the information on mechanical installation in the associated addenda to the operating instructions and/or the associated manual.

## 4.1 Before you start

### NOTICE

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

Only install the drive if the following conditions are met:

- The data on the nameplate of the drive corresponds with the voltage supply system or with the output voltage of the frequency 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 between −20°C and +40°C

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

    Note that information on the nameplate may differ. It is essential that the operating conditions for the unit comply with the nameplate information.
  - No oil, acid, gas, vapors, radiation, etc.
  - Installation altitude max. 1000 m above sea level

    Observe the chapter Installation altitude (→ 🗎 59)
  - Note the limitations for encoders
  - Special design: Drive configured in accordance with the ambient conditions

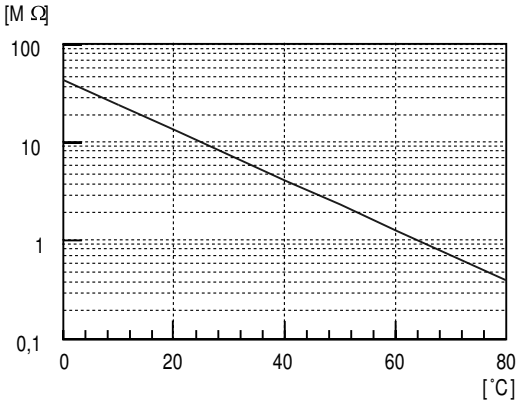
The above mentioned information refers to standard orders. The conditions might be different when you order drives other than the standard. Observe any differing conditions in the order confirmation.

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## 4.2 Extended storage of motors

- Note that the service life of the lubricant in the ball bearings is reduced by 10% per year after the first year of storage.
- You should re-lubricate the lubrication devices on motors that have been in storage for longer than 5 years before startup. Observe the information on the motor lubricant plate.
- Check whether the motor has absorbed moisture as a result of being stored for a long time. Measure the insulation resistance for this purpose (measuring voltage 500 V).

**The insulation resistance (see the following figure) varies greatly depending on the temperature. The motor must be dried if the insulation resistance is insufficient.**




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If the measured resistance, depending on the ambient temperature, is in a range above the limit characteristic curve, the insulation resistance is sufficient. If the value is below the limit characteristic curve, the motor must be dried.

### 4.2.1 Drying the motor

Heating the motor either with warm air or via an isolation transformer:

- With warm air

  DR.. motors with rotor designation "J" may be dried with warm air only.

**⚠ WARNING**

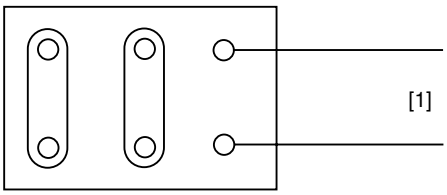


The motor shaft may be subject to torque when drying via isolation transformer.

Possible injury.

- DR.. motors with rotor designation "J" may be dried with warm air only.

**Connection with wiring diagram R13:**

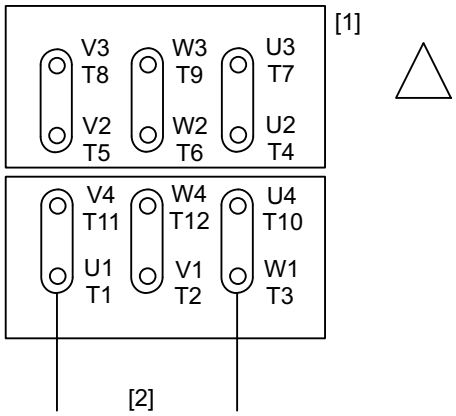



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[1] Transformer

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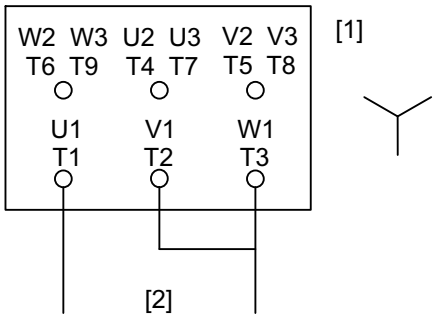
**Connection with wiring diagram R72:**




*2343045259*

[1] Motor terminal boards [2] Transformer

**Connection with wiring diagram R76:**




*2343047179*

[1] Motor terminal boards [2] Transformer

The drying process is finished when the minimum insulation resistance has been exceeded.

Check terminal box for the following:

- The inside is clean and dry
- The connections and fixing parts are free from corrosion
- The gasket and sealing surfaces are in good condition
- The cable glands are tight, otherwise clean or replace them
- Using an isolation transformer
  - Connect the windings in series (see following figures)
  - Auxiliary AC voltage supply max. 10% of the nominal voltage with max. 20% of the rated current

## 4.3 Motor installation notes



### ⚠ CAUTION

Sharp edges due to open keyway.

Minor injuries.

- Insert key in keyway.
- Pull protective sleeve over shaft.

### NOTICE

Improper assembly may damage the drive and corresponding components.

Possible damage to property.

- Observe the following notes.

- Motor shaft ends must be thoroughly cleaned of anti-corrosion agents, contamination or similar (use a commercially available solvent). Do not allow the solvent to penetrate the bearings or sealing rings – this could damage the material.
- Only install the gearmotor in the specified mounting position on a level, vibration-free and torsionally rigid support structure.
- 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. motor option /C "Canopy", to prevent objects or fluids entering motors in vertical mounting positions (M4/V1).
- Check that there is sufficient clearance around the motor to provide for adequate cooling air supply, and that the motor does not suck in warm air from other devices.
- 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.**
- If using brakemotors with manual brake release, screw in either the hand lever (with self-reengaging manual brake release) or the set screw (with lockable manual brake release).
- Protect shaft again against corrosion, if necessary.

### INFORMATION



**DR..**: To mount motors with a foot made of aluminum, you have to use washers with at least twice the bolt diameter. Use bolts of strength class 8.8. Do not exceed the tightening torque according to VDI 2230-1.

**DRN..**: To mount motors with a foot made of aluminum, you have to use washers with an outer diameter that is at least twice the bolt 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. The maximum bolt length for DRN80 – 90 = M8×20, for DRN100 – 132S = M10×25.

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### 4.3.1 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.

## 4.4 Installation tolerances

| Shaft end | Flanges |
|---|---|
| Diameter tolerance according to EN 50347<br>• ISO j6 with Ø ≤ 28 mm<br>• ISO k6 with Ø ≥ 38 mm up to ≤ 48 mm<br>• ISO m6 at Ø ≥ 55 mm<br>• Center bore in accordance with DIN 332, shape DR.. | Centering shoulder tolerance in accordance with EN 50347<br>• ISO j6 with Ø ≤ 250 mm<br>• 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 standalone motors.

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## 4.6 HR/HF manual brake release

### 4.6.1 HF manual brake release

You can use the optional lockable HF 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 with a nylon coat in order to prevent it from unintended further penetration or from falling out.

Proceed as follows to activate the lockable HF manual brake release:

- Screw in the set screw until there is no more clearance at the releasing lever. Additionally, screw in the set screw by another 1/4 or 1/2 revolution in order to manually release the brake.

Proceed as follows to loosen the lockable HF manual brake release:

- Loosen the set screw at least until the floating clearance (see chapter Retrofitting HR/HF manual brake release (→ 🗎 33)) of the manual brake release has completely returned.

**⚠ WARNING**



Lacking functionality of the manual brake release due to improper brake installation, e.g. set screw inserted too far.

Severe or fatal injuries.

- Only qualified staff may perform work on the brake.
- Check the brake for proper function prior to startup.

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### 4.6.2 Retrofitting HR/HF manual brake release



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

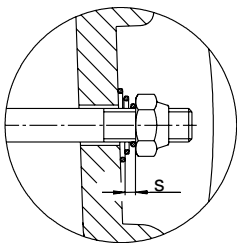
Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)

     See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103).
   - Fan guard or fan guard with encoder mounting [35], retaining ring [32] and fan [36]
2. Installing manual brake release:
   - **For BE05 – BE11:**
   – Remove the sealing ring [95]
   – Screw in and glue studs [56], insert sealing ring for manual brake release [95] and hammer in parallel pin [59].
   – Mount releasing lever [53], conical springs [57] and adjusting nuts [58].
   - **For B20 – BE122:**
   – Screw in studs [56].
   – Mount releasing lever [53], conical springs [57] and adjusting nuts [58].
3. Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   **The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.**




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| Brake | Floating clearance s<br>mm |
|---|---|
| BE05, BE1, BE2, | 1.5 |
| BE5 | 1.7 |
| BE11, BE20, BE30, BE32, BE 60, BE62, BE120, BE122 | 2 |

4. Reinstall the removed parts.

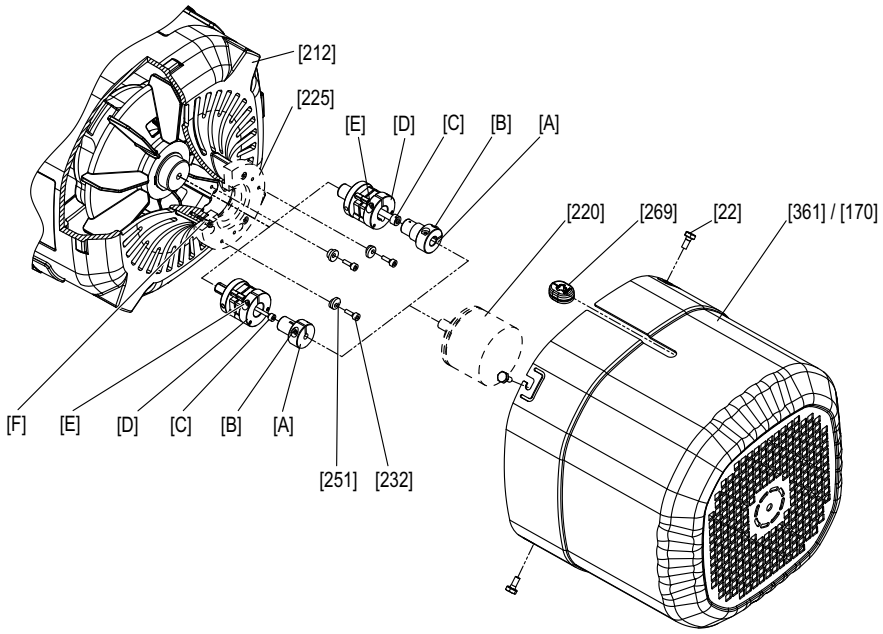
## 4.7 Non-SEW encoder mounting

If a drive was ordered with a non-SEW encoder, SEW-EURODRIVE will deliver the drive with a coupling included. For operation without a non-SEW encoder, the coupling must not be mounted.

## 4.8 Mounting the XV.. encoder mounting adapter for DR..71 – 225, DRN80 – 225

If you have ordered the XV.. encoder mounting adapter, the adapter and the coupling 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 | [361] | Extended fan guard |
| [170] | Forced cooling fan guard | [269] | Grommet |
| [212] | Fan guard with encoder mount | [A] | Adapter |
| [220] | Encoder | [B] | Retaining screw |
| [225] | Intermediate flange (not with XV1A) | [C] | Central retaining screw |
| [232] | Screws (only with XV1A and XV2A) | [D] | Coupling (spread- or solid shaft coupling) |
| [251] | Conical spring washers (only with XV1A and XV2A) | [E] | Retaining screw |
| | | [F] | Screw |

1. If available, remove extended fan guard [361] or forced cooling fan guard [170].
2. **For XV2A and XV4A:** Remove intermediate flange [225].
3. Screw in the coupling [D] into the encoder bore of the motor shaft with the screw [C].

   **DR..71 – 132, DRN80 – 132S:** Tighten the screw [C] with a tightening torque of 3 Nm.

   **DR..160 – 225, DRN132M – 225:** Tighten the screw [C] with a tightening torque of 8 Nm.
4. Push the adapter [A] on the encoder [220] and tighten it with the retaining screw [B] with a tightening torque of 3 Nm.

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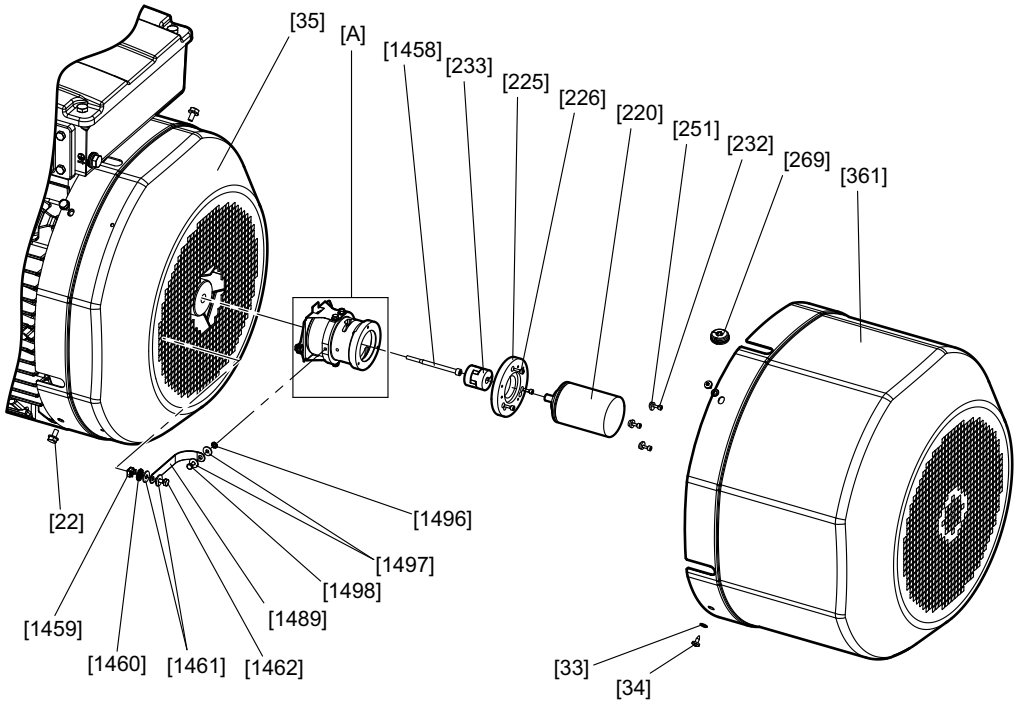
5. **For XV2A and XV4A:** Mount the intermediate flange [225] with the screw [F] with a tightening torque of 3 Nm.
6. Push the encoder and the adapter on the coupling [D] and tighten the retaining screw [E] with a tightening torque of 3 Nm.
7. **With XV1A and XV2A:** Arrange conical spring washers [251] with retaining screws [232] and place in annular groove of the encoder [220] and tighten with a tightening torque of 3 Nm.
8. **For XV3A and XV4A:** Installation by the customer via the bores in the encoder plate.

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## 4.9 Mounting the encoder to the EV../AV mounting adapter to DR..250 – 280, DRN250 – 280 motors

If you have ordered the EV../AV.. encoder mounting adapter, the coupling 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] | Extended fan guard (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] | Grommet | [A] | Encoder mounting adapter |

1. Remove extended fan guard [361], if installed. Loosen screws [34].
   - **With /V forced cooling fan option:** Remove forced cooling fan guard [170]. Loosen screws [22].
2. Push the coupling [233] with diameter 14 mm onto the pin of the encoder mounting adapter [A]. Tighten the screw of the coupling clamping hub [233] with 3 Nm through the slots in the encoder mounting adapter [A].
3. **With option EV2/3/4/5/7A, AV2/3/4/5/7A**: Mount the intermediate flange [225] to the encoder mounting adapter [A] with screws [226]. The tightening torque must be 3 Nm.
4. Mount the conical spring washers [251] to the encoder mounting adapter [A] with screws [232]. Do not tighten the screws [232] yet.

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5. Mount the encoder [220] to the encoder mounting adapter [A] or intermediate flange [225]. Insert the encoder shaft [220] into the coupling [233]. Insert the conical spring washers into the socket of the encoder [220] and tighten the screws [232] with 3 Nm. Tighten the screw of the coupling clamping hub [233] on the encoder end with 3 Nm.
6. Pull the cable of the encoder [220] through the cable grommet [269]. Insert the cable grommet [269] into the extended fan guard [361].
   - **With /V forced cooling fan option:** Insert the cable grommet into the forced cooling fan guard [170].
7. Mount the extended fan guard to the fan guard with screws [34] and washers [33].
   - **With /V forced cooling fan option:** Mount the forced cooling fan guard [170] with screws [22].

### 4.9.1 XH.. encoder mounting adapters

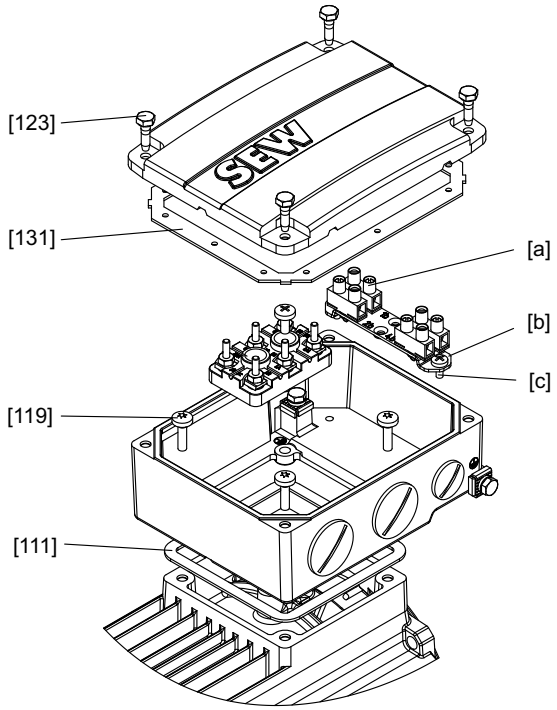
The XH1A, XH7A and XH8A encoder mounting adapters for hollow shaft encoders are premounted on delivery.

Proceed according to chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103) to mount the encoder.

## 4.10 Terminal box

### 4.10.1 Turning the terminal box

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




*7362206987*

[111] Seal
[119] Terminal box retaining screws (4 x)
[123] Terminal box cover retaining screws (4 x)
[131] Seal
[a] Terminal
[b] Auxiliary terminal retaining screws (2 x)
[c] Retaining plate

Proceed as follows to turn the terminal box:

1. Loosen the screws [123] from the terminal box cover and remove the cover.
2. Remove the terminals [a], if available.
3. Unscrew the retaining screws [119] of the terminal box.
4. Clean the sealing surfaces at the stator shoulder as well as at the lower part and the cover of the terminal box.
5. Check the gaskets [111 and 131] for damage and replace them if necessary.
6. Position the terminal box as desired. Refer to the appendix for the arrangement of the auxiliary terminals.
7. Tighten the screws of the lower part of the terminal box with the following tightening torques:
   - **DR..71 – 132, DRN80 – 132S:** 5 Nm
   - **DR..160 – 225, DRN132M – 225:** 25.5 Nm

   Do not forget the retaining plate [c] if available.
8. Tighten the screws of the terminal box cover with the following tightening torques:
   - **DR..71 – 132, DRN80 – 132S:** 4 Nm

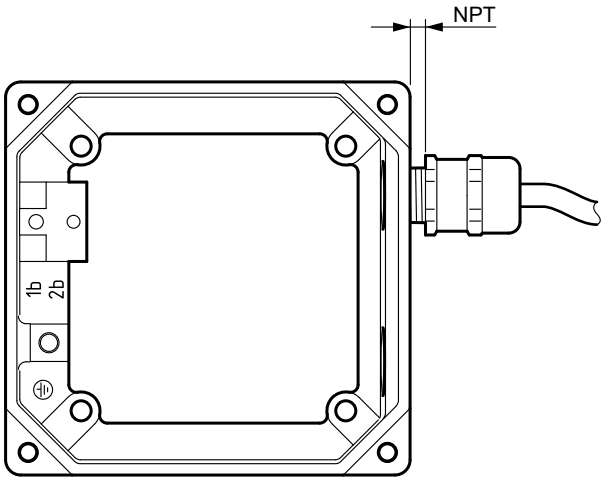
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- **DR..160, DRN132M/L:** 10.3 Nm
- **DR..180 – 225, DRN160 – 225 (aluminum design):** 10.3 Nm
- **DR..180 – 225, DRN160 – 225 (gray cast iron design):** 25.5 Nm

Make sure the gasket is seated properly.

### 4.10.2 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).

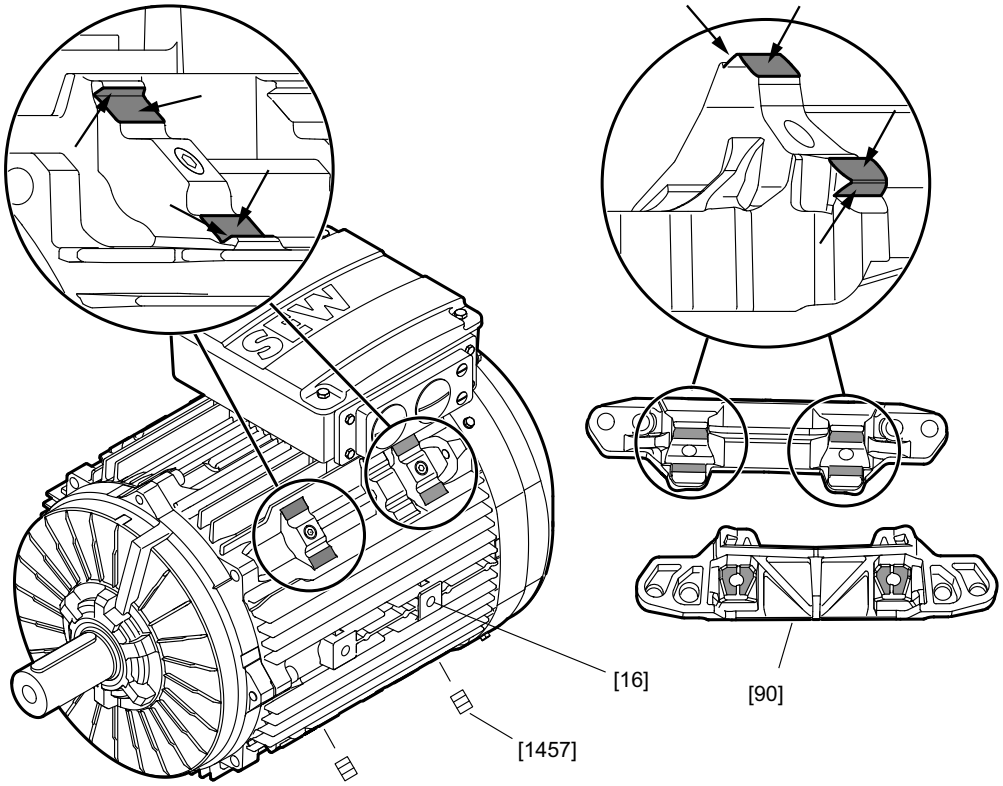



*14949925387*

SEW-EURODRIVE recommends to seal the screw fitting with Teflon tape or Loctite®.

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

The following figure shows a DR..280 motor with option /F.A (retrofit feet).




*18014406536422539*

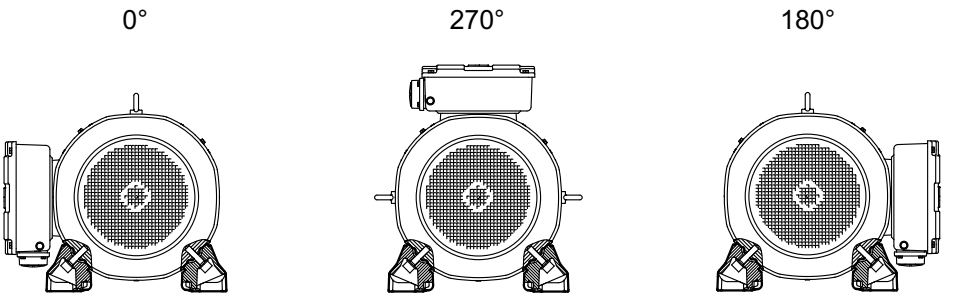
[16] Stator
[90] Foot
[1457] Set screw
Remove paint from marked surfaces

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. Remove the set screws [1457]. Only remove the set screws from those threads into which you will screw the foot screws [94]. For DR..250/280, DRN250/280, 4 set screws, for DRN315, 6 set screws.
2. Remove the paint from the contact surfaces of the stator [16] (see marking in the "Example illustration of DR..280" above). For DR..250/280. DRN250/280, there are 8 surfaces, for DRN315, 12 there are 12. SEW-EURODRIVE recommends to use a chisel or flat scraper for this purpose. Remove the paint only from those surfaces to which the feet will be mounted. Refer to the illustration "Terminal box positions" below for selecting the contact surfaces. A thin layer of corrosion protection agent can be applied to the contact surfaces

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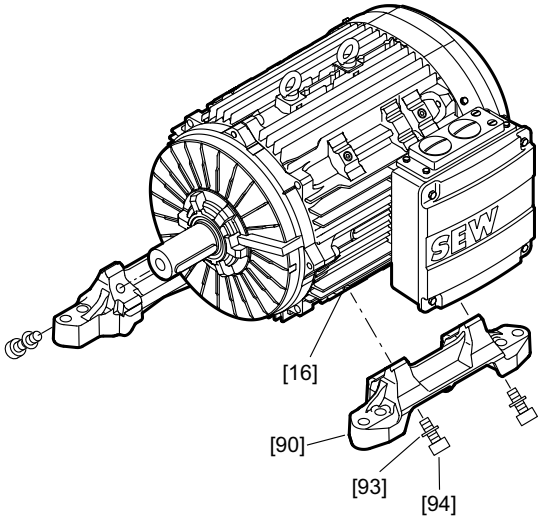
once the paint has been removed.
Possible terminal box positions are illustrated below:




*9007211165643403*

3. Remove the paint from the contact surfaces of the feet [90] (see marking in the "Example illustration of DR..280" above). SEW-EURODRIVE recommends to use a chisel or flat scraper for this purpose. A thin corrosion protection agent can be applied to the contact surfaces once the paint has been removed.
4. Attach the feet [90] to the motor using the screws [94] and washers [93]. The tightening torque for the screws [94] must be 410 Nm. The screws are microencapsulated. This is why you have to screw in and tighten the screws quickly.
5. If necessary, you can apply paint or corrosion protection at the joint after attaching the feet [90].

### 4.11.1 Changing the position of the motor feet




*7741968395*

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

When re-installing the feet in another position, observe the following:

- After removing the screws [94], check them for damage, e.g. to the thread.
- Remove the used microencapsulation.
- Clean the thread 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.

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## 4.12 Options

### 4.12.1 Air filter LF

The air filter, a kind of fleece mat, is mounted in front of the fan grille. It can be easily removed and mounted again for cleaning purposes.

The air filter avoids that dust and other particles drawn in by the air are distributed. It also prevents the ducts between the cooling fins from becoming 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 |
|---|---|
| Certifications | All certifications |
| Ambient temperature | -40 °C to +100 °C |
| Suitable for the following motor sizes: | DR.71 – 132 |
| Filter material | Viledon PSB290SG4 fleece |

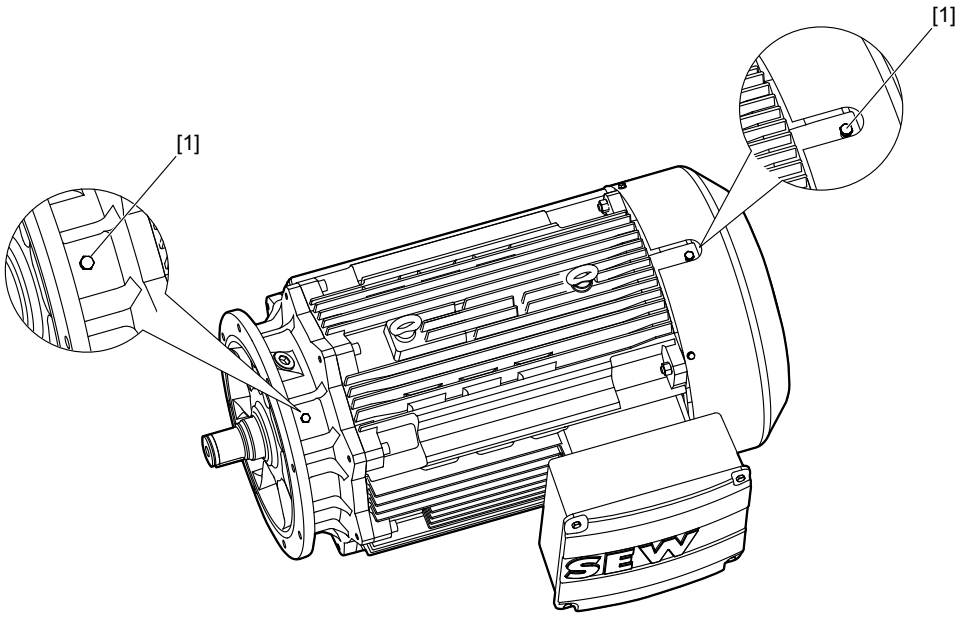
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### 4.12.2 Mounting adapter for measuring nipple

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

- with bore
- with bore and enclosed measuring nipples

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




*9007201960947467*

[1] Bore with inserted measuring nipples

Proceed as follows to connect the customer measuring device:

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

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### 4.12.3 2nd shaft end with optional cover

SEW-EURODRIVE supplies the optional equipment "2nd shaft end" with inserted key (additional protection by means of a tape). As standard, no cover is supplied. It can be ordered optionally for sizes DR.71 – 280, DRN80 – 280.

## INFORMATION

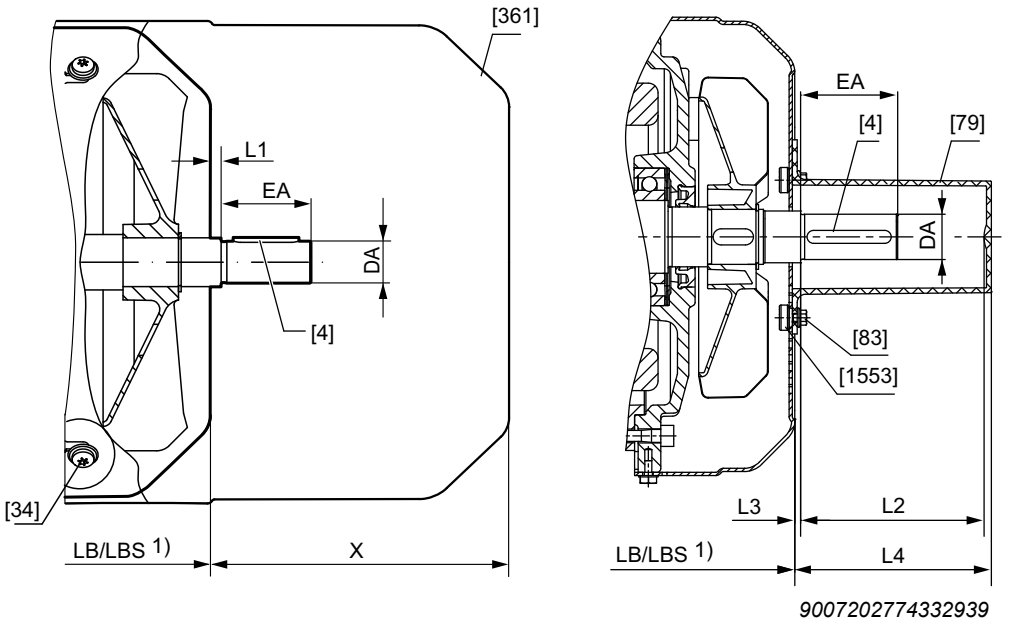
The motor must only be operated with a suitably secured key.

The following figure shows the dimensions of the covers:

**Standard for DR..71 – 132, DRN80 – 132S, DR..250/280, DRN250/280**

**Optional for DR..160 – 225, DRN132M – 225**

**Standard for DR..160 – 225, DRN132M – 225M**




| | | | |
|---|---|---|---|
| [4] | Keyway | [361] | Extended fan guard |
| [34] | Tapping screw | [1553] | Cage nut |
| [79] | Protective cap | LB/LBS | Length of the motor/brakemotor |
| [83] | Hex head screw | 1) | Refer to the "AC Motors" catalog for dimensions |

### Dimensions

| Motor size | | DA | EA | L1 | L2 | L3 | L4 | X |
|---|---|---|---|---|---|---|---|---|
| DR.. | DRN.. | | | | | | | |
| DR..71 | – | 11 | 23 | 2 | – | 2 | – | 91.5 |
| DR..71 /BE | – | | | | – | | – | 88 |
| DR..80 | DRN..80 | 14 | 30 | 2 | – | 2 | – | 95.5 |
| DR..80 /BE | DRN..80 /BE | | | | – | | – | 94.5 |
| DR..90 | DRN..90 | 14 | 30 | 2 | – | 2 | – | 88.5 |
| DR..90 /BE | DRN..90 /BE | | | | – | | – | 81 |
| DR..100 | DRN..100 | 14 | 30 | 2 | – | 2 | – | 87.5 |
| DR..100 /BE | DRN..100 /BE | | | | – | | – | 81 |
| DR..112 – 132 | DRN..112 – 132S | 19 | 40 | 3.5 | – | 3.5 | – | 125 |
| DR..112 – 132 /BE | DRN..112 – 132S /BE | | | | – | | – | 120.5 |
| DR..160 | DRN..132M/L | 28 | 60 | 4 | 122 | 3.5 | 124 | 193 |
| DR..160 /BE | DRN..132M/L /BE | | | | | | | 187 |
| DR..180 | DRN..160 – 180 | 38 | 80 | 4 | 122 | 3.5 | 122 | 233 |
| DR..180 /BE | DRN..160 – 180 /BE | | | | | | | 236 |
| DR..200 – 225 | DRN..200 – 225 | 48 | 110 | 5 | 122 | 5 | 122 | 230 |
| DR..200 – 225 /BE | DRN..200 – 225 /BE | | | | | | | 246 |
| DR..250/280 | DRN..250/280 | 55 | 110 | 3 | – | 3 | – | 243.5 |
| DR..250/280 /BE | DRN..250/280 /BE | | | | | | | |

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# 5 Electrical installation

If the motor includes safety-relevant components, 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 strictly in accordance with the specifications in the operating instructions at hand and the respective addendum to the operating instructions. Else, the right to claim under warranty will become invalid.



**⚠ WARNING**

Risk of injury due to electric shock.

Severe or fatal injuries.

- Observe the following notes.

- It is essential to comply with the safety notes in chapter 2 during installation!
- Switch contacts in utilization category AC-3 to EN 60947-4-1 must be used for switching the motor and the brake.
- Use switch contacts in utilization category DC-3 according to EN 60947-4-1 for switching the brake with DC 24 V.
- When motors are powered by inverters, you must adhere to the wiring instructions issued by the inverter manufacturer.
- Observe the operating instructions of the inverter.

## 5.1 Additional regulations

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

## 5.2 Wiring diagrams and terminal assignment diagrams

Connect the motor only as shown in the wiring diagram(s) included with the motor. Do not connect or start up the motor if the wiring diagram is missing. The applicable wiring diagrams are available from SEW-EURODRIVE free of charge.

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## 5.3 Wiring notes

Adhere to the safety notes during installation.

### 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
- Incoming 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 SEW motor protection devices (TF temperature sensors) 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.

## 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.

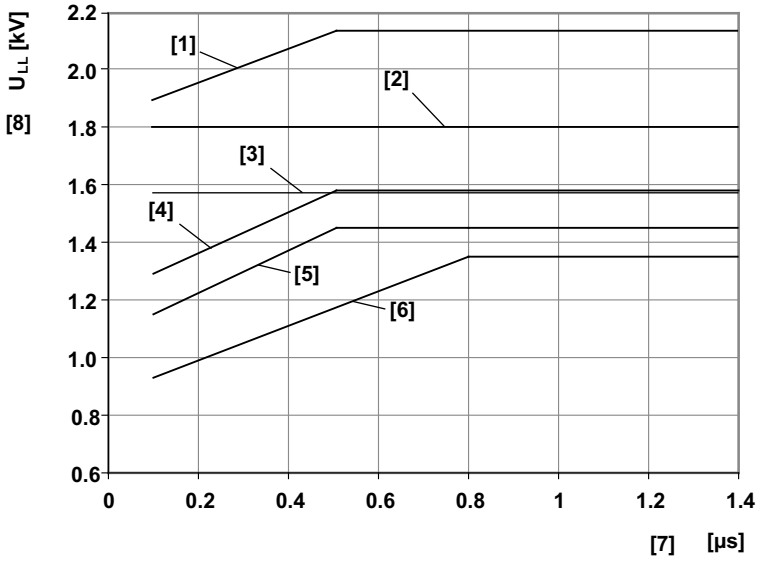
### 5.4.1 Motors with frequency inverters from SEW-EURODRIVE

We have tested operation of the motor on SEW-EURODRIVE frequency inverters. The required electric strength values of the motors were confirmed and the startup routines adjusted to the motor data. You can operate the DR../DRN.. 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.

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### 5.4.2 Motor with non-SEW inverter

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




*9007203235332235*

[1] Permitted pulse voltage for DR.., DRN.. AC motors with reinforced insulation and increased resistance against partial discharge (/RI2)

[2] Permitted pulse voltage for DR.., DRN.. AC 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 to IEC 60034-25, limit value curve A for nominal voltage $V_N \leq 500$ V, star connection

[5] Permitted pulse voltage according to 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 non-SEW inverter
- The threshold of the brake chopper voltage
- The operating mode of the motor (motoring/regenerative operation)

→ 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. LF grounding is not installed as standard.

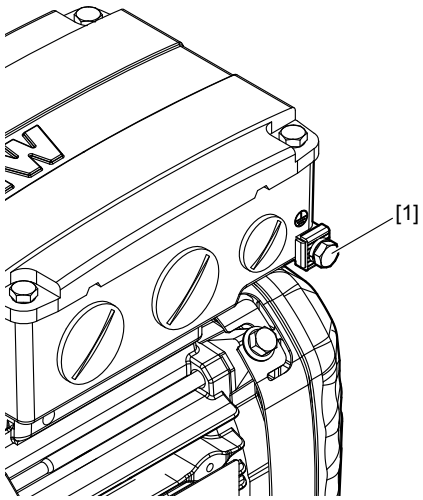
LF grounding can be ordered as completely pre-installed at the factory. For this an aluminum or gray cast iron terminal box designed for brake connections is required for DR..71 – 132, DRN80 – 132S motors. For DR..160 – 225 motors, DRN132M – 225, this option can be combined with all terminal box types.

The option can be combined with HF grounding (→ 🗎 52).

### INFORMATION

All parts of the LF grounding kit are made from stainless steel.

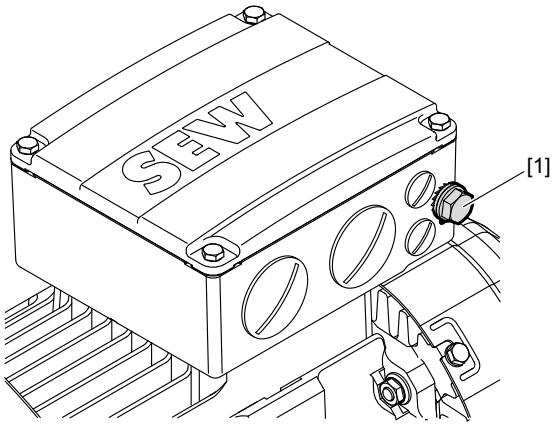
**DR..71 – 132, DRN80 – 132S**




*8024328587*

[1] LF grounding at the terminal box

**DR..160 – 225, DRN132M – 225**




*8026938379*

[1] LF grounding at the terminal box

## 5.6 Improving the grounding (EMC), HF grounding

For improved, low-impedance grounding at high frequencies, we recommend using the following connections: SEW-EURODRIVE recommends to use corrosion-resistant 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-installed at the factory, or as
- "Grounding terminal" kit for customer installation; part numbers listed in the following table.

| Motor size | Part number of "Grounding terminal" kit |
|---|---|
| DR..71S/M<br>DR..80S/M, DRN80 | 1363 3953 |
| DR..90M/L, DRN90 | |
| DR..100M, DRN100LS | |
| DR..100L – 132, DRN100L – 132S | 1363 3945 |
| DR..160 – 225, DRN132M – 225<br>With aluminum terminal box | |

### INFORMATION

All parts of the kit are made from stainless steel.

### INFORMATION

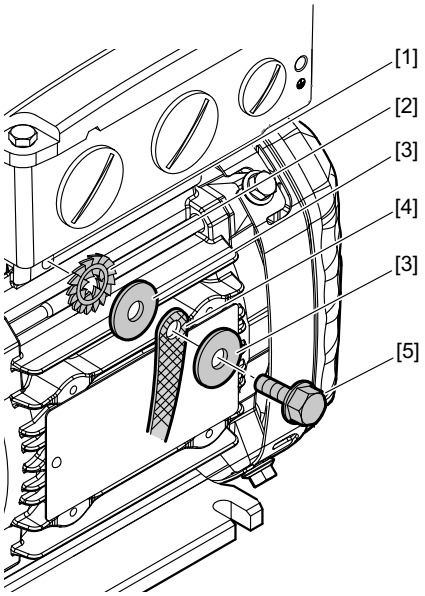
For further information regarding the grounding, refer to the SEW publication "Drive Engineering – Practical Implementation, EMC in Drive Engineering".

### 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.

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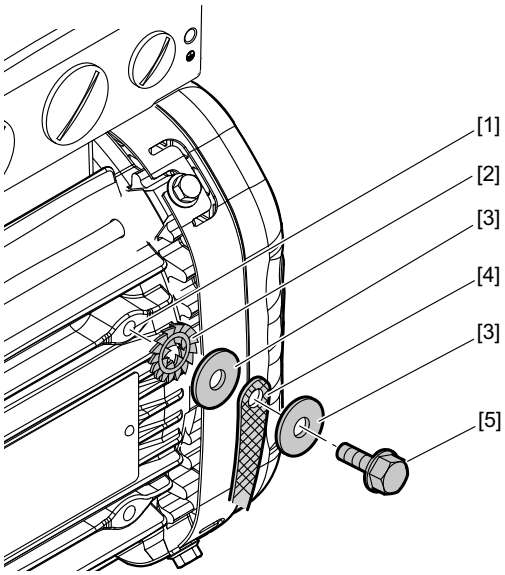
### 5.6.1 Sizes DR..71S/M, DR..80S/M and DRN80 with HF(+LF) grounding




*8026768011*

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

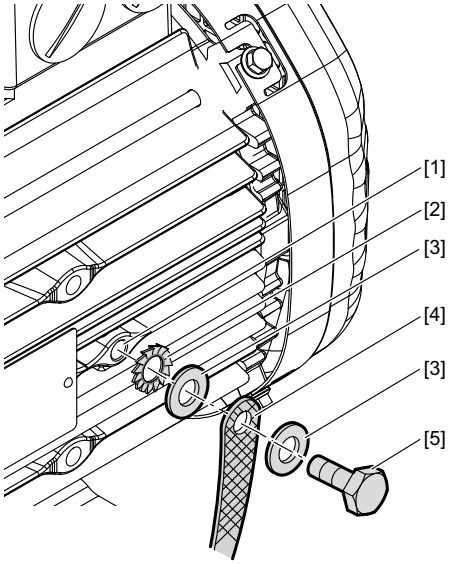
### 5.6.2 Sizes DR..90M/L, DRN90 with HF(+LF) grounding




*8026773131*

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

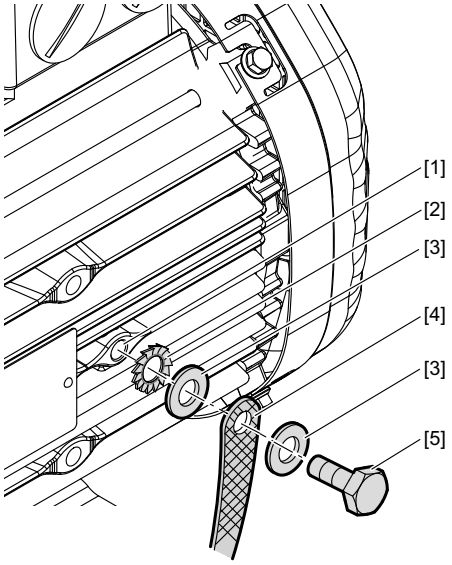
### 5.6.3 Size DR..100M, DRN100LS with HF(+LF) grounding




*18014402064551947*

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

### 5.6.4 Sizes DR..100L – 132, DRN100L – 132S with HF(+LF) grounding

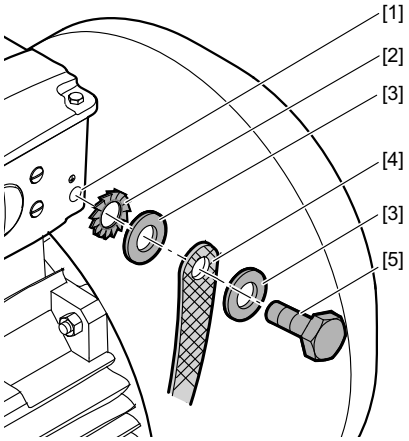



*18014402064551947*

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

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### 5.6.5 Sizes DR..160 – 315, DRN132M – 315 with HF(+LF) grounding




*9007202821668107*

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

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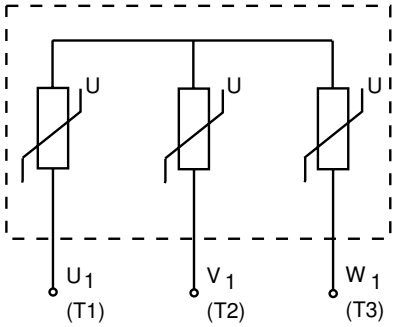
## 5.7 Special aspects in switching operation

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 circuit 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 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, among other factors, on the starting frequency – note the project planning.



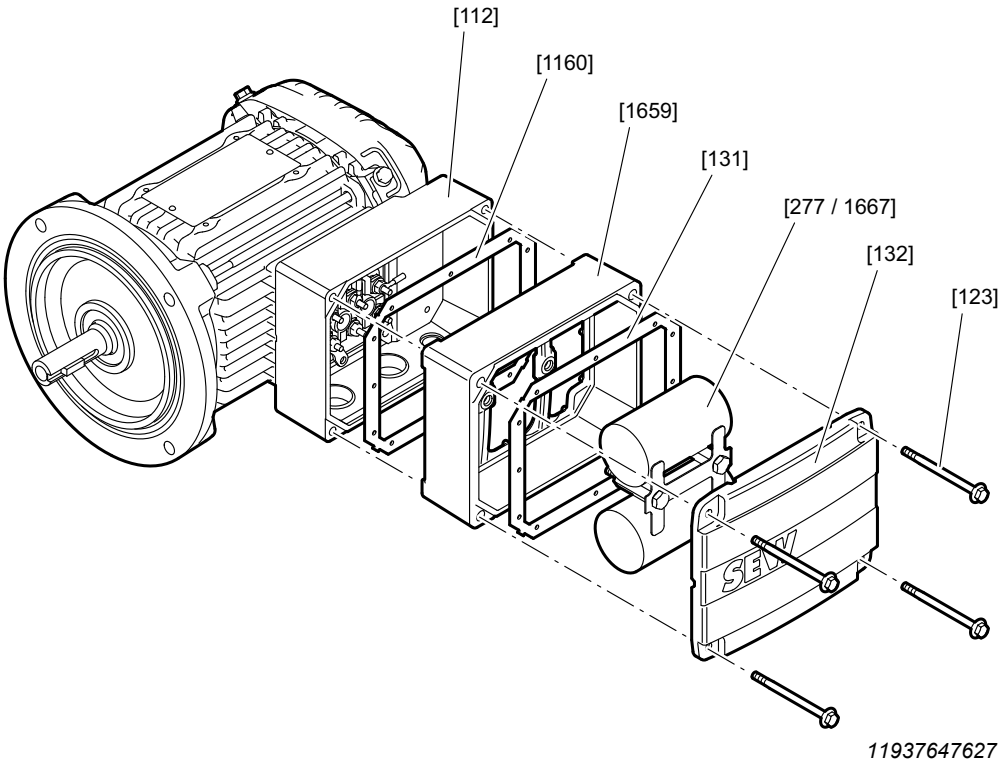

*2454566155*

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## 5.9 Special aspects of single-phase motors

### Scope of delivery and motor design

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




*11937647627*

| | | | |
|---|---|---|---|
| [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 the single-phase motor



**⚠ 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.

The DRK.. single-phase motor is delivered with one or two installed and connected running capacitors. The data specified in the chapter Technical Data (→ 🗎 184) apply.

## INFORMATION



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

## INFORMATION



A full-load start using only the running capacitors is not possible.

Parts which are not supplied must be ordered from specialist retailers and must be connected according to the corresponding instructions and wiring diagrams (→ 🗎 207).

Proceed as follows during connection:

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

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## 5.10 Ambient conditions during operation

### 5.10.1 Ambient temperature

The temperature range of -20 °C to +40 °C must be ensured unless specified otherwise on the nameplate. Motors approved for use in higher or lower ambient temperatures have specific designations on the nameplate.

### 5.10.2 Installation altitude

The rated data specified on the nameplate applies to an installation altitude of maximum 1000 m above sea level. Installation altitudes of more than 1000 m above sea level must be taken into account for project planning of motors and gearmotors.

### 5.10.3 Hazardous radiation

Motors must not be subjected to hazardous radiation (such as ionizing radiation). Consult SEW-EURODRIVE, if necessary.

### 5.10.4 Hazardous gases, vapors and dusts

The DR../DRN.. AC motors are equipped with gaskets that are suitable for the designated use.

If the motor is operated in environments with high environmental impact, such as increased ozone values, the DR../DRN.. motors can be optionally equipped with gaskets of a higher quality. If you have doubts regarding the stability of the gaskets in connection with the respective environmental impacts, consult SEW-EURODRIVE.

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## 5.11 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. The applicable wiring diagrams are available from SEW-EURODRIVE free of charge.

### INFORMATION

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

Observe the following points when connecting the motor:

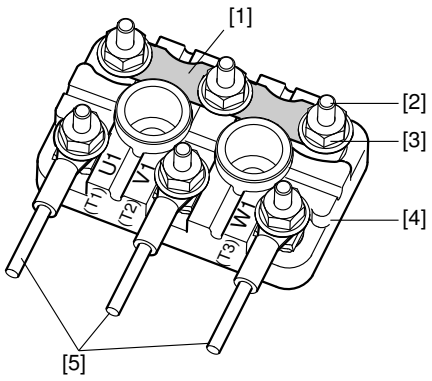
- Check cable cross section
- Arrange terminal links correctly
- Screw on the connections and the PE conductor correctly
- Make sure that the connection cables are not cramped to avoid damage to the cable insulation.
- Observe air gaps, see chapter "Electrical connection"
- In the terminal box: Check 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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## 5.12 Connecting the motor via terminal block

### 5.12.1 According to wiring diagram R13

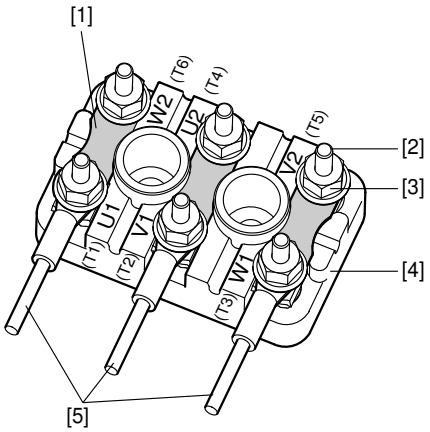
**Arrangement of terminal links with ⅄ connection**




*9007199493673739*

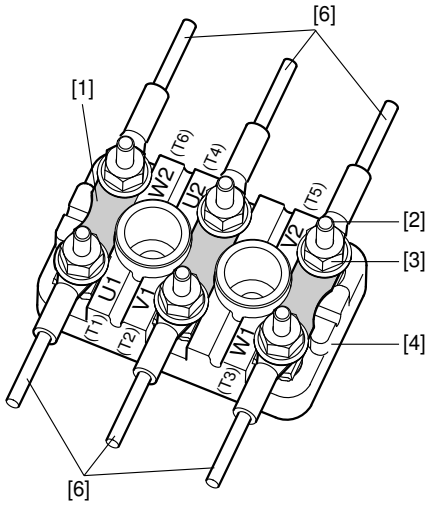
**Arrangement of terminal links with △ connection**

Motor size DR..71 – 280, DRN80 – 280:
(Single-sided supply)




*9007199493672075*

Motor size DR../DRN250 – 315:
(Double-sided supply)




*9007199734852747*

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

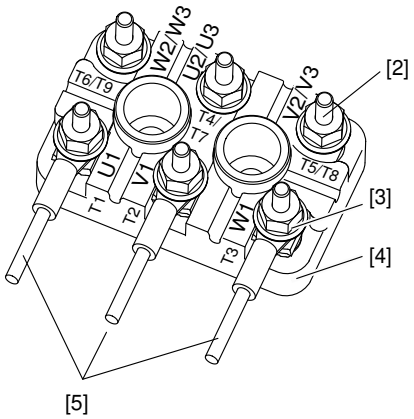
## INFORMATION

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

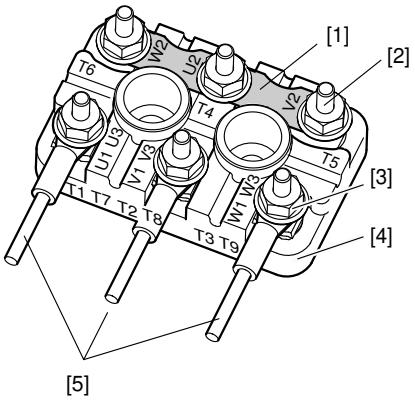
- M12: 250 A
- M16: 315 A

### 5.12.2 According to wiring diagram R76

**Arrangement of terminal links with ⅄ connection**




**Arrangement of terminal links with ⅄⅄ connection**




[1] Terminal link
[2] Terminal stud
[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.

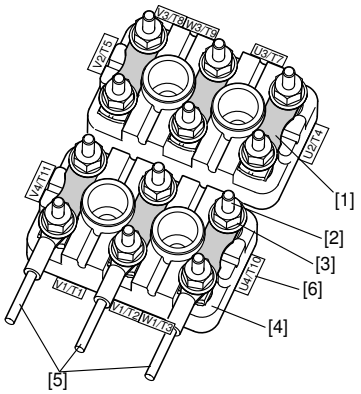
- U3 (T7) from U2 (T4) to U1 (T1)
- V3 (T8) from V2 (T5 ) to V1 (T2)
- W3 (T9) from W2 (T6) to W1 (T3)

→ 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.

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### 5.12.3 According to wiring diagram R72

**Arrangement of terminal links with △ connection**

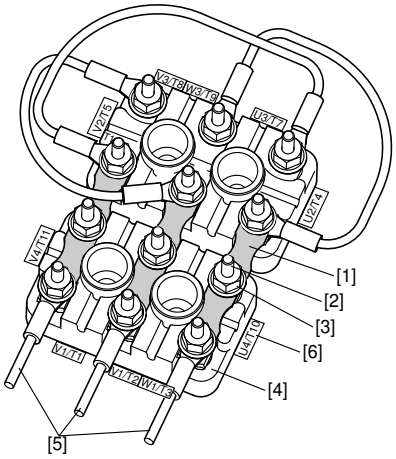



*18014400828555147*

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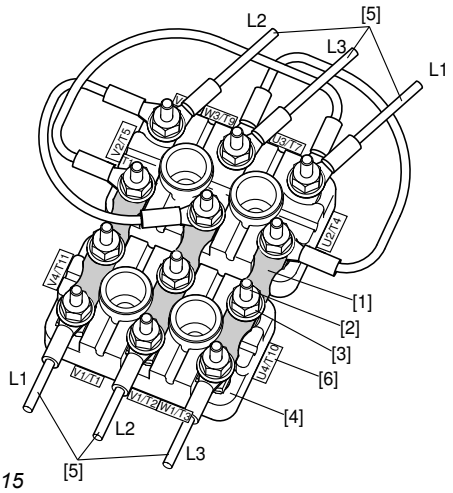
### Arrangement of terminal links with △△ connection

Motor size DR..71 – 280, DRN80 – 280:
(Single-sided supply)




*18014400845874315*

Motor size DR../DRN250 – 315:
(Double-sided supply)




*9007208157343883*

[1] Terminal link
[2] Terminal stud
[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

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### 5.12.4 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.

| Motor size DR..71 – 100, DRN80 – 100 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Terminal studs** | **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** | **Pre-assembled terminal links** | M5 | 4 |
| | | **≤ 2.5 mm²** | **1a** | **Solid wire** | **Pre-assembled terminal links** | | |
| | | **≤ 6 mm²** | **1b** | **Ring cable lug** | **Pre-assembled terminal links** | | |
| | | ≤ 6 mm² | 2 | Ring cable lug | Connection accessories enclosed | | |
| M5 | 2.0 Nm | ≤ 2.5 mm² | 1a | Solid wire Conductor end sleeve | Pre-assembled terminal links | | |
| | | ≤ 16 mm² | 1b | Ring cable lug | Pre-assembled terminal links | | |
| | | ≤ 16 mm² | 2 | Ring cable lug | Connection accessories enclosed | | |
| M6 | 3.0 Nm | ≤ 35 mm² | 3 | Ring cable lug | Connection accessories enclosed | | |

| Motor size DR..112 – 132, DRN112 – 132S | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Terminal studs** | **Tightening torque hex nut** | **Customer connection** | **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** | **Pre-assembled terminal links** | M5 | 4 |
| | | **≤ 16 mm²** | **1b** | **Ring cable lug** | **Pre-assembled terminal links** | | |
| | | ≤ 16 mm² | 2 | Ring cable lug | Connection accessories enclosed | | |
| M6 | 3.0 Nm | ≤ 35 mm² | 3 | Ring cable lug | Connection accessories enclosed | | |

| Motor size DR..160, DRN132M/L | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Terminal stud** | **Tightening torque hex nut** | **Customer connection** | **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 |

| Motor size DR..180 – 225, DRN160 – 225 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Terminal studs** | **Tightening torque hex nut** | **Customer connection** | **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 |

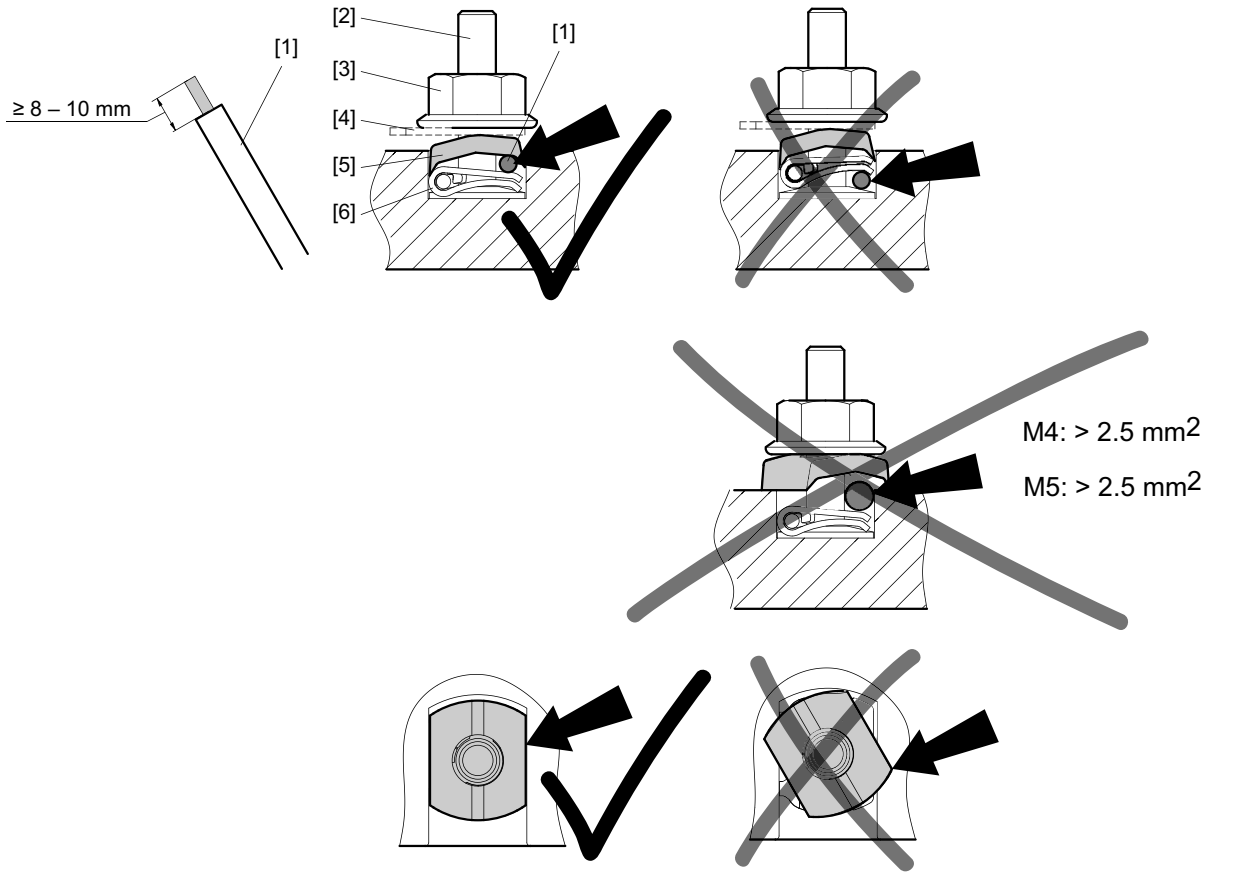
| Motor size DR../DRN250 – 280 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Terminal studs** | **Tightening torque hex nut** | **Customer connection** | **Design** | **Connection type** | **Scope of delivery** | **PE terminal stud** | **PE design** |
| **Ø** | | **Cross section** | | | | **Ø** | |
| 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 |

| Motor size DR../DRN315 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Terminal studs** | **Tightening torque hex nut** | **Customer connection** | **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 variants may have different connections, for example, different terminal stud diameters and/or a different scope of delivery.

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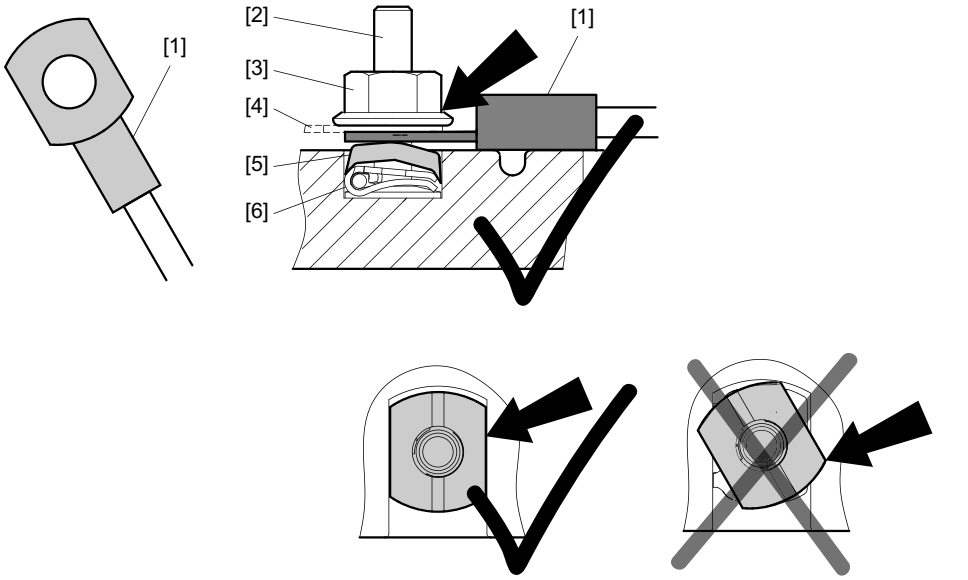
**Variant 1a**




*27021597853089931*

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

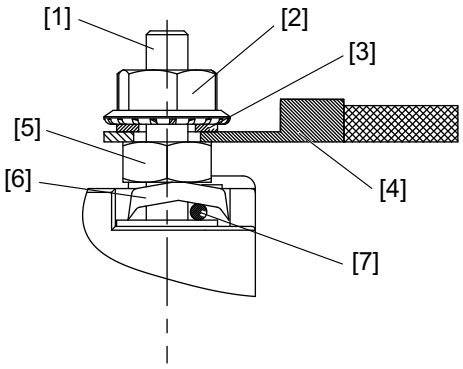
**Variant 1b:**




*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**

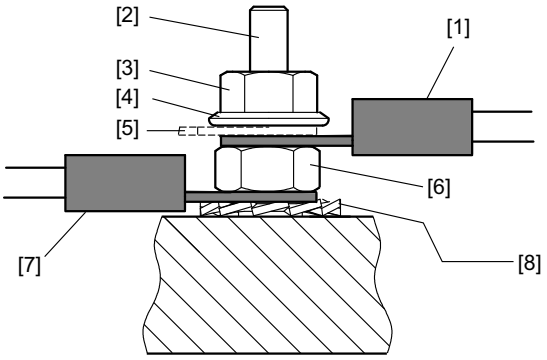



*9007199440180363*

[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

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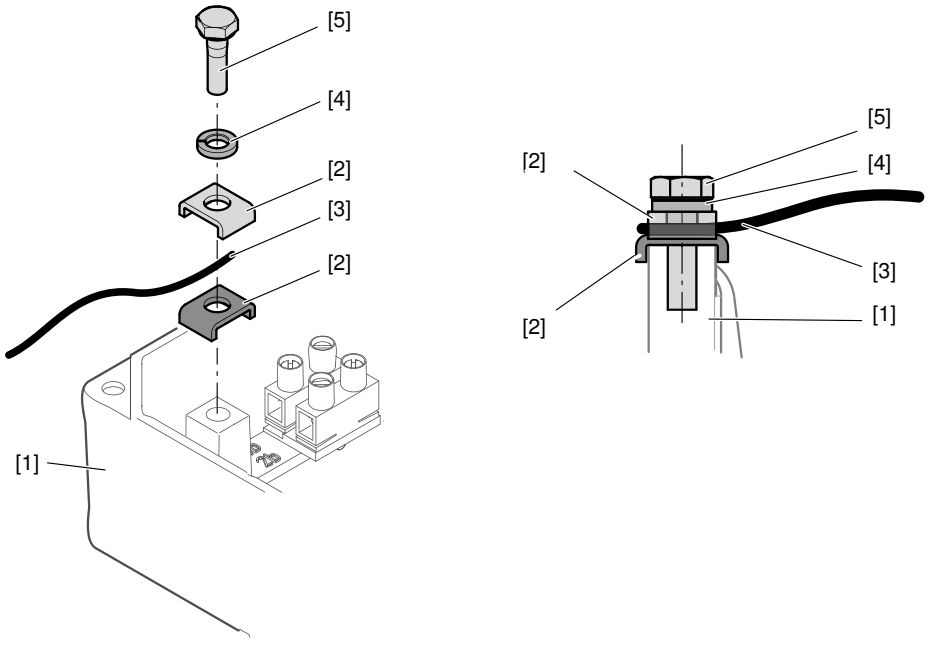
**Variant 3**




*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**

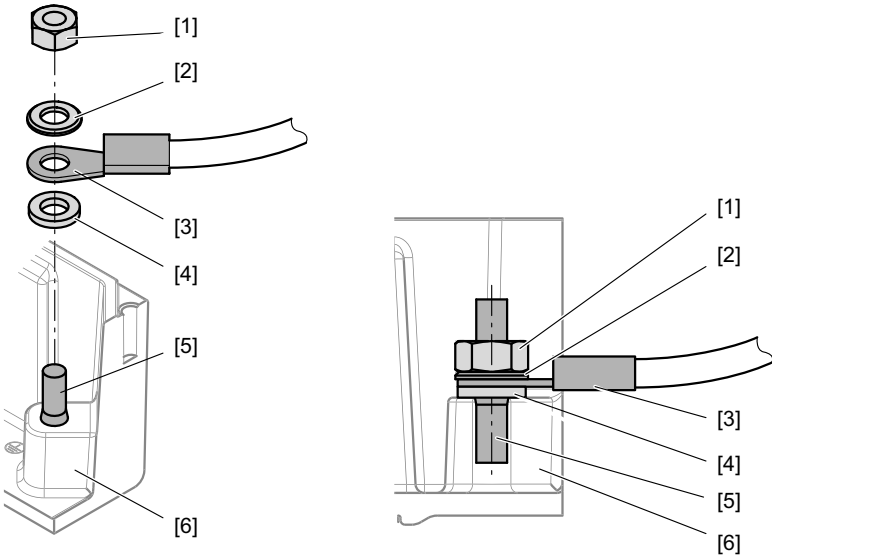



*9007200394347659*

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

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**Variant 5**



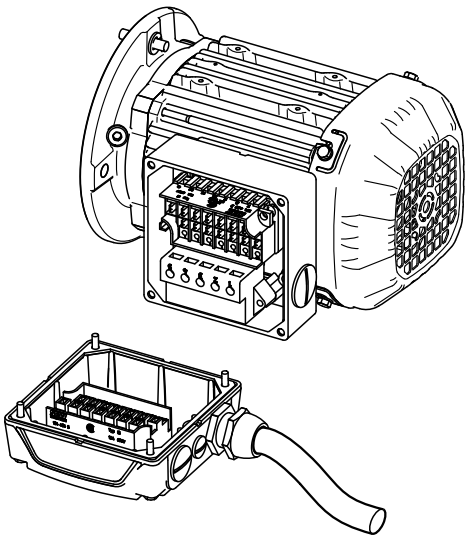

*1139608587*

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

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## 5.13 Connecting the motor plug connector

### 5.13.1 IS plug connector



1009070219

The lower part of the IS plug connector is completely wired at the factory including the additional features such as brake rectifier. The IS plug connector top is included in the delivery and must be connected according to the specifications in the wiring diagram.

**⚠ WARNING**

No grounding due to incorrect installation.

Severe or fatal injuries.

- It is essential to comply with the safety notes in chapter 2 during installation.
- Tighten the retaining screws of the IS plug connector properly with 2 Nm as these screws also act as protective earth contacts.

The IS plug connector has CSA approval up to 600 V. Note for application according to CSA regulations: Tighten the M3 clamping screws to a torque of 0.5 Nm. See the following table for American Wire Gauge (AWG) cable cross sections.

**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 x 2.5 and 1 x 1.5 $mm^2$ |

**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 carefully.
- Install the plug connector (see chapter Installing the connector (→ 🗎 74))

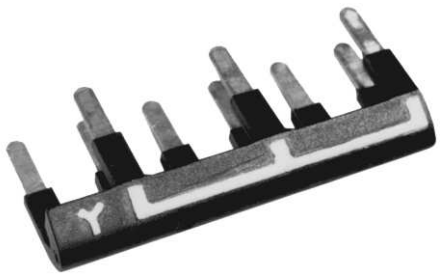
*Wiring up as shown in wiring diagram R81*

**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 (→ 🗎 74))

**For ⅄ or △ operation:**

- Connect as shown in the wiring diagram
- Install the variable terminal link as shown in the following figures according to the required motor operation (⅄ or △).
- Install the plug connector (see chapter Installing the connector (→ 🗎 74))



*9007200053347851*



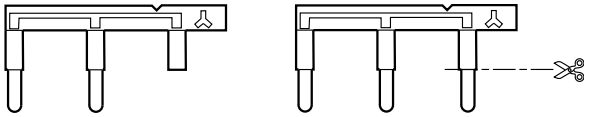
*9007200053349515*

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*Brake control system BSR – preparing the variable terminal link*

**For ⅄ operation:**

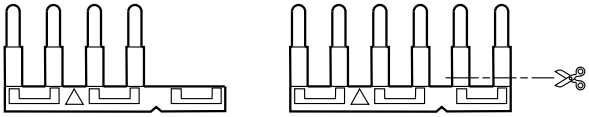
On the ⅄ side of the variable terminal link as shown in the following figure: Remove only the bare metal pin of the marked prong horizontally – touch guard!



*9007200053520139*

**For △ operation:**

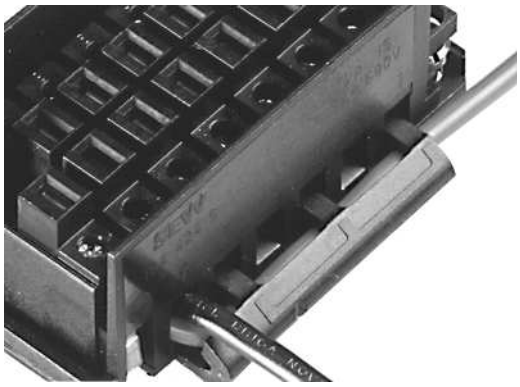
On the △ side of the variable terminal link as shown in the following figure: Completely remove two prongs horizontally.



*9007200053518475*

*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 (→ 🗎 74))

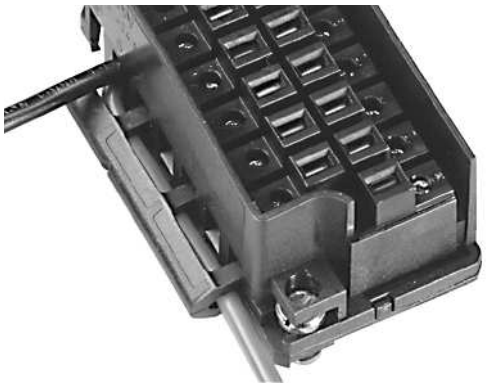


*9007200053521803*

### Installing the plug connector

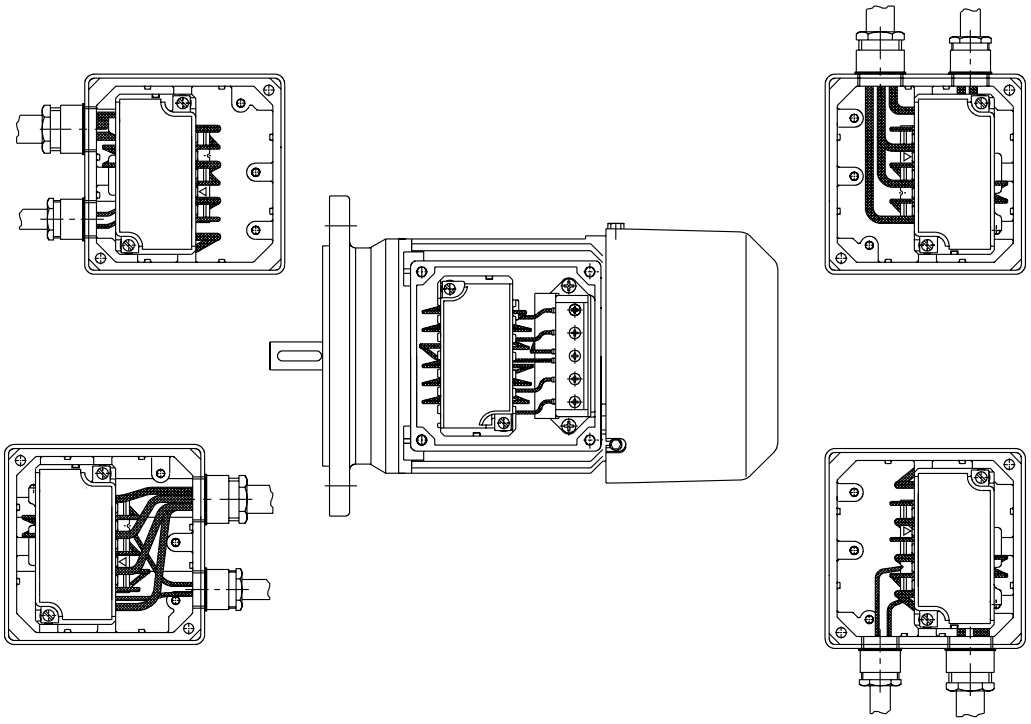
The housing cover of the IS plug connector can be screwed onto the lower housing part depending on the required position of the cable lead. The upper section of the plug connector shown in the following figure must first be installed in the housing cover so it will match the position of the lower section of the plug connector:

- Define the required mounting position
- Install the upper section of the plug connector into the housing cover in accordance with the mounting position
- Close the plug connector
- Tighten the cable gland



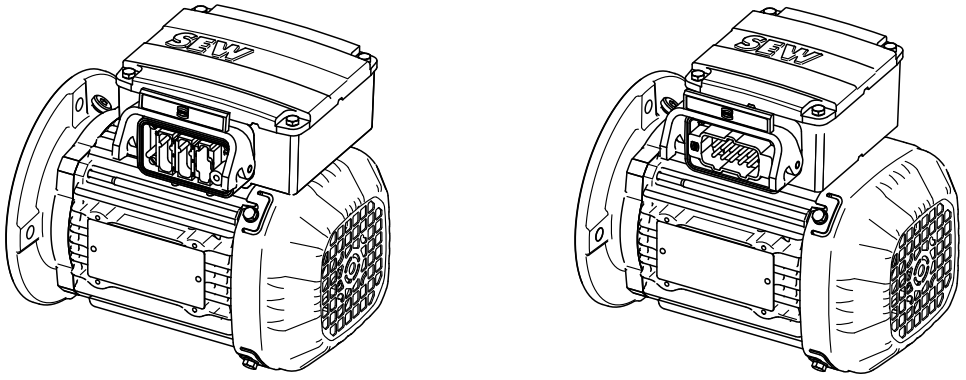
9007200053719819

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



9007200053526155

### 5.13.2 AB.., AD.., AM.., AK.., AC.., AS.. plug connectors



1009065611

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

UL approval has been granted for the plug connectors.

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

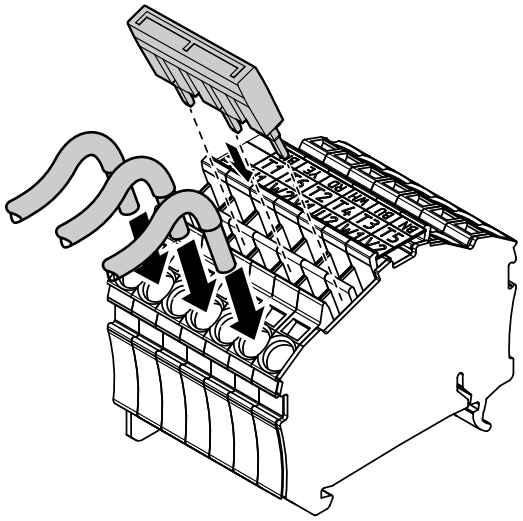
The degree of protection is only applied when the mating connector is mounted and locked.

## 5.14 Connecting the motor via terminal strip

### 5.14.1 KCC terminal strip

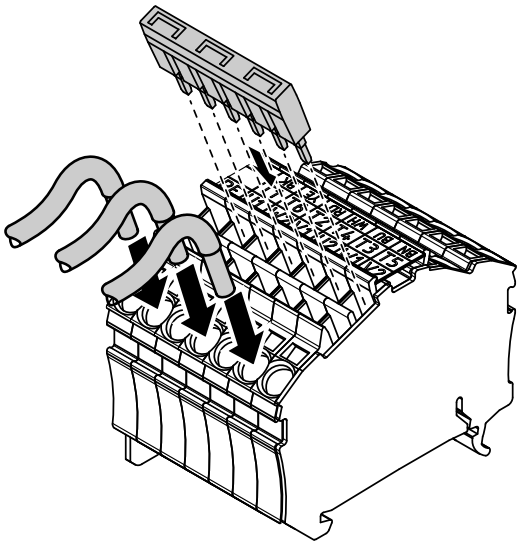
- In accordance with the wiring diagram provided
- Check the max cable cross section:
  - 4 mm$^2$, rigid
  - 4 mm$^2$, flexible
  - 2.5 mm$^2$, flexible with conductor end sleeve
- In the terminal box: Check winding connections and tighten them if necessary
- Strip 10 – 12 mm of insulation

**Arrangement of terminal links for ⅄ connection**



*18014399506064139*

**Arrangement of terminal links for △ connection**



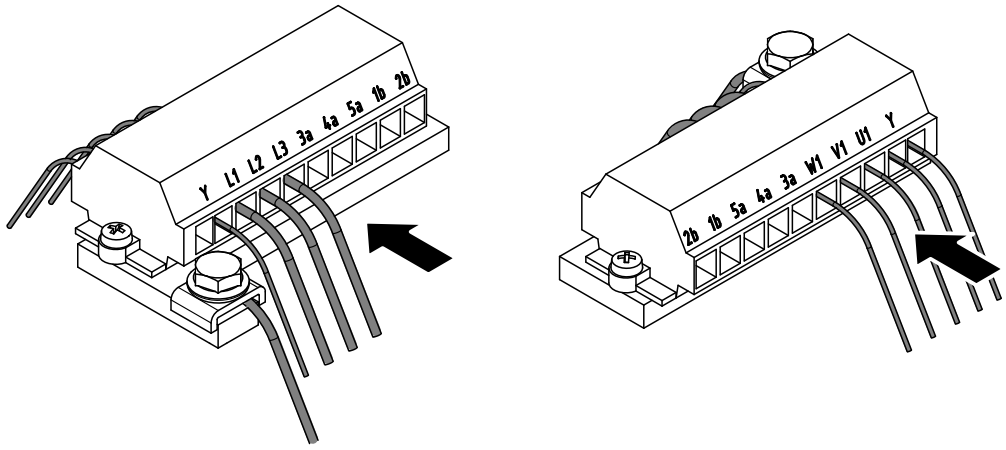
*18014399506066059*

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### 5.14.2 KC1 terminal strip

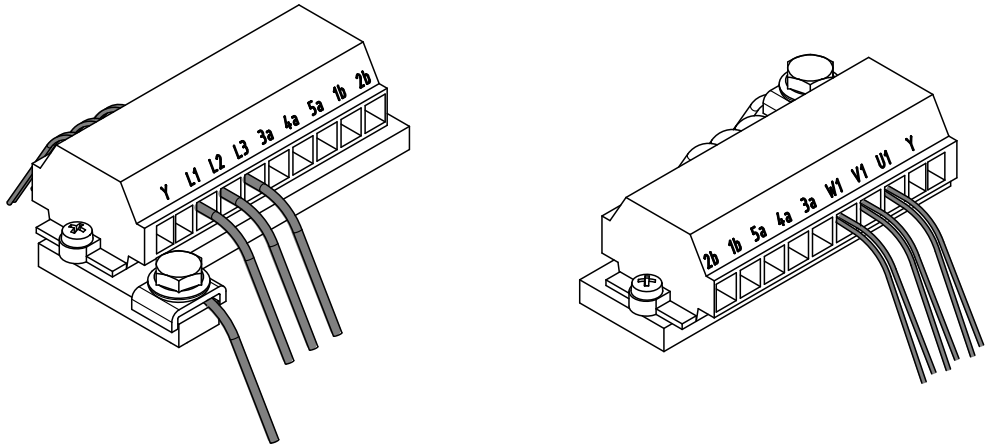
- Perform the connection in accordance with the enclosed wiring diagram
- Check the maximum cable cross section:
  - 2.5 mm² rigid
  - 2.5 mm² flexible
  - 1.5 mm² flexible with conductor end sleeve
- Strip 8 – 9 mm of insulation

**Arrangement of terminal links with ⅄ connection**




*9007200257397387*

**Arrangement of terminal links with △ connection**




*9007200257399307*

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## 5.15 Connecting the brake

The brake is released electrically. The brake is applied mechanically when the voltage is switched off.



**⚠ WARNING**

Risk of crushing if the hoist falls.

Severe or fatal injuries.

- 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 provided wiring diagram.
- In view of the DC voltage to be switched and the high level of current load, it is essential to use either special brake contactors or AC contactors with contacts in utilization category AC-3 according to EN 60947-4-1.

### 5.15.1 Connecting the brake control

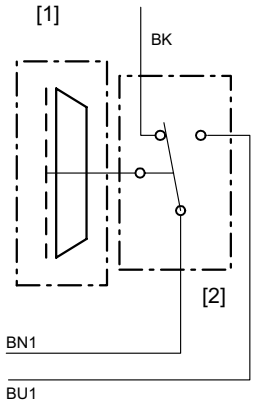
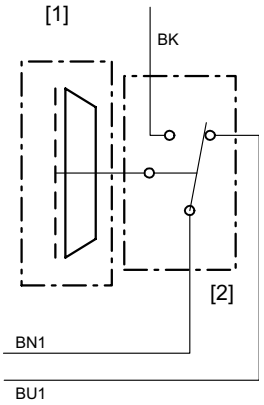
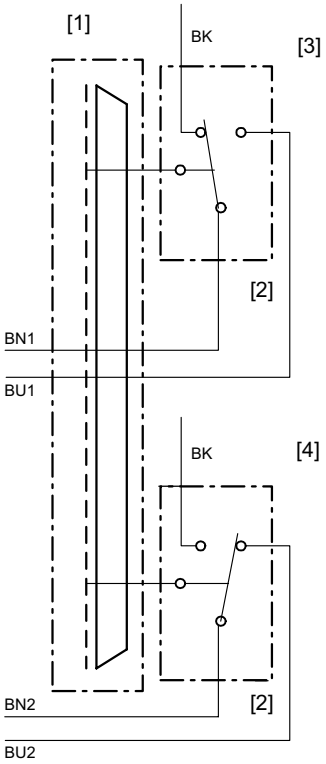
The DC disk brake is powered by a brake control system with protection circuit. It is located in the terminal box/IS lower part or must be installed in the control cabinet.

- Check the cable cross sections – braking currents (see chapter Technical data (→ 🗎 159))
- Connect the brake control according to the provided wiring diagram
- For motors in thermal class 180 (H), the brake rectifier and brake control systems are usually installed in the control cabinet. If you have ordered a brakemotor with insulating plate, it will be delivered with the terminal box isolated thermally from the brakemotor. In this case, the brake rectifier and brake control can be installed in the terminal box. The insulating plate increases the height of the terminal box by 9 mm.

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### 5.15.2 Connecting diagnostic unit /DUB

Connect the diagnostic unit as shown in the wiring 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.

| SF 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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### 5.15.3 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.

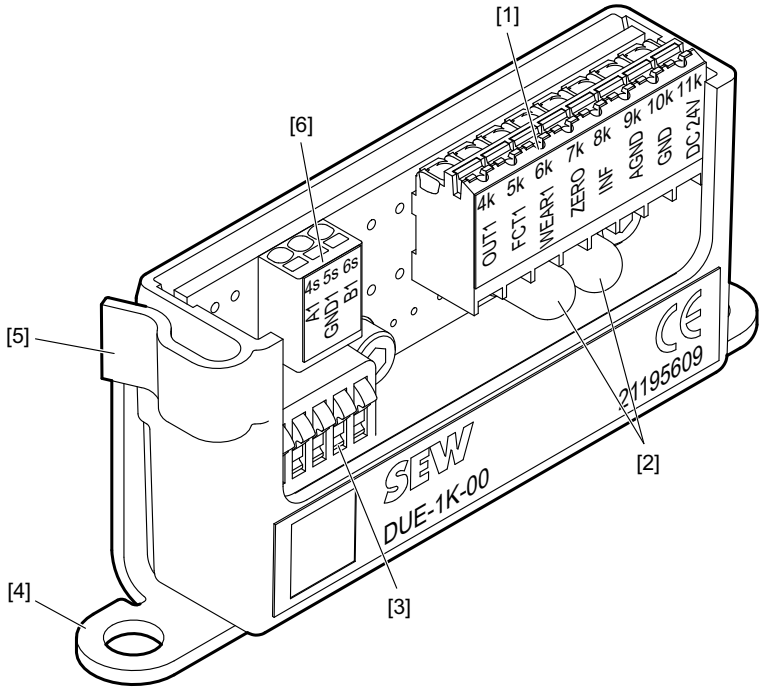
If the diagnostic unit /DUE was ordered, the function and wear monitoring is installed and calibrated at the factory. The customer must connect the diagnostic unit, see wiring diagram. The switching point of the wear monitoring is preset to the maximally permitted value. According to the "code table", a reduced value can be set.

For the state of the evaluation unit, refer to chapter "Status display of the evaluation unit".

For information on retrofitting the diagnostic unit /DUE, refer to chapter "Retrofitting the diagnostic unit /DUE for function and wear monitoring".

#### 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.




*14950549515*

[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 |
| 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 [6] | FCT1 | The brake is open. Electromagnet is active. Pressure plate is in contact with magnet body. |
| Red [6] | WEAR1 | The current working air gap of the brake reached or exceeded the preset maximum working air gap. |

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## 5.16 Options

Connect the optional equipment as shown in the wiring connection diagrams provided with the motor. **Do not connect any optional equipment if the wiring diagram is missing.** You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

### 5.16.1 Temperature sensor /TF



**NOTICE**

Destruction of the temperature sensor due to overheating if the voltage is too high.

The drive system might be damaged.

- Do not apply voltages > 30 V to the TF temperature sensor.

The PTC thermistors comply with DIN 44082.

Resistance measurement (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. If the temperature reaches an excessive level, a thermal protection function must be triggered immediately.

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

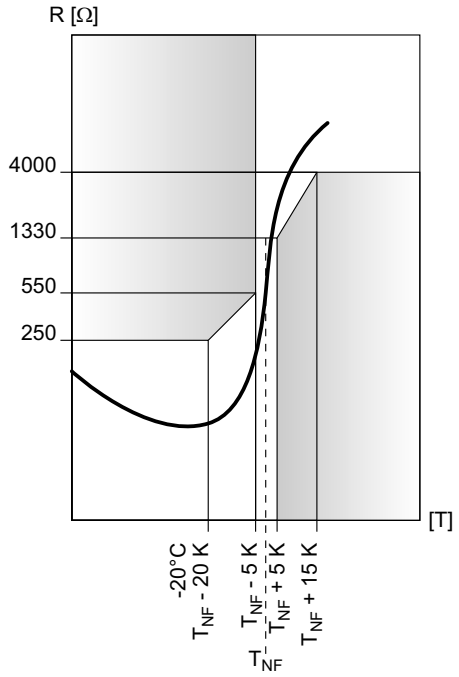
Observe the provided wiring diagram for the connection of the TF temperature sensor. If the wiring diagram is missing, you can obtain it from SEW-EURODRIVE free of charge.

**INFORMATION**

The temperature sensor TF may not be subjected to voltages > 30 V.

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




*5470153483*

### 5.16.2 TH winding thermostats

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

| | $V_{AC}$ | $V_{DC}$ | |
|---|---|---|---|
| Voltage V 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 | | | |

### 5.16.3 /KY temperature sensor (KTY84 – 130)

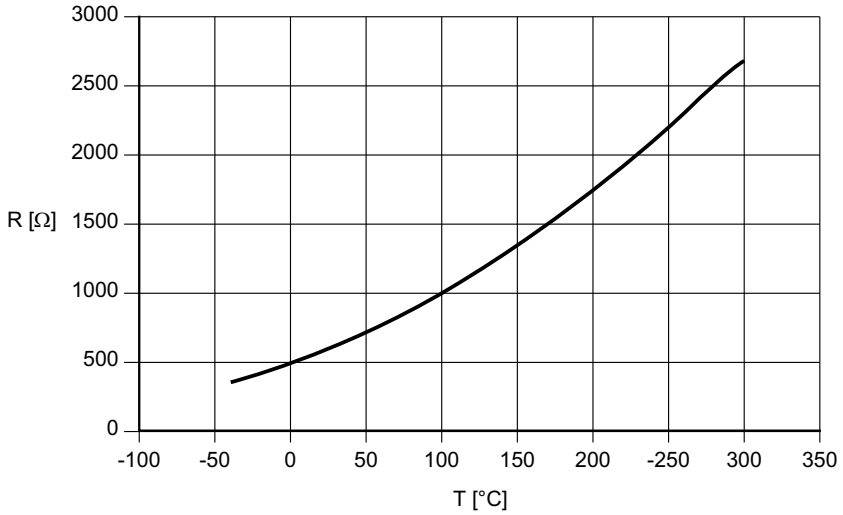
## NOTICE

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

The drive system might be damaged.

- Avoid currents > 4 mA in the circuit of the KTY.
- Observe the correct connection of KTY to ensure correct evaluation of the temperature sensor. Ensure correct polarity.

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 (+)<br>Blue (−) |
| Total resistance at 20 – 25 °C | 540 Ω < R < 640 Ω |
| Test current | < 3 mA |

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### 5.16.4 Temperature sensor /PT (PT100)

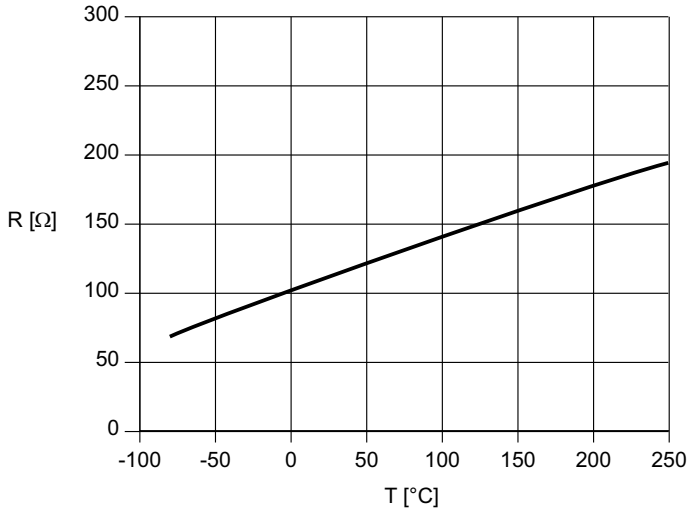
## NOTICE

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

The drive system might be damaged.

- Avoid currents > 4 mA in the circuit of the PT100.
- Observe the correct connection of PT100 to ensure correct evaluation of the temperature sensor. Ensure correct polarity.

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 Ω < R < 110 Ω |
| Test current | < 3 mA |

### 5.16.5 V forced cooling fan

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

| Motor size | Operating mode/connection | Frequency Hz | Voltage V |
|---|---|---|---|
| DR..71 – 132, DRN80 – 132S | 1 ~ AC[1] (△) | 50 | 100 – 127 |
| DR..71 – 132, DRN80 – 132S | 3 ~ AC ⅄ | 50 | 175 – 220 |
| DR..71 – 132, DRN80 – 132S | 3 ~ AC △ | 50 | 100 – 127 |
| DR..71 – 180, DRN80 – 180 | 1 ~ AC[1] (△) | 50 | 230 – 277 |
| DR..71 – 315, DRN80 – 315 | 3 ~ AC ⅄ | 50 | 346 – 500 |
| DR..71 – 315, DRN80 – 315 | 3 ~ AC △ | 50 | 200 – 290 |

1) Steinmetz circuit

| Motor size | Operating mode/connection | Frequency Hz | Voltage V |
|---|---|---|---|
| DR..71 – 132, DRN80 – 132S | 1 ~ AC[1] (△) | 60 | 100 – 135 |
| DR..71 – 132, DRN80 – 132S | 3 ~ AC ⅄ | 60 | 175 – 230 |
| DR..71 – 132, DRN80 – 132S | 3 ~ AC △ | 60 | 100 – 135 |
| DR..71 – 180, DRN80 – 180 | 1 ~ AC[1] (△) | 60 | 230 – 277 |
| DR..71 – 315, DRN80 – 315 | 3 ~ AC ⅄ | 60 | 380 – 575 |
| DR..71 – 315, DRN80 – 315 | 3 ~ AC △ | 60 | 220 – 330 |

1) Steinmetz circuit

| Motor size | Operating mode/connection | Voltage V |
|---|---|---|
| DR..71 – 132, DRN80 – 132S | DC 24 V | 24 |

## INFORMATION

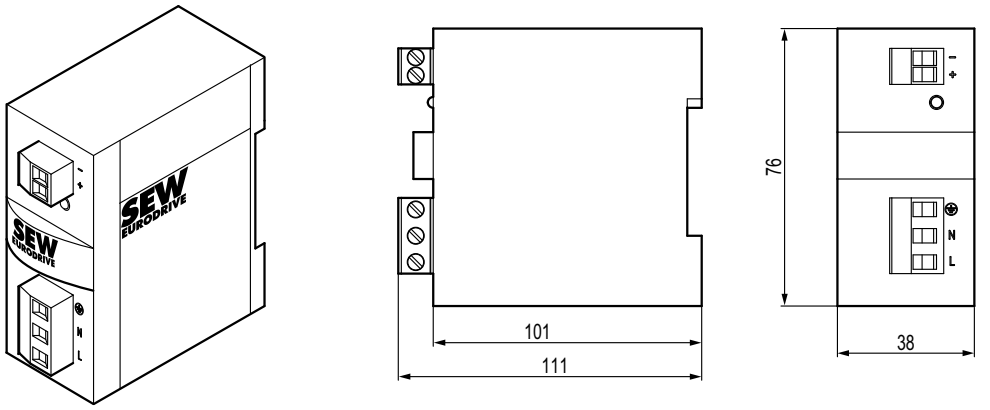
For information on how to connect the V forced cooling fan, refer to the wiring diagram (→ 🗎 205).

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### 5.16.6 UWU52A switched-mode power supply

The forced cooling fan type V for DC 24 V 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; attachment to EN 60715 TH35 mounting rail in the control cabinet |
| Part number: | 0188 1817 |

### 5.16.7 Overview of mount-on encoders

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

| Encoder | Motor size | Encoder type | Mounting type | Supply in $V_{DC}$ | Signal | Wiring diagram |
|---|---|---|---|---|---|---|
| ES7S | DR..71 – 132<br>DRN80 – 132S | Incremental | Shaft-centered | 7 – 30 | 1 $V_{ss}$ sin/cos | 68180xx08 |
| ES7R | DR..71 – 132<br>DRN80 – 132S | Incremental | Shaft-centered | 7 – 30 | TTL (RS422) | 68179xx08 |
| ES7C | DR..71 – 132<br>DRN80 – 132S | Incremental | Shaft-centered | 4.5 – 30 | HTL / TTL (RS422) | 68179xx08 |
| AS7W | DR..71 – 132<br>DRN80 – 132S | Absolute value | Shaft-centered | 7 – 30 | 1 $V_{ss}$ sin/cos | 68181xx08 |
| AS7Y | DR..71 – 132<br>DRN80 – 132S | Absolute value | Shaft-centered | 7 – 30 | 1 $V_{ss}$ sin/cos + SSI | 68182xx07 |
| EG7S | DR..160 – 280<br>DRN132M – 280 | Incremental | Shaft-centered | 7 – 30 | 1 $V_{ss}$ sin/cos | 68180xx08 |
| EG7R | DR..160 – 280<br>DRN132M – 280 | Incremental | Shaft-centered | 7 – 30 | TTL (RS422) | 68179xx08 |
| EG7C | DR..160 – 280<br>DRN132M – 280 | Incremental | Shaft-centered | 4.5 – 30 | HTL / TTL (RS422) | 68179 xx08 |
| AG7W | DR..160 – 280<br>DRN132M – 280 | Absolute value | Shaft-centered | 7 – 30 | 1 $V_{ss}$ sin/cos | 68181xx08 |
| AG7Y | DR..160 – 280<br>DRN132M – 280 | Absolute value | Shaft-centered | 7 – 30 | 1 $V_{ss}$ sin/cos + SSI | 68182xx07 |
| EH7S | DR..315<br>DRN315 | Incremental | Shaft-centered | 10 – 30 | 1 $V_{ss}$ sin/cos | 08511xx08 |
| EH7C | DR..315<br>DRN315 | Incremental | Shaft-centered | 10 – 30 | HTL | 08511xx08 |
| EH7R | DR..315<br>DRN315 | Incremental | Shaft-centered | 10 – 30 | TTL (RS422) | 08511xx08 |
| EH7T | DR..315<br>DRN315 | Incremental | Shaft-centered | 5 | TTL (RS422) | 08511xx08 |
| AH7Y | DR..315<br>DRN315 | Absolute value | Shaft-centered | 9 – 30 | TTL (RS422) +SSI | 08259xx07 |
| AV1H | DR..160 – 280<br>DRN132M – 280 | Absolute value | Flange centered | 7 – 12 | Hiperface® / 1 $V_{ss}$ sin/cos | – |
| AV1Y | DR..160 – 280<br>DRN132M – 280 | Absolute value | Flange centered | 10 – 30 | 1 $V_{ss}$ sin/cos + SSI | – |

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| En-coder | Motor size | Encoder type | Mounting type | Supply in $V_{DC}$ | Signal | Wiring diagram |
|---|---|---|---|---|---|---|
| EV2C | DR..160 – 280<br>DRN132M – 280 | Incremental | Flange centered | 9 – 26 | HTL | – |
| EV2S | DR..160 – 280<br>DRN132M – 280 | Incremental | Flange centered | 9 – 26 | 1 $V_{ss}$ sin/cos | – |
| EV2R | DR..160 – 280<br>DRN132M – 280 | Incremental | Flange centered | 9 – 26 | TTL (RS422) | – |
| EV2T | DR..160 – 280<br>DRN132M – 280 | Incremental | Flange centered | 5 | TTL (RS422) | – |

## 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

### 5.16.8 Overview of built-in encoders and visual feedback

## INFORMATION

For information on how to connect the built-in encoder, refer to the wiring diagram.

- Observe chapter "Wiring diagrams" for connection via terminal strip.
- Observe the enclosed wiring diagram for connection via M12 connectors.

| Encoder | Motor size | Supply in $V_{DC}$ | Signals |
|---|---|---|---|
| EI71[1)] | DR..71 – 132<br>DRN80 – 132S | 9 – 30 | HTL 1 period/revolution |
| EI72[1)] | | | HTL 2 periods/revolution |
| EI76[1)] | | | HTL 6 periods/revolution |
| EI7C[1)] | | | HTL 24 periods/revolution |

1) B in the type designation marks the unit generation of the encoder in the documentation. They are not indicated on the nameplate.

### 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 | |
|---|---|
| **Blinking 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 display 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 |

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### 5.16.9 Installation notes for encoders

When connecting the encoders to the inverters, observe the provided wiring diagrams and the information in these operating instructions as well as the operating instructions/wiring diagrams of the respective inverter and the operating instructions/wiring diagrams provided with the non-SEW encoder if applicable.

Proceed according to chapter "Motor and brake maintenance" to connect the encoders mechanically. Observe the following notes:

- Maximum line length (inverter to encoder):
  - 100 m with a capacitance per unit length conductor – shield ≤ 110 nF/km
  - 100 m with a capacitance per unit length conductor – conductor ≤ 85 nF/km
- Core cross section: 0.20 – 0.5 $mm^2$ recommendation ≥ 0.25 $mm^2$
- Use shielded cable with twisted pair conductors 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, keeping 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 level 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 during assembly.
- Tighten the screws of the connection cover with a tightening torque of 2 Nm.

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### 5.16.10 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 head 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

- Observe the safety notes in chapter 2 during installation.
- In case of problems, refer to the chapter "Malfunctions" (→ 🗎 185).

If the motor includes safety-relevant components, 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 strictly in accordance with the specifications in the operating instructions at hand and the respective addendum to the operating instructions. Else, the right to claim under warranty will become invalid.

### ⚠ WARNING



Risk of injury due to electric shock.

Severe or fatal injuries.

- Observe the following notes.
- 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 issued by the inverter manufacturer.
- Observe the operating instructions of the inverter.

### ⚠ CAUTION



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

Risk of burns.

- Let the motor cool down before you start your work.

### NOTICE

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

Possible damage to property.

- 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 the DR..250/280, DRN250/280 AC motor **with the BE brake and an encoder**, note the following:

- The brake must be used as a holding brake only.
- The brake may only be applied when the speed is ≤ 20 1/min. For higher speeds, please contact SEW-EURODRIVE.
- Emergency stops from a higher motor speed are allowed.

## 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 "Extended storage of motors" (→ 🗎 28) are performed after extended storage periods.
- All connections have to be 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.
- The lockable manual brake release is permitted.
- Loose elements like keys are appropriately secured.

## 6.2 Motors with reinforced bearing

## NOTICE

Bearings might be damaged due to missing overhung load.

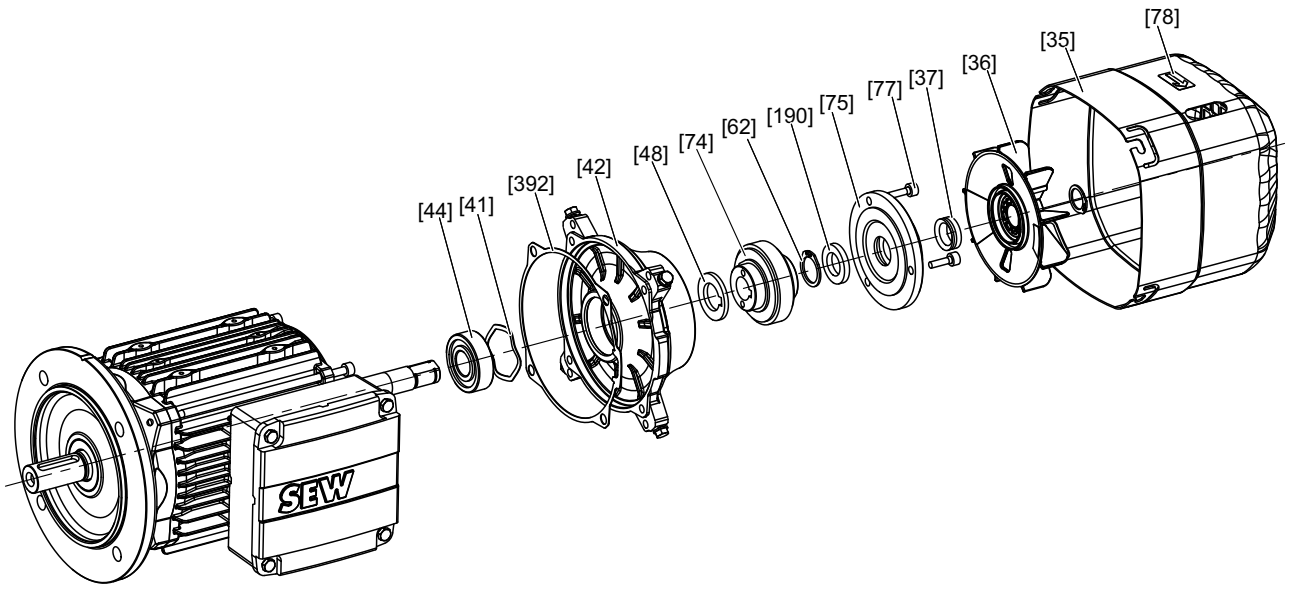
The drive system might be damaged.

- Do not operate cylindrical roller bearings without overhung load.

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## 6.3 Altering the blocking direction on motors with a backstop

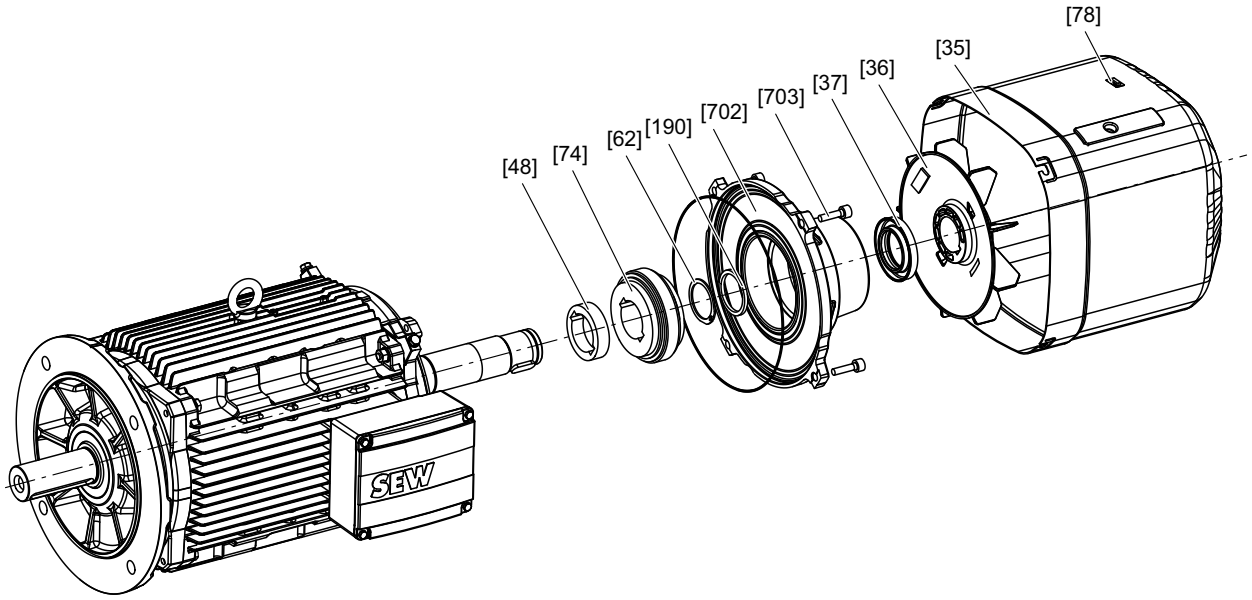
### 6.3.1 Basic structure of DR..71 – 80, DRN80 with backstop




*9007200397599243*

[35] Fan guard
[36] Fan
[37] Sealing ring
[41] Cup spring
[42] Backstop endshield
[44] Deep grooved ball bearing
[48] Spacing ring
[62] Retaining ring
[74] Sprag ring, complete
[75] Sealing flange
[77] Screw
[78] Label
[190] Felt ring
[392] Gasket

### 6.3.2 Basic structure of DR..90 – 315, DRN90 – 315 with backstop




*9007200397597323*

[35] Fan guard
[36] Fan
[37] Sealing ring
[48] Spacing ring
[62] Retaining ring
[74] Sprag ring, complete
[78] Label
[190] Felt ring
[702] Backstop housing, complete
[703] Cap screw

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### 6.3.3 Changing the blocking direction

A backstop is used to block/preclude 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 gearmotor 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 (ensure correct connection of power supply with motor). For inspection purposes, you can operate the backstop one time with half the motor voltage in the blocking direction:



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Before starting work, isolate the motor and, if installed, the forced cooling fan from the power supply.
- Safeguard against accidental startup.
- Carefully observe the following steps!

Proceed as follows to change the blocking direction:

1. Remove forced cooling fan and rotary encoder, if installed.

   See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103)
2. Remove flange cover or fan guard [35]
3. **For the DR..71 – 80, DRN80:** Remove the sealing flange [75].

   **For the DR../DRN90 – 315:** Completely remove the backstop housing [702].
4. Loosen the retaining ring [62].
5. Remove the sprag ring [74] via screws in the forcing threads or using a puller.
6. Spacing ring [48], if provided, remains installed.
7. Turn around the sprag ring [74], check the old grease and replace according to the specifications below and reinstall the sprag ring.
8. Install retaining ring [62].
9. **For the DR..71 – 80, DRN80:** Apply Hylomar to cover sealing flange [75] and install it. Replace felt ring [190] and sealing ring [37], if required.

   **For the DR../DRN90 – 315:** Replace seal [901], felt ring [190] and sealing ring [37], if required, and install the backstop housing [702].
10. Reinstall the removed parts.
11. Replace the label indicating the direction of rotation.

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### Lubricating the backstop

The backstop is greased at the factory with the corrosion protection low-viscosity grease Mobil LBZ. 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.. motor type | 71 | 80 | 90/100 | 112/132 | 160 | 180 | 200/225 | 250/280 | 315 |
|---|---|---|---|---|---|---|---|---|---|
| **Motor type DRN..** | **–** | **80** | **90/100** | **112/132S** | **132M/L** | **160/180** | **200/225** | **250/280** | **315** |
| Amount of grease in g | 9 | 11 | 15 | 20 | 30 | 45 | 80 | 80 | 120 |

The tolerance regarding the grease level is ± 30%.

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# 7 Inspection/maintenance



**⚠ WARNING**

Risk of crushing if the hoist falls or in the event of uncontrolled unit behavior.

Severe or fatal injuries.

- Secure or lower hoist drives (danger of falling)
- Safeguard and/or protect the driven machine against touching
- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Only use genuine spare parts in accordance with the valid spare parts list.
- Always install a new brake control system at the same time as replacing the brake coil.

If the motor includes safety-relevant components, 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. Else, the right to claim under warranty will become invalid.



**⚠ CAUTION**

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

Risk of burns.

- Let the motor cool down before you start your work.

**NOTICE**

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

Possible damage to the oil seals.

- For assembly, the ambient temperature and the oil seals themselves may not be colder than 0 °C.



**INFORMATION**

Apply grease with a grease depot (Klüber Petamo GHY133N) to the lip of the oil seal before assembly.



**INFORMATION**

Friction disks in the brakemotor may only be replaced by SEW-EURODRIVE service staff.

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

Before re-startup of the motor, make sure that all regulations are complied with and document this with a label on the motor or a written test report.

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:

| Unit / unit part | Time interval | What to do? |
|---|---|---|
| BE brake | • **If used as a working brake:**<br>At least every 3000 operating hours[1)]<br>• **If used as a holding brake:**<br>Every 2 to 4 years, depending on operating conditions[1)] | Brake inspection<br>• Measure the brake disk thickness<br>• Brake disk, lining<br>• Measure and adjust working air gap<br>• Pressure plate<br>• Driver/gearing<br>• Pressure rings<br>• Sucking off any abrasion<br>• Inspect the switch contacts and replace them, if necessary (e.g. in case of burn-out) |
| Motor | • **Every 10000 operating hours**[2) 3)] | Inspect the motor:<br>• Check rolling bearing and change if necessary.<br>• Replace the oil seal<br>• Clean cooling air ducts |
| Drive | • Different [3)] | • Touch up or renew the surface/corrosion protection<br>• Check and clean the air filter.<br>• if applicable, clean condensation drain hole at the bottom of the fan guard<br>• Clean clogged bores |

1) The amount of wear depends on many factors and may be high. The machine designer must calculate the required inspection/maintenance intervals individually in accordance with the project planning documents (e.g. "Project Planning for Drives").

2) For the DR../DRN250 – 315 with relubrication device, note the shortened relubrication periods in the chapter "Bearing lubrication DR../DRN250 – 315".

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.

### 7.1.1 Connection cables

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

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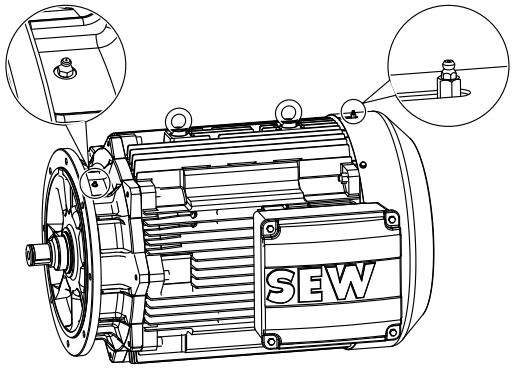
## 7.2 Bearing lubrication

### 7.2.1 Bearing lubrication DR..71 – 280, DRN80 – 280

In standard design, the bearings are lubricated for life.

### 7.2.2 Bearing lubrication DR..250 – 315, DRN250 – 315 with relubrication device /NS

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




*375353099*

[1] Lubrication device in type A in accordance with DIN 71412

Under normal operating conditions and at an ambient temperature between -20 °C to +40 °C, SEW-EURODRIVE uses ESSO 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**

You can purchase the lubricants in 400 g cartridges from SEW-EURODRIVE. Refer to chapter Order information for lubricants and anti-corrosion agents (→ 🗎 176) for order information.

## 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, ensure that the bearing is two-thirds full.

After relubricating the motors, you should startup slowly, if possible, so that the grease is distributed evenly.

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**Re-lubrication period**

The table below lists the bearing relubrication intervals for the following conditions:

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

At greater speeds, higher loads or higher ambient temperatures, the re-lubrication intervals are shorter. Use 1.5 times the quantity for the initial filling.

| | Horizontal mounting position | | Vertical mounting position | |
|---|---|---|---|---|
| **Motor type** | **Duration** | **Quantity** | **Duration** | **Quantity** |
| **DR../DRN250 – 315 /NS** | 5000 h | 50 g | 3000 h | 70 g |
| **DR../DRN250 – 315 /ERF /NS** | 3000 h | 50 g | 2000 h | 70 g |

## 7.3 Reinforced bearings

In the /ERF (reinforced bearings) option, cylindrical rolling bearings are installed on the A-side.

**NOTICE**

Bearings might be damaged due to missing overhung load.

The drive system might be damaged.

- Do not operate cylindrical roller bearings 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 DR..250 – 315, DRN250 – 315 with relubrication device / NS (→ 🗎 101).

## 7.4 Corrosion protection

If a drive is equipped with the /KS corrosion protection option and IP56 or IP66, you have to replace the Hylomar at the studs.

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## 7.5 Motor and brake maintenance – preliminary work

**⚠ WARNING**

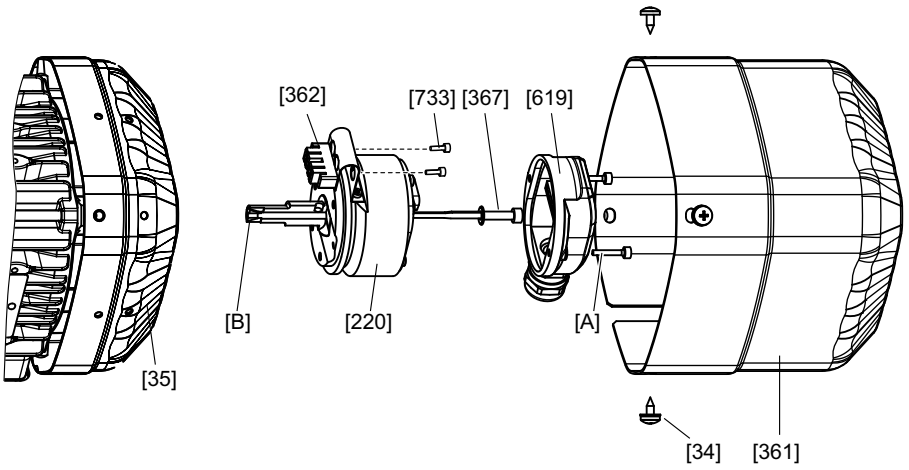
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Before starting work, isolate the motor, brake, and if installed, the forced cooling fan from the power supply.
- Safeguard against accidental startup.

### 7.5.1 Removing the rotary encoder from DR..71 – 132, DRN80 – 132S

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




*3475618443*

| | | | |
|---|---|---|---|
| [34] | Tapping screw | [367] | Retaining screw |
| [35] | Fan guard | [619] | Encoder cover |
| [220] | Encoder | [733] | Screws |
| [361] | Extended fan guard | [A] | Screws |
| [362] | Torque bracket | [B] | Cone |

**Removing ES7. and AS7. encoders**

1. Remove the cover [361].
2. Unscrew and remove the connection cover [619]. Do not disconnect the encoder connection cable.
3. Loosen screws [733].
4. Unscrew the central retaining screw [367] by about 2 to 3 turns and unfasten the spread shaft cone by tapping lightly on the screw head.

   Do not lose the cone [B].
5. Carefully remove the expansion anchor of the torque bracket [362] from the cover grid and the encoder form the rotor.

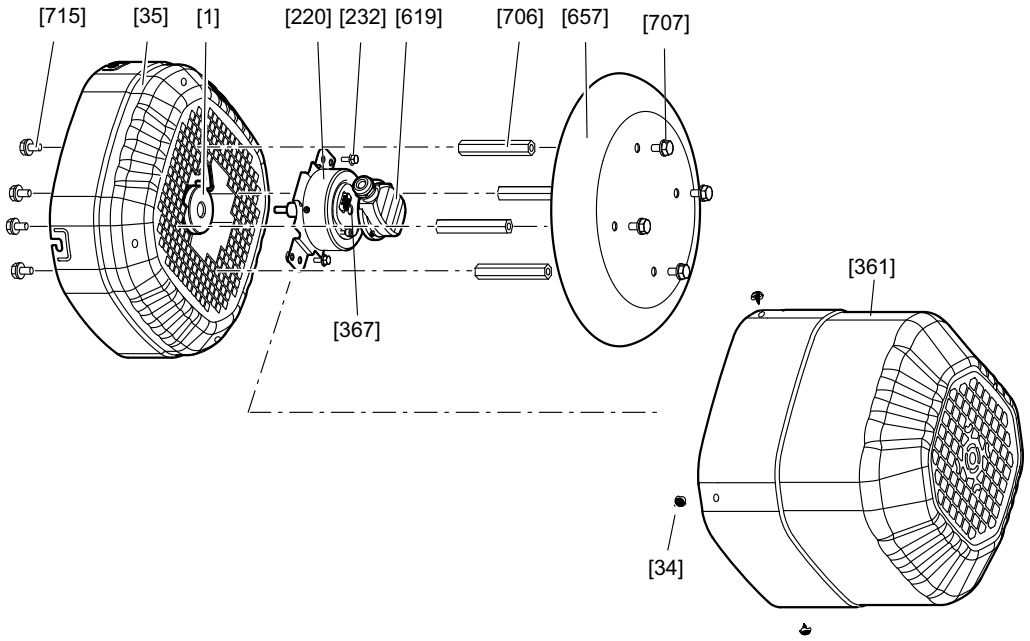
### Re-assembly

**Proceed as follows to re-assemble the encoder:**

1. Tighten the central retaining screw [367] with a tightening torque of 2.9 Nm.
2. Tighten the screw [733] in the expansion anchor with a tightening torque of max. 2.0 Nm.
3. Assemble the encoder cover [619] and tighten the screws [A] with a tightening torque of 2 Nm.
4. Install the extended fan guard [361] with the screws [34].

## 7.5.2 Removing the rotary encoder from DR..160 – 280, DRN132M – 280

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




*9007201646566283*

| | | | |
|---|---|---|---|
| [1] | Rotor | [367] | Retaining screw |
| [34] | Tapping screw | [619] | Connection cover |
| [35] | Fan guard | [657] | Canopy |
| [220] | Encoder | [706] | Spacer bolt |
| [232] | Screws | [707][715] | Screws |
| [361] | Extended fan guard | [A] | Screws |

### Removing EG7. and AG7. encoders

1. Loosen the screws [22] and remove the forced cooling fan guard [170].
2. Remove the cable grommet [269] with encoder cable from the forced cooling fan guard [170].
3. Loosen the screws [232] and [936] and remove the torque bracket [935].
4. Loosen the retaining screw [220] on the encoder and remove the encoder from the rotor [1].

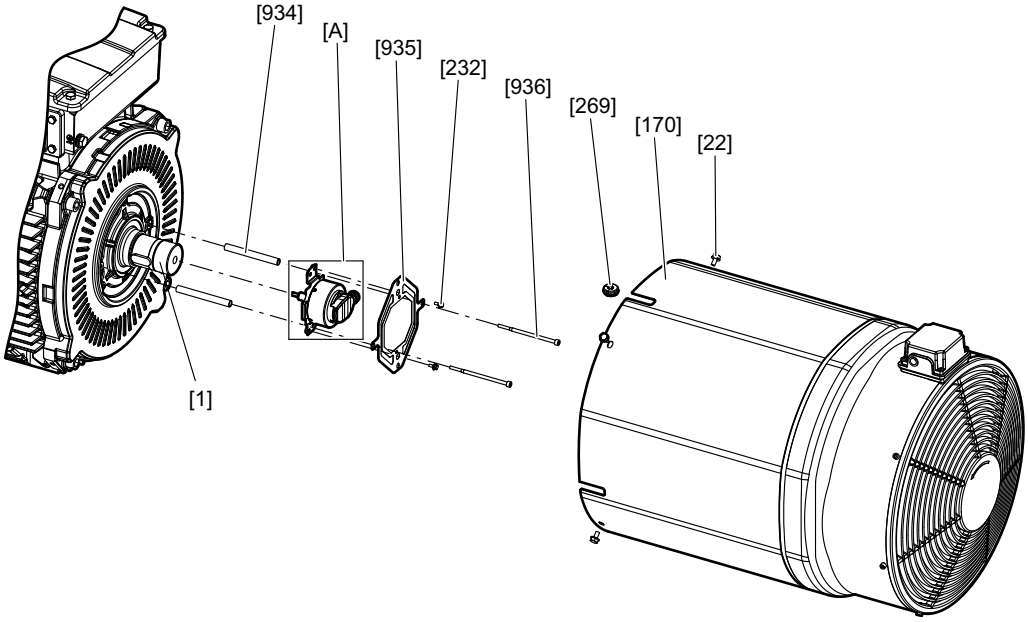
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**Re-assembly**

1. Place the encoder onto the rotor [1] and attach it with the central retaining screw of the encoder [A]. The tightening torque must be 8 Nm.
2. Place the torque bracket [935] on the spacing bushings [934] and tighten the screws [936] with 11 Nm.
3. Attach the torque bracket of the encoder [A] to the torque bracket [935] using the screws [232]. The tightening torque must be 6 Nm.
4. Pull the cable of the encoder [220] through the cable grommet [269]. Insert the cable grommet [269] into the forced cooling fan guard [170].
5. Mount the forced cooling fan guard [170] and tighten the screws [22] with 28 Nm.

### 7.5.3 Removing the rotary encoder from a DR..160 – 225, DRN132M – 315 motor with /V forced cooling fan option

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




*7715961995*

| | | | |
|---|---|---|---|
| [22] | Screw | [935] | Torque arm |
| [170] | Forced cooling fan guard | [936] | Screw |
| [232] | Screws | [934] | Spacer bushing |
| [269] | Grommet | [A] | Encoder |

**Removing EG7. and AG7. encoders**

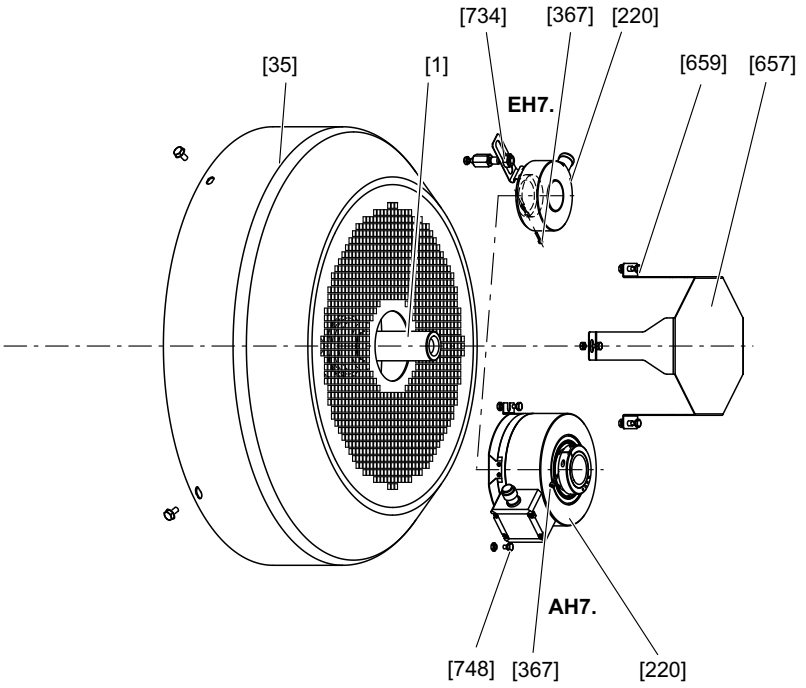
1. Loosen the screws [22] and remove the forced cooling fan guard [170].
2. Remove the cable grommet [269] with encoder cable from the forced cooling fan guard [170].
3. Loosen the screws [232] and [936] and remove the torque bracket [935].
4. Loosen the retaining screw [220] on the encoder and remove the encoder from the rotor [1].

**Re-assembly**

1. Place the encoder onto the rotor [1] and attach it with the central retaining screw of the encoder [A]. The tightening torque must be 8 Nm.
2. Place the torque bracket [935] on the spacing bushings [934] and tighten the screws [936] with 11 Nm.
3. Attach the torque bracket of the encoder [A] to the torque bracket [935] using the screws [232]. The tightening torque must be 6 Nm.
4. Pull the cable of the encoder [220] through the cable grommet [269]. Insert the cable grommet [269] into the forced cooling fan guard [170].
5. Mount the forced cooling fan guard [170] and tighten the screws [22] with 28 Nm.

### 7.5.4 Removing the rotary encoder from DR..315, DRN315

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




*9007199662370443*

| | | | |
|---|---|---|---|
| [35] | Fan guard | [659] | Screw |
| [220] | Encoder | [734] | Nut |
| [367] | Retaining screw | [748] | Screw |
| [657] | Cover plate | | |

**Removing EH7. encoders**

1. Remove the cover plate [657] by loosening the screws [659].
2. Separate the encoder [220] from the fan guard by loosening the nut [734].
3. Loosen the retaining screw [367] on the encoder and remove the encoder [220] from the rotor [1].

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### Removing AH7. encoders

1. Remove the protection cover [657] by loosening the screws [659].
2. Separate the encoder [220] from the fan guard by loosening the screws [748].
3. Loosen the retaining screw [367] on the encoder and remove the encoder [220] from the shaft.

### Re-assembly

1. Mount fan guard [35].
2. Push the encoder [220] on the shaft and fasten it with the retaining screw [367] applying a tightening torque according to the following table:

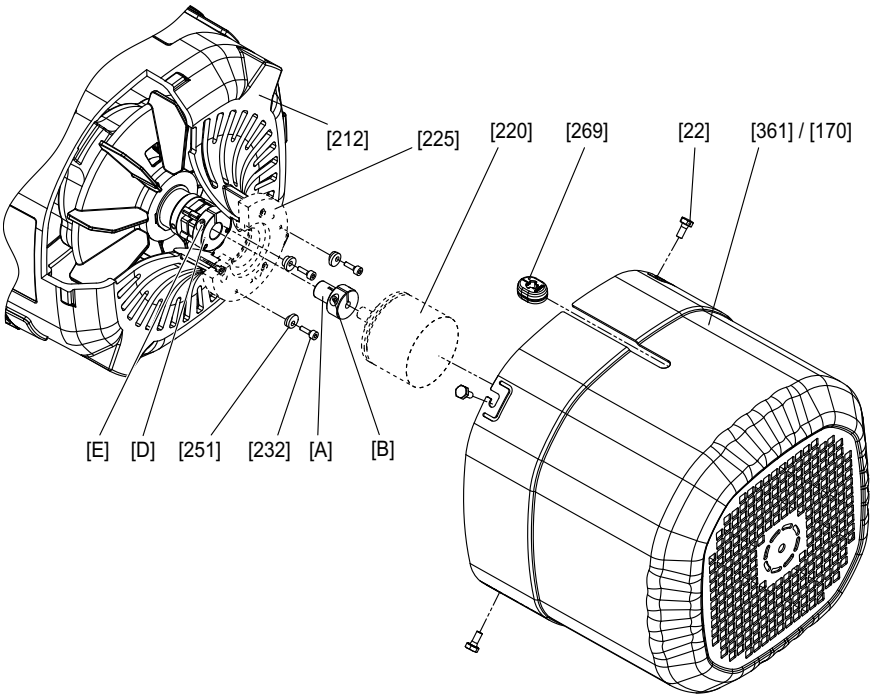
| Encoder | Tightening torque |
|---|---|
| EH7. | 0.7 Nm |
| AH7. | 3.0 Nm |

3. Install the screw [748] and the nut [734].
4. Install the cover plate [657].

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### 7.5.5 Mounting/removing the rotary encoder with XV.. mounting adapter for DR..71 – 225, DRN80 – 225

The following figure illustrates the disassembly procedure using a non-SEW encoder as an example:




*9007202887906699*

| | | | |
|---|---|---|---|
| [22] | Screw | [361] | Extended fan guard (normal/long) |
| [170] | Forced cooling fan guard | [269] | 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] | Screws (enclosed with XV1A and XV2A) | [E] | Clamping screw |
| [251] | Conical spring washers (enclosed with XV1A and XV2A) | | |

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

1. Remove the extended fan guard [361] or forced cooling fan guard [170] by loosening the screws [22].
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 the adapter [A] and the encoder [220].

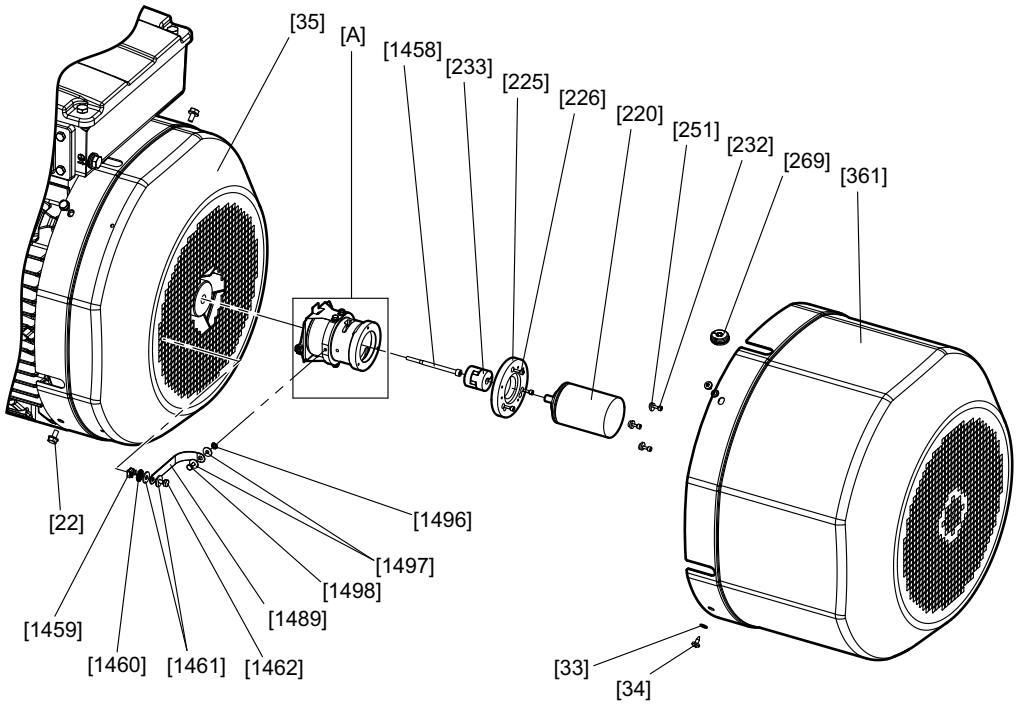
**Re-assembly**

1. Proceed according to chapter "Connecting XV.. encoder mounting adapter to DR..71 – 225, DRN80 – 225 motors (→ 🗎 34)" to mount the encoder.

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### 7.5.6 Mounting/removing the rotary encoder with EV../AV.. mounting adapter for DR..250 – 280, DRN250 – 280

The following figure illustrates the disassembly procedure using a non-SEW encoder as an example:




*9007206970704907*

| | | | |
|---|---|---|---|
| [22] | Screw | [361] | Extended fan guard (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] | Grommet | [A] | Encoder mounting adapter |

**Removing the encoder mounting adapter**

1. Loosen the screws [34] and washers [33] at the extended fan guard. Remove the extended fan guard [361].
2. Remove the encoder. For more details, see chapter "Removing the encoder." (→ 🗎 110)
3. Loosen the ground strap of the encoder mounting adapter [A] with serrated lock washer [1496], washers [1497], and screw [1498].
4. Loosen the screws [22] and remove the fan guard [35].

5. Loosen the encoder mounting adapter [A] with screw [1458] in the encoder bore of the rotor and remove it.

   If the encoder mounting adapter cannot easily be removed: Screw in an M6 set screw with 20 – 35 mm length into the rotor bore (bore for screw [1458]) and tighten it finger-tight. Screw in a set screw M8 with > 10 mm length or a screw M8 with min. 80 mm length into the same bore and push out the encoder mounting adapter [A] from the rotor [1]. Then remove the set screw M6 from the rotor again.

**Removing EV.., AV.. encoders**

1. Loosen the screws [34] and remove the extended fan guard [361].
2. Remove the cable grommet [269] with encoder cable from the extended fan guard [361].
3. Loosen the screws [232] and turn the conical spring washers of the encoder [220] outwards. Loosen the screw of the coupling clamping hub [233] on the encoder end through the slots in the encoder mounting adapter [A].
4. Remove the encoder [220] from the encoder mounting adapter [A] or intermediate flange [225].

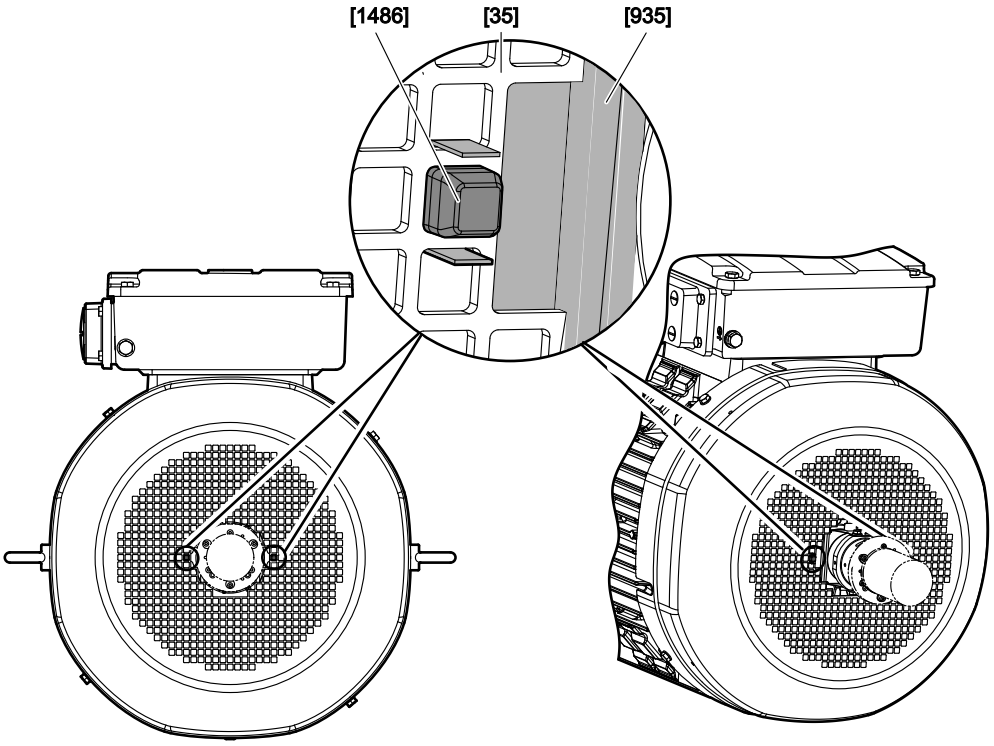
**Re-assembly**

1. Proceed according to chapter "Connecting EV../AV.. encoder mounting adapter to DR..250 – 280, DRN250 – 280 motors (→ 🖹 36)" 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.

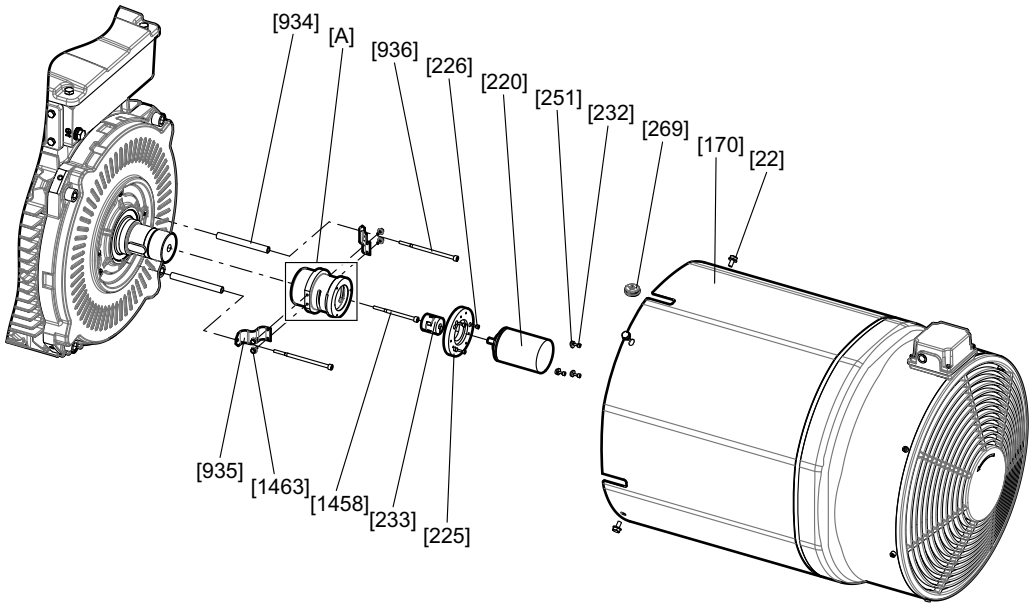



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### 7.5.7 Mounting/removing the rotary encoder with EV../AV../XV.. mounting adapter for DR..250 – 280, DRN250 – 280 with /V forced cooling fan option

The following figure illustrates the disassembly procedure using a non-SEW encoder as an example:




7715965835

| | | | |
|---|---|---|---|
| [22] | Screw | [269] | 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. Loosen the screws [22] and remove the forced cooling fan guard [170].
2. Remove the cable grommet [269] from the fan guard [170].
3. Loosen the screws [232] and turn the conical spring washers [251] to the side. Loosen the screw of the coupling clamping hub [233] on the encoder end and remove the encoder [220]. The intermediate flange [225] and screws [226] can remain at the encoder mounting adapter [A].
4. Loosen the screws [1458] and [936] and 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 [A] cannot easily be removed: Screw in a set screw M6 with 20 – 35 mm length into the rotor bore (bore for screw [1458]) and tighten it finger-tight. Screw in a set screw M8 with > 10 mm length or a screw M8 with min. 80 mm length into the same bore and push out the encoder mounting adapter [A] from the rotor [1]. Then remove the set screw M6 from the rotor again.

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

1. Loosen the screws [22] and remove the forced cooling fan guard [170].
2. Remove the cable grommet [269] with encoder cable from the forced cooling fan guard [170].
3. Turn the conical spring washers of the encoder [220] outwards and loosen the screws [232]. Loosen the screw of the coupling clamping hub [233] on the encoder end.
4. Remove the encoder [220] from the encoder mounting adapter [A] or intermediate flange [225].

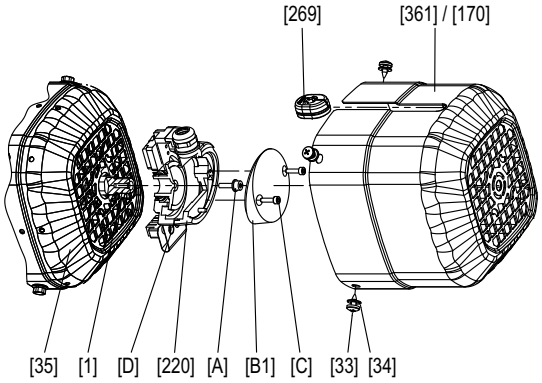
**Re-assembly**

1. Proceed as described in chapter "Installing the EV.A / AV.A encoder mounting adapter on DR..250 – 280, DRN250 – 280 motors" (→ 🗎 36) to mount the encoder.

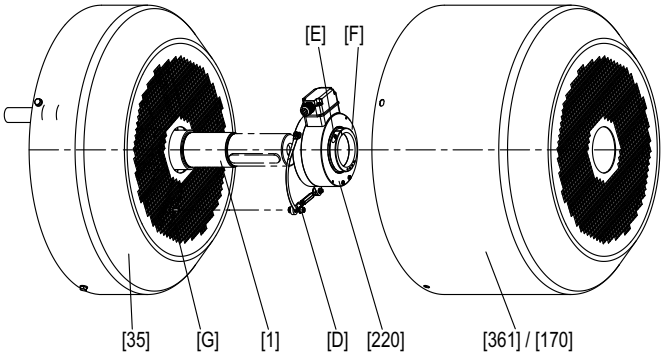
### 7.5.8 Installing/removing hollow shaft encoders from/to XH.. mounting adapter of DR..71 – 225, DRN80 – 225

The following figure illustrates the disassembly procedure using a non-SEW encoder as an example:

Encoder mounting via XH1A mounting adapter




Encoder mounting via XH7A and XH8A mounting adapter




*3633161867*

| | |
|---|---|
| [1] | Rotor |
| [33] | Tapping screw |
| [34] | Washer |
| [35] | Fan guard |
| [170] | Forced cooling fan guard |
| [220] | Encoder |
| [269] | Grommet |
| [361] | Extended fan guard |
| [A] | Retaining screw |
| [B] | Encoder cover |
| [C] | Screw for torque bracket |
| [D] | Nut of the torque bracket |
| [E] | Screw |
| [F] | Clamping ring |
| [G] | Nut of the torque bracket |

**Removing hollow shaft encoders from XH1A mounting adapter**

1. Remove cover [361] or forced cooling fan guard [170].
2. Loosen encoder cover [B] via screws [C].
3. Remove screw [A].
4. Loosen screw and nut of the torque bracket [D] and remove torque arm.
5. Remove encoder [220] from rotor [1].

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**Removing hollow shaft encoders from XH7A and XH8A mounting adapter**

1. Remove cover [361] or forced cooling fan guard [170].
2. Loosen screw [E] on clamping ring [F].
3. Remove nut of torque bracket [G].
4. Remove encoder [220] from rotor [1].

**Reinstalling hollow shaft encoders to XH1A mounting adapter**

1. Push encoder [220] on rotor [1].
2. Mount torque bracket via screws [D].
3. Fasten the encoder [220] via screw [A] with a tightening torque of 2.9 Nm.
4. Fasten encoder cover [B] via screws [C] with a tightening torque of 3 Nm.
5. Install cover [361] or forced cooling fan guard [170].

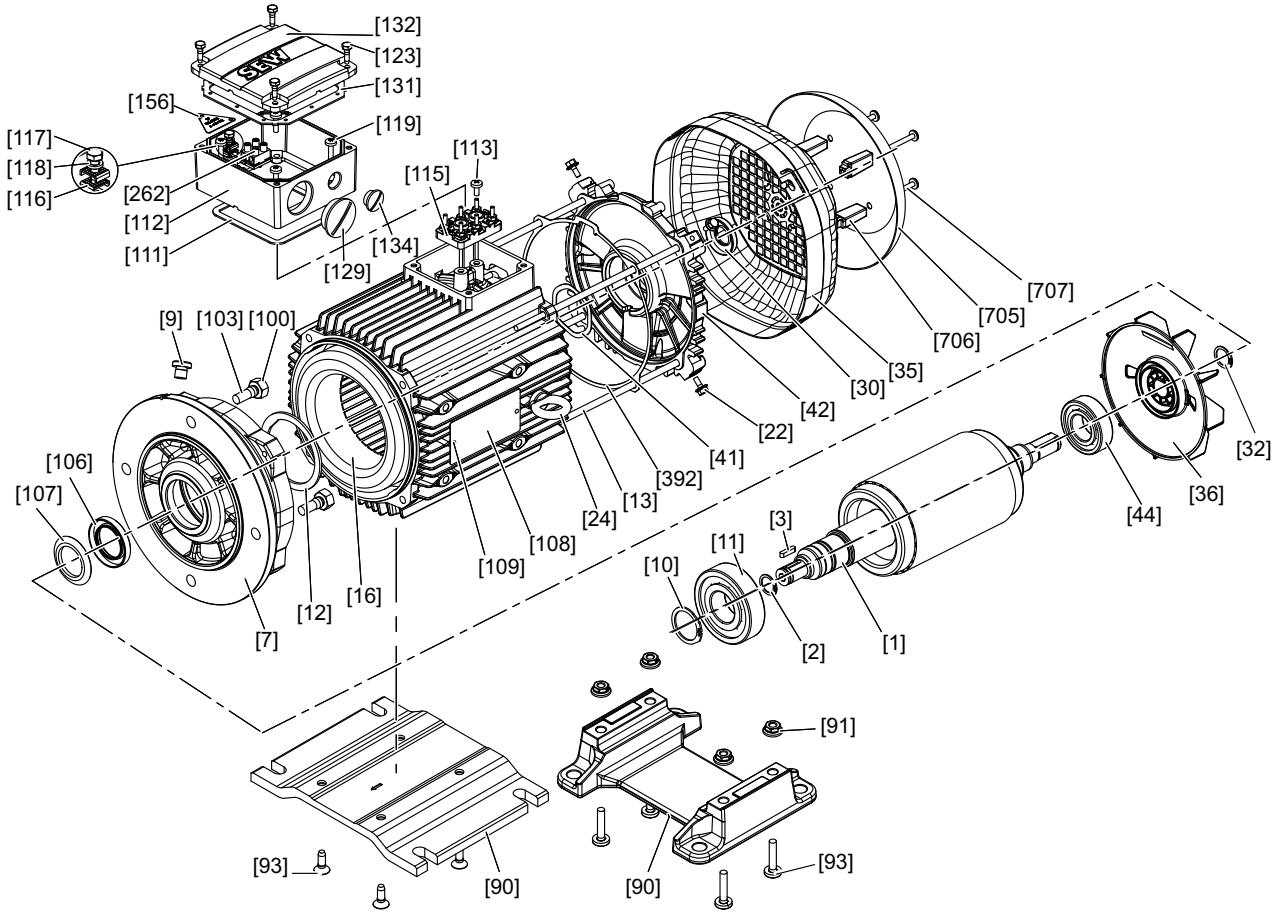
**Reinstalling hollow shaft encoders to XH7A and XH8A mounting adapter**

1. Push encoder [220] on rotor [1].
2. Mount torque bracket via nut [D] with a tightening torque of 10.3 Nm.
3. Fasten clamping ring [F] via screw [E] with a tightening torque of 5 Nm.
4. Install cover [361] or forced cooling fan guard [170].

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## 7.6 Inspection/maintenance of DR..71 – 315, DRN80 – 315 motors

### 7.6.1 Basic structure of DR..71 – 132/DRN80 – 132S

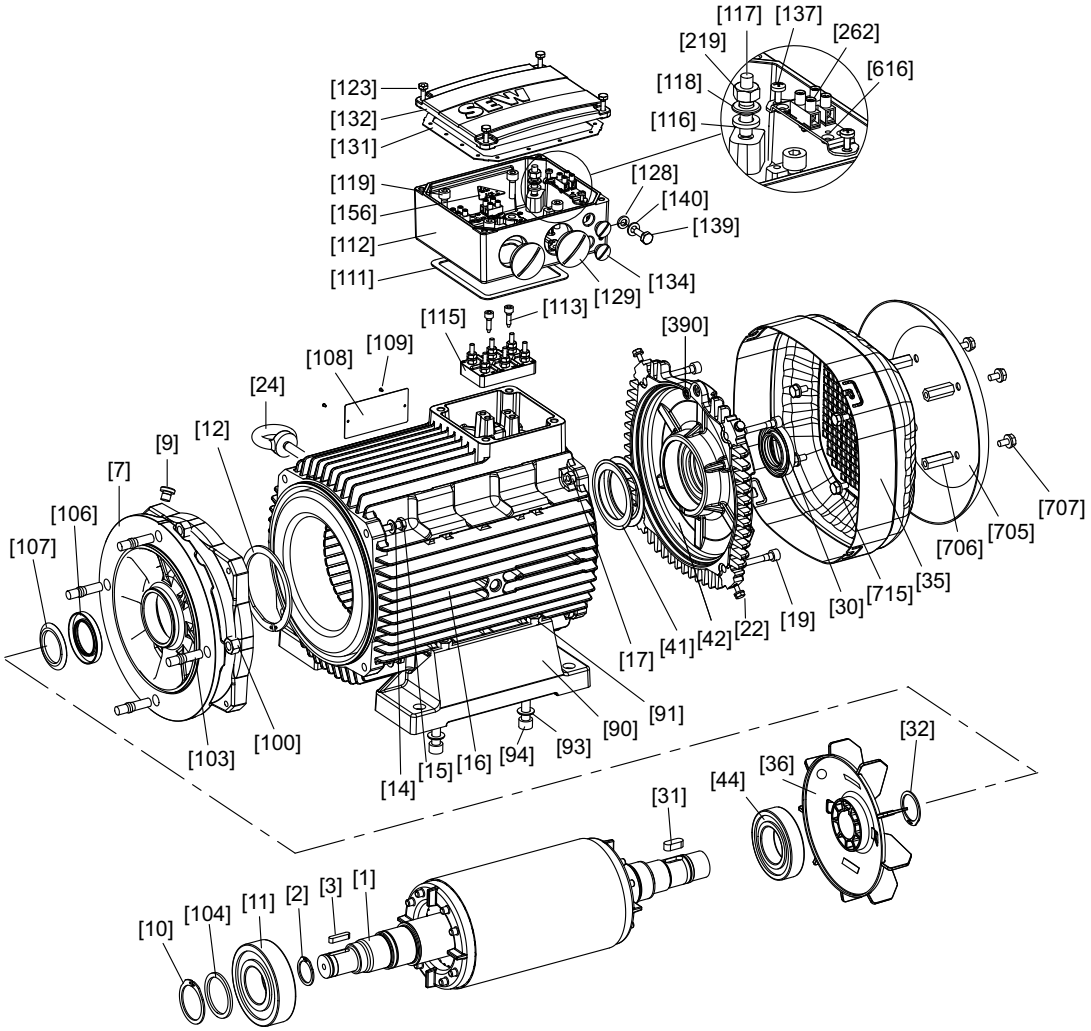



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [1] | Rotor | [30] | Oil seal | [106] | Oil seal | [123] | Hex head screw |
| [2] | Retaining ring | [32] | Retaining ring | [107] | Oil flinger | [129] | Screw plug with O-ring |
| [3] | Key | [35] | Fan guard | [108] | Nameplate | [131] | Gasket for cover |
| [7] | Flanged endshield | [36] | Fan | [109] | Grooved pin | [132] | Terminal box cover |
| [9] | Screw plug | [41] | Shim washer | [111] | Gasket for lower part | [134] | Screw plug with O-ring |
| [10] | Retaining ring | [42] | B-side endshield | [112] | Terminal box lower part | [156] | Information sign |
| [11] | Deep groove ball bearing | [44] | Deep groove ball bearing | [113] | Pan head screw | [262] | Connection terminal, complete |
| [12] | Retaining ring | [90] | Bed plate | [115] | Terminal board | [392] | Gasket |
| [13] | Cap screw | [91] | Hex nut | [116] | Terminal yoke | [705] | Canopy |
| [16] | Stator | [93] | Pan head screw | [117] | Hex head screw | [706] | Spacer |
| [22] | Hex head screw | [100] | Hex nut | [118] | Lock washer | [707] | Pan head screw |
| [24] | Eyebolt | [103] | Stud | [119] | Pan head screw | | |

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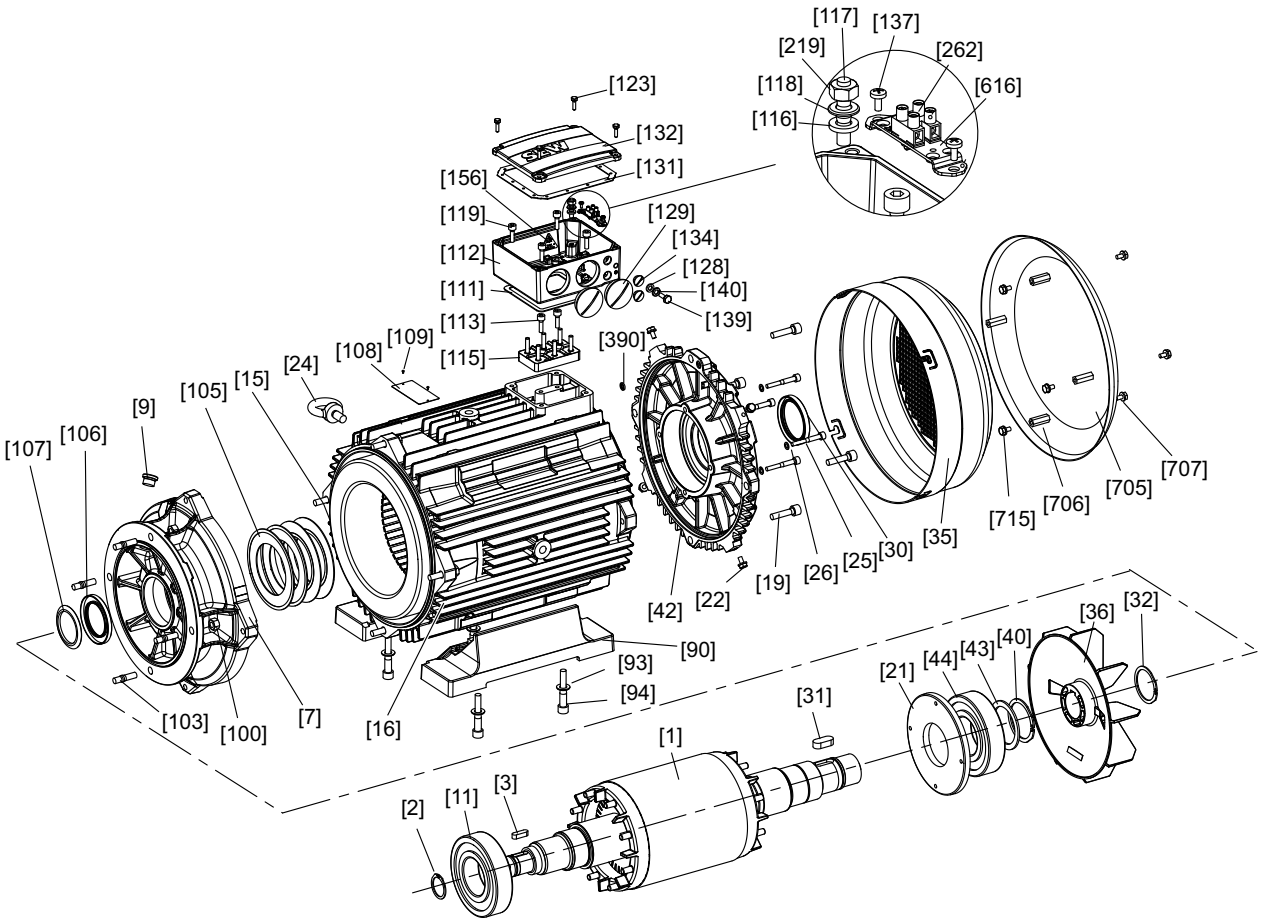
### 7.6.2 Basic structure of DR..160 – 180, DRN132M – 180




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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [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 | | | | |

### 7.6.3 Basic structure of DR..200 – 225, DRN200 – 225

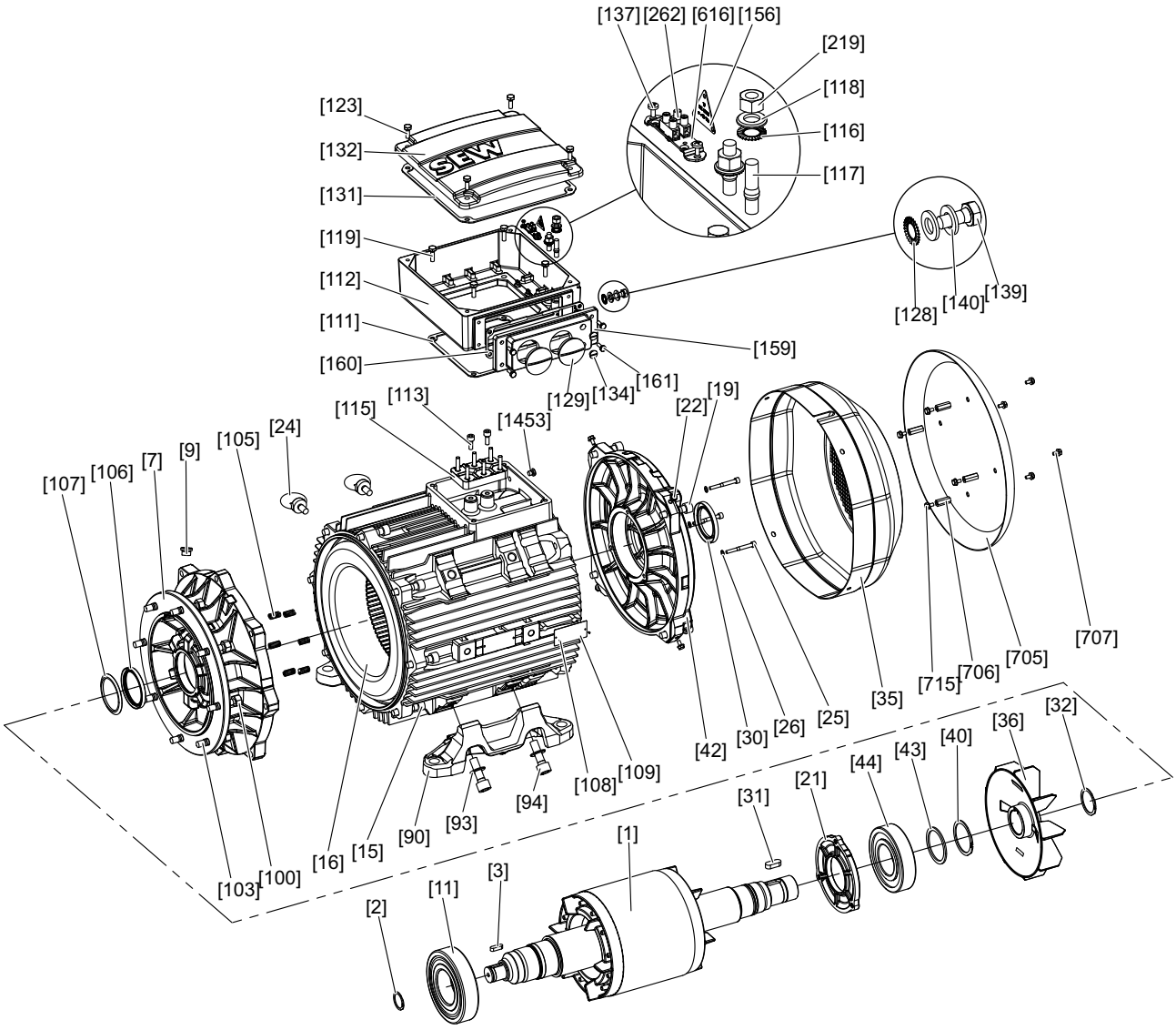



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [1] | Rotor | [31] | Key | [107] | Oil flinger | [132] | Terminal box cover |
| [2] | Retaining ring | [32] | Retaining ring | [108] | Nameplate | [134] | Screw plug |
| [3] | Key | [35] | Fan guard | [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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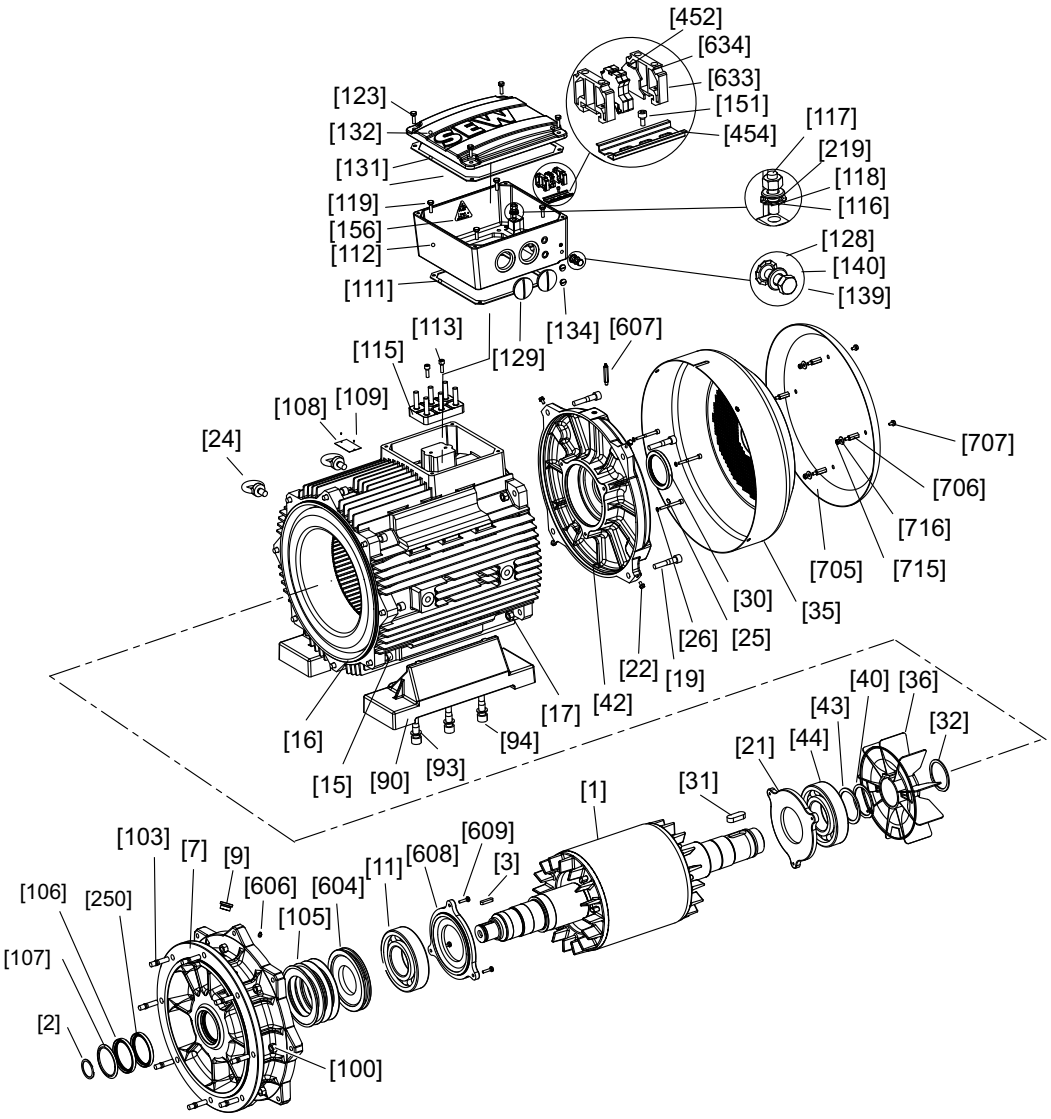
### 7.6.4 Basic structure of DR..250 – 280, DRN250 – 280




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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [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 gasket |
| [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 | [705] | Canopy |
| [24] | Eyebolt | [103] | Stud | [128] | Serrated lock washer | [706] | Spacer bolt |
| [25] | Cap screw | [105] | Compression spring | [129] | Screw plug | [707] | Hex head screw |
| [26] | Shield ring | [106] | Oil seal | [131] | Gasket for cover | [715] | Hex head screw |
| [30] | Oil seal | [107] | Oil flinger | [132] | Terminal box cover | [1453] | Screw plug |
| [31] | Key | | | | | | |

### 7.6.5 Basic structure of DR..315, DRN315




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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [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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### 7.6.6 Inspection steps for DR..71 – 315, DRN80 – 315 motors



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove forced cooling fan and rotary encoder, if installed.

   See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103).
2. With gearmotors: Remove the motor from the gear unit.

   Remove pinion and oil flinger [107].
3. Remove fan guard [35] and fan [36].
4. Remove stator:
   - **Size DR..71 – 132, DRN80 – 132S:** Remove cap screws [13] from flanged endshield [7] and B-side endshield [42]. Remove stator [16] from flanged endshield [7].
   - **Size DR..160 – 180, DRN132M – 180:** Loosen cap screws [19] and remove B-side endshield [42]. Loosen hex head screw [15] and remove stator from flanged endshield.
   - **Size DR..200 – 225, DRN200 – 225**
   – Loosen hex head screw [15] and remove the flanged endshield [7] from the stator.
   – Loosen cap screws [19] and remove the complete rotor [1] together with the B-side endshield [42].
   – Loosen cap screws [25] and remove the complete rotor [1] from the B-side endshield [42].
   - **Size DR..250 – 280, DRN250 – 280 without** /ERF or /NS option
   – Loosen cap screws [15] and remove the flange [7].
   – Loosen cap screws [19] and remove the B-side endshield [42] together with the rotor [1].
   – Loosen cap screws [25] and remove the B-side endshield [42] from the rotor [1].
   - **Size DR..250 – 280, DRN250 – 280** with /ERF or /NS option or **DR../DRN315**
   – Unfasten cap screws [19] and [25], and remove B-side 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].
   – Before disassembly, preferably protect the oil seal seat from damage using adhesive tape or a protective sleeve.
5. Visual inspection: Are there traces of gear oil or moisture inside the stator?
   - If not, proceed with step 8.
   - If there is moisture, proceed with step 6.
   - If there is gear oil, have the motor repaired by a specialist workshop

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6. If there is moisture inside the stator:
   - With gearmotors: Remove the motor from the gear unit.
   - With motors without a gear unit: Remove A-flange.
   - Remove the rotor [1].
7. Clean the winding, dry it and check it electrically (see chapter "Drying the motor" (→ 🗎 28)).
8. Replace the rolling bearing [11], [44] with permitted rolling bearing types.

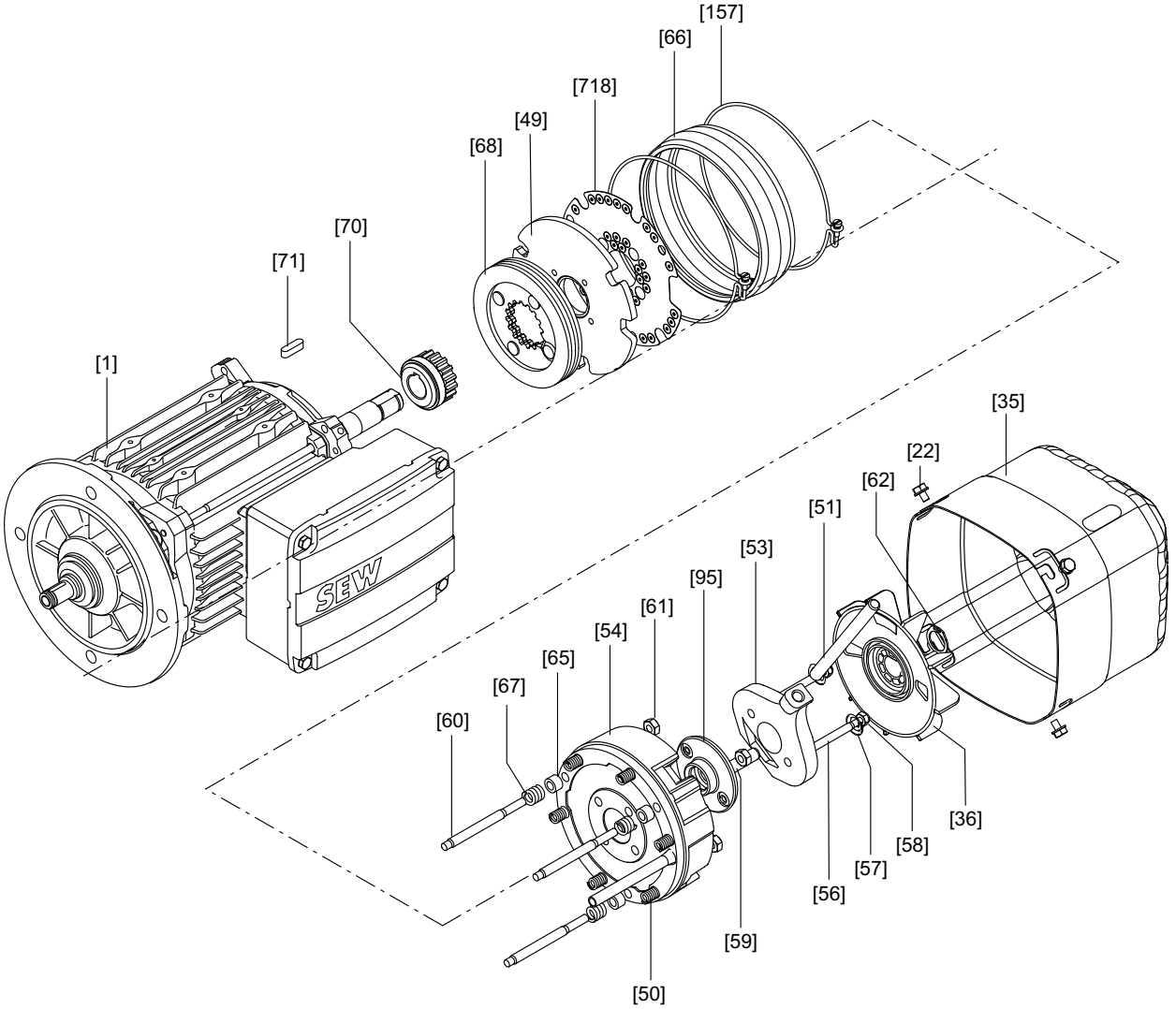
   See chapter "Permitted rolling bearing types" (→ 🗎 174).
9. **DR..250 – 280, DRN250 – 280 with** /ERF or /NS option or **DR../DRN315**
   - Fill the rolling bearing with grease until it is two thirds full. See chapter "Bearing lubrication" (→ 🗎 101).
   - Note: Place the oil seal flange [608] and [21] onto the rotor shaft before installing the bearings.
   - Starting on the A-side, mount the motor vertically.
   - 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 into the flange [7].
   - Fasten the oil seal flange [608] to the flange [7] using the hex head bolts [609].
10. 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).
11. Reseal the stator seat:
    - Seal the sealing surface with duroplastic sealing compound (operating temperature -40 to +180 °C), such as "SEW L Spezial".
    - For sizes **DR..71 – 132, DRN80 – 132S**: Replace sealing [392].
    - For sizes **DR..71 – 132, DRN80 – 132S**: Change O-ring [1480] if it is deformed or damaged. As an alternative, use e.g. "SEW L Spezial" instead of the O-ring.
12. Install the motor and optional equipment.

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## 7.7 Inspection/maintenance of DR..71 – 315, DRN80 – 315 brakemotors

### 7.7.1 Basic structure of DR..71 – 80, DRN80 brakemotors

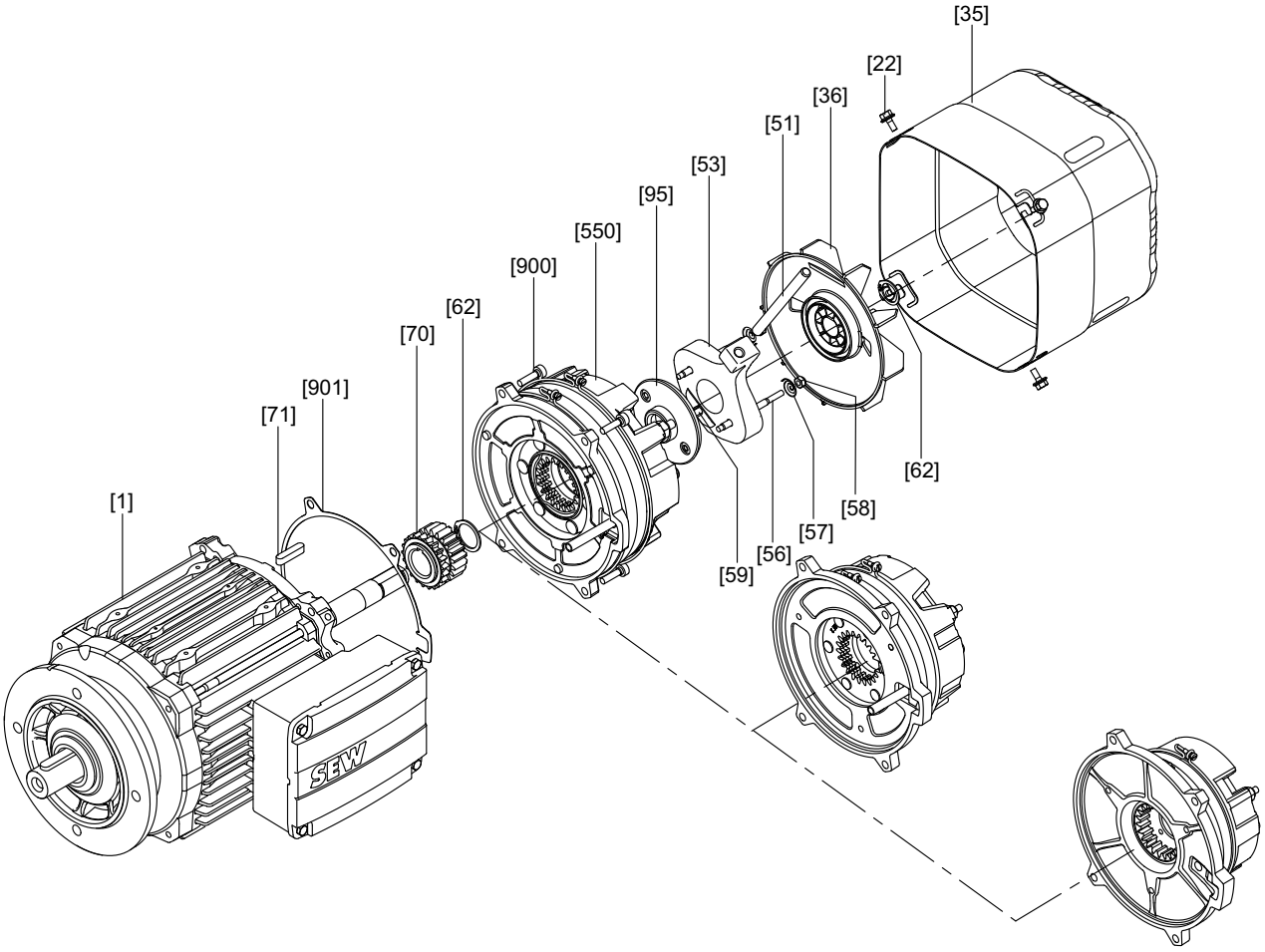



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| | | | | | |
|---|---|---|---|---|---|
| [1] | Motor with brake endshield | [54] | Magnet body, complete | [67] | Counter spring |
| [22] | Hex head screw | [56] | Stud | [68] | Brake disk |
| [35] | Fan guard | [57] | Conical spring | [62] | Retaining ring |
| [36] | Fan | [58] | Adjusting nut | [70] | Driver |
| [49] | Pressure plate | [59] | Parallel pin | [71] | Key |
| [50] | Brake spring | [60] | Stud 3x | [95] | Sealing ring |
| [11] | Complete magnet body | [61] | Hex nut | [718] | Damping plate |
| [51] | Hand lever | [65] | Pressure ring | | |
| [53] | Releasing lever | [66] | Sealing strip | | |

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

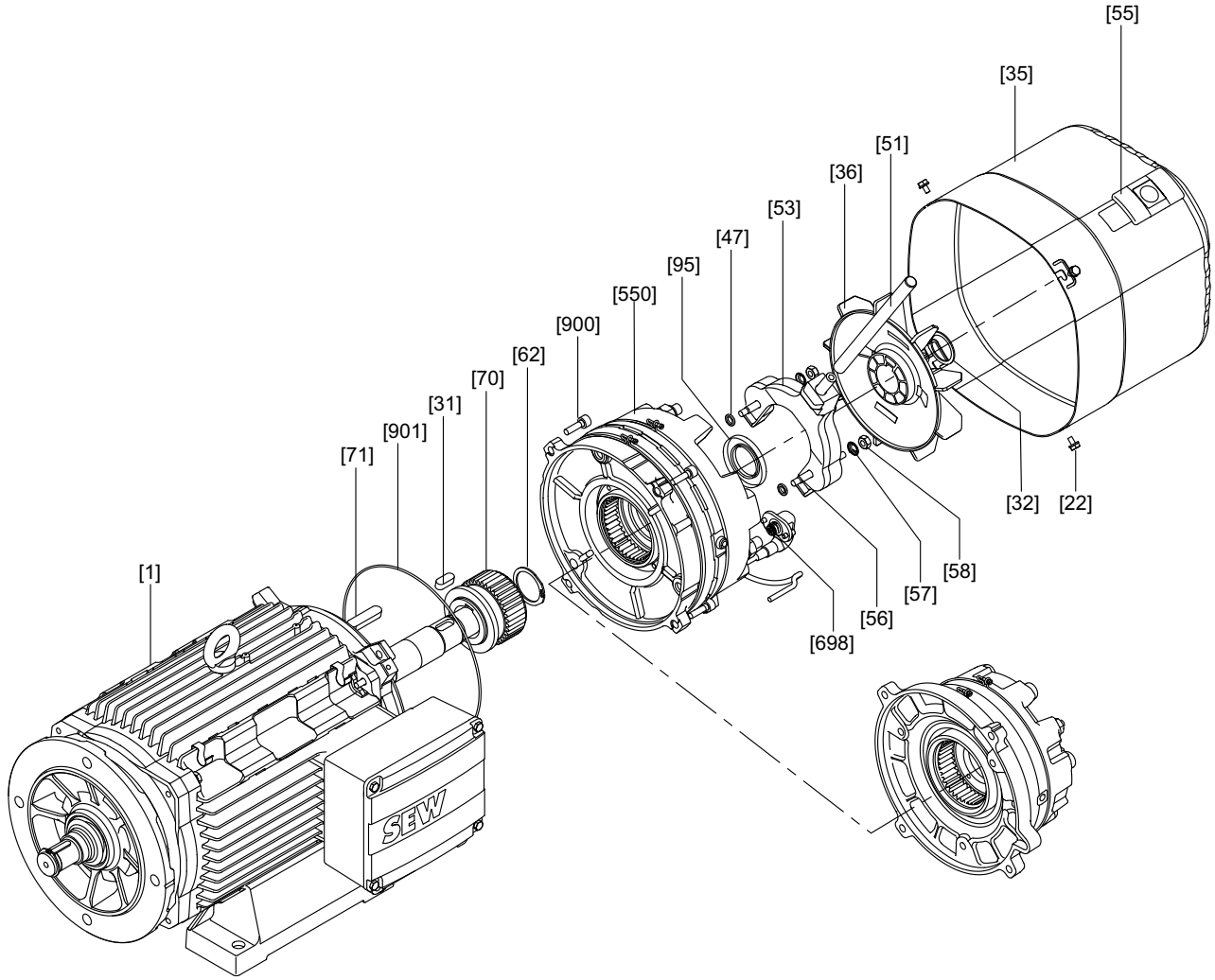



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| | | | | | |
|---|---|---|---|---|---|
| [1] | Motor with brake endshield | [53] | Releasing lever | [70] | Driver |
| [22] | Hex head screw | [56] | Stud | [71] | Key |
| [32] | Retaining ring | [57] | Conical spring | [95] | Sealing ring |
| [35] | Fan guard | [58] | Adjusting nut | [550] | Pre-assembled brake |
| [36] | Fan | [59] | Parallel pin | [900] | Screw |
| [51] | Hand lever | [62] | Retaining ring | [901] | Gasket |

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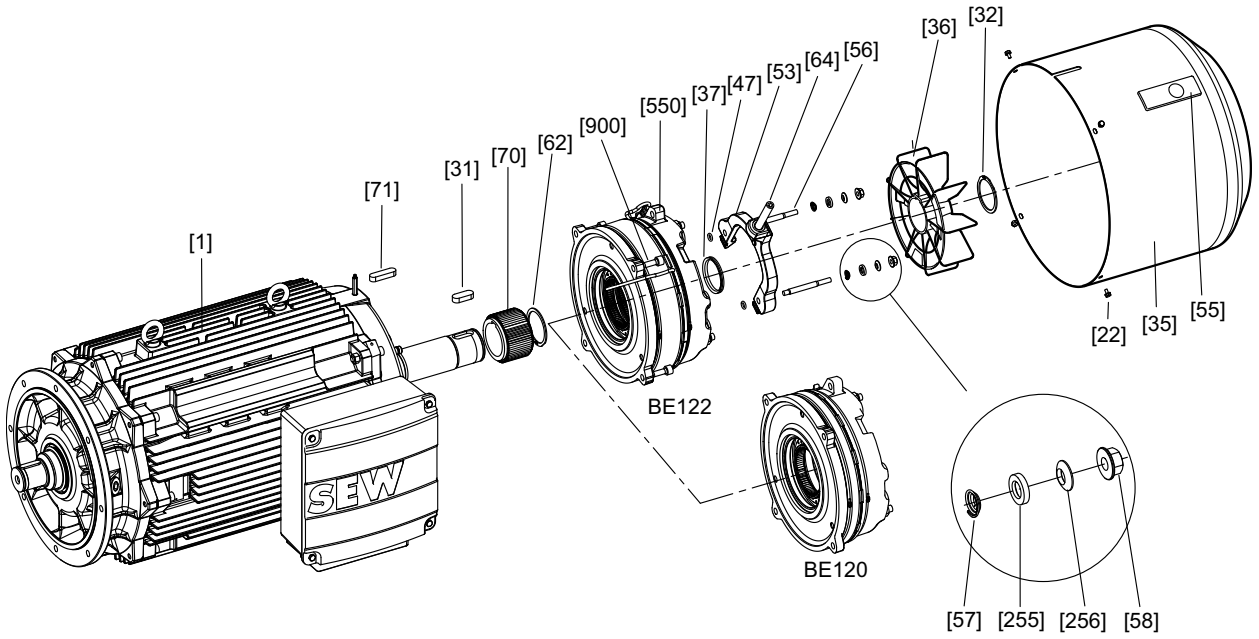
### 7.7.3 Basic structure of DR..160 – 280, DRN132M – 280 brakemotors




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| | | | | | |
|---|---|---|---|---|---|
| [1] | Motor with brake endshield | [51] | Hand lever | [70] | Driver |
| [22] | Hex head screw | [53] | Releasing lever | [71] | Key |
| [31] | Key | [55] | Closing piece | [95] | Sealing ring |
| [32] | Retaining ring | [56] | Stud | [550] | Pre-assembled brake |
| [35] | Fan guard | [57] | Conical spring | [698] | Connector complete (only for BE20 – BE122) |
| [36] | Fan | [58] | Adjusting nut | [900] | Screw |
| [47] | O-ring | [62] | Retaining ring | [901] | O-ring |

### 7.7.4 DR.315 brakemotor – basic structure




| | | | | | |
|---|---|---|---|---|---|
| [1] | Motor with brake endshield | [53] | Releasing lever | [71] | Key |
| [22] | Hex head screw | [55] | Closing piece | [255] | Conical seat |
| [31] | Key | [56] | Stud | [256] | Spherical washer |
| [32] | Retaining ring | [57] | Conical spring | [550] | Pre-assembled brake |
| [35] | Fan guard | [58] | Adjusting nut | [900] | Screw |
| [36] | Fan | [62] | Retaining ring | [901] | Gasket |
| [37] | V-ring | [64] | Set screw | | |
| [47] | O-ring | [70] | Driver | | |

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### 7.7.5 Inspection steps for DR..71 – 315, DRN80 – 315 brakemotors



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove forced cooling fan and rotary encoder, if installed.

   See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103).
2. With gearmotors: Remove the motor from the gear unit.

   Remove pinion and oil flinger [107].
3. Remove fan guard [35] and fan [36].
4. Remove stator:
   - **Size DR..71 – 132, DRN80 – 132S:** Remove cap screws [13] from flanged endshield [7] and B-side endshield [42]. Remove stator [16] from flanged endshield [7].
   - **Size DR..160 – 180, DRN132M – 180:** Loosen cap screws [19] and remove B-side endshield [42]. Loosen hex head screw [15] and remove stator from flanged endshield.
   - **Size DR..200 – 225, DRN200 – 225**
   – Loosen hex head screw [15] and remove the flanged endshield [7] from the stator.
   – Loosen cap screws [19] and remove the complete rotor [1] together with the B-side endshield [42].
   – Loosen cap screws [25] and remove the complete rotor [1] from the B-side endshield [42].
   - **Size DR..250 – 280, DRN250 – 280 without** /ERF or /NS option
   – Loosen cap screws [15] and remove the flange [7].
   – Loosen cap screws [19] and remove the B-side endshield [42] together with the rotor [1].
   – Loosen cap screws [25] and remove the B-side endshield [42] from the rotor [1].
   - **Size DR..250 – 280, DRN250 – 280** with /ERF or /NS option or **DR../DRN315**
   – Unfasten cap screws [19] and [25], and remove B-side 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].
   – Before disassembly, preferably protect the oil seal seat from damage using adhesive tape or a protective sleeve.
5. Remove the brake cable:
   - **BE05 – 11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – 122:** Loosen safety screws of the brake plug connector [698] and remove plug connector.

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6. Push the brake off the stator and carefully lift it off.
7. Pull the stator back by about 3 to 4 cm.
8. Visual inspection: Are there traces of gear oil or moisture inside the stator?
   - If not, proceed with step 11.
   - If there is moisture, proceed with step 9.
   - If there is gear oil, have the motor repaired by a specialist workshop
9. If there is moisture inside the stator:
   - With gearmotors: Remove the motor from the gear unit
   - With motors without a gear unit: Remove A-flange
   - Remove the rotor [1]
10. Clean the winding, dry it and check it electrically (see chapter "Drying the motor" (→ 🗎 28)).
11. Replace the rolling bearing [11], [44] with permitted rolling bearing types.

    See chapter "Permitted rolling bearing types" (→ 🗎 174).
12. **DR..250 – 280, DRN250 – 280 with** /ERF or /NS option or **DR../DRN315**
    - Fill the rolling bearing with grease until it is two thirds full. See chapter "Bearing lubrication" (→ 🗎 101).
    - Note: Place the oil seal flange [608] and [21] onto the rotor shaft before installing the bearings.
    - Starting on the A-side, mount the motor vertically.
    - 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 into the flange [7].
    - Fasten the oil seal flange [608] to the flange [7] using the hex head bolts [609].
    - Screw in the stator [16] and flange [7] with screws [15].

      Note: Protect the winding overhang from damage.
    - Before mounting the B-side endshield, screw in the M8 set screw approximately 200 mm into the oil seal flange [21].
    - Before mounting the B-side endshield [42], feed the set screw in through a bore for the screw [25]. Screw B-side 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].
    - Renew oil seals
    – A-side: Replace oil seals [106], for gearmotors replace the oil flinger [107] and oil seal [250].

      With gearmotors, fill about two-thirds of the space between the two oil seals with suitable grease. See chapter Order information for lubricants and anti-corrosion agents (→ 🗎 176).
    – B-side: Insert the oil seal [30], and coat the sealing lip with the same grease.
13. Reseal the shaft:
    - A-side: Replace the oil seal [106]
    - B-side: Replace the oil seal [30]

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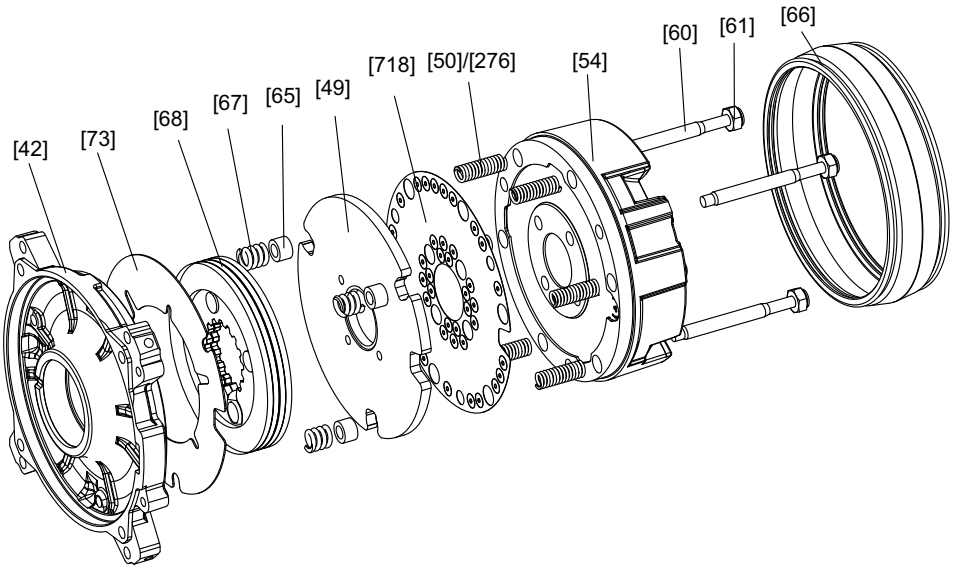
Apply suitable grease to the sealing lip. See chapter Order information for lubricants and anti-corrosion agents (→ 🗎 176).

14. Reseal the stator seat:
    - Seal the sealing surface with duroplastic sealing compound

      (operating temperature –40 °C to +180 °C), e.g. "SEW L Spezial".
    - For **sizes DR..71 – 132, DRN80 – 132S**: Replace sealing [392].
15. **Motor size DR..160 – 280, DRN132M – 280:** Replace the O-ring [901] between the B-side endshield [42] and the pre-assembled brake [550]. Install the pre-assembled brake [550]
16. Apply suitable grease to the sealing ring [95]. See chapter Order information for lubricants and anti-corrosion agents (→ 🗎 176).
17. Install the motor, the brake and optional equipment.

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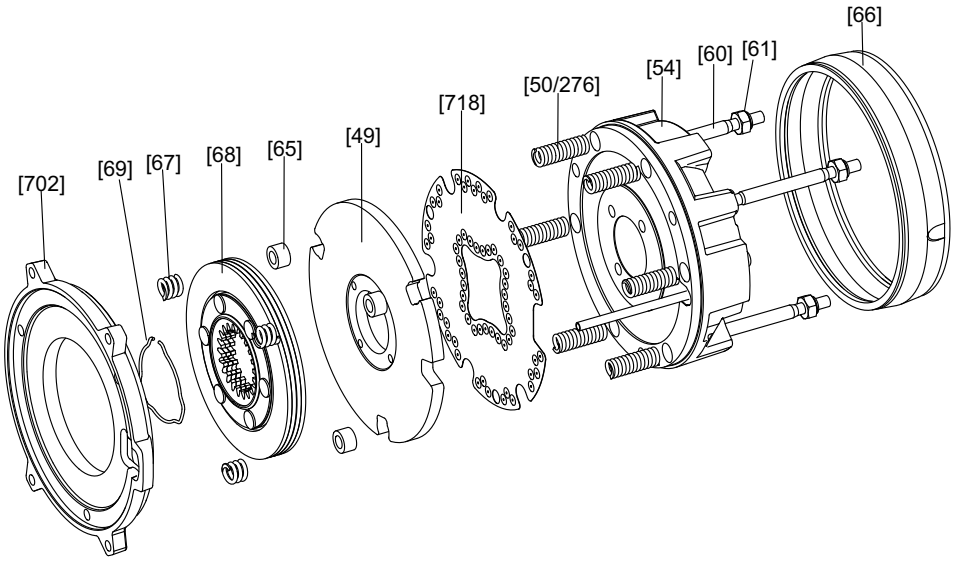
### 7.7.6 Basic structure of BE05 – BE2 brakes (DR..71 – 80, DRN80)




*18014399037859723*

| | | | | | |
|---|---|---|---|---|---|
| [42] | Brake endshield | [61] | Hex nut | [73] | Washer |
| [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 3x | [68] | Brake disk | | |

### 7.7.7 Basic structure of BE1 – BE11 brakes (DR..90 – 160, DRN90 – 132S)

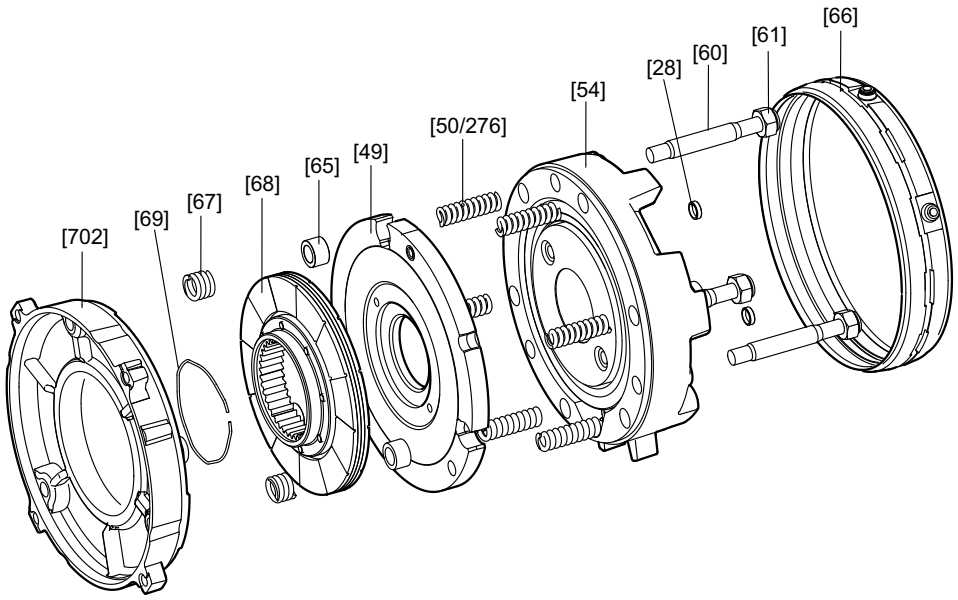



*18014398683684619*

| | | | | | |
|---|---|---|---|---|---|
| [49] | Pressure plate | [61] | Hex nut | [68] | Brake disk |
| [50] | Brake spring (normal) | [65] | Pressure ring | [276] | Brake spring (blue) |
| [54] | Magnet body, complete | [66] | Sealing strip | [702] | Friction disk |
| [60] | Stud 3x | [67] | Counter spring | [718] | Damping plate |

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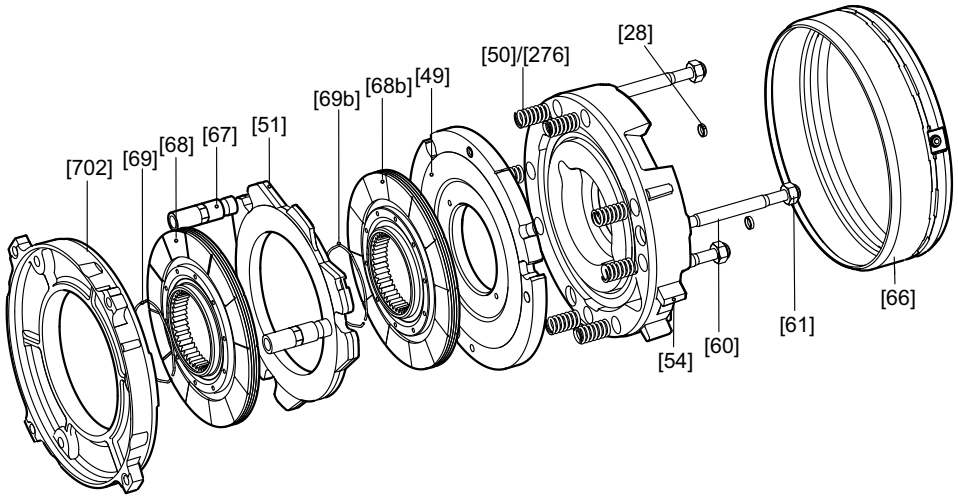
### 7.7.8 Basic structure of BE20 brakes (DR..160 – 180, DRN132M – 180)




*9007200415803275*

| | | | | | |
|---|---|---|---|---|---|
| [28] | Closing cap | [61] | Hex nut | [69] | Circular spring |
| [49] | Pressure plate, complete | [65] | Pressure ring | [276] | Brake spring (blue) |
| [50] | Brake spring (normal) | [66] | Sealing strip | [702] | Friction disk |
| [54] | Magnet body, complete | [67] | Counter spring | | |
| [60] | Stud 3x | [68] | Brake disk | | |

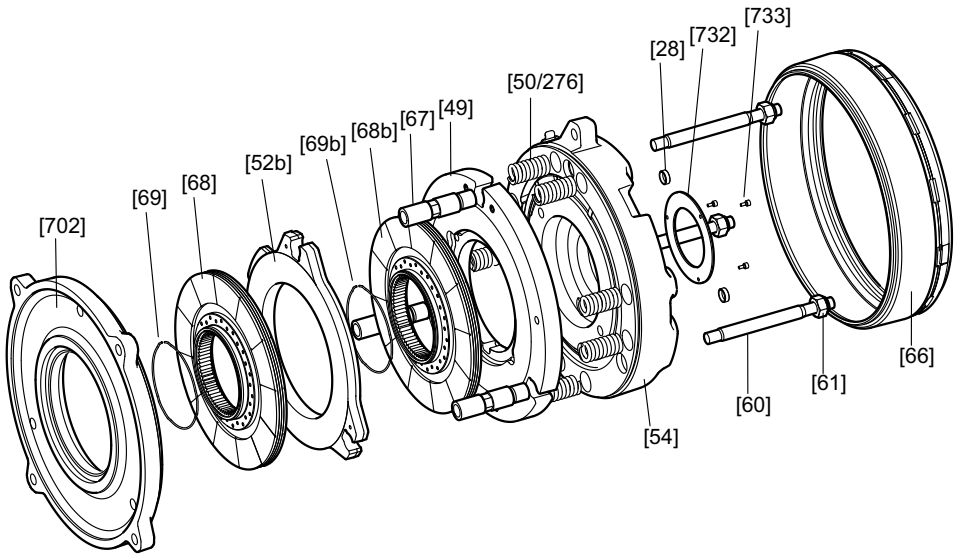
### 7.7.9 Basic structure of BE30 – BE32 brakes (DR..180 – 225, DRN180 – 225)




*18014399663204747*

| | | | | | |
|---|---|---|---|---|---|
| [28] | Closing cap | [60] | Stud 3x | [69] | Circular spring |
| [49] | Pressure plate | [61] | Hex nut | [276] | Brake spring (blue) |
| [50] | Brake spring (normal) | [66] | Sealing strip | [718] | Friction disk |
| [51] | Brake plate | [67] | Setting sleeve | | |
| [54] | Magnet body | [68] | Brake disk | | |

### 7.7.10 Basic structure of BE60 – BE122 brakes (DR..250 – 315, DRN250 – 315)




*18014398863076107*

| | | | | | |
|---|---|---|---|---|---|
| [28] | Closing cap | [61] | Hex nut | [69b] | Circular spring (BE122 only) |
| [49] | Pressure plate | [66] | Sealing strip | [276] | Brake spring |
| [50] | Brake spring | [67] | Counter spring | [702] | Friction disk |
| [52b] | Brake plate (BE122 only) | [68] | Brake disk | [732] | Cover plate |
| [54] | Magnet body, complete | [68b] | Brake disk (BE12 only) | [733] | Screw |
| [60] | Stud 3x | [69] | Circular spring | | |

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### 7.7.11 Setting the working air gap of BE05 – BE122 brakes



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

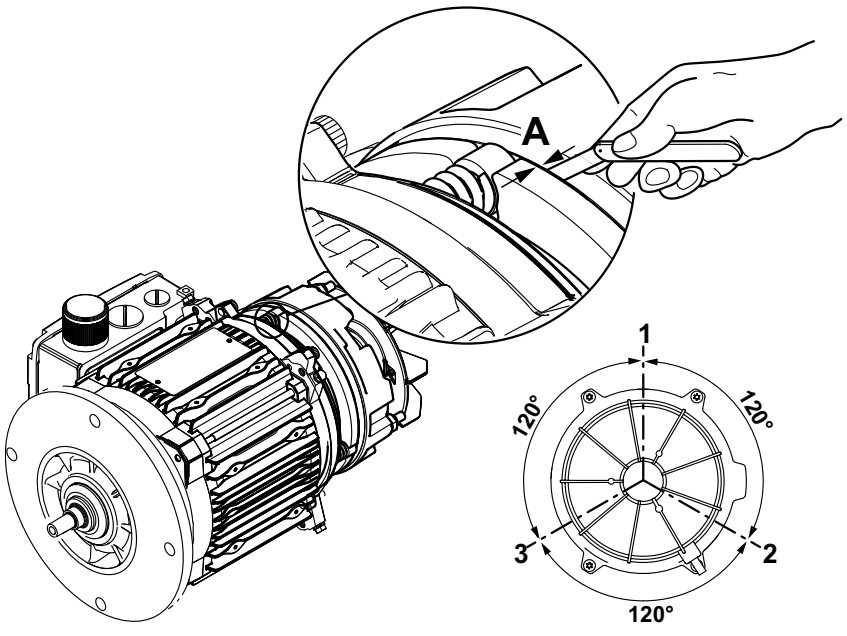
Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and rotary encoder, if installed.

     See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103).
   - Fan guard with encoder mounting or fan guard [35]
2. Push the sealing strip [66] aside,
   - Release the clamping strap, if necessary
   - Sucking off any abrasion
3. Measure the brake disk [68]:
   - Minimum brake disk thickness see chapter "Technical data" (→ 🗎 159).
   - If necessary, replace brake disk according to chapter Replacing the brake disk of BE05 – BE122 brakes (→ 🗎 133).
4. **BE30 – 122:** Unfasten the setting sleeve [67] by turning it towards the B-side endshield.
5. Measure the working air gap A (see the following figure)

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



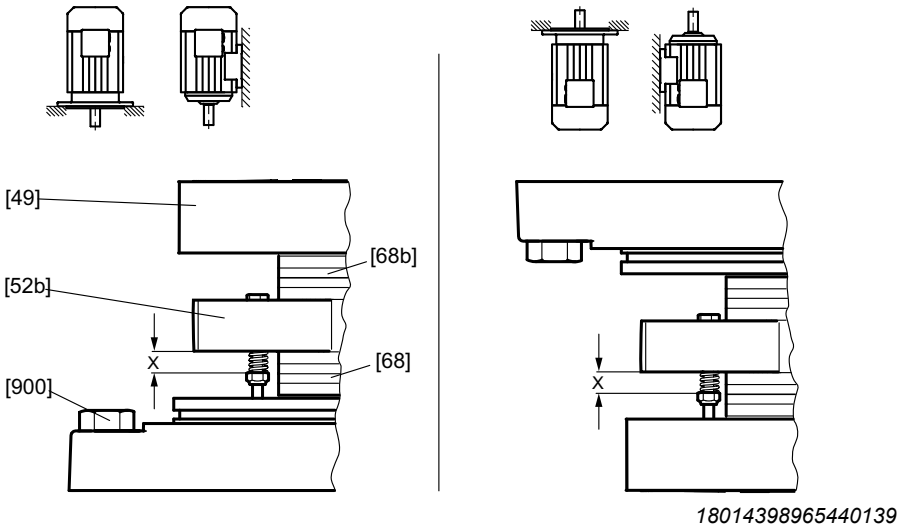

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- **BE050 – 20:** Tighten the hex nuts [61] until the working air gap is set correctly, see chapter "Technical data".
- **BE30 – 62:** Tighten the hex nuts [61] until the working air gap is 0.25 mm.
- **BE120 – 122:** Tighten the hex nuts [61] until the working air gap is 0.30 mm.
- **If you are mounting the BE32 in a vertical position, set the 3 springs of the brake plate to the following dimension:**

| Mounting position | X in mm |
|---|---|
| Brake at the top | 7.3 |
| Brake at the bottom | 7.3 |

- **If you are mounting the BE62 – 122 brakes in a vertical position, set the 3 springs on the brake plate to the following position:**

| Mounting position | X in mm |
|---|---|
| Brake at the top | 10.0 |
| Brake at the bottom | 10.0 |




*18014398965440139*

[49] Pressure plate
[52b] Brake plate (BE32, BE62, BE122)
[68] Brake disk
[68b] Brake disk (BE32, BE62, BE122)
[900] Hex nut

7. **BE30 – 122:** Screw the setting sleeves [67] to the magnet body until the working air gap is correctly set, see chapter "Technical data (→ 🗎 159)".
8. Install the sealing strip back in place and re-install the dismantled parts.

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### 7.7.12 Replacing the brake disk of BE05 – BE122 brakes

In addition to the brake elements listed in column "BE brake", see chapter "Inspection and maintenance intervals" (→ 🗎 100), check the hex nuts [61] for wear when you replace the brake disk. You must always replace the hex nuts [61] when you replace the brake disk.



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.



**INFORMATION**

- The brake of DR..71 – 80, DRN80 motor sizes cannot be removed from the motor because the BE brake is directly installed on the brake endshield of the motor.
- The brake of DR..90 – 315, DRN90 – 315 motor sizes can be removed from the motor for replacing the brake disk because the BE brake is pre-installed on the brake endshield of the motor with a friction disk.

1. Remove the following:
   - Forced cooling fan and rotary encoder, if installed.

     See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103).
   - Fan guard with encoder mount or fan guard [35], retaining ring [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – 11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – 122:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. Remove the rubber sealing strip [66]
4. Remove manual brake release if necessary.
   - Setting nuts [58], conical springs [57], studs [56], releasing lever [53], spiral dowel pin, if necessary [59], conical seat [255], spherical washer [256]
5. Loosen hex nuts [61], carefully pull off the magnet body [54] (brake cable!) and take out the brake springs [50].
6. **BE05 – 11:** Remove the damping plate [718], pressure plate [49] and brake disk [68]

   **BE20, BE30, BE60, BE120:** Remove pressure plate [49] and brake disk [68]

   **BE32, BE62, BE122:** Remove pressure plate [49], brake disks [68] and [68b]
7. Clean the brake components.
8. Install new brake disk(s).

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9. Brake parts are installed as described in chapter Inspection steps for DR..71 – 315, DRN80 – 315 brakemotors (→ 🗎 125).
   - 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 (→ 🗎 131)".
10. In case of manual brake release: Use the setting nuts to adjust the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

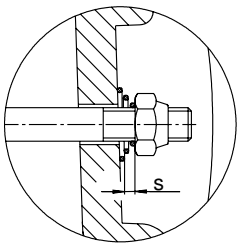
## ⚠ WARNING



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

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.




*177241867*

| Brake | Floating clearance s in mm |
|---|---|
| BE05, BE1, BE2, | 1.5 |
| BE5 | 1.7 |
| BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122 | 2 |

11. Put the sealing strip in place and re-install the dismantled parts.

## INFORMATION



- The lockable manual brake release (type HF) is already released when resistance is encountered as the set screw is turned.
- The self-reengaging manual brake release (type HR) can be operated with normal hand pressure.
- In brakemotors with self-reengaging manual brake release, the manual brake release lever must be removed after startup/maintenance! A bracket is provided for storing the lever on the outside of the motor.

## INFORMATION



After replacing the brake disk, the maximum braking torque will be reached after several cycles.

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### 7.7.13 Changing the braking torque of BE05 – BE122 brakes

The braking torque can be altered in stages.

- By changing the type and number of brake springs
- By changing the complete magnet body (only possible for BE05 and BE1)
- By changing the brake (from motor size DR..90, DRN90).
- By changing to a double-disk brake (BE30 only)

For the possible braking torque steps, please refer to chapter "Technical data" (→ 🗎 159).

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### 7.7.14 Changing the brake spring of BE05 – BE122 brakes



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and rotary encoder, if installed.

     See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103).
   - Fan guard with encoder mount or fan guard [35], retaining ring [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – 11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – 122:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. Remove the sealing strip [66] and the manual brake release:
   - Setting nuts [58], conical springs [57], studs [56], releasing lever [53], spiral dowel pin [59], conical seat [255], spherical washer [256]
4. Loosen hex nuts [61] and pull off the magnet body [54]
   - By approx. 50 mm (watch the brake cable)
5. Replace or add brake springs [50/276/265]
   - Arrange brake springs symmetrically
6. Brake parts are installed as described in chapter Inspection steps for DR..71 – 315, DRN80 – 315 brakemotors (→ 🗎 125).
   - 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 (→ 🗎 131)".
7. In case of manual brake release: Use the setting nuts to adjust the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).



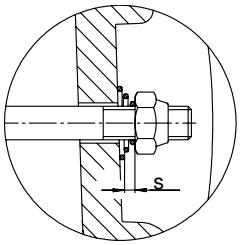
**⚠ WARNING**

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

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.

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| Brake | Floating clearance s in mm |
|---|---|
| BE05, BE1, BE2, | 1.5 |
| BE5 | 1.7 |
| BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122 | 2 |

8. Put the sealing strip in place and re-install the dismantled parts.

## INFORMATION

Replace setting nuts [58] and hex nuts [61] if the removal procedure is repeated.

### 7.7.15 Changing the magnet body of BE05 – BE122 brakes



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and rotary encoder, if installed.

     See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103).
   - Fan guard with encoder mount or fan guard [35], retaining ring [32/62] and fan [36]
2. Remove the sealing strip [66] and the manual brake release:
   - Setting nuts [58], conical coil springs [57], studs [56], releasing lever [53], spiral dowel pin [59]
3. Remove the brake cable
   - **BE05 – 11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – 122:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
4. Loosen hex nuts [61], remove complete magnet body [54], remove brake springs [50/276].
5. Install new magnet body with brake springs. For the possible braking torque steps, please refer to chapter "Technical data" (→ 🗎 159).
6. Brake parts are installed as described in chapter Inspection steps for DR..71 – 315, DRN80 – 315 brakemotors (→ 🗎 125).
   - 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 (→ 🗎 131)".
7. In case of manual brake release: Use the setting nuts to adjust the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).



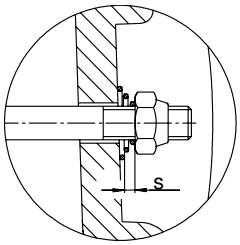
**⚠ WARNING**

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

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.

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| Brake | Floating clearance s in mm |
|---|---|
| BE05, BE1, BE2 | 1.5 |
| BE5 | 1.7 |
| BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122 | 2 |

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

## INFORMATION

Replace setting nuts [58] and hex nuts [61] if the removal procedure is repeated.

### 7.7.16 Changing the brake of DR..71 – 80, DRN80 motors



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the following steps!

1. Remove the following:
   - Forced cooling fan and rotary encoder, if installed.

     See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103)
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the terminal box cover and loosen the brake cable from the rectifier. If necessary, attach trailing wire to brake cables.
3. Loosen machine screws [13] and remove brake endshield with brake from stator.
4. Insert the brake cable of the new brake into the terminal box.
5. Install the new brake, observing the alignment of the cams of the brake endshield.
6. Reseal the shaft:
   - Replace the sealing ring [95]
   - Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (→ 🗎 176)).
7. 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 following figure).

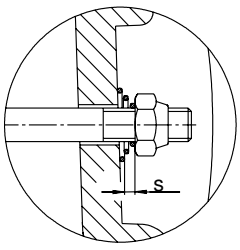


**⚠ WARNING**

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

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.




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| Brakes | Floating clearance s in mm |
|---|---|
| BE05, BE1, BE2 | 1.5 |

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### 7.7.17 Changing the brakes for DR..90 – 225, DRN90 – 225



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and rotary encoder, if installed.

     See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103).
   - Fan guard with encoder mount or fan guard [35], retaining ring [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – 11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – 32:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. Unfasten screws [900] and remove brake from brake endshield.
4. **DR..90 – 132, DRN90 – 132S:** Pay attention to the alignment of the gasket [901].
5. Connect the brake cables of the new brake.
6. Install the new brake, observing the alignment of the cams of the friction disk.
7. Reseal the shaft:
   - Replace the sealing ring [95]
   - Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (→ 🗎 176)).
8. In case of manual brake release: Use the setting nuts to adjust the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

**⚠ WARNING**

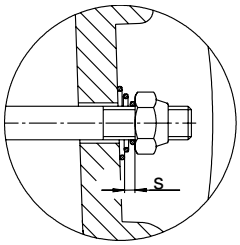


No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.

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| Brake | Floating clearance s in mm |
|---|---|
| BE05, BE1, BE2 | 1.5 |
| BE5 | 1.7 |
| BE11, BE20, BE30, BE32 | 2 |

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### 7.7.18 Changing the brakes for DR..250 – 315, DRN250 – 315



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the following steps!

1. Remove the following:
   - Forced cooling fan and rotary encoder, if installed.

     See chapter "Motor and brake maintenance – preliminary work" (→ 🗎 103)
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. **BE60 – 62:** Remove the brake cable
   - Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - Connect the brake cables of the new brake
3. **BE120 – 122**: Unfasten brake connector.
4. Unfasten screws [900] and remove brake from brake endshield.
5. Install the new brake, observing the alignment of the cams of the friction disk.
6. Reseal the shaft:
   - Replace the sealing ring [95]
   - Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (→ 🗎 176)).
7. 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 following figure).

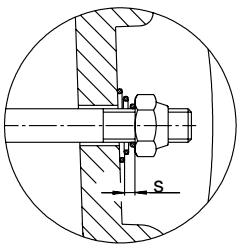


**⚠ WARNING**

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

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.

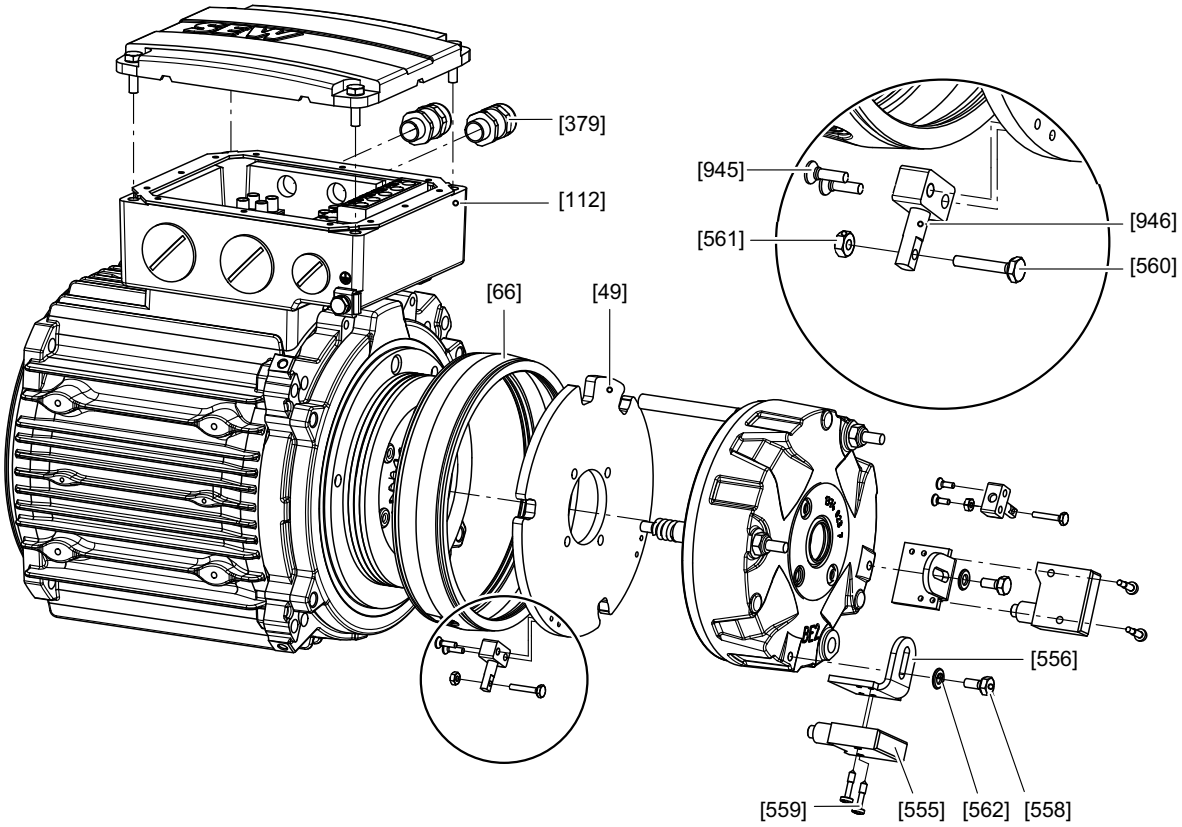



*177241867*

| Brakes | Floating clearance s in mm |
|---|---|
| BE60, BE62, BE120, BE122 | 2 |

## 7.8 Inspection/maintenance work diagnostic unit /DUB

### 7.8.1 Basic structure of diagnostic unit /DUB on DR..90 – 100 with BE2

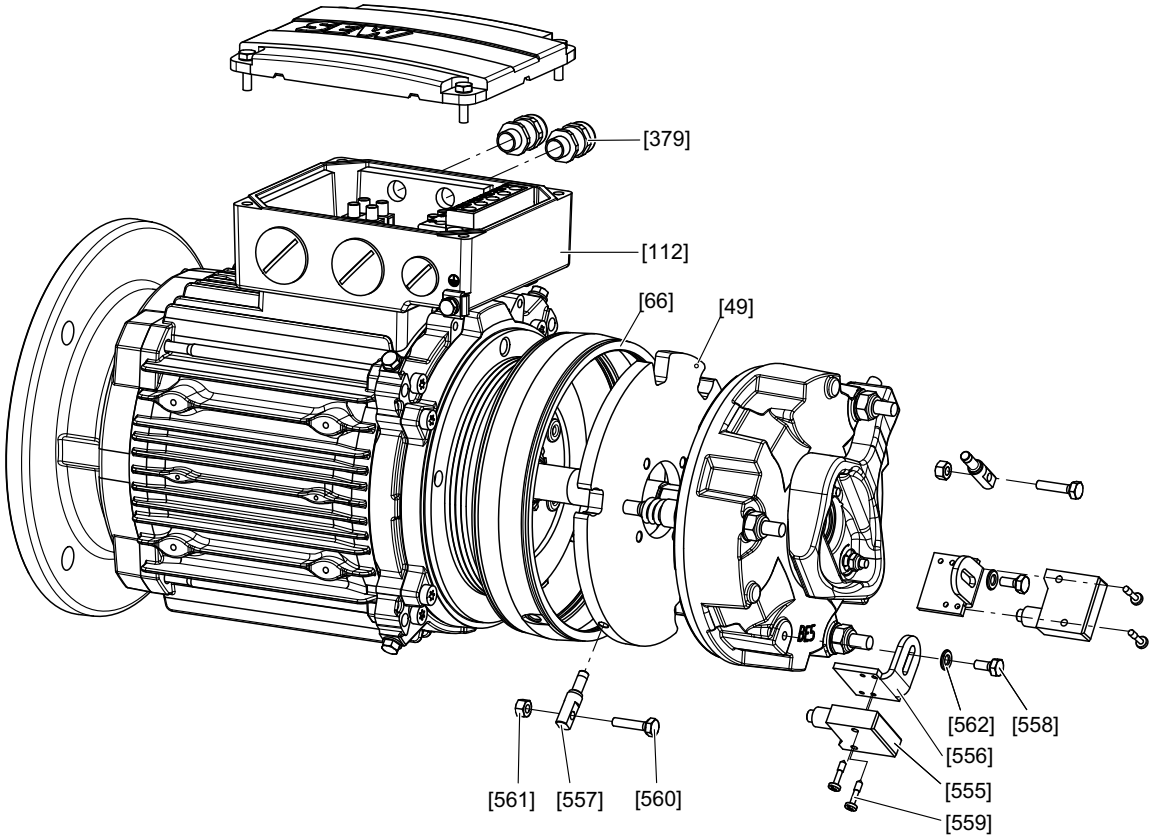



*9007200340056843*

| | | | | | |
|---|---|---|---|---|---|
| [49] | Pressure plate for DUB | [556] | Angle bracket | [561] | Stud |
| [66] | Sealing strip for DUB | [557] | Stud | [562] | Washer |
| [112] | Terminal box lower part | [558] | Hex head screw | [945] | Countersunk screw |
| [379] | Screw fitting | [559] | Pan head screw | [946] | Mounting plate complete |
| [555] | Microswitch | [560] | Hex head screw | | |

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### 7.8.2 Basic structure of diagnostic unit /DUB on DR..90 – 315 with BE5 – 122




*1085317771*

| | | | | | |
|---|---|---|---|---|---|
| [49] | Pressure plate for /DUB | [556] | Mounting bracket | [561] | Stud |
| [66] | Sealing strip for /DUB | [557] | Pin | [562] | Washer |
| [112] | Terminal box lower part | [558] | Hex head screw | | |
| [379] | Screw fitting | [559] | Pan head screw | | |
| [555] | Microswitch | [560] | Hex head screw | | |

### 7.8.3 Inspection/maintenance work diagnostic unit /DUB for function monitoring



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Check working air gap according to chapter "Setting the working air gap of BE05 – BE122 brakes (→ 🗎 131)" 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 hex head screw [560] back until microswitch [555] switches back (contacts brown-blue open).
4. To ensure operational reliability, turn hex head screw [560] further back by one-sixth of a revolution (0.1 mm).
5. Tighten hex nut [561], while doing so, hold hex head screw [560] to keep it in the correct position.
6. Switch the brake on and off several times. Check whether the microswitch opens and closes reliably in any motor shaft position. Therefore, turn the motor shaft manually several times.

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### 7.8.4 Inspection/maintenance work diagnostic unit /DUB for wear monitoring



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Check and, if necessary, adjust the working air gap according to chapter "Setting the working air gap for BE.. brake".
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. **For BE2 – 5:** Loosen hex head screw [560] by a 3/4 revolution towards the microswitch [555] (with BE2 by about 0.375 mm / with BE5 by about 0.6 mm).

   **For BE11 – 122:** Loosen hex head screw [560] towards the microswitch [555] by a whole revolution (about 0.8 mm).
4. Tighten hex nut [561], while doing so, hold hex head screw [560] to keep it in the correct position.
5. If the brake lining reaches the wear limit, the microswitch automatically switches back (contacts brown-blue open) and activates a relay or a signal.

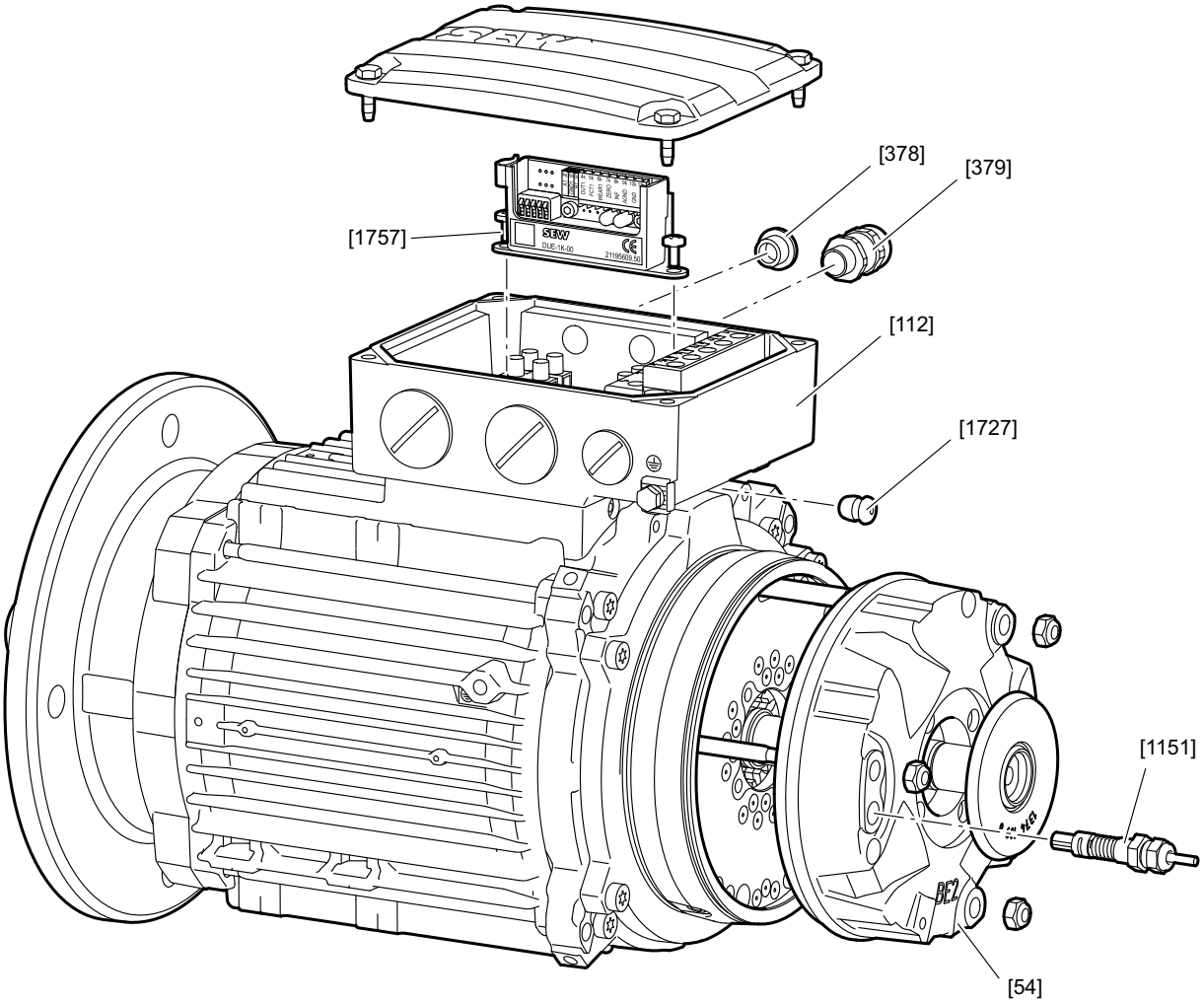
### 7.8.5 Inspection/maintenance of the diagnostic unit /DUB for function and wear monitoring

If two diagnostic units /DUB are connected to one brake, both monitoring statuses can be realized. In this case, set the diagnostic unit /DUB for wear monitoring before you set the diagnostic unit /DUB for function monitoring.

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## 7.9 Inspection/maintenance work diagnostic unit /DUE

### 7.9.1 Disassembling the diagnostic unit /DUE




14278188043

[54] Magnet body
[112] Terminal box lower part
[378] Screw plug
[379] Cable gland
[1151] Sensor
[1727] Grommet
[1757] Evaluation unit

1. Remove forced cooling fan and rotary encoder, if installed. See chapter "Motor and brake maintenance – preliminary work (→ 🗎 103)".
2. First, remove the actuator elements [1191] from designs with manual brake release.
3. Remove the fan guard [35] or the forced cooling fan [170] by loosening the retaining screws [22].
4. If applicable: Remove the retaining ring [32] and the fan wheel [36] using a suitable tool.
5. Loosen the screw [1154] for the cable fixture clamp [1153].
6. Loosen the union nut of the sensor screw fitting. The sensor cable is free.
7. Loosen the sensor [1151] on the mounting flange. Remove the sensor.

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### 7.9.2 Retrofitting diagnostic unit /DUE for function and wear monitoring



**⚠ DANGER**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Disconnect the motor from the power supply and safeguard it against accidental startup before starting work!

For the component designation of the evaluation unit, refer to chapter "Component designation" (→ 🗎 80).

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#### Setting and installing the 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).

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.

1. Set the wear limit using the DIP switches.

## INFORMATION

Set the DIP switch only in a de-energized state.

| S1 | S2 | S3 | S4 | S5 | Wear limit | BE1 – 2 | BE5 | BE 1 – 2 (FS) | BE5 (FS) |
|---|---|---|---|---|---|---|---|---|---|
| **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 | | | | X |
| **0** | **0** | **1** | **1** | **0** | 0.6 mm | X | | X | |
| **0** | **0** | **1** | **1** | **1** | 0.5 mm | | | | |

| S1 | S2 | S3 | S4 | S5 | Wear limit | BE11 – 122 | BE11 – 30 (FS) | BE32 (FS) |
|---|---|---|---|---|---|---|---|---|
| **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 | | | X |
| **1** | **0** | **1** | **0** | **1** | 0.7 mm | | X | |
| **1** | **0** | **1** | **1** | **0** | 0.6 mm | | | |
| **1** | **0** | **1** | **1** | **1** | 0.5 mm | | | |

X = Factory setting

Setting possible in addition

2. Screw the evaluation unit into the terminal box after consultation with SEW-EURODRIVE.
3. Connect the sensor. See chapter "Connecting the sensor (→ 🗎 153)".
4. Calibrate the infinite value. See chapter "Calibration of infinite value" (→ 🗎 155).
5. Install the sensor in the brake. See chapter "Installing the sensor (→ 🗎 156)".

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6. Route the cable. See chapter "Cable routing" (→ 🗎 157).
7. Calibrate the zero value. See chapter "Calibration of zero value" (→ 🗎 157).
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 (→ 🗎 154)".

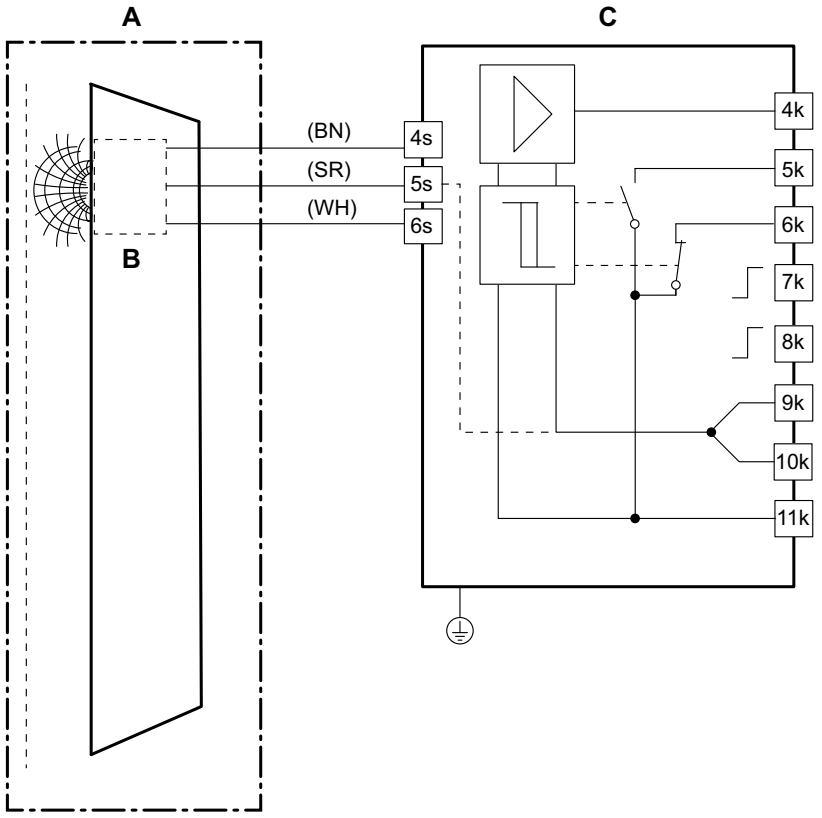
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### Connecting electronics

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

## INFORMATION

Use shielded cables to wire the evaluation unit. Connect the shield at least at one end to the GND.




*9007212783931659*

[A] Brake
[B] Eddy current sensor
[C] Evaluation unit

[4s] Connection sensor A1 (brown cable)
[5s] Connection sensor GND 1 (shield)
[6s] Connection sensor B1 (white cable)

[4k] Analog output wear 1 (air gap)
[5k] Digital output function 1 (NO contact)
[6k] Digital output wear 1 (NC contact)
[7k] Input calibration zero value
[8k] Input calibration infinite value
[9k] Signal ground AGND
[10k] Ground potential GND
[11k] 24 V DC supply

The evaluation unit is supplied with DC 24 V via the terminals GND [10k] and DC24V [11k].

Brake monitoring provides digital signals for:

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

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

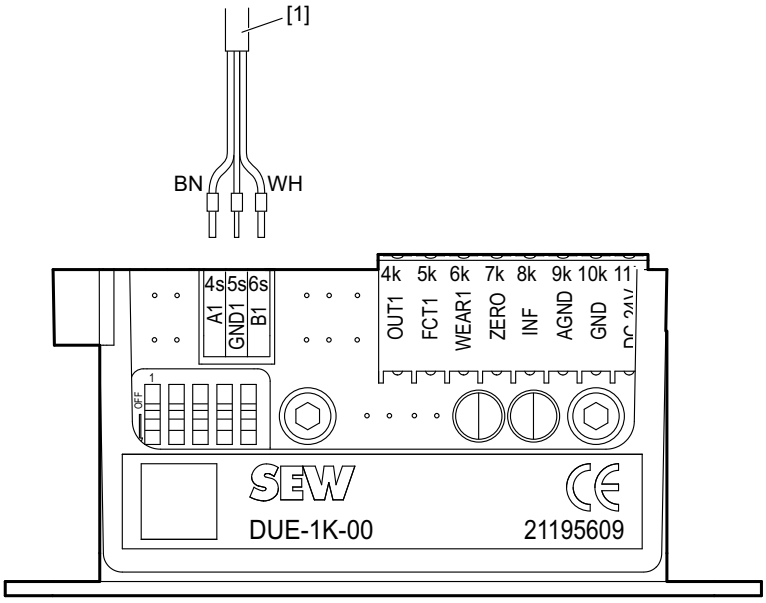
- Terminal OUIT1 [4k]

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 "Setting and installing the evaluation unit" (→ 🗎 150).

*Connecting the sensor*




*14975059851*

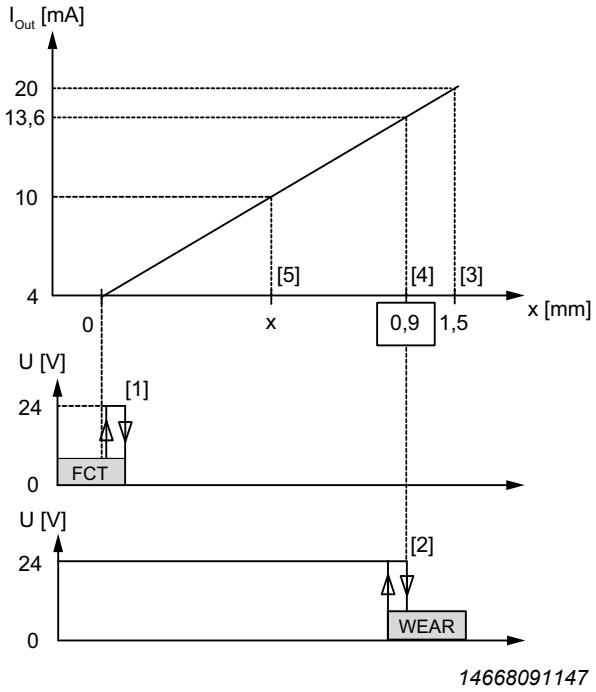
[1] Brake sensor

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 "Calibration of infinite value" (→ 🗎 155). To remove the sensor cables, use an insulated screwdriver to disengage the clips.

*Output signals for function and wear monitoring*

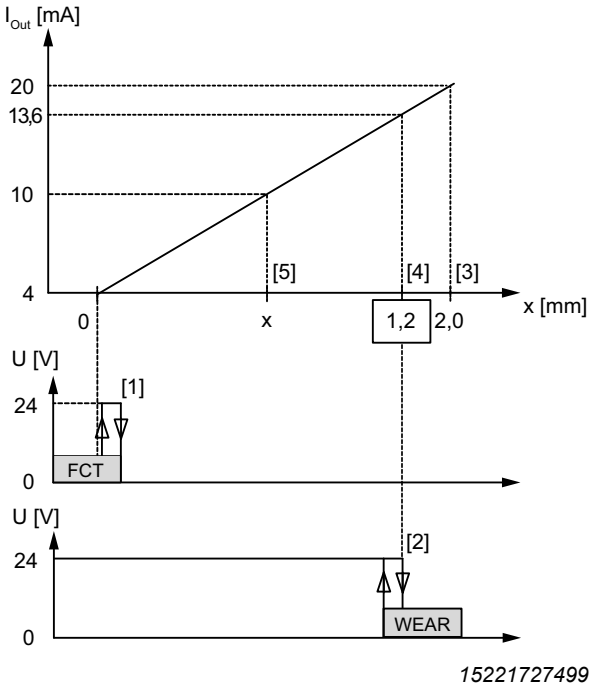
The diagnostic unit /DUE provides an analog signal (4 – 20 mA, DIN IEC 60381-1) for the current working air gap of the brake.

**D6**




14668091147

**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)

### Calibration of 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.

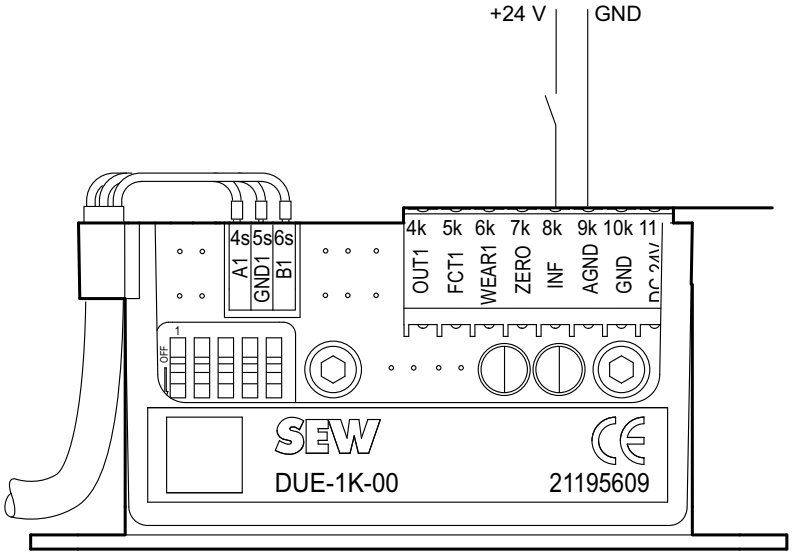
The sensor must be removed from the brake for the following steps.

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. Apply supply voltage to INF (8k) and AGND (9k) for 5 seconds. GND can be used as reference potential instead of AGND. The evaluation unit is supplied via the calibration input during calibration.

Calibration of the infinite value was successful if the red LED flashes every second.

The corresponding wiring diagram for the calibration process.




*14975067787*

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

The analog output OUT1 signals 0 mA during the calibration procedure. After successful calibration, the output has 20 mA.

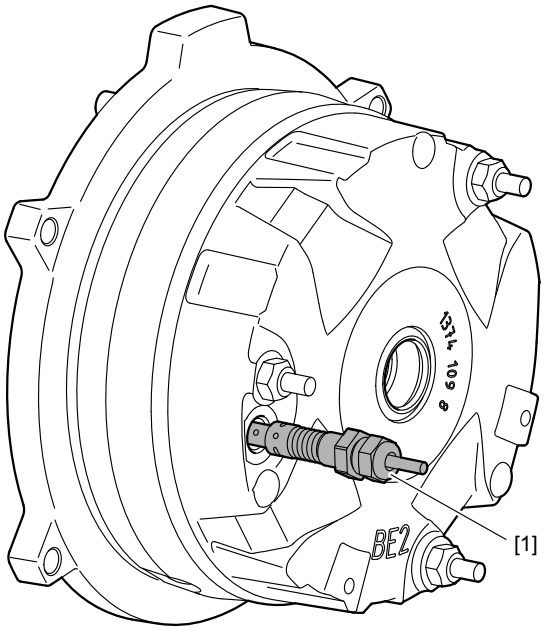
### Installing the sensor

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 brake using a clip or similar.

### Calibration zero value

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

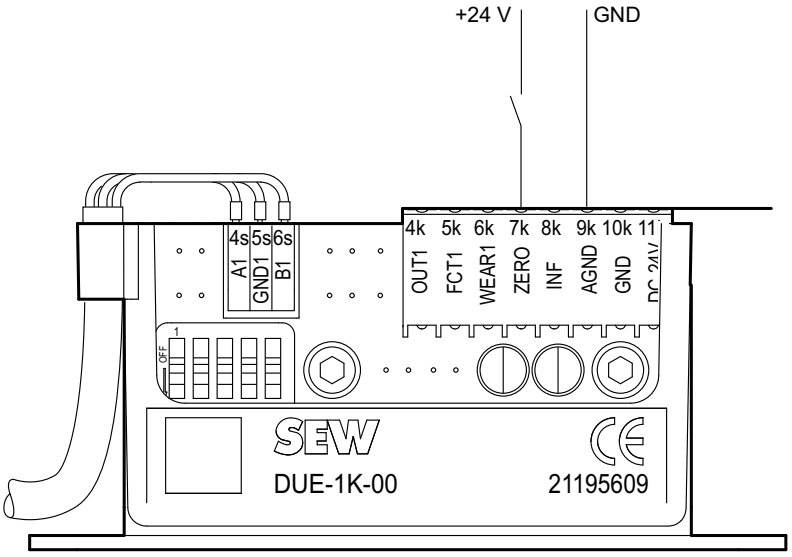
Procedure during calibration of the zero value:

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 as reference potential instead of AGND. 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, FCT1 send a 0 signal which may lead to error messages (wear limit reached).

The analog output OUT1 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 | Green | Red | FCT | WEAR | OUT | |
| Open | Installed | – | – | To | Off | To | Off | HI | HI | 3.6 – 5.6 mA | Brake open, no wear |
| Closed | Installed | – | – | Off | Off | Off | Off | LO | HI | 6 – 20 mA | Brake closed, no wear |
| Closed | Installed | – | – | Off | To | Off | To | LO | LO | 6 – 20 mA | Brake closed, set wear limit of brake reached |
| – | – | – | – | Off | To | Off | To | LO | LO | >20 mA | Measuring range exceeded or sensor not connected correctly |
| – | Not installed | – | HI | Off | Blinking 1 Hz | Off | Blinking 1 Hz | LO | LO | 0 mA | Calibration of infinite value active |
| – | Not installed | – | HI | Off | Flashing 1 Hz | Off | Flashing 1 Hz | LO | LO | 20 mA | Infinite calibration successful |
| – | – | – | – | Blinking 1 Hz | Blinking 1 Hz | Blinking 1 Hz | Blinking 1 Hz | Clock 1 Hz | Clock 1 Hz | 0 mA | Not completely calibrated:<br>• ZERO calibration missing<br>• Delivery state (both calibrations missing) |
| Open | Installed | HI | – | Off | Blinking 2 Hz | Off | Blinking 2 Hz | LO | LO | 0 mA | Calibration of zero value active |
| Open | Installed | HI | – | Off | Blinking 2 Hz | Off | Blinking 2 Hz | LO | LO | 4 mA | First zero value successful |
| Open | Installed | HI | – | Off | Flickering | Off | Flickering | LO | LO | 4 mA | Smaller zero value detected and saved |

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# 8 Technical data

## 8.1 Work done, working air gap, braking torques

If you use encoders and brakes with functional safety technology, the values for the maximum working air gaps and the work done until maintenance are reduced. For the new values, refer to the addendum to the operating instructions "Safety-Rated Encoders/Safety-rated Brakes – DR..71 – 315, DRN80 315 AC Motors – Functional Safety".

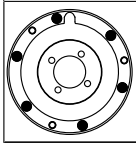
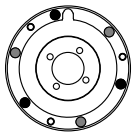
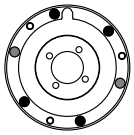
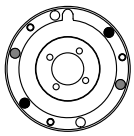
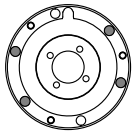
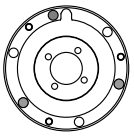
| Brake Type | Braking work done until maintenance | Working air gap | | Brake disk | Part number damping plate/pole sheet | Braking torque settings | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | min.[1] | Max. | Min. | | Braking torque | Type and number of Brake springs | | | Purchase order number of Brake springs | |
| | $10^6$ J | mm | | mm | | Nm | Normal | blue | white | Normal | Blue/white |
| **BE05** | 120 | 0.25 | 0.6 | 9.0 | 13740563 | 5.0 | 3 | – | – | 0135017X | 13741373 |
| | | | | | | 3.5 | – | 6 | – | | |
| | | | | | | 2.5 | – | 4 | – | | |
| | | | | | | 1.8 | – | 3 | – | | |
| **BE1** | 120 | 0.25 | 0.6 | 9.0 | 13740563 | 10 | 6 | – | – | 0135017X | 13741373 |
| | | | | | | 7.0 | 4 | 2 | – | | |
| | | | | | | 5.0 | 3 | – | – | | |
| **BE2** | 180 | 0.25 | 0.6 | 9.0 | 13740199 | 20 | 6 | – | – | 13740245 | 13740520 |
| | | | | | | 14 | 2 | 4 | – | | |
| | | | | | | 10 | 2 | 2 | – | | |
| | | | | | | 7.0 | – | 4 | – | | |
| | | | | | | 5.0 | – | 3 | – | | |
| **BE5** | 390 | 0.25 | 0.9 | 9.0 | 13740695 | 55 | 6 | – | – | 13740709 | 13740717 |
| | | | | | | 40 | 2 | 4 | – | | |
| | | | | | | 28 | 2 | 2 | – | | |
| | | | | | | 20 | – | – | 6 | | 13747738 |
| | | | | | | 14 | – | – | 4 | | |
| **BE11** | 640 | 0.3 | 1.2 | 10.0 | 13741713 | 110 | 6 | – | – | 13741837 | 13741845 |
| | | | | | | 80 | 2 | 4 | – | | |
| | | | | | | 55 | 2 | 2 | – | | |
| | | | | | | 40 | – | 4 | – | | |
| | | | | | 13741713 + 13746995 | 28 | – | 3 | – | | |
| | | | | | | 20 | – | – | 4 | 13741837 | 13747789 |
| **BE20** | 1000 | 0.3 | 1.2 | 10.0 | – | 200 | 6 | – | – | 13743228 | 13742485 |
| | | | | | – | 150 | 4 | 2 | – | | |
| | | | | | – | 110 | 3 | 3 | – | | |
| | | | | | – | 80 | 3 | – | – | | |
| | | | | | 13746758 | 55 | – | 4 | – | | |
| | | | | | | 40 | – | 3 | – | | |
| **BE30** | 1500 | 0.3 | 1.2 | 10.0 | – | 300 | 8 | – | – | 01874551 | 13744356 |
| | | | | | – | 200 | 4 | 4 | – | | |
| | | | | | – | 150 | 4 | – | – | | |
| | | | | | – | 100 | – | 8 | – | | |
| | | | | | – | 75 | – | 6 | – | | |
| **BE32** | 1500 | 0.4 | 1.2 | 10.0 | – | 600 | 8 | – | – | 01874551 | 13744356 |
| | | | | | – | 500 | 6 | 2 | – | | |
| | | | | | – | 400 | 4 | 4 | – | | |
| | | | | | – | 300 | 4 | – | – | | |
| | | | | | – | 200 | – | 8 | – | | |
| | | | | | – | 150 | – | 6 | – | | |
| | | | | | 13746731 | 100 | – | 4 | – | | |

| Brake Type | Braking work done until maintenance | Working air gap | | Brake disk | Part number damping plate/pole sheet | Braking torque settings | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | min.[1] | Max. | Min. | | Braking torque | Type and number of Brake springs | | | Purchase order number of Brake springs | |
| | $10^6$ J | mm | | mm | | Nm | Normal | blue | white | Normal | Blue/white |
| **BE60** | 2500 | 0.3 | 1.2 | 10.0 | – | 600 | 8 | – | – | 01868381 | 13745204 |
| | | | | | – | 500 | 6 | 2 | – | | |
| | | | | | – | 400 | 4 | 4 | – | | |
| | | | | | – | 300 | 4 | – | – | | |
| | | | | | – | 200 | – | 8 | – | | |
| **BE62** | 2500 | 0.4 | 1.2 | 10.0 | – | 1200 | 8 | – | – | 01868381 | 13745204 |
| | | | | | – | 1000 | 6 | 2 | – | | |
| | | | | | – | 800 | 4 | 4 | – | | |
| | | | | | – | 600 | 4 | – | – | | |
| | | | | | – | 400 | – | 8 | – | | |
| **BE120** | 390 | 0.6 | 1.2 | 12.0 | – | 1000 | 8 | – | – | 13608770 | 13608312 |
| | | | | | – | 800 | 6 | 2 | – | | |
| | | | | | – | 600 | 4 | 4 | – | | |
| | | | | | – | 400 | 4 | – | – | | |
| **BE122** | 300 | 0.8 | 1.2 | 12.0 | – | 2000 | 8 | – | – | 13608770 | 13608312 |
| | | | | | – | 1600 | 6 | 2 | – | | |
| | | | | | – | 1200 | 4 | 4 | – | | |
| | | | | | – | 800 | 4 | – | – | | |

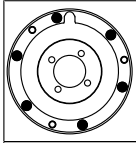
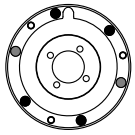
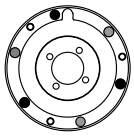
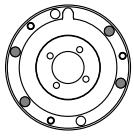
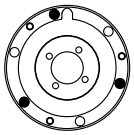
1) When checking the working air gap, note: Parallelism tolerances on the brake disk may give rise to deviations of ± 0.15 mm after a test run.

The following table shows the brake spring layout:

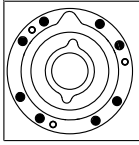
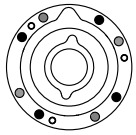
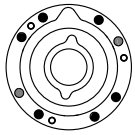
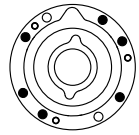
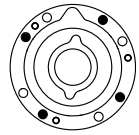
**BE05 – 11:**

| 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 | 6 + 2 springs | 4 + 4 springs | 6 springs | 4 springs |
|---|---|---|---|---|
|  |  |  |  |  |

## INFORMATION

Due to the selected pivoted mounting position/pivoting angle, the values for braking work are reduced by 50% compared to the values specified here.

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## 8.2 Braking torque assignment

### 8.2.1 Motor sizes DR..71 – 100, DRN80 – 100

| Motor type | Brake type | Braking torque gradation in Nm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DR..71** | BE05 | 1.8 | 2.5 | 3.5 | 5.0 | | | | | | | |
| | BE1 | | | | 5.0 | 7.0 | 10 | | | | | |
| **DR..80 DRN80** | BE05 | 1.8 | 2.5 | 3.5 | 5.0 | | | | | | | |
| | BE1 | | | | 5.0 | 7.0 | 10 | | | | | |
| | BE2 | | | | | 7.0 | 10 | 14 | 20 | | | |
| **DR..90 DRN90** | BE05 | 1.8 | 2.5 | 3.5 | 5.0 | | | | | | | |
| | BE1 | | | | 5.0 | 7.0 | 10 | | | | | |
| | BE2 | | | | 5.0 | 7.0 | 10 | 14 | 20 | | | |
| | BE5 | | | | | | | 14 | 20 | 28 | 40 | 55 |
| **DR..100 DRN100** | BE1 | | | | 5.0 | 7.0 | 10 | | | | | |
| | BE2 | | | | 5.0 | 7.0 | 10 | 14 | 20 | | | |
| | BE5 | | | | | | | 14 | 20 | 28 | 40 | 55 |

### 8.2.2 Motor sizes DR..112 – 225, DRN112 – 225

| Motor type | Brake type | Braking torque gradation in Nm | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DR..112 DRN112 DR..132 DRN132S** | BE5 | 14 | 20 | 28 | 40 | 55 | | | | | | | | | | | |
| | BE11 | | 20 | 28 | 40 | 55 | 80 | 110 | | | | | | | | | |
| **DR..160 DRN132M/L** | BE11 | | 20 | 28 | 40 | 55 | 80 | 110 | | | | | | | | | |
| | BE20 | | | | 40 | 55 | 80 | 110 | 150 | 200 | | | | | | | |
| **DR..180 DRN160 – 180** | BE20 | | | | 40 | 55 | 80 | 110 | 150 | 200 | | | | | | | |
| | BE30 | | | | | | 75 | 100 | 150 | 200 | 300 | | | | | | |
| | BE32 | | | | | | | 100 | 150 | 200 | 300 | 400 | 500 | 600 | | | |
| **DR..200/225 DRN200 – 225** | BE30 | | | | | | 75 | 100 | 150 | 200 | 300 | | | | | | |
| | BE32 | | | | | | | 100 | 150 | 200 | 300 | 400 | 500 | 600 | | | |
| | BE60 | | | | | | | | | 200 | 300 | 400 | 500 | 600 | | | |
| | BE62 | | | | | | | | | | | 400 | | 600 | 800 | 1000 | 1200 |

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### 8.2.3 Motor size DR..250/280, DRN250/280

| Motor type | Brake type | Braking torque gradation in Nm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **DR..250/280 DRN250 – 280** | BE60 | 200 | 300 | 400 | 500 | 600 | | | | | |
| | BE62 | | | 400 | | 600 | 800 | 1000 | 1200 | | |
| | BE120 | | | 400 | | 600 | 800 | 1000 | | | |
| | BE122 | | | | | | 800 | | 1200 | 1600 | 2000 |

### 8.2.4 Motor sizes DR..315, DRN315

| Motor type | Brake type | Braking torque gradation in Nm | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **DR..315 DRN315** | BE120 | 400 | 600 | 800 | 1000 | | | |
| | BE122 | | | 800 | | 1200 | 1600 | 2000 |

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## 8.3 Operating currents

### 8.3.1 Brake BE05, BE1, BE2

The current values $I_H$ (holding current) listed in the tables are r.m.s. values. Use only appropriate instruments for measuring r.m.s. values. The inrush current (acceleration current) $I_B$ only flows for a short time (ca. 160 ms) when the brake is released. There is no increased inrush current if a BG or BMS brake rectifier is used or if there is a direct DC voltage supply (only possible with brakes up to size BE2).

| | BE05, BE1 | BE2 |
|---|---|---|
| Maximum braking torque in Nm | 5/10 | 20 |
| Braking power in W | 32 | 43 |
| Inrush current ratio $I_B/I_H$ | 4 | 4 |

| Nominal voltage $V_N$ | | BE05, BE1 | | BE2 | |
|---|---|---|---|---|---|
| $V_{AC}$ | $V_{DC}$ | $I_H$ $A_{AC}$ | $I_G$ $A_{DC}$ | $I_H$ $A_{AC}$ | $I_G$ $A_{DC}$ |
| 24 (23-26) | 10 | 2.25 | 2.90 | 2.95 | 3.80 |
| 60 (57-63) | 24 | 0.90 | 1.17 | 1.18 | 1.53 |
| 120 (111-123) | 48 | 0.45 | 0.59 | 0.59 | 0.77 |
| 147 (139-154) | 60 | 0.36 | 0.47 | 0.48 | 0.61 |
| 184 (174-193) | 80 | 0.29 | 0.37 | 0.38 | 0.49 |
| 208 (194-217) | 90 | 0.26 | 0.33 | 0.34 | 0.43 |
| 230 (218-243) | 96 | 0.23 | 0.30 | 0.30 | 0.39 |
| 254 (244-273) | 110 | 0.20 | 0.27 | 0.27 | 0.35 |
| 290 (274-306) | 125 | 0.18 | 0.24 | 0.24 | 0.31 |
| 330 (307-343) | 140 | 0.16 | 0.21 | 0.21 | 0.28 |
| 360 (344-379) | 160 | 0.14 | 0.19 | 0.19 | 0.25 |
| 400 (380-431) | 180 | 0.13 | 0.17 | 0.17 | 0.22 |
| 460 (432-484) | 200 | 0.11 | 0.15 | 0.15 | 0.19 |
| 500 (485-542) | 220 | 0.10 | 0.13 | 0.14 | 0.18 |
| 575 (543-600) | 250 | 0.09 | 0.12 | 0.12 | 0.16 |

$I_B$ Acceleration current – brief inrush current
$I_H$ Holding current r.m.s. value in the supply cable to the SEW brake rectifier
$I_G$ Direct current with direct DC voltage supply
$V_N$ Nominal voltage (nominal voltage range)

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### 8.3.2 Brakes BE5, BE11, BE20, BE30, BE32, BE60, BE62

The current values $I_H$ (holding current) listed in the tables are r.m.s. values. Use only appropriate instruments for measuring r.m.s. values. The inrush current (acceleration current) $I_B$ only flows for a short time (ca. 160 ms) when the brake is released. A separate voltage supply is not possible.

| | BE5 | BE11 | BE20 | BE30, BE32 | BE60, BE62 |
|---|---|---|---|---|---|
| Maximum braking torque in Nm | 55 | 110 | 200 | 300/600 | 600/1200 |
| Braking power in W | 49 | 77 | 100 | 130 | 195 |
| Inrush current ratio $I_B/I_H$ | 5.7 | 6.6 | 7 | 10 | 9.2 |

| **Nominal voltage $V_N$** | **BE5** | **BE11** | **BE20** | **BE30, BE32** | **BE60, BE62** |
|---|---|---|---|---|---|
| **$V_{DC}$** | **$I_H$ $A_{AC}$** | **$I_H$ $A_{AC}$** | **$I_H$ $A_{AC}$** | **$I_H$ $A_{AC}$** | **$I_H$ $A_{AC}$** |
| 60 (57-63) | 1.28 | 2.05 | 2.55 | – | – |
| 120 (111-123) | 0.64 | 1.04 | 1.28 | 1.66 | – |
| 147 (139-154) | 0.51 | 0.83 | 1.02 | 1.33 | – |
| 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 |

$I_B$ Acceleration current – brief inrush current
$I_H$ Holding current r.m.s. value in the supply cable to the SEW brake rectifier
$I_G$ Direct current with direct DC voltage supply
$V_N$ Nominal voltage (nominal voltage range)

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### 8.3.3 Brake BE120, BE122

The current values $I_H$ (holding current) listed in the tables are r.m.s. values. Use only appropriate instruments for measuring r.m.s. values. The inrush current (acceleration current) $I_B$ only flows for a short time (ca. 400 ms) when the brake is released. A separate voltage supply is not possible.

| | BE120 | BE122 |
|---|---|---|
| Maximum braking torque in Nm | 1000 | 2000 |
| Braking power in W | 250 | 250 |
| Inrush current ratio $I_B/I_H$ | 4.9 | 4.9 |

| Nominal voltage $V_N$ | BE120 | BE122 |
|---|---|---|
| $V_{AC}$ | $I_H$ $A_{AC}$ | $I_H$ $A_{AC}$ |
| 230 (218-243) | 1.80 | 1.80 |
| 254 (244-273) | 1.60 | 1.60 |
| 290 (274-306) | 1.43 | 1.43 |
| 360 (344-379) | 1.14 | 1.14 |
| 400 (380-431) | 1.02 | 1.02 |
| 460 (432-484) | 0.91 | 0.91 |
| 500 (485-542) | 0.81 | 0.81 |
| 575 (543-600) | 0.72 | 0.72 |

$I_B$ Acceleration current – brief inrush current
$I_H$ Holding current r.m.s. value in the supply cable to the SEW brake rectifier
$I_G$ Direct current with direct DC voltage supply
$V_N$ Nominal voltage (nominal voltage range)

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## 8.4 Resistors

### 8.4.1 Brake BE05, BE1, BE2, BE5

| | BE05, BE1 | BE2 |
|---|---|---|
| Maximum braking torque in Nm | 5/10 | 20 |
| Braking power in W | 3 2 | 43 |
| Inrush current ratio $I_B/I_H$ | 4 | 4 |

| Nominal voltage $V_N$ | | BE05, BE1 | | BE2 | |
|---|---|---|---|---|---|
| $V_{AC}$ | $V_{DC}$ | $R_B$ | $R_T$ | $R_B$ | $R_T$ |
| 24 (23-26) | 10 | 0.77 | 2.35 | 0.57 | 1.74 |
| 60 (57-63) | 24 | 4.85 | 14.8 | 3.60 | 11.0 |
| 120 (111-123) | 48 | 19.4 | 59.0 | 14.4 | 44.0 |
| 147 (139-159) | 60 | 30.5 | 94.0 | 23.0 | 69.0 |
| 184 (174-193) | 80 | 48.5 | 148 | 36.0 | 110 |
| 208 (194-217) | 90 | 61.0 | 187 | 45.5 | 139 |
| 230 (218-243) | 96 | 77.0 | 235 | 58.0 | 174 |
| 254 (244-273) | 110 | 97.0 | 296 | 72.0 | 220 |
| 290 (274-306) | 125 | 122 | 372 | 91 | 275 |
| 330 (307-343) | 140 | 154 | 469 | 115 | 350 |
| 360 (344-379) | 160 | 194 | 590 | 144 | 440 |
| 400 (380-431) | 180 | 244 | 743 | 182 | 550 |
| 460 (432-484) | 200 | 308 | 935 | 230 | 690 |
| 500 (485-542) | 220 | 387 | 1178 | 290 | 870 |
| 575 (543-600) | 250 | 488 | 1483 | 365 | 1100 |

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### 8.4.2 Brakes BE11, BE20, BE30, BE32, BE60, BE62

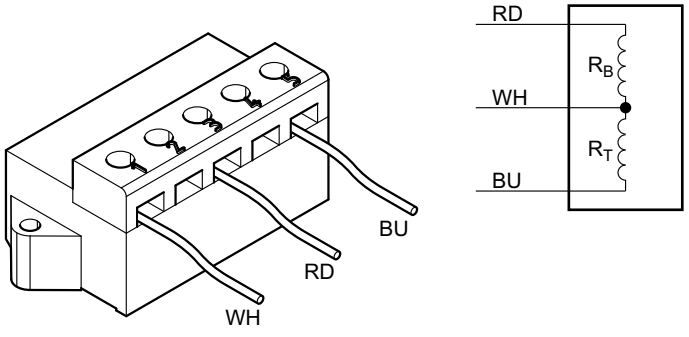
| | BE5 | BE11 | BE20 | BE30, BE32 | BE60, BE62 |
|---|---|---|---|---|---|
| Maximum braking torque in Nm | 55 | 110 | 200 | 300/600 | 600/1200 |
| Braking power in W | 49 | 77 | 100 | 130 | 195 |
| Inrush current ratio $I_B/I_H$ | 5.7 | 6.6 | 7.5 | 8.5 | 9.2 |

| Nominal voltage $V_N$ | BE5 | | BE11 | | BE20 | | BE30, BE32 | | BE60, BE62 | |
|---|---|---|---|---|---|---|---|---|---|---|
| $V_{AC}$ | $R_B$ | $R_T$ | $R_B$ | $R_T$ | $R_B$ | $R_T$ | $R_B$ | $R_T$ | $R_B$ | $R_T$ |
| 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 | – | – |
| 147 (139-159) | 13.8 | 66 | 7.7 | 44.0 | 5.4 | 36.1 | 3.7 | 27.3 | – | – |
| 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 |

### 8.4.3 Resistance measurement BE05, BE1, BE2, BE5, BE30, BE32, BE60, BE62

**Cut-off in the AC circuit**

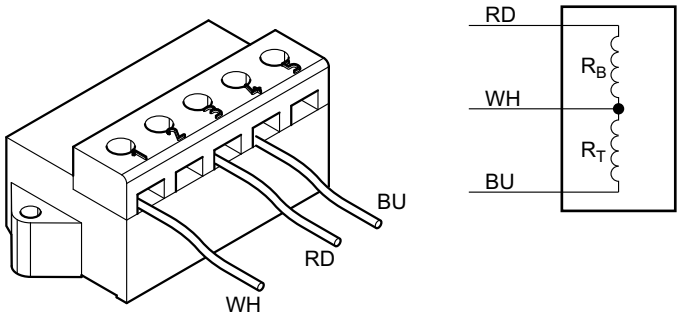
The following illustration shows how to measure resistance with cut-off in the AC circuit.




*9007199497350795*

### 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 | | |
| $V_N$ | Nominal voltage (nominal voltage range) | | |

## INFORMATION

When measuring the resistance of the coil section $R_T$ or the accelerator coil $R_B$, 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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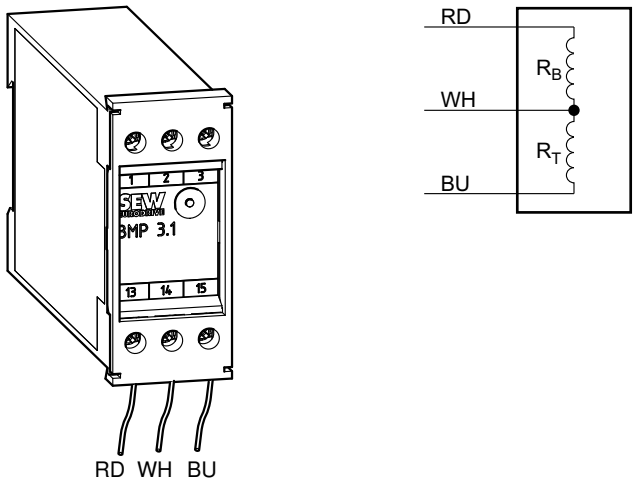
### 8.4.4 Brake BE120, BE122

| | BE120, BE122 |
|---|---|
| Maximum braking torque in Nm | 1000/2000 |
| Braking power in W | 250 |
| Inrush current ratio $I_B/I_H$ | 4.9 |

| Nominal voltage $V_N$ | BE120, BE122 | |
|---|---|---|
| $V_{AC}$ | $R_B$ | $R_T$ |
| 230 (218-243) | 8.0 | 29.9 |
| 254 (244-273) | 10.1 | 37.6 |
| 290 (274-306) | 12.7 | 47.4 |
| 360 (344-379) | 20.1 | 75.1 |
| 400 (380-431) | 25.3 | 94.6 |
| 460 (432-484) | 31.8 | 119.0 |
| 500 (485-542) | 40.1 | 149.9 |
| 575 (543-600) | 50.5 | 188.7 |

### 8.4.5 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 (nominal voltage range) | | |

## INFORMATION

When measuring the resistance of the coil section $R_T$ or the accelerator coil $R_B$, 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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## 8.5 Brake control system

### 8.5.1 Permitted combinations

The table below shows the standard and optional combinations of brakes and brake rectifiers.

| | | BE05 | BE1 | BE2 | BE5 | BE11 | BE20 | BE30, BE32 | BE60, BE62 | BE120, BE122 |
|---|---|---|---|---|---|---|---|---|---|---|
| BG | BG 1.4 | X[3] | X[3] | X[3] | – | – | – | – | – | – |
| | BG 1.5 | X[1] | X[1] | X[1] | • | – | – | – | – | – |
| | BG 3 | X[2] | X[2] | X[2] | – | – | – | – | – | – |
| BGE | BGE 1.4 | o | o | o | 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 | X | X | X | • | – | – | – | – | – |
| BMS | BMS 1.4 | o | o | o | – | – | – | – | – | – |
| | BMS 1.5 | • | • | • | – | – | – | – | – | – |
| | BMS 3 | • | • | • | – | – | – | – | – | – |
| BME | BME 1.4 | o | o | o | o | o | o | o | o | – |
| | BME 1.5 | • | • | • | • | • | • | • | X | – |
| | BME 3 | • | • | • | • | • | • | • | X | – |
| BMH | BMH 1.4 | o | o | o | o | o | o | o | – | – |
| | BMH 1.5 | • | • | • | • | • | • | • | – | – |
| | BMH 3 | • | • | • | • | • | • | • | – | – |
| BMK | BMK 1.4 | o | o | 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 | o | o | – |
| | BMP 1.5 | • | • | • | • | • | • | • | – | – |
| | BMP 3 | • | • | • | • | • | • | • | – | – |
| | BMP 3.1 | – | – | – | – | – | – | – | – | X |
| BMV | BMV 5 | • | • | • | • | • | • | – | – | – |
| BSG | BSG | • | • | • | X | X | X | – | – | – |

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| | | BE05 | BE1 | BE2 | BE5 | BE11 | BE20 | BE30, BE32 | BE60, BE62 | BE120, BE122 |
|---|---|---|---|---|---|---|---|---|---|---|
| BSR | BGE 1.4 + SR 15 | o | o | o | o | o | o | o | o | – |
| | BGE 3 + SR 11 | • | • | • | • | • | – | – | – | – |
| | BGE 3 + SR 15 | • | • | • | • | • | • | • | – | – |
| | BGE 1.5 + SR 11 | • | • | • | • | • | – | – | – | – |
| | BGE 1.5 + SR 15 | • | • | • | • | • | • | • | – | – |
| BUR | BGE 3 + UR 11 | • | • | • | • | – | – | – | – | – |
| | BGE 1.5 + UR 15 | • | • | • | • | • | • | • | – | – |

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 Can be selected with 575 $V_{AC}$ nominal brake voltage
– Not permitted

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### 8.5.2 Wiring space of the motor

The following table lists the technical data of brake control systems for installation in the motor wiring space and the assignments with regard to motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

| Type | Function | Voltage | Holding current $I_{Hmax}$ in A | Type | Part number | Color code |
|---|---|---|---|---|---|---|
| BG | One-way rectifier | AC 150 – 500 V | 1.5 | BG 1.5 | 8253846 | Black |
| | | AC 24 – 500 V | 3.0 | BG 3 | 8253862 | Brown |
| BGE | One-way rectifier with electronic switching | AC 150 – 500 V | 1.5 | BGE 1.5 | 8253854 | Red |
| | | AC 42 – 150 V | 3.0 | BGE 3 | 8253870 | Blue |
| BSR | Half-wave rectifier + current relay for switch-off in the DC circuit | AC 150 – 500 V | 1.0 | BGE 1.5 + SR 11 | 8253854<br>8267618 | |
| | | | 1.0 | BGE 1.5 + SR 15 | 8253854<br>8267626 | |
| | | AC 42 – 150 V | 1.0 | BGE 3 + SR11 | 8253870<br>8267618 | |
| | | | 1.0 | BGE 3 + SR15 | 8253870<br>8267626 | |
| BUR | Half-wave rectifier + voltage relay for switch-off in the DC circuit | AC 150 – 500 V | 1.0 | BGE 1.5 + UR 15 | 8253854<br>8267596 | |
| | | AC 42 – 150 V | 1.0 | BGE 3 + UR 11 | 8253870<br>8267588 | |
| BS | Varistor protection circuit | DC 24 V | 5.0 | BS24 | 8267634 | Water blue |
| BSG | Electronic switching | DC 24 V | 5.0 | BSG | 8254591 | White |
| BMP | Half-wave rectifier with electronic switching, integrated voltage relay for switch-off in the DC circuit | AC 230 – 575 V | 2.8 | BMP 3.1[1)] | 8295077 | |

1) Only sizes 280M, 315

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### 8.5.3 Control cabinet

The following table lists the technical data of brake control systems for installation in the control cabinet and the assignments with regard to motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

| Type | Function | Voltage | Holding current $I_{Hmax}$ in A | Type | Part number | Color code |
|---|---|---|---|---|---|---|
| BMS | One-way rectifier as BG | AC 230 – 575 V | 1.0 | BMS 1.4 | 8298300 | Black |
| | | AC 150 – 500 V | 1.5 | BMS 1.5 | 8258023 | Black |
| | | AC 42 – 150 V | 3.0 | BMS 3 | 8258031 | Brown |
| BME | One-way rectifier with electronic switching as BGE | AC 230 – 575 V | 1.0 | BME 1.4 | 8298319 | Red |
| | | AC 150 – 500 V | 1.5 | BME 1.5 | 8257221 | Red |
| | | AC 42 – 150 V | 3.0 | BME 3 | 825723X | Blue |
| BMH | One-way rectifier with electronic switching and heating function | AC 230 – 575 V | 1.0 | BMH 1.4 | 8298343 | Green |
| | | AC 150 – 500 V | 1.5 | BMH 1.5 | 825818X | Green |
| | | AC 42 – 150 V | 3 | BMH 3 | 8258198 | Yellow |
| BMP | One-way rectifier with electronic switching, integrated voltage relay for switch-off in the DC circuit | AC 230 – 575 V | 1.0 | BMP 1.4 | 8298327 | White |
| | | AC 150 – 500 V | 1.5 | BMP 1.5 | 8256853 | White |
| | | AC 42 – 150 V | 3.0 | BMP 3 | 8265666 | Light blue |
| | | AC 230 – 575 V | 2.8 | BMP 3.1[1)] | 8295077 | |
| BMK | One-way rectifier with electronic switch mode, DC 24 V control input and separation in the DC circuit | AC 230 – 575 V | 1.0 | BMK 1.4 | 8298335 | Water blue |
| | | AC 150 – 500 V | 1.5 | BMK 1.5 | 8264635 | Water blue |
| | | AC 42 – 150 V | 3.0 | BMK 3 | 8265674 | Bright red |
| BMV | Brake control unit with electronic switching, DC 24 V control input and fast switch-off | DC 24 V | 5.0 | BMV 5 | 13000063 | White |

1) Only sizes 280M, 315

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## 8.6 Permitted rolling bearing types

### 8.6.1 Rolling bearing types for motor sizes DR..71 – 315

| Motor type | A-side bearing | | B-side bearing | |
|---|---|---|---|---|
| | IEC motor | Gearmotor | AC motor | Brakemotor |
| **DR..71** | 6204-2Z-J-C3 | 6303-2Z-J-C3 | 6203-2Z-J-C3 | 6203-2RS-J-C3 |
| **DR..80,** | 6205-2Z-J-C3 | 6304-2Z-J-C3 | 6304-2Z-J-C3 | 6304-2RS-J-C3 |
| **DR..90 – 100** | 6306-2Z-J-C3 | | 6205-2Z-J-C3 | 6205-2RS-J-C3 |
| **DR..112 – 132** | 6308-2Z-J-C3 | | 6207-2Z-J-C3 | 6207-2RS-J-C3 |
| **DR..160** | 6309-2Z-J-C3 | | 6209-2Z-J-C3 | 6209-2RS-J-C3 |
| **DR..180, DRN180** | 6312-2Z-J-C3 | | 6213-2Z-J-C3 | 6213-2RS-J-C3 |
| **DR..200 – 225** | 6314-2Z-J-C3 | | 6314-2Z-J-C3 | 6314-2RS-J-C3 |
| **DR..250 – 280** | 6317-2Z-J-C4 | | 6315-2Z-J-C3 | 6315-2RS-J-C3 |

### 8.6.2 Rolling bearing types for motor sizes DRN80 – 315

| Motor type | A-side bearing | | B-side bearing | |
|---|---|---|---|---|
| | IEC motor | Gearmotor | AC motor | Brakemotor |
| **DRN80** | 6205-2Z-J-C3<br>E2.6205-2Z-C3-K24 | 6304-2Z-J-C3 | 6304-2Z-J-C3<br>E2.6304-2Z-C3-K24 | 6304-2RS-J-C3 |
| **DRN90** | 6305-2Z-J-C3 | | 6205-2Z-J-C3 | 6205-2RS-J-C3 |
| **DRN100** | 6306-2Z-J-C3 | | 6205-2Z-J-C3 | 6205-2RS-J-C3 |
| **DRN112** | 6308-2Z-J-C3 | | 6207-2Z-J-C3 | 6207-2RS-J-C3 |
| **DRN132S** | 6308-2Z-J-C3<br>E2.6308-2Z-C3-K24 | 6308-2Z-J-C3 | 6207-2Z-J-C3<br>E2.6207-2Z-C3-K24 | 6207-2RS-J-C3 |
| **DRN132M/L** | 6308-2Z-J-C3 | 6309-2Z-J-C3 | 6209-2Z-J-C3 | 6209-2RS-J-C3 |
| **DRN160** | 6310-2Z-J-C3 | 6312-2Z-J-C3 | 6212-2Z-J-C3 | 6212-2RS-J-C3 |
| **DRN180** | 6311-2Z-J-C3 | 6312-2Z-J-C3 | 6212-2Z-J-C3 | 6212-2RS-J-C3 |
| **DRN200** | 6312-2Z-J-C3 | 6314-2Z-J-C3 | 6314-2Z-J-C3 | 6314-2RS-J-C3 |
| **DRN225** | 6314-2Z-J-C3 | | 6314-2Z-J-C3 | 6314-2RS-J-C3 |
| **DRN250 – 280** | 6317-2Z-J-C4 | | 6315-2Z-J-C3 | |

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### 8.6.3 Rolling bearing types for motor sizes DR..315, DRN315

| Motor type | A-side bearing | | B-side bearing | |
|---|---|---|---|---|
| | IEC motor | Gearmotor | IEC motor | Gearmotor |
| **DR..315K, DRN315S** | 6319-J-C3 | 6319-J-C3 | 6319-J-C3 | 6319-J-C3 |
| **DR..315S, DRN315M** | | | | |
| **DR..315M, DRN315L** | 6319-J-C3 | 6322-J-C3 | 6319-J-C3 | 6322-J-C3 |
| **DR..315L, DRN315H** | | | | |

### 8.6.4 Motors with /ERF reinforced bearings for motor sizes DR..250 – 315, DRN250 – 315

| Motor type | A-side bearing | B-side bearing | |
|---|---|---|---|
| | | IEC motor | Gearmotor |
| **DR..250 – 280, DRN250 – 280** | NU317E-C3 | 6315-J-C3 | |
| **DR..315K, DRN315S** | NU319E | 6319-J-C3 | 6319-J-C3 |
| **DR..315S, DRN315M** | | | |
| **DR..315M, DRN315L** | | | 6322-J-C3 |
| **DR..315L, DRN315H** | | | |

### 8.6.5 /NIB current-insulated rolling bearings for motor sizes DR..200 – 315, DRN200 – 315

| Motor type | B-side bearing | |
|---|---|---|
| | AC motor | Gearmotor |
| **DR..200 – 225, DRN200 – 225** | 6314-J-C3-EI | 6314-J-C3-EI |
| **DR..250 – 280, DRN250 – 280** | 6315-Z-J-C3-EI | 6315-Z-J-C3-EI |
| **DR..315K, DRN315S** | 6319-J-C3-EI | 6319-J-C3-EI |
| **DR..315S, DRN315M** | | |
| **DR..315M, DRN315L** | | 6322-J-C3-EI |
| **DR..315L, DRN315H** | | |

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## 8.7 Lubricant tables

### 8.7.1 Lubricant table for rolling bearings

**INFORMATION**

Using the wrong bearing greases could cause bearing damage.

**Motors with sealed bearings**

The bearings are 2Z or 2RS closed bearings and cannot be re-lubricated. They are used for the sizes DR..71 – 280, DRN80 – 280.

| | Ambient temperature | Manufacturer | Type | DIN designation |
|---|---|---|---|---|
| Motor rolling bearings | -20 °C – +80 °C | Esso | Polyrex EM[1)] | K2P-20 |
| | +20 °C – +100 °C | Klüber | Barrierta L55/2[2)] | KX2U |
| | -40 °C – +60 °C | Kyodo Yushi | Multemp SRL[2)] | K2N-40 |

1) Mineral lubricant (= mineral-based rolling bearing grease)

2) Synthetic lubricant (= synthetic-based roller bearing grease)

**Motors with open bearings**

Motors of the size DR..250/280, 315, DRN250/280, 315 have open bearings and can be equipped with a relubrication device.

| | Ambient temperature | Manufacturer | Type | DIN designation |
|---|---|---|---|---|
| Motor rolling bearings | -20 °C – +80 °C | Esso | Polyrex EM[1)] | K2P-20 |
| | -40 °C – +60 °C | SKF | GXN[1)] | K2N-40 |

1) Mineral lubricant (= mineral-based rolling bearing grease)

## 8.8 Order information for lubricants and anti-corrosion agents

Lubricants and anti-corrosion agents can be ordered directly from SEW-EURODRIVE using the following order numbers.

| Use | Manufacturer | Type | Quantity | Purchase order number |
|---|---|---|---|---|
| Lubricant for rolling bearings | Esso | Polyrex EM | 400 g | 03259420 |
| | SKF | GXN | 400 g | 09101276 |
| Lubricant for sealing rings | | | | |
| Material: NBR/FKM | Klüber | Petamo GHY 133N | 10 g | 04963458 |
| Material: EPDM | Klüber | Klübersynth BLR 46-122 | 10 g | 03252663 |
| Corrosion protection and lubricant | SEW-EURODRIVE | NOCO® fluid | 5.5 g | 09107819 |

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## 8.9 Encoders

### 8.9.1 ES7. and EG7.

| Encoder type | | ES7S | EG7S | ES7R | EG7R | ES7C | EG7C |
|---|---|---|---|---|---|---|---|
| For motors | | DR..71 – 132 DRN80 – 132S | DR..160 – 280 DRN132M – 280 | DR..71 – 132 DRN80 – 132S | DR..160 – 280 DRN132M – 280 | DR..71 – 132 DRN80 – 132S | DR..160 – 280 DRN132M – 280 |
| Supply voltage | $U_B$ | DC 7 V – 30 V | | DC 7 – 30 V | | DC 4.75 – 30 V | |
| Max. current consumption | $I_{in}$ | 140 $mA_{RMS}$ | | 160 $mA_{RMS}$ | | 250 $mA_{RMS}$ | |
| Max. pulse frequency | $f_{max}$ | 150 kHz | | 120 kHz | | 120 kHz | |
| Periods per revolution | A, B | 1024 | | 1024 | | 1024 | |
| | C | 1 | | 1 | | 1 | |
| Output amplitude per track | $U_{high}$ | 1 $V_{SS}$ | | ≥ DC 2.5 V | | ≥ DC 2.5 V | |
| | $U_{low}$ | | | ≤ DC 0.5 V | | ≤ DC 1.1 V | |
| Signal output | | Sin/Cos | | TTL | | HTL | |
| Output current per track | $I_{out}$ | 10 $mA_{RMS}$ | | 25 $mA_{RMS}$ | | 60 $mA_{RMS}$ | |
| Pulse duty factor | | Sin/Cos | | 1: 1 ± 10% | | 1: 1 ± 10% | |
| Phase angle A : B | | 90° ± 3° | | 90° ± 20° | | 90° ± 20° | |
| Vibration resistance | | ≤ 100 m/s² | | ≤ 100 m/s² | ≤ 200 m/s² | ≤ 100 m/s² | |
| Shock resistance | | ≤ 1000 m/s² | ≤ 2000 m/s² | ≤ 1000 m/s² | ≤ 2000 m/s² | ≤ 1000 m/s² | ≤ 2000 m/s² |
| Maximum speed | $n_{max}$ | 6000 rpm | | 6000 rpm | | 6000 rpm | |
| Degree of protection | | IP66 | | IP66 | | IP66 | |
| Connection | | Terminal box on incremental encoder | | | | | |

### 8.9.2 EH7.

| Encoder type | | EH7R | EH7T | EH7C | EH7S |
|---|---|---|---|---|---|
| For motors | | DR..315 DRN315 | | | |
| Supply voltage | $U_B$ | DC 10 V – 30 V | DC 5 V | DC 10 V - 30 V | |
| Max. current consumption | $I_{in}$ | 140 mA | | 225 mA | 140 mA |
| Max. pulse frequency $f_{max}$ | kHz | 300 | | | 180 |
| Periods per revolution | A, B | 1024 | | | |
| | C | 1 | | | |
| Output amplitude | $U_{high}$ | ≥ 2.5 V | | $V_B$ -3 V | 1 $V_{ss}$ |
| | $U_{low}$ | ≤ 0.5 V | | ≤ 2.5 V | |
| Signal output | | TTL (RS-422) | | HTL | Sin/Cos |
| Output current per track | $I_{out}$ | 20 mA | | 30 mA | 10 mA |
| Pulse duty factor | | 1: 1 ± 20% | | | 90° ± 10° |
| Phase angle A : B | | 90° ± 20° | | | - |
| Vibration resistance at 10 Hz – 2 kHz | | ≤ 100 m/s² (EN 60088-2-6) | | | |
| Shock resistance | | ≤ 2000 m/s² (EN 60088-2-27) | | | |
| Maximum speed $n_{max}$ | rpm | 6000, 2500 at 60°C | | | |
| Degree of protection | | IP65 (EN 60529) | | | |
| Connection | | 12-pin plug connector | | | |

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### 8.9.3 AS7Y and AG7Y

| Encoder type | | AS7Y | AG7Y |
|---|---|---|---|
| For motors | | DR..71 – 132<br>DRN80 – 132S | DR..160 – 280<br>DRN132M – 280 |
| Supply voltage | $U_B$ | DC 7 – 30 V | |
| Max. current consumption | $I_{in}$ | 150 $mA_{RMS}$ | |
| Max. pulse frequency | $f_{max}$ | 200 kHz | |
| Periods per revolution | A, B | 2048 | |
| | C | - | |
| Output amplitude per track | $U_{high}$ | 1 $V_{SS}$ | |
| | $U_{low}$ | | |
| Signal output | | Sin/Cos | |
| Output current per track | $I_{out}$ | 10 $mA_{RMS}$ | |
| Pulse duty factor | | Sin/Cos | |
| Phase angle A : B | | 90° ± 3° | |
| Scanning code | | Gray Code | |
| Single-turn resolution | | 4096 increments/revolution | |
| Multi-turn resolution | | 4096 revolutions | |
| Data transmission | | synchronous-serial | |
| Serial data output | | Driver to EIA RS-422 | |
| Serial pulse input | | Recommended receiver to EIA RS-422 | |
| Clock frequency | | Permitted range: 100 – 2000 kHz (max. 100 m cable length with 300 kHz) | |
| Clock-pulse space period | | 12 – 30 µs | |
| Vibration resistance | | ≤ 100 m/s² | |
| Shock resistance | | ≤ 1000 m/s² | ≤ 2000 m/s² |
| Maximum speed | $n_{max}$ | 6000 rpm | |
| Degree of protection | | IP66 | |
| Connection | | Terminal strip in pluggable connection cover | |

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### 8.9.4 AS7W and AG7W

| Encoder type | | AS7W | AG7W |
|---|---|---|---|
| For motors | | DR..71 – 132<br>DRN80 – 132S | DR..160 – 280<br>DRN132M – 280 |
| Supply voltage | $U_B$ | DC 7 – 30 V | |
| Max. current consumption | $I_{in}$ | 140 $mA_{RMS}$ | |
| Max. pulse frequency | $f_{max}$ | 200 kHz | |
| Periods per revolution | A, B | 2048 | |
| | C | – | |
| Output amplitude per track | $U_{high}$ | 1 $V_{SS}$ | |
| | $U_{low}$ | | |
| Signal output | | Sin/Cos | |
| Output current per track | $I_{out}$ | 10 $mA_{RMS}$ | |
| Pulse duty factor | | Sin/Cos | |
| Phase angle A : B | | 90° ± 3° | |
| Scanning code | | Binary code | |
| Single-turn resolution | | 8192 increments/revolution | |
| Multi-turn resolution | | 65536 revolutions | |
| Data transmission | | RS485 | |
| Serial data output | | Driver to EIA RS-485 | |
| Serial pulse input | | Recommended driver to EIA RS-422 | |
| Clock frequency | | 9600 Bd | |
| Clock-pulse space period | | – | – |
| Vibration resistance | | ≤ 100 m/s² | ≤ 200 m/s² |
| Shock resistance | | ≤ 1000 m/s² | ≤ 2000 m/s² |
| Maximum speed | $n_{max}$ | 6000 rpm | |
| Degree of protection | | IP66 | |
| Connection | | Terminal strip in pluggable connection cover | |

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### 8.9.5 AH7Y

| Encoder type | | AH7Y |
|---|---|---|
| For motors | | DR..315<br>DRN315 |
| Supply voltage | $U_B$ | DC 9 V – 30 V |
| Max. current consumption | $I_{in}$ | 160 mA |
| Periods per revolution | A, B | 2048 |
| | C | – |
| Output amplitude | $U_{high}$ | ≥ 2.5 $V_{SS}$ |
| | $U_{low}$ | ≤ 0.5 $V_{SS}$ |
| Max. pulse frequency | | 120 kHz |
| Signal output | | TTL (RS-422) |
| Output current per track | $I_{out}$ | 20 mA |
| Pulse duty factor | | 1: 1 ± 20% |
| Phase angle A : B | | 90° ± 20° |
| Absolute encoder scanning code | | Gray Code |
| Single-turn resolution | | 4096 increments/revolution |
| Multi-turn resolution | | 4096 revolutions |
| Data transmission of absolute value | | Synchronous, serial (SSI) |
| Serial data output | | Driver to EIA RS-485 |
| Serial pulse input | | Optocoupler, recommended driver to EIA RS-485 |
| Clock frequency | | Permitted range: 100 – 800 kHz (max. 100 m cable length with 300 kHz) |
| Clock-pulse space period | | 12 ms – 30 ms |
| Vibration resistance at 10 Hz – 2 kHz | | ≤ 100 $m/s^2$ (EN 60088-2-6) |
| Shock resistance | | ≤ 2000 $m/s^2$ (EN 60088-2-27) |
| Maximum speed $n_{max}$ | $n_{max}$ | 3500 rpm |
| Degree of protection | | IP56 (EN 60529) |
| Connection | | Terminal strip on encoder |

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### 8.9.6 EI7. B

| Encoder type | | EI7C | EI76 | EI72 | EI71 |
|---|---|---|---|---|---|
| For motors | | DR..71 – 132<br>DRN80 – 132S | | | |
| Supply voltage | $V_B$ | DC 9 – 30 V | | | |
| Max. current consumption (with no load) | $I_{max}$ | 120 $mA_{RMS}$ | | | |
| Max. pulse frequency at $n_{max}$ | $f_{max}$ | 1.44 kHz | | | |
| Periods per revolution | A, B | 24 | 6 | 2 | 1 |
| (signal tracks) | C | – | | | |
| Output amplitude per track | $V_{high}$ | ≥ $V_B$ -3.5 V | | | |
| | $V_{low}$ | ≤ 3 V | | | |
| Signal output | | HTL | | | |
| Maximum output current per track | $I_{out_max}$ | 60 $mA_{RMS}$ | | | |
| Pulse duty factor<br>(DIN IEC 60469-1)<br>$t = t_{log_1}/(t_{period})$<br>n = constant | | 30 – 70% (typically: 50%) | | | |
| Phase offset A: B<br>$\varphi_{phase, A:B}$<br>n = constant | | 70°– 110° (typically: 90°) | | | |
| Vibration resistance | | 10 g (98.1 $m/s^2$); 5 – 2000 Hz (EN 60068-2-6:2008) | | | |
| Shock resistance | | 100 g (981 $m/s^2$); 6 ms (EN 60068-2-27:2009) | | | |
| Permitted magnetic interference field on the outer contour of the motor | $B_{extmax}$<br>$H_{extmax}$ | 25mT<br>20kA/m | | | |
| Maximum speed | $n_{max}$ | 3600 $min^{-1}$ | | | |
| Degree of protection | | IP66 | | | |
| Connection | | Terminal strip in the terminal box or M12 (4- or 8-pin) | | | |

### 8.9.7 EV2.

| Encoder type | | EV2T | EV2S | EV2R | EV2C |
|---|---|---|---|---|---|
| For motors | | DR..71 – DR..225<br>DRN80 – 225 | | | |
| Supply voltage | $U_B$ | DC 5 V | DC 9 V – 26 V | | |
| Max. current consumption | $I_{in}$ | 160 $mA_{RMS}$ | 120 $mA_{RMS}$ | 160 $mA_{RMS}$ | 250 $mA_{RMS}$ |
| Max. pulse frequency | $f_{max}$ | 120 kHz | | | |
| Periods per revolution | A, B | 1024 | | | |
| | C | 1 | | | |
| Output amplitude per track | $U_{high}$ | ≥ 2.5 V | 1 $V_{SS}$ | ≥ 2.5 V | ≥ $V_B$ - 3.5 V |
| | $U_{low}$ | ≤ 0.5 V | | ≤ 0.5 V | ≤ 3 V |
| Signal output | | TTL | Sin/Cos | TTL | HTL |
| Output current per track | $I_{out}$ | 25 $mA_{RMS}$ | 10 $mA_{RMS}$ | 25 $mA_{RMS}$ | 60 $mA_{RMS}$ |
| Pulse duty factor | | 1: 1 ± 20% | Sin/Cos | 1: 1 ± 20% | |
| Phase angle A : B | | 90° ± 20° | 90° | 90° ± 20° | |
| Data memory | | – | | | |
| Vibration resistance | | ≤ 100 $m/s^2$ | | | |
| Shock resistance | | ≤ 1000 $m/s^2$ | ≤ 3000 $m/s^2$ | ≤ 1000 $m/s^2$ | |
| Maximum speed | $n_{max}$ | 6000 rpm | | | |
| Weight | m | 0.36 kg | | | |
| Degree of protection | | IP66 | | | |
| Connection | | Terminal box on incremental encoder | | | |

## 8.10 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-1 K-00 |
|---|---|---|---|
| Part number | | | 21195609 |
| Signal outputs (1 channel) | | | Out1: 4 – 20 mA<br>FCT1: DC 24 V (150 mA)<br>WEAR1: DC 24 V (150 mA) |
| Current consumption | Max. | mA | 190 |
| | 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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## 8.11 Characteristic values of functional safety

### 8.11.1 Characteristic safety values of the brakes BE05 – BE122

Definition of the characteristic safety value $B10_d$:

The value $B10_d$ specifies the number of cycles at which 10% of components have failed dangerously (definition according to standard EN ISO 13849-1). Failed dangerously means in this context that the brake is not applied when required. This means the brake does not deliver the necessary braking torque.

| Size | $B10_d$<br>Switching cycles |
|---|---|
| **BE05** | 16,000,000 |
| **BE1** | 12,000,000 |
| **BE2** | 8,000,000 |
| **BE5** | 6,000,000 |
| **BE11** | 3,000,000 |
| **BE20** | 2,000,000 |
| **BE30** | 1,500,000 |
| **BE32** | 1,500,000 |
| **BE60** | 1,000,000 |
| **BE62** | 1,000,000 |
| **BE120** | 250,000 |
| **BE122** | 250,000 |

In addition to the brakes listed above, SEW also offers safety-rated brakes up to size 32. For detailed information, refer to the addendum to the operating instructions "Safety-Rated Brakes – Functional Safety for AC Motors."

### 8.11.2 Safety characteristics of safety-rated encoders

Definition of the characteristic safety value $MTTF_d$:

The value $MTTF_d$ (Mean Time To Failure) specifies the mean time to dangerous failure / component fault.

| Motor size | Designation | $MTTF_d$[1)] | Service life |
|---|---|---|---|
| | | In years | |
| **DR..71 – 132**<br>**DRN80 – 132S** | ES7S | 61 | 20 |
| | AS7W | 41 | 20 |
| | AS7Y | 41 | 20 |
| | EI7C FS | 202 | 20 |
| **DR..160 – 315**<br>**DRN132M – 315** | EG7S | 61 | 20 |
| | AG7W | 41 | 20 |
| | AG7Y | 41 | 20 |

1) Referring to an ambient temperature of 40°C

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## 8.12 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 duty at 1500 / 1800 rpm (230 V) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | $M_A$ / $M_N$ with $C_B$ | $C_A$ for $M_A/M_N$ | |
| **Motor type** | | $P_N$ | $n_N$ | $I_N$ | cos φ | $C_B$ | | 100% | 150% |
| | **Hz** | **kW** | **rpm** | **A** | | **µF** | | **µF** | **µF** |
| **DRK71S4** | 50 | 0.18 | 1450 | 1.53 | 0.81 | 20 | 0.5 | 14 | 25 |
| | 60 | | 1755 | 1.38 | 0.87 | 18 | 0.45 | 14 | 25 |
| **DRK71M4** | 50 | 0.25 | 1455 | 2.05 | 0.80 | 25 | 0.45 | 16 | 35 |
| | 60 | | 1760 | 1.80 | 0.89 | 25 | 0.5 | 14 | 30 |
| **DRK80S4** | 50 | 0.37 | 1420 | 2.40 | 0.98 | 18 | 0.5 | 12 | 25 |
| | 60 | | 1730 | 2.45 | 0.94 | 15 | 0.45 | 12 | 20 |
| **DRK80M4** | 50 | 0.55 | 1430 | 3.45 | 0.97 | 25 | 0.5 | 12 | 30 |
| | 60 | | 1740 | 3.45 | 0.94 | 20 | 0.5 | 12 | 25 |
| **DRK90M4** | 50 | 0.75 | 1430 | 4.75 | 0.93 | 15+15 | 0.5 | 20 | 40 |
| | 60 | | 1740 | 4.80 | 0.90 | 25 | 0.5 | 18 | 35 |
| **DRK90L4** | 50 | 1.1 | 1415 | 6.6 | 0.97 | 20+25 | 0.5 | 30 | 70 |
| | 60 | | 1725 | 6.8 | 0.93 | 15+20 | 0.55 | 30 | 50 |

$C_B$ Running capacitor

$C_A$ Start-up capacitor

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# 9 Malfunctions



**⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- De-energize the motor before you start working on the unit.
- Secure the motor against unintended power-up.



**⚠ CAUTION**

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

Risk of burns.

- Let the motor cool down before you start your work.

**NOTICE**

Improper troubleshooting measures may damage the drive.

Possible damage to property.

- Use only genuine spare parts in accordance with the valid spare parts list.
- Strictly observe the safety notes in the individual chapters.

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## 9.1 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 |
| | Malfunction 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; follow the wiring diagram |
| | Motor power designed for star-star connection but only connected in star | Correct the connection from star to star-star; follow the 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;<br>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;<br>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;<br>Check the connections |
| Incorrect direction of rotation | Motor connected incorrectly | Swap two 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 | |
| Fuses blow or motor protection trips immediately | Short circuit in the motor supply cable | Eliminate short circuit |
| | Supply cables connected incorrectly | Correct the wiring, observe the wiring diagram |
| | Short circuit in the motor | Send motor to specialist workshop for repair |
| | Ground fault on motor | |
| 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 |

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| Fault | Possible cause | Measure |
|---|---|---|
| Motor heats up excessively (measure temperature) | Overload | Measure power, check project planning and use larger motor or reduce load if necessary |
| | Insufficient cooling | Provide for 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 blown | Look for and rectify cause (see above); replace fuse |
| | Line voltage deviates from the rated motor voltage by more than 5% (range A) / 10% (range B). | Adjust motor to line voltage |
| | Nominal duty cycle (S1 to S10, DIN 57530) exceeded, e.g. caused by excessive starting frequency | Adjust the nominal duty cycle of the motor to the required operating conditions; consult a professional to determine the proper drive, if necessary |
| Excessively loud | Ball bearing compressed, dirty or damaged | Re-align motor and the driven machine, inspect rolling bearing and replace if necessary. See chapter "Permitted rolling bearing types" (→ 🗎 174). |
| | Vibration of rotating parts | Look for the case, possibly an imbalance; correct the cause, observe method for balancing |
| | Foreign objects in cooling air ducts | Clean cooling air ducts |
| | For DR.. motors with rotor designation "J": Load too high | Reduce load |

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## 9.2 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 | Install a new brake control, check resistors and insulation of the brake coils (see "Resistors" chapter for resistance values)<br>Check switchgear, replace if necessary |
| | Max. permitted working air gap exceeded because brake lining worn down | Measure and set working air gap.<br>See the following chapters:<br>• Setting the working air gap of BE05 – BE122 brakes (→ 🗎 131)<br>• Setting the working air gap of BE120 – BE122 brakes<br>If the brake disk is too thin, replace the brake disk.<br>See the following chapters:<br>• Replacing the brake disk of BE05 – BE122 brakes (→ 🗎 133)<br>• Replacing the brake disk of BE120 – BE122 brakes |
| | 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 overheats | 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 insulation of the brake coils (see "Resistors" chapter for resistance values);<br>Replace complete brake and brake control (specialist workshop),<br>Check switchgear, replace if necessary |
| | Rectifier defective | Replace rectifier and brake coil; it may be more economical to replace the complete brake |

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| Fault | Possible cause | Measure |
|---|---|---|
| Brake does not brake | Working air gap not correct | Measure and set working air gap.<br>See the following chapters:<br>• Setting the working air gap of BE05 – BE122 brakes (→ 🗎 131)<br>• Setting the working air gap of BE120 – BE122 brakes<br>If the brake disk is too thin, replace the brake disk.<br>See the following chapters:<br>• Replacing the brake disk of BE05 – BE122 brakes (→ 🗎 133)<br>• Replacing the brake disk of BE120 – BE122 brakes |
| | Brake lining worn | Replace entire brake disk.<br>See the following chapters:<br>• Replacing the brake disk of BE05 – BE122 brakes (→ 🗎 133)<br>• Replacing the brake disk of BE120 – BE122 brakes |
| | Incorrect braking torque | Check the project planning and change the braking torque if necessary; see chapter "Work done, working air gap, braking torques" (→ 🗎 159)<br>• by changing the type and number of brake springs.<br>See the following chapters:<br>– Changing the braking torque of BE05 – BE122 brakes (→ 🗎 135)<br>– Changing the braking torque of BE120 – BE122 brakes<br>• by selecting a different brake<br>See chapter "Braking torque assignment" (→ 🗎 161) |

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| Fault | Possible cause | Measure |
|---|---|---|
| Brake does not brake | Working air gap so large that setting nuts for the manual brake release come into contact | Set the working air gap.<br>See the following chapters:<br>• Setting the working air gap of BE05 – BE122 brakes (→ 🗎 131)<br>• Setting the working air gap of BE120 – BE122 brakes |
| | Manual brake release device not set correctly | Set the adjusting nuts for the manual brake release correctly<br>See the following chapters:<br>• Changing the braking torque of BE05 – BE122 brakes (→ 🗎 135)<br>• Changing the braking torque of BE120 – BE122 brakes |
| | Brake locked by manual brake release HF | Loosen the set screw, remove if necessary |
| 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 |
| Noises in vicinity of brake | Gearing wear on the brake disk or the driver caused by jolting startup | Check the project planning, replace the brake disk if necessary<br>See the following chapters:<br>• Replacing the brake disk of BE05 – BE122 brakes (→ 🗎 133)<br>• Replacing the brake disk of BE120 – BE122 brakes<br>Have a specialist workshop replace the driver |
| | Alternating torques due to incorrectly set frequency inverter | Check correct setting of frequency inverter according to its operating instructions, correct if necessary. |

## 9.3 Malfunctions when operated with a frequency inverter

The symptoms described in the "Motor malfunctions" chapter may also occur when the motor is operated with a frequency inverter. Please 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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## 9.4 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.

## 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)

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# 10 Appendix

## 10.1 Wiring diagrams

### INFORMATION

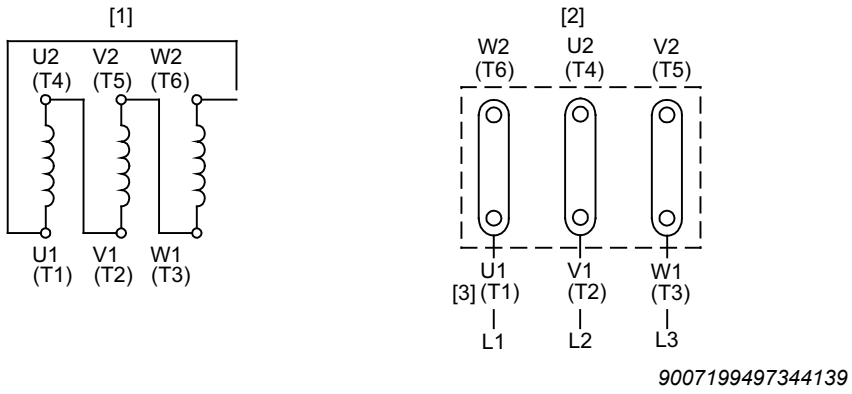
The motor should be connected as shown in the connection wiring diagram or the terminal assignment diagram, which are supplied with the motor. The following chapter only shows a selection of the common types of connections. You can obtain the relevant wiring diagrams free of charge from SEW-EURODRIVE.

### 10.1.1 Delta and star connection in wiring diagram R13

For all motors with one speed, direct on-line or ⅄/△ start-up.

#### Delta connection

The following figure shows △ connection for low voltage.

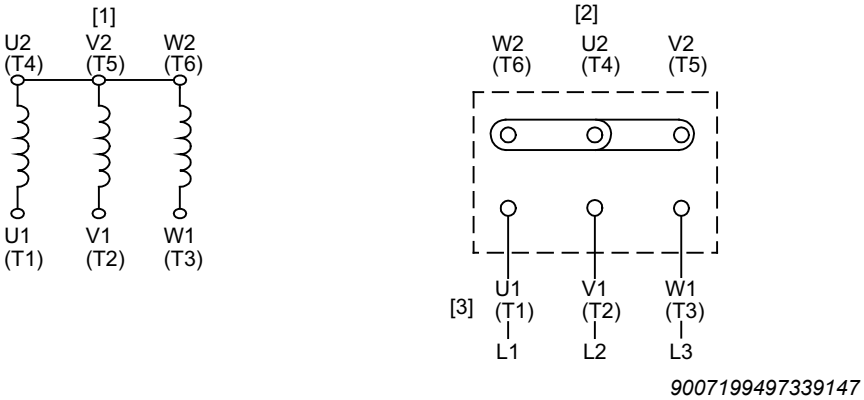



*9007199497344139*

[1] Motor winding
[2] Motor terminal board
[3] Incoming cables

#### Star connection

The following figure shows ⅄ connection for high voltage.




*9007199497339147*

[1] Motor winding
[2] Motor terminal board
[3] Incoming cables

Direction of rotation reversal: Swap connection of 2 incoming cables, L1 – L2

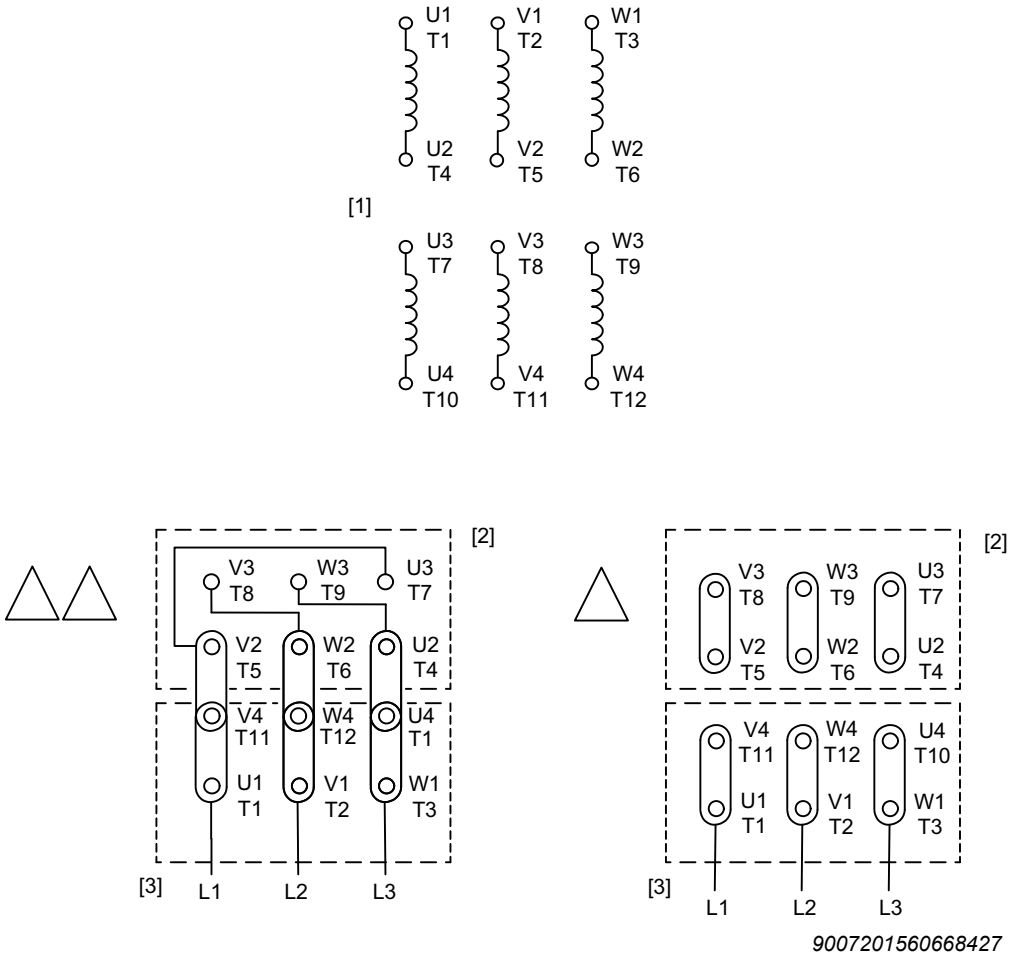
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### 10.1.2 Delta connection with wiring diagram R72 (68192 xx 09)

For all motors with one speed and direct power-on.

**Delta connection, Double-delta connection**

The following figure shows △ connection for high voltages and △ △ connection for low voltages.




[1] Motor winding
[2] Motor terminal board
[3] Incoming cables

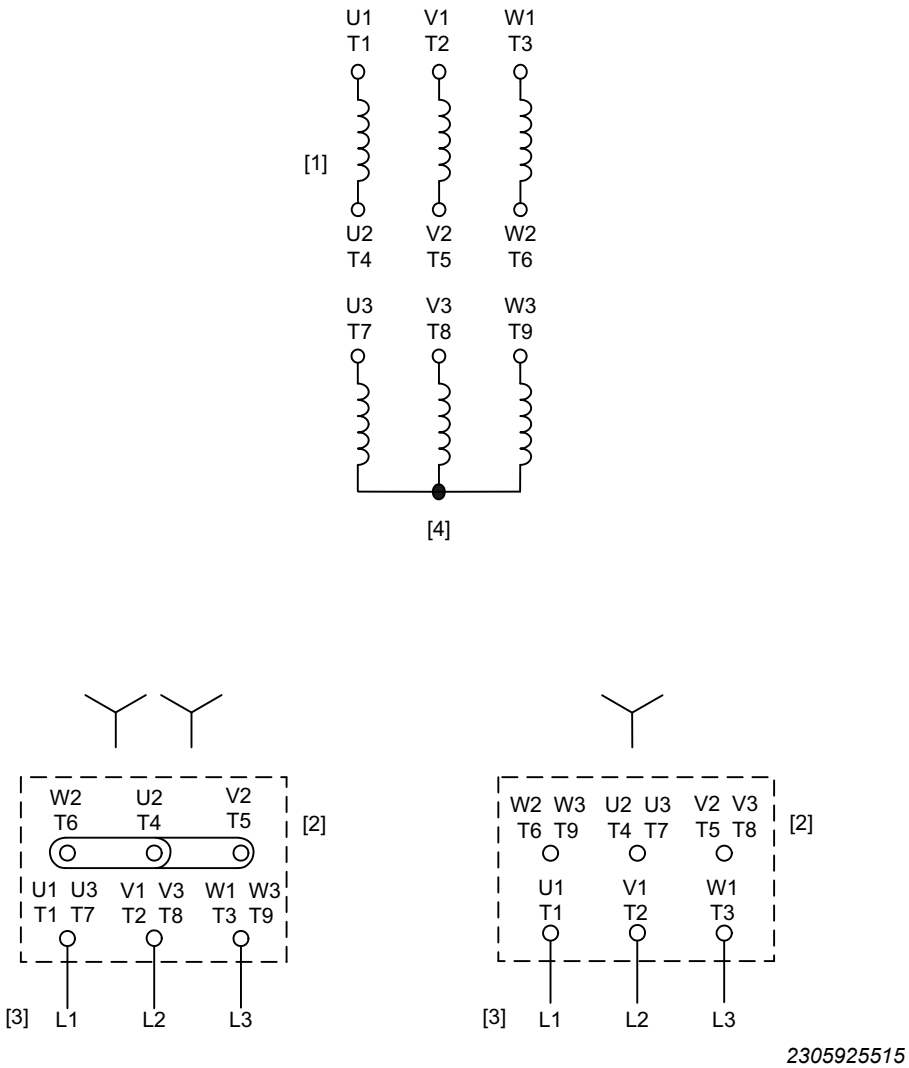
Direction of rotation reversal: Swap connection of 2 incoming cables, L1 – L2

### 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 ⅄ connection for high voltages and ⅄ ⅄ connection for low voltages.




[1] Motor winding
[2] Motor terminal board
[3] Incoming cables
[4] Star point connected in motor

Direction of rotation reversal: Swap connection of 2 incoming cables, L1 - L2

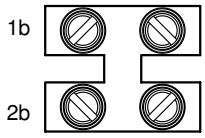
### 10.1.4 Motor protection with TF or TH for DR..71 – 280, DRN80 – 280

**TF/TH**

The following figures show the connection of motor protection with TF PTC thermistor sensors or TH bimetallic thermostats.

Either a two-pin connection terminal or a five-pin terminal strip is available for connecting to the trip switch.

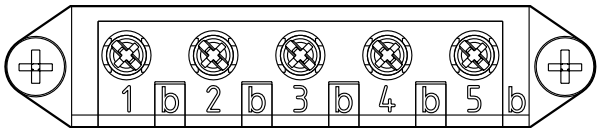
**Example: TF/TH to a two-pin terminal strip**




*9007199728684427*

| 1b | 2b |
|---|---|
| TF/TH | TF/TH |

**Example: 2xTF/TH to a five-pin terminal strip**

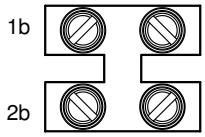



*18014398983427083*

| 1b | 2b | 3b | 4b | 5b |
|---|---|---|---|---|
| 1.TF/TH | 1.TF/TH | 2nd TF/TH | 2nd TF/TH | – |

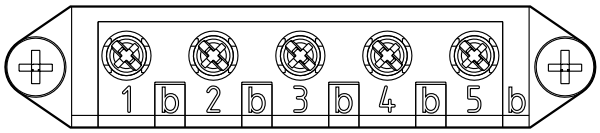
**2xTF/TH with anti-condensation heating**

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 |




*18014398983427083*

| 1b | 2b | 3b | 4b | 5b |
|---|---|---|---|---|
| 1.TF/TH | 1.TF/TH | 2nd TF/TH | 2nd TF/TH | – |

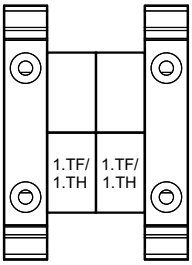
### 10.1.5 Motor protection using TF or TH with DR..315, DRN315

**TF/TH**

The following figures show the connection of motor protection with TF PTC thermistor sensors or TH bimetallic thermostats.

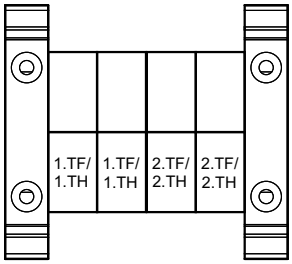
Depending on the version, an "x-pin" terminal strip is available for connection to the trip switch.

**Example: TF/TH to terminal strip**




*473405707*

**Example: 2xTF/TH to terminal strip**



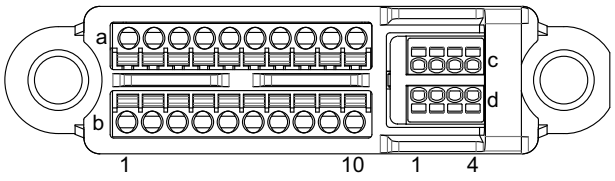

*473410187*

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### 10.1.6 EI7.B built-in encoder

**Connection via terminal strip**

The encoder is equipped with a 10-pin terminal strip for connection:




*9007207579353739*

## INFORMATION

The ranges 1a – 10a, 1c – 4c und 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[1] (BU) | 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[1] (BU) | 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[1] (BU) | n. c.[1] | n. c.[1] | n. c.[1] | c |
| n. c.[1] | n. c.[1] | EI72[1] (RD) | n. c.[1] | d |

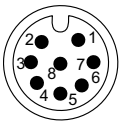
| Pin assignment EI7**1** B | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | |
| GND[1] (BU) | n. c.[1] | n. c.[1] | n. c.[1] | c |
| n. c.[1] | n. c.[1] | n. c.[1] | EI71[1] (RD) | d |

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<br>• Male<br> | Pin 1: $+U_B$<br>Pin 2: B<br>Pin 3: GND<br>Pin 4: A | • A coded<br>• Male<br> | Pin 1: $+U_B$<br>Pin 2: GND<br>Pin 3: A<br>Pin 4: $\overline{A}$<br>Pin 5: B<br>Pin 6: $\overline{B}$<br>Pin 7: TF1<br>Pin 8: TF1 |

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### 10.1.7 Brake control BGE; BG; BSG; BUR

BE brake

BGE, BG, BSG, BUR brake control;

Apply voltage to release the brake (see nameplate).

Contact rating of the brake control: AC3 in accordance with EN 60947-4-1.

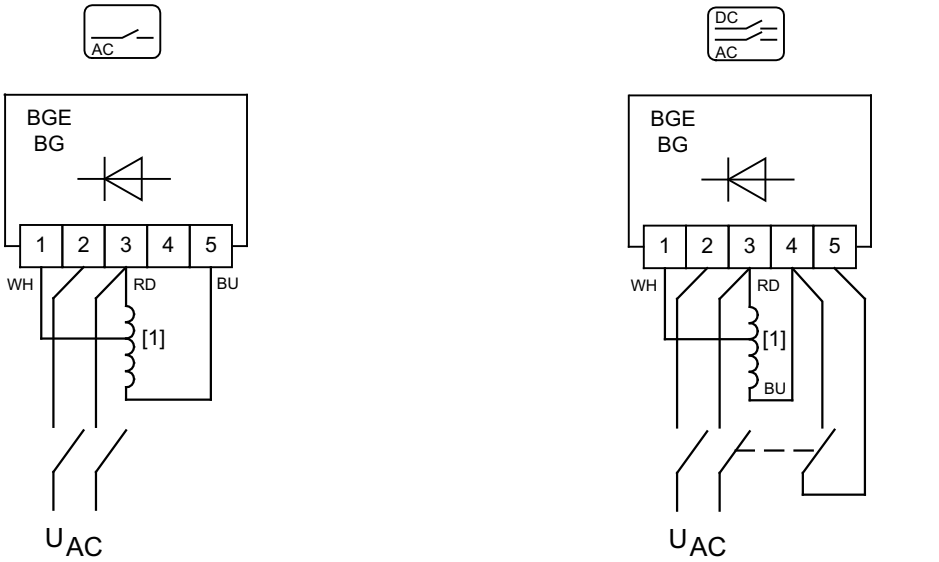
The voltage can be distributed as follows:

- Through a separate supply cable
- From the motor terminal board

**This does not apply to pole-changing and frequency-controlled motors.**

#### BG / BGE

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.

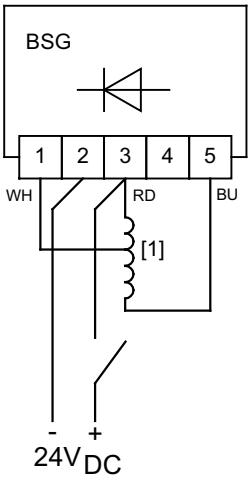



*242604811*

[1] Brake coil

### BSG

The following illustration shows the DC 24 V connection of the BSG control unit




*242606475*

[1] Brake coil

### BUR



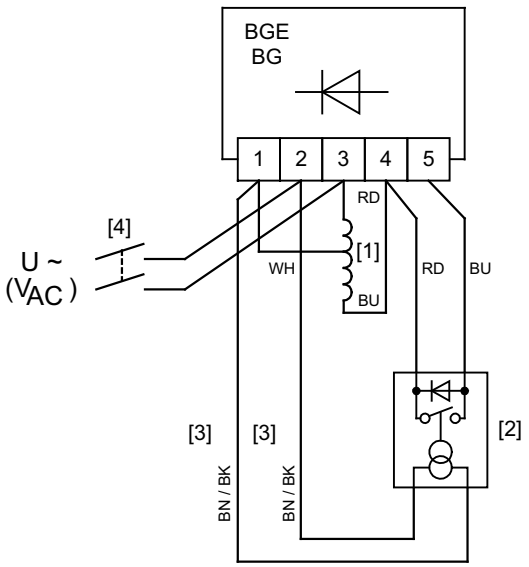
**⚠ WARNING**

Malfunction caused by incorrect connection for frequency operation.

Possible damage to the drive system.

- Do not connect the brake to the terminal board of the motor.

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

BE brake

BSR brake control

Brake voltage = Phase-to-neutral voltage

The white connecting leads 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 prior startup.

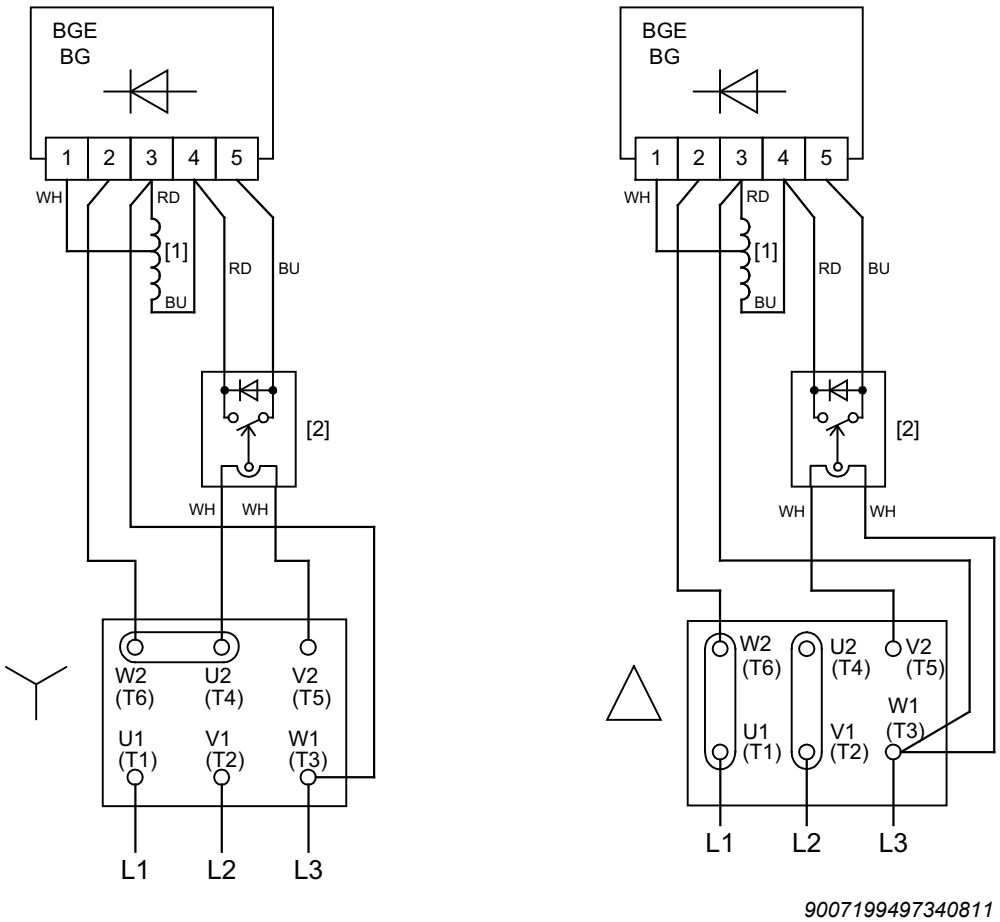
**Factory set to star in wiring diagram R13**

The following illustration shows the factory wiring for the BSR brake control

Example

Motor: AC 230 V / AC 400 V

Brake: AC 230 V




*9007199497340811*

[1] Brake coil
[2] SR11/15 current relay

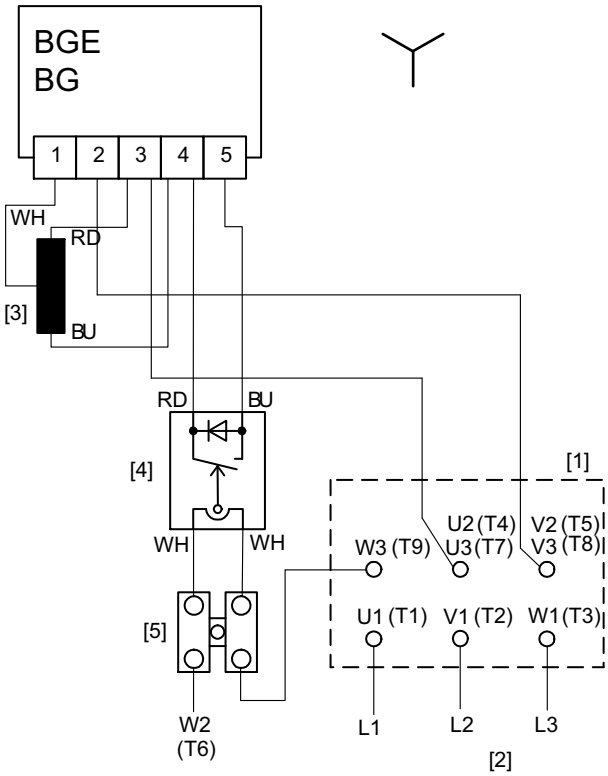
### Factory set to start in wiring diagram R76

The following illustration shows the factory wiring for the BSR brake control

Example

Motor: AC 230 V / AC 460 V

Brake: AC 230 V




*2319077003*

[1] Motor terminal board
[2] Incoming cables
[3] Brake coil
[4] SR11/15 current relay
[5] Auxiliary terminal

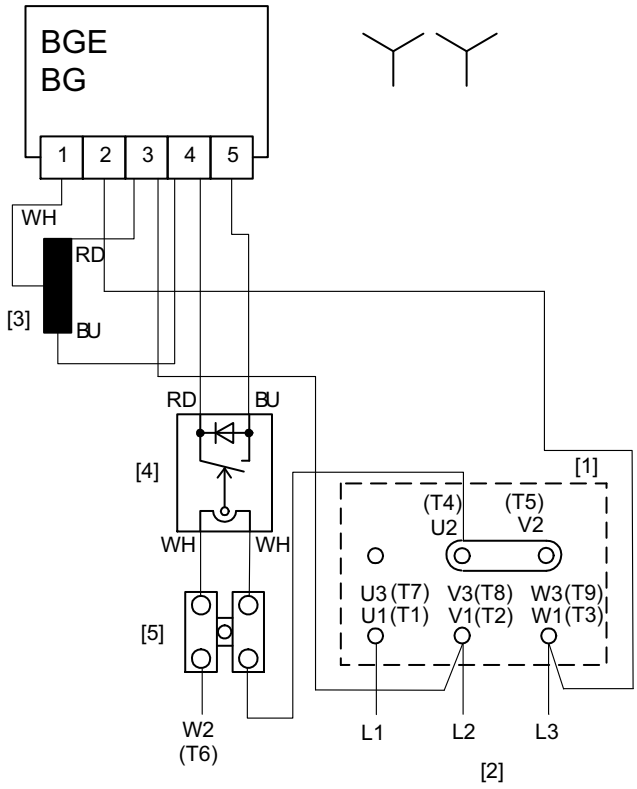
**Alternative connection: Factory set to double-star with wiring diagram R76**

The following illustration shows the factory wiring for the BSR brake control

Example

Motor: AC 230 V / AC 460 V

Brake: AC 230 V




*2337824139*

[1] Motor terminal board
[2] Incoming cables
[3] Brake coil
[4] SR11/15 current relay
[5] Auxiliary terminal

### 10.1.9 BMP3.1 brake control in the terminal box

Brake BE120, BE122

BMP3.1 brake control

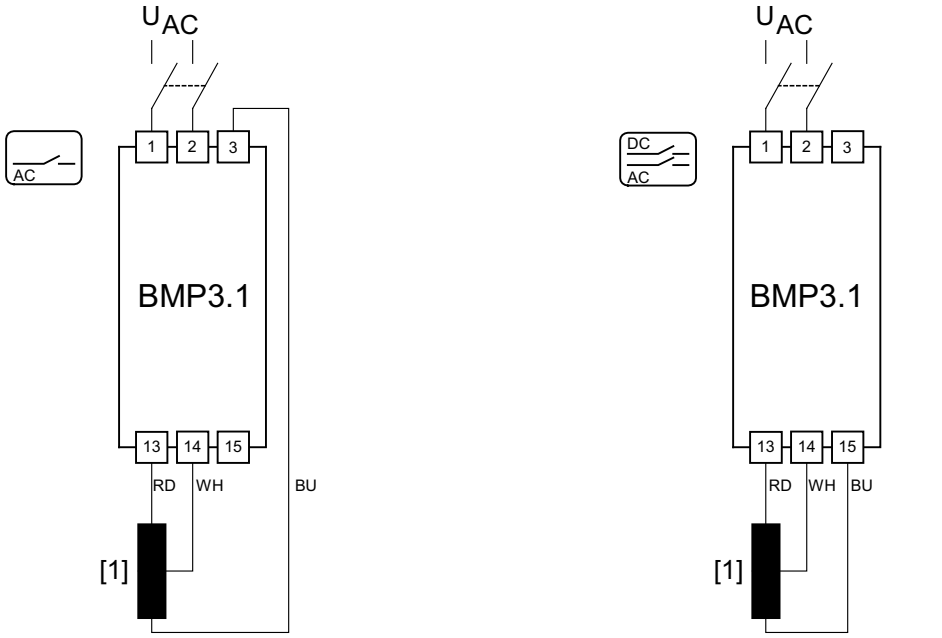
Apply voltage to release the brake (see nameplate).

Contact rating of the brake control: AC3 in accordance with EN 60947-4-1.

Separate supply cables are required for the voltage supply.

**BMP3.1**

The following illustration shows the wiring for the BMP3.1 brake rectifier for the AC-side shut-off as well as the DC and AC-side shutoff.



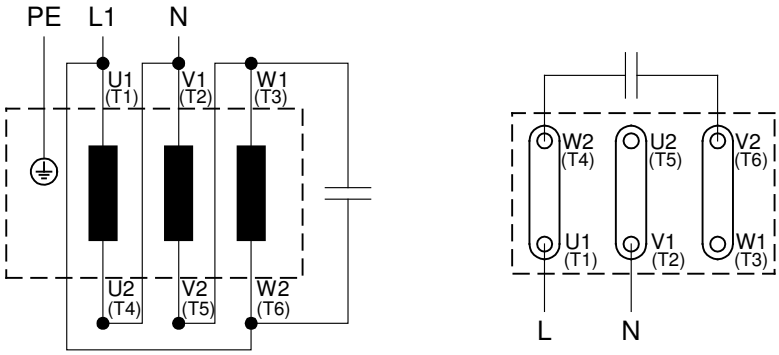

*365750411*

[1] Brake coil

### 10.1.10 V forced cooling fan

#### Delta-Steinmetz

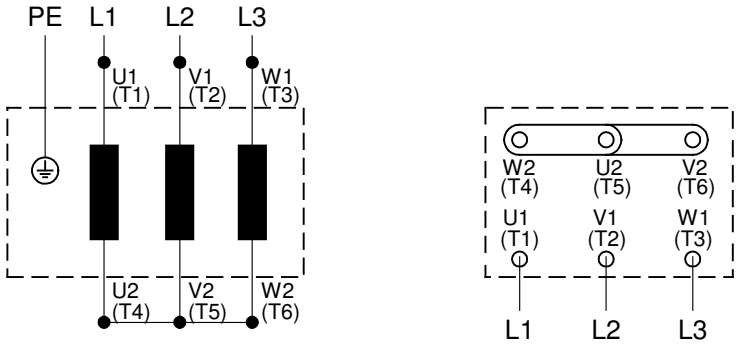
The following figure shows the wiring of the V forced cooling fan for delta-Steinmetz connection for 1-phase operation




*9007199778089483*

#### Star connection

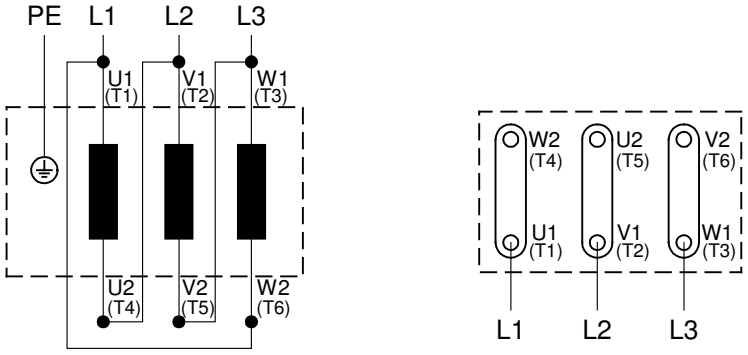
The following figure shows the wiring of the V forced cooling fan for star connection.




*9007199778091147*

#### Delta connection

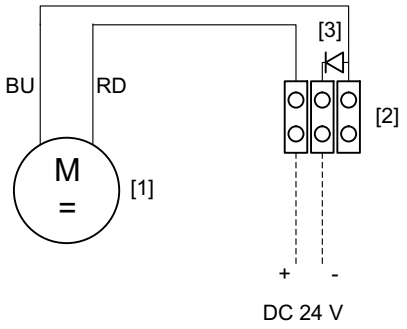
The following figure shows the wiring of the V forced cooling fan for delta connection.




*18014399032833803*

### 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

A Factory
B Customer wiring

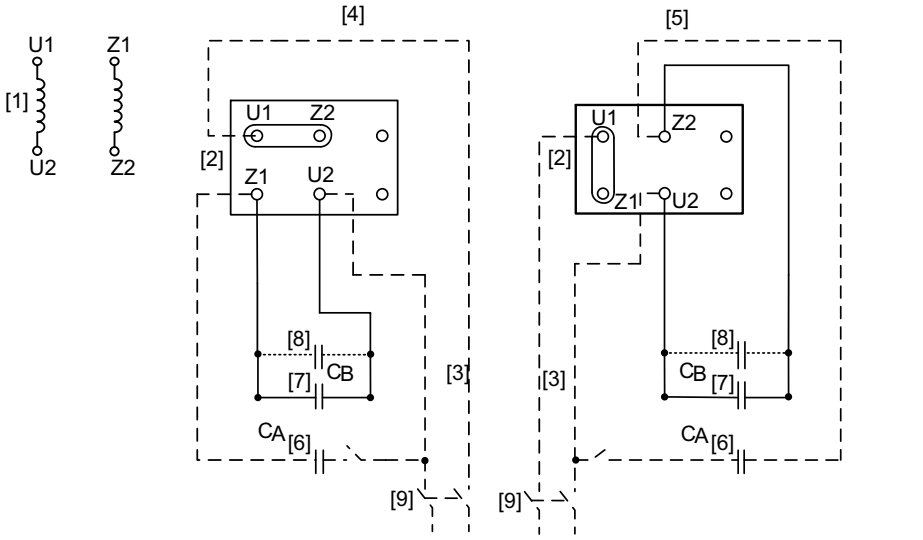
## INFORMATION

Observe the polarity.

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### 10.1.11 DRK... single-phase motor

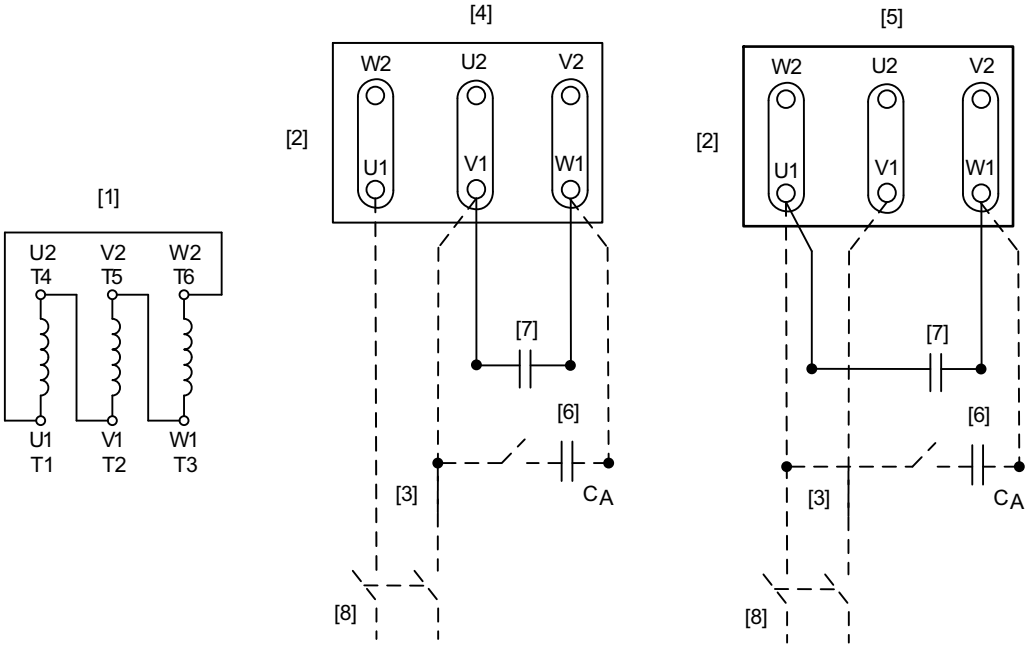
**ER10 wiring diagram**




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

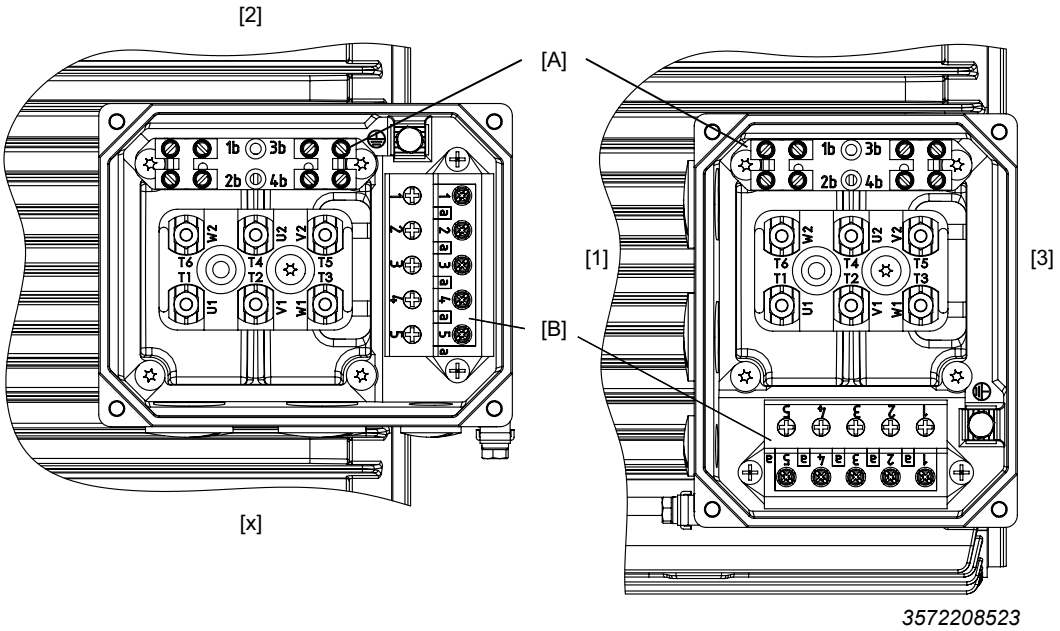
| | | | |
|---|---|---|---|
| [1] | Motor winding | [5] | CW rotation, connected at factory |
| [2] | Motor terminal board | [6] | Starting capacitor, switchable |
| [3] | Incoming cables | [7] | Running capacitor |
| [4] | Counterclockwise rotation | [8] | All-pole power switch |

## 10.2 Auxiliary terminals 1 and 2

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




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 system 2 | [A] | Auxiliary terminal 1 |
| [3] | Terminal box system 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.

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# 11 Address list

| | | | |
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| **Algeria** | | | |
| Sales | Algiers | REDUCOM Sarl<br>16, rue des Frères Zaghnoune<br>Bellevue<br>16200 El Harrach Alger | Tel. +213 21 8214-91<br>Fax +213 21 8222-84<br>http://www.reducom-dz.com<br>info@reducom-dz.com |
| **Argentina** | | | |
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| | Sydney | SEW-EURODRIVE PTY. LTD.<br>9, Sleigh Place, Wetherill Park<br>New South Wales, 2164 | Tel. +61 2 9725-9900<br>Fax +61 2 9725-9905<br>enquires@sew-eurodrive.com.au |
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| | Vancouver | SEW-EURODRIVE CO. OF CANADA LTD.<br>Tilbury Industrial Park<br>7188 Honeyman Street<br>Delta, BC V4G 1G1 | Tel. +1 604 946-5535<br>Fax +1 604 946-2513<br>b.wake@sew-eurodrive.ca |
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| Service Competence Center | Mechanics / Mechatronics | SEW-EURODRIVE GmbH & Co KG<br>Ernst-Blickle-Straße 1<br>D-76676 Graben-Neudorf | Tel. +49 7251 75-1710<br>Fax +49 7251 75-1711<br>scc-mechanik@sew-eurodrive.de |
| | Electronics | SEW-EURODRIVE GmbH & Co KG<br>Ernst-Blickle-Straße 42<br>D-76646 Bruchsal | Tel. +49 7251 75-1780<br>Fax +49 7251 75-1769<br>scc-elektronik@sew-eurodrive.de |
| Drive Technology Center | North | SEW-EURODRIVE GmbH & Co KG<br>Alte Ricklinger Straße 40-42<br>D-30823 Garbsen (Hannover) | Tel. +49 5137 8798-30<br>Fax +49 5137 8798-55<br>dtc-nord@sew-eurodrive.de |
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| Drive Center | Berlin | SEW-EURODRIVE GmbH & Co KG<br>Alexander-Meißner-Straße 44<br>D-12526 Berlin | Tel. +49 306331131-30<br>Fax +49 306331131-36<br>dc-berlin@sew-eurodrive.de |
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| | Saarland | SEW-EURODRIVE GmbH & Co KG<br>Gottlieb-Daimler-Straße 4<br>D-66773 Schwalbach Saar – Hülzweiler | Tel. +49 6831 48946 10<br>Fax +49 6831 48946 13<br>dc-saarland@sew-eurodrive.de |
| | Ulm | SEW-EURODRIVE GmbH & Co KG<br>Dieselstraße 18<br>D-89160 Dornstadt | Tel. +49 7348 9885-0<br>Fax +49 7348 9885-90<br>dc-ulm@sew-eurodrive.de |
| | Würzburg | SEW-EURODRIVE GmbH & Co KG<br>Nürnbergerstraße 118<br>D-97076 Würzburg-Lengfeld | Tel. +49 931 27886-60<br>Fax +49 931 27886-66<br>dc-wuerzburg@sew-eurodrive.de |
| Drive Service Hotline / 24 Hour Service | | | +49 800 SEWHELP<br>+49 800 7394357 |

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| **Great Britain** | | | |
| Assembly<br>Sales<br>Service | Normanton | SEW-EURODRIVE Ltd.<br>DeVilliers Way<br>Trident Park<br>Normanton<br>West Yorkshire<br>WF6 1GX | Tel. +44 1924 893-855<br>Fax +44 1924 893-702<br>http://www.sew-eurodrive.co.uk<br>info@sew-eurodrive.co.uk |
| | Drive Service Hotline / 24 Hour Service | | Tel. 01924 896911 |
| **Greece** | | | |
| Sales | Athens | Christ. Boznos & Son S.A.<br>12, K. Mavromichali Street<br>P.O. Box 80136<br>GR-18545 Piraeus | Tel. +30 2 1042 251-34<br>Fax +30 2 1042 251-59<br>http://www.boznos.gr<br>info@boznos.gr |
| **Hungary** | | | |
| Sales<br>Service | Budapest | SEW-EURODRIVE Kft.<br>Csillaghegyí út 13.<br>H-1037 Budapest | Tel. +36 1 437 06-58<br>Fax +36 1 437 06-50<br>http://www.sew-eurodrive.hu<br>office@sew-eurodrive.hu |
| **Iceland** | | | |
| Sales | Reykjavik | Varma & Vélaverk ehf.<br>Knarrarvogi 4<br>IS-104 Reykjavík | Tel. +354 585 1070<br>Fax +354 585)1071<br>http://www.varmaverk.is<br>vov@vov.is |
| **India** | | | |
| Registered Office<br>Assembly<br>Sales<br>Service | Vadodara | SEW-EURODRIVE India Private Limited<br>Plot No. 4, GIDC<br>POR Ramangamdi • Vadodara - 391 243<br>Gujarat | Tel. +91 265 3045200<br>Fax +91 265 3045300<br>http://www.seweurodriveindia.com<br>salesvadodara@seweurodriveindia.com |
| Assembly<br>Sales<br>Service | Chennai | SEW-EURODRIVE India Private Limited<br>Plot No. K3/1, Sipcot Industrial Park Phase II<br>Mambakkam Village<br>Sriperumbudur - 602105<br>Kancheepuram Dist, Tamil Nadu | Tel. +91 44 37188888<br>Fax +91 44 37188811<br>saleschennai@seweurodriveindia.com |
| | Pune | SEW-EURODRIVE India Private Limited<br>Plant: Plot No. D236/1,<br>Chakan Industrial Area Phase- II,<br>Warale, Tal- Khed,<br>Pune-410501, Maharashtra | Tel. +91 21 35301400<br>salespune@seweurodriveindia.com |
| **Indonesia** | | | |
| Sales | Jakarta | PT. Cahaya Sukses Abadi<br>Komplek Rukan Puri Mutiara Blok A no 99,<br>Sunter<br>Jakarta 14350 | Tel. +62 21 65310599<br>Fax +62 21 65310600<br>csajkt@cbn.net.id |
| | Jakarta | PT. Agrindo Putra Lestari<br>JL.Pantai Indah Selatan, Komplek Sentra Industri Terpadu, Pantai indah Kapuk Tahap III, Blok E No. 27<br>Jakarta 14470 | Tel. +62 21 2921-8899<br>Fax +62 21 2921-8988<br>aplindo@indosat.net.id<br>http://www.aplindo.com |
| | Medan | PT. Serumpun Indah Lestari<br>Jl.Pulau Solor no. 8, Kawasan Industri Medan II<br>Medan 20252 | Tel. +62 61 687 1221<br>Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041<br>sil@serumpunindah.com<br>serumpunindah@yahoo.com<br>http://www.serumpunindah.com |
| | Surabaya | PT. TRIAGRI JAYA ABADI<br>Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11<br>Surabaya 60111 | Tel. +62 31 5990128<br>Fax +62 31 5962666<br>sales@triagri.co.id<br>http://www.triagri.co.id |
| | Surabaya | CV. Multi Mas<br>Jl. Raden Saleh 43A Kav. 18<br>Surabaya 60174 | Tel. +62 31 5458589<br>Fax +62 31 5317220<br>sianhwa@sby.centrin.net.id<br>http://www.cvmultimas.com |

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| **Ireland** | | | |
| Sales<br>Service | Dublin | Alperton Engineering Ltd.<br>48 Moyle Road<br>Dublin Industrial Estate<br>Glasnevin, Dublin 11 | Tel. +353 1 830-6277<br>Fax +353 1 830-6458<br>http://www.alperton.ie<br>info@alperton.ie |
| **Israel** | | | |
| Sales | Tel Aviv | Liraz Handasa Ltd.<br>Ahofer Str 34B / 228<br>58858 Holon | Tel. +972 3 5599511<br>Fax +972 3 5599512<br>http://www.liraz-handasa.co.il<br>office@liraz-handasa.co.il |
| **Italy** | | | |
| Assembly<br>Sales<br>Service | Solaro | SEW-EURODRIVE di R. Blickle & Co.s.a.s.<br>Via Bernini,14<br>I-20020 Solaro (Milano) | Tel. +39 02 96 9801<br>Fax +39 02 96 79 97 81<br>http://www.sew-eurodrive.it<br>sewit@sew-eurodrive.it |
| **Ivory Coast** | | | |
| Sales | Abidjan | SEW-EURODRIVE SARL<br>Ivory Coast<br>Rue des Pècheurs, Zone 3<br>26 BP 916 Abidjan 26 | Tel. +225 21 21 81 05<br>Fax +225 21 25 30 47<br>info@sew-eurodrive.ci<br>http://www.sew-eurodrive.ci |
| **Japan** | | | |
| Assembly<br>Sales<br>Service | Iwata | SEW-EURODRIVE JAPAN CO., LTD<br>250-1, Shimoman-no,<br>Iwata<br>Shizuoka 438-0818 | Tel. +81 538 373811<br>Fax +81 538 373814<br>http://www.sew-eurodrive.co.jp<br>sewjapan@sew-eurodrive.co.jp<br>hamamatsu@sew-eurodrive.co.jp |
| **Kazakhstan** | | | |
| Sales | Almaty | SEW-EURODRIVE LLP<br>291-291A, Tole bi street<br>050031, Almaty | Tel. +7 (727) 350 5156<br>Fax +7 (727) 350 5156<br>http://www.sew-eurodrive.kz<br>sew@sew-eurodrive.kz |
| | Tashkent | SEW-EURODRIVE LLP<br>Representative office in Uzbekistan<br>96A, Sharaf Rashidov street,<br>Tashkent, 100084 | Tel. +998 71 2359411<br>Fax +998 71 2359412<br>http://www.sew-eurodrive.uz<br>sew@sew-eurodrive.uz |
| | Ulaanbaatar | SEW-EURODRIVE LLP<br>Representative office in Mongolia<br>Suite 407, Tushig Centre<br>Seoul street 23,<br>Sukhbaatar district,<br>Ulaanbaatar 14250 | Tel. +976-77109997<br>Fax +976-77109997<br>http://www.sew-eurodrive.mn<br>sew@sew-eurodrive.mn |
| **Kenya** | | | |
| is supported by Tanzania. | | | |
| **Latvia** | | | |
| Sales | Riga | SIA Alas-Kuul<br>Katlakalna 11C<br>LV-1073 Riga | Tel. +371 6 7139253<br>Fax +371 6 7139386<br>http://www.alas-kuul.lv<br>info@alas-kuul.com |
| **Lebanon** | | | |
| Sales Lebanon | Beirut | Gabriel Acar & Fils sarl<br>B. P. 80484<br>Bourj Hammoud, Beirut | Tel. +961 1 510 532<br>Fax +961 1 494 971<br>ssacar@inco.com.lb |
| Sales / Jordan / Kuwait / Saudi Arabia / Syria | Beirut | Middle East Drives S.A.L. (offshore)<br>Sin El Fil.<br>B. P. 55-378<br>Beirut | Tel. +961 1 494 786<br>Fax +961 1 494 971<br>http://www.medrives.com<br>info@medrives.com |

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| **Lithuania** | | | |
| Sales | Alytus | UAB Irseva<br>Statybininku 106C<br>LT-63431 Alytus | Tel. +370 315 79204<br>Fax +370 315 56175<br>http://www.irseva.lt<br>irmantas@irseva.lt |
| **Luxembourg** | | | |
| Assembly<br>Sales<br>Service | Brussels | SEW-EURODRIVE n.v./s.a.<br>Researchpark Haasrode 1060<br>Evenementenlaan 7<br>BE-3001 Leuven | Tel. +32 16 386-311<br>Fax +32 16 386-336<br>http://www.sew-eurodrive.lu<br>info@sew-eurodrive.be |
| **Macedonia** | | | |
| Sales | Skopje | Boznos DOOEL<br>Dime Anicin 2A/7A<br>1000 Skopje | Tel. +389 23256553<br>Fax +389 23256554<br>http://www.boznos.mk |
| **Madagascar** | | | |
| Sales | Antananarivo | Ocean Trade<br>BP21bis. Andraharo<br>Antananarivo<br>101 Madagascar | Tel. +261 20 2330303<br>Fax +261 20 2330330<br>oceantrabp@moov.mg |
| **Malaysia** | | | |
| Assembly<br>Sales<br>Service | Johor | SEW-EURODRIVE SDN BHD<br>No. 95, Jalan Seroja 39, Taman Johor Jaya<br>81000 Johor Bahru, Johor<br>West Malaysia | Tel. +60 7 3549409<br>Fax +60 7 3541404<br>sales@sew-eurodrive.com.my |
| **Mexiko** | | | |
| Assembly<br>Sales<br>Service | Quéretaro | SEW-EURODRIVE MEXICO SA DE CV<br>SEM-981118-M93<br>Tequisquiapan No. 102<br>Parque Industrial Quéretaro<br>C.P. 76220<br>Quéretaro, México | Tel. +52 442 1030-300<br>Fax +52 442 1030-301<br>http://www.sew-eurodrive.com.mx<br>scmexico@seweurodrive.com.mx |
| **Mongolia** | | | |
| Technical Office | Ulaanbaatar | SEW-EURODRIVE LLP<br>Representative office in Mongolia<br>Suite 407, Tushig Centre<br>Seoul street 23,<br>Sukhbaatar district,<br>Ulaanbaatar 14250 | Tel. +976-77109997<br>Fax +976-77109997<br>http://www.sew-eurodrive.mn<br>sew@sew-eurodrive.mn |
| **Morocco** | | | |
| Sales<br>Service | Mohammedia | SEW-EURODRIVE SARL<br>2 bis, Rue Al Jahid<br>28810 Mohammedia | Tel. +212 523 32 27 80/81<br>Fax +212 523 32 27 89<br>http://www.sew-eurodrive.ma<br>sew@sew-eurodrive.ma |
| **Namibia** | | | |
| Sales | Swakopmund | DB Mining & Industrial Services<br>Einstein Street<br>Strauss Industrial Park<br>Unit1<br>Swakopmund | Tel. +264 64 462 738<br>Fax +264 64 462 734<br>anton@dbminingnam.com |
| **Netherlands** | | | |
| Assembly<br>Sales<br>Service | Rotterdam | SEW-EURODRIVE B.V.<br>Industrieweg 175<br>NL-3044 AS Rotterdam<br>Postbus 10085<br>NL-3004 AB Rotterdam | Tel. +31 10 4463-700<br>Fax +31 10 4155-552<br>Service: 0800-SEWHELP<br>http://www.sew-eurodrive.nl<br>info@sew-eurodrive.nl |
| **New Zealand** | | | |
| Assembly<br>Sales<br>Service | Auckland | SEW-EURODRIVE NEW ZEALAND LTD.<br>P.O. Box 58-428<br>82 Greenmount drive<br>East Tamaki Auckland | Tel. +64 9 2745627<br>Fax +64 9 2740165<br>http://www.sew-eurodrive.co.nz<br>sales@sew-eurodrive.co.nz |

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| **New Zealand** | | | |
| | Christchurch | SEW-EURODRIVE NEW ZEALAND LTD.<br>30 Lodestar Avenue, Wigram<br>Christchurch | Tel. +64 3 384-6251<br>Fax +64 3 384-6455<br>sales@sew-eurodrive.co.nz |
| **Nigeria** | | | |
| Sales | Lagos | EISNL Engineering Solutions and Drives Ltd<br>Plot 9, Block A, Ikeja Industrial Estate ( Ogba Scheme)<br>Adeniyi Jones St. End<br>Off ACME Road, Ogba, Ikeja, Lagos | Tel. +234 1 217 4332<br>http://www.eisnl.com<br>team.sew@eisnl.com |
| **Norway** | | | |
| Assembly<br>Sales<br>Service | Moss | SEW-EURODRIVE A/S<br>Solgaard skog 71<br>N-1599 Moss | Tel. +47 69 24 10 20<br>Fax +47 69 24 10 40<br>http://www.sew-eurodrive.no<br>sew@sew-eurodrive.no |
| **Pakistan** | | | |
| Sales | Karachi | Industrial Power Drives<br>Al-Fatah Chamber A/3, 1st Floor Central Commercial Area,<br>Sultan Ahmed Shah Road, Block 7/8,<br>Karachi | Tel. +92 21 452 9369<br>Fax +92-21-454 7365<br>seweurodrive@cyber.net.pk |
| **Paraguay** | | | |
| Sales | Fernando de la Mora | SEW-EURODRIVE PARAGUAY S.R.L<br>De la Victoria 112, Esquina nueva Asunción<br>Departamento Central<br>Fernando de la Mora, Barrio Bernardino | Tel. +595 991 519695<br>Fax +595 21 3285539<br>sewpy@sew-eurodrive.com.py |
| **Peru** | | | |
| Assembly<br>Sales<br>Service | Lima | SEW EURODRIVE DEL PERU S.A.C.<br>Los Calderos, 120-124<br>Urbanizacion Industrial Vulcano, ATE, Lima | Tel. +51 1 3495280<br>Fax +51 1 3493002<br>http://www.sew-eurodrive.com.pe<br>sewperu@sew-eurodrive.com.pe |
| **Philippines** | | | |
| Sales | Makati | P.T. Cerna Corporation<br>4137 Ponte St., Brgy. Sta. Cruz<br>Makati City 1205 | Tel. +63 2 519 6214<br>Fax +63 2 890 2802<br>mech_drive_sys@ptcerna.com<br>http://www.ptcerna.com |
| **Poland** | | | |
| Assembly<br>Sales<br>Service | Łódź | SEW-EURODRIVE Polska Sp.z.o.o.<br>ul. Techniczna 5<br>PL-92-518 Łódź | Tel. +48 42 293 00 00<br>Fax +48 42 293 00 49<br>http://www.sew-eurodrive.pl<br>sew@sew-eurodrive.pl |
| | Service | Tel. +48 42 293 0030<br>Fax +48 42 293 0043 | 24 Hour Service<br>Tel. +48 602 739 739 (+48 602 SEW SEW)<br>serwis@sew-eurodrive.pl |
| **Portugal** | | | |
| Assembly<br>Sales<br>Service | Coimbra | SEW-EURODRIVE, LDA.<br>Av. da Fonte Nova, n.º 86<br>P-3050-379 Mealhada | Tel. +351 231 20 9670<br>Fax +351 231 20 3685<br>http://www.sew-eurodrive.pt<br>infosew@sew-eurodrive.pt |
| **Romania** | | | |
| Sales<br>Service | Bucharest | Sialco Trading SRL<br>str. Brazilia nr. 36<br>011783 Bucuresti | Tel. +40 21 230-1328<br>Fax +40 21 230-7170<br>sialco@sialco.ro |
| **Russia** | | | |
| Assembly<br>Sales<br>Service | St. Petersburg | ZAO SEW-EURODRIVE<br>P.O. Box 36<br>RUS-195220 St. Petersburg | Tel. +7 812 3332522 / +7 812 5357142<br>Fax +7 812 3332523<br>http://www.sew-eurodrive.ru<br>sew@sew-eurodrive.ru |

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**Sambia**

is supported by South Africa.

**Senegal**

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|---|---|---|---|
| Sales | Dakar | SENEMECA<br>Mécanique Générale<br>Km 8, Route de Rufisque<br>B.P. 3251, Dakar | Tel. +221 338 494 770<br>Fax +221 338 494 771<br>http://www.senemeca.com<br>senemeca@senemeca.sn |

**Serbia**

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|---|---|---|---|
| Sales | Belgrade | DIPAR d.o.o.<br>Ustanicka 128a<br>PC Košum, IV floor<br>SRB-11000 Beograd | Tel. +381 11 347 3244 / +381 11 288 0393<br>Fax +381 11 347 1337<br>office@dipar.rs |

**Singapore**

| | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Singapore | SEW-EURODRIVE PTE. LTD.<br>No 9, Tuas Drive 2<br>Jurong Industrial Estate<br>Singapore 638644 | Tel. +65 68621701<br>Fax +65 68612827<br>http://www.sew-eurodrive.com.sg<br>sewsingapore@sew-eurodrive.com |

**Slovakia**

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|---|---|---|---|
| Sales | Bratislava | SEW-Eurodrive SK s.r.o.<br>Rybničná 40<br>SK-831 06 Bratislava | Tel.+421 2 33595 202, 217, 201<br>Fax +421 2 33595 200<br>http://www.sew-eurodrive.sk<br>sew@sew-eurodrive.sk |
| | Košice | SEW-Eurodrive SK s.r.o.<br>Slovenská ulica 26<br>SK-040 01 Košice | Tel. +421 55 671 2245<br>Fax +421 55 671 2254<br>Mobile +421 907 671 976<br>sew@sew-eurodrive.sk |

**Slovenia**

| | | | |
|---|---|---|---|
| Sales<br>Service | Celje | Pakman - Pogonska Tehnika d.o.o.<br>UI. XIV. divizije 14<br>SLO - 3000 Celje | Tel. +386 3 490 83-20<br>Fax +386 3 490 83-21<br>pakman@siol.net |

**South Africa**

| | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Johannesburg | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>Eurodrive House<br>Cnr. Adcock Ingram and Aerodrome Roads<br>Aeroton Ext. 2<br>Johannesburg 2013<br>P.O.Box 90004<br>Bertsham 2013 | Tel. +27 11 248-7000<br>Fax +27 11 248-7289<br>http://www.sew.co.za<br>info@sew.co.za |
| | Cape Town | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>Rainbow Park<br>Cnr. Racecourse & Omuramba Road<br>Montague Gardens<br>Cape Town<br>P.O.Box 36556<br>Chempet 7442 | Tel. +27 21 552-9820<br>Fax +27 21 552-9830<br>Telex 576 062<br>bgriffiths@sew.co.za |
| | Durban | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>48 Prospecton Road<br>Isipingo<br>Durban<br>P.O. Box 10433, Ashwood 3605 | Tel. +27 31 902 3815<br>Fax +27 31 902 3826<br>cdejager@sew.co.za |
| | Nelspruit | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>7 Christie Crescent<br>Vintonia<br>P.O.Box 1942<br>Nelspruit 1200 | Tel. +27 13 752-8007<br>Fax +27 13 752-8008<br>robermeyer@sew.co.za |

**South Korea**

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

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| **South Korea** | | | |
| | Busan | SEW-EURODRIVE KOREA CO., LTD.<br>28, Noksansandan 262-ro 50beon-gil,<br>Gangseo-gu,<br>Busan, Zip 618-820 | Tel. +82 51 832-0204<br>Fax +82 51 832-0230 |
| **Spain** | | | |
| Assembly<br>Sales<br>Service | Bilbao | SEW-EURODRIVE ESPAÑA, S.L.<br>Parque Tecnológico, Edificio, 302<br>E-48170 Zamudio (Vizcaya) | Tel. +34 94 43184-70<br>Fax +34 94 43184-71<br>http://www.sew-eurodrive.es<br>sew.spain@sew-eurodrive.es |
| **Sri Lanka** | | | |
| Sales | Colombo | SM International (Pte) Ltd<br>254, Galle Raod<br>Colombo 4, Sri Lanka | Tel. +94 1 2584887<br>Fax +94 1 2582981 |
| **Swaziland** | | | |
| Sales | Manzini | C G Trading Co. (Pty) Ltd<br>PO Box 2960<br>Manzini M200 | Tel. +268 2 518 6343<br>Fax +268 2 518 5033<br>engineering@cgtrading.co.sz |
| **Sweden** | | | |
| Assembly<br>Sales<br>Service | Jönköping | SEW-EURODRIVE AB<br>Gnejsvägen 6-8<br>S-55 303 Jönköping<br>Box 3100 S-55 003 Jönköping | Tel. +46 36 34 42 00<br>Fax +46 36 34 42 80<br>http://www.sew-eurodrive.se<br>jonkoping@sew.se |
| **Switzerland** | | | |
| Assembly<br>Sales<br>Service | Basel | Alfred Imhof A.G.<br>Jurastrasse 10<br>CH-4142 Münchenstein bei Basel | Tel. +41 61 417 1717<br>Fax +41 61 417 1700<br>http://www.imhof-sew.ch<br>info@imhof-sew.ch |
| **Taiwan** | | | |
| Sales | Taipei | Ting Shou Trading Co., Ltd.<br>6F-3, No. 267, Sec. 2<br>Tung Huw S. Road<br>Taipei | Tel. +886 2 27383535<br>Fax +886 2 27368268<br>Telex 27 245<br>sewtwn@ms63.hinet.net<br>http://www.tingshou.com.tw |
| | Nan Tou | Ting Shou Trading Co., Ltd.<br>No. 55 Kung Yeh N. Road<br>Industrial District<br>Nan Tou 540 | Tel. +886 49 255353<br>Fax +886 49 257878<br>sewtwn@ms63.hinet.net<br>http://www.tingshou.com.tw |
| **Tanzania** | | | |
| Sales | Daressalam | SEW-EURODRIVE PTY LIMITED TANZANIA<br>Plot 52, Regent Estate<br>PO Box 106274<br>Dar Es Salaam | Tel. +255 0 22 277 5780<br>Fax +255 0 22 277 5788<br>http://www.sew-eurodrive.co.tz<br>central.mailbox@sew.co.tz |
| **Thailand** | | | |
| Assembly<br>Sales<br>Service | Chonburi | SEW-EURODRIVE (Thailand) Ltd.<br>700/456, Moo.7, Donhuaroh<br>Muang<br>Chonburi 20000 | Tel. +66 38 454281<br>Fax +66 38 454288<br>sewthailand@sew-eurodrive.com |
| **Tunisia** | | | |
| Sales | Tunis | T. M.S. Technic Marketing Service<br>Zone Industrielle Mghira 2<br>Lot No. 39<br>2082 Fouchana | Tel. +216 79 40 88 77<br>Fax +216 79 40 88 66<br>http://www.tms.com.tn<br>tms@tms.com.tn |
| **Turkey** | | | |
| Assembly<br>Sales<br>Service | Kocaeli-Gebze | SEW-EURODRİVE Hareket<br>Sistemleri San. Ve TIC. Ltd. Sti<br>Gebze Organize Sanayi Böl. 400 Sok No. 401<br>41480 Gebze Kocaeli | Tel. +90 262 9991000 04<br>Fax +90 262 9991009<br>http://www.sew-eurodrive.com.tr<br>sew@sew-eurodrive.com.tr |

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| **Ukraine** | | | |
| Assembly<br>Sales<br>Service | Dnipropetrovsk | ООО «СЕВ-Евродрайв»<br>ул.Рабочая, 23-В, офис 409<br>49008 Днепропетровск | Tel. +380 56 370 3211<br>Fax +380 56 372 2078<br>http://www.sew-eurodrive.ua<br>sew@sew-eurodrive.ua |
| **United Arab Emirates** | | | |
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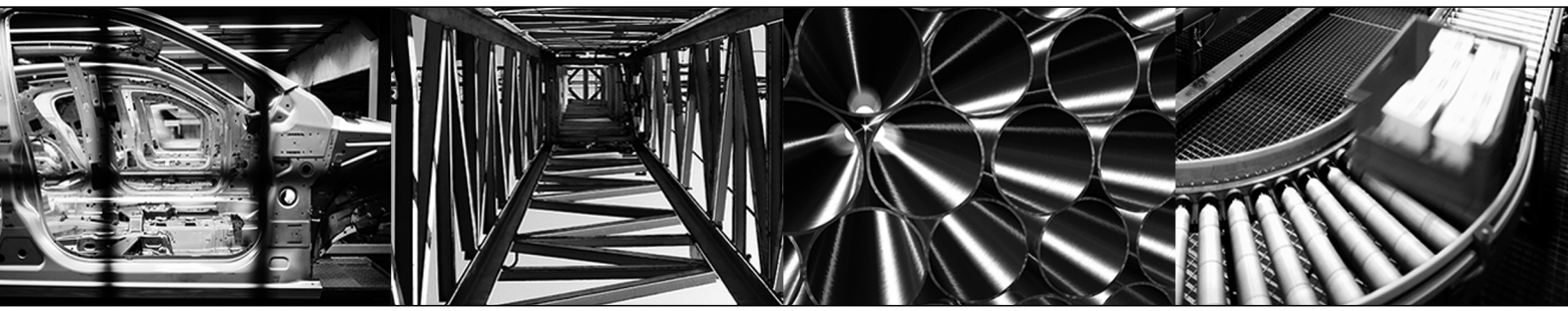
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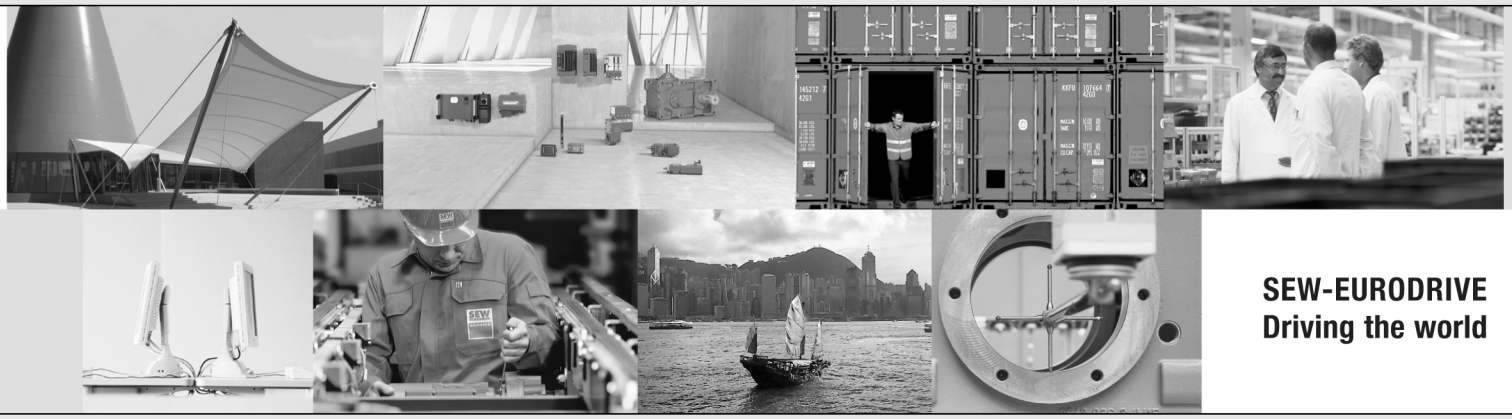
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